

EUROPEAN ASSOCIATION OF PROFESSORS EMERITI



The Capital of Knowledge of Emeriti in Action

**Proceedings
of the Second International Congress**

April 28-30, 2022, Naples, Italy

Edited by

Natale Gaspare De Santo, Vincenzo Bonavita, Luigi Campanella,
Malcolm Phillips, Dennis V. Cokkinos

SOCIETY FOR THE PROPAGATION
OF USEFUL BOOKS



ATHENS 2023

The Capital of Knowledge of Emeriti in Action

Copyright © 2023

Society for the Propagation of Useful Books

Athens, 2023

ISBN 978-618-5683-14-6

*The views expressed herein are those of the authors
and not necessarily those of the Editing Committee
the European Association of Professors Emeriti
or the Society for the Propagation of Useful books.*

*This book is being published
while Humankind lives under the pressure of a
crescendo, an escalation of extreme uncertainty and adversity,
as defined by the trendy word permacrisis.
The extended period of insecurity is perpetuated
by the combined effects of the
Covid-19 Syndemic and the invasion of Ukraine.*

*We Professors Emeriti express our hope
that Humanity will find the most humane solution
through creativity, wisdom and the science of diplomacy.*

CONTENTS

Foreword. On the creativity of professors emeriti(ae): the key to aging young	
Natale Gaspare De Santo, Vincenzo Bonavita , Luigi Campanella, Malcolm Phillips, Dennis V. Cokkinos.....	17

THE CAPITAL OF KNOWLEDGE OF EMERITI IN ACTION

1. The human capital of age: protecting the creativity of professors emeriti(ae)	
Natale Gaspare De Santo	23
2. Professors emeriti(ae): Those who have wisdom and look for “the beyond” and the unknown	
Adolfo Russo	27
3. Sciences from below: Challenges in the social division of working and knowing	
Liv Mjelde	33
4. Active ageing: The role of professors emeriti	
Nancy Papalexandris.....	37
5. Ethical and legal aspects related to the contributions of emeriti professors to the public good	
Lucija Čok and Gregory Sadlek, Luigi Campanella, George Christodoulou, Jože Gričar, Carole-Lynne Le Navenec, Heinrich C. Mayr	43
6. The transition toward the ecological modernization of society: what contribution of emeriti professors in the context of knowledge economy?	
Luigi Fusco Girard	49
7. About the “Association of Professors Emeriti Fridericians (APEF) with a look to the future	
Carlo Lauro	57
8. Life and academic activities of professors emeriti and retired professors in the University of Maribor	
Dušica Mičetić-Turk, Maja Šikić Pogačar, Zmago Turk.....	63
9. The Human Capital of Age	
Luigi Santini, Olimpio Guerriero, Stefano Sepe.....	69
10. A portrait of the artists as an old man: Paths and secrets of creative longevity in musical art	
Vincenzo Viccaro.....	75

ON ACADEMIES

11. Accademia Pontaniana: A brief history	
Giuseppe Marrucci	81
12. The need for a unification of “Knowledge” in medicine to protect the patient	
Goffredo Sciaudone, Carlo Melodia	85
13. Manmade Climate Change and the World Cultural and Natural Heritage	
Christos Zerefos	93
14. The Italian Institute for Philosophical Studies	
Antonio Gargano	101
15. On the history of Biogem	
Ortensio Zecchino	105
16. The communication of science in a pandemic	
Sir Adrian Smith	109

STATE-OF-THE-ART LECTURES

17. Climate change and the challenges of a rapid ecological transition: the role of food	
Riccardo Valentini	113
18. The Covid-19 syndemic, a new public health concept	
Patrick Berche	119
19. Cardiology in the 21st Century	
Dennis V. Cokkinos	125

NATURE PROTECTION

20. Protection of Nature in Europe	
Franco Pedrotti	135
21. The culture of the forest and the role of knowledge	
Orazio Ciancio, Piermaria Corona, Susanna Nocentini	141
22. Plant photosynthesis and climate	
Paolo Pupillo	147
23. Nature protection	
Massimo Pica Ciamarra	153
24. Towards a hydrogen economy? Where we are	
Paolo Ciambelli, Marcel Van de Voorde	159

25. Modern computational oracles in environmental engineering and risk analysis	
Nikos Markatos	165
26. Aerosol research for atmospheric quality and human health	
Maria Ochsenkühn-Petropoulou, Fotios Tsopelas, Theopisti Lympieropoulou, Lamprini-Areti Tsakanika, Klaus-Michael Ochsenkühn, Burkhard Beckhoff ..	173

WHAT IS AGING?

27. From the inversion of the paradigm between “aging and disease” to the concept of “biomedical person”	
Francesco Salvatore	181
28. Chronic kidney disease: A human model of accelerated aging	
Alessandra Perna, Yselys Garcia Martinez, Margherita Borriello	187
29. <i>Nothobranchius furzeri</i>: A tankful of opportunities for ageing research	
Livia D’Angelo, Paolo de Girolamo	193
30. Zebrafish: A model organism for studying the focal segmental glomerulosclerosis	
Anna Iervolino, Florian Siegerist, Tim Lange, Sabrina Siccardi, Francesca Pia Caruso, Michele Ceccarelli, Karlhans Endlich, Nicole Endlich and Giovambattista Capasso.....	199
31. Physical inactivity vs physical activity – Will we survive?	
Rado Pišot	205

BRAIN AND MENTAL HEALTH

32. Diagnostic error and clinical method in neurology	
Vincenzo Bonavita	213
33. About Parkinson’s disease	
Carmine Vitale	219
34. Stroke Medicine from antiquity to today	
Rosa Fortunata Musolino, Fabrizio Giammello	225
35. Neuro-nephrology in advanced age: Will the kidney function lead to eternal youth of the mind?	
Davide Viggiano	231
36. Mental health effects of disasters: avoid, mitigate or just tolerate?	
George N. Christodoulou, Eugenia Triantafillou, Nikos G. Christodoulou	237

37. Neuroplasticity and maieutics of emotions: A work of integration	
Goffredo Sciaudone, Rosetta Rossi, Francesca Sciaudone	245
38. Relational field and complex networks: The contribution of computational sciences to psychotherapy	
Raffaele Sperandeo.....	251

EPIDEMICS, PANDEMICS AND SYNDEMICS

39. Epidemic and pandemic: past, present and future	
Vincenzo Savica.....	259
40. Pathocenosis (from ancient contagious diseases, to plagues, epidemics, pandemics and epizooties)	
Antonio Pugliese	265
41. Vaccination against Covid-19: Which vaccine to select	
Raymond Ardaillou.....	271
42. The balance of the Covid-19 pandemic is the final warning to humanity	
Ljubiša R. Mitrović, Dragana Mitrović, Dunja Veličković	279
43. How the pandemic has exacerbated educational inequality	
Sir Les Ebdon.....	285

PECULIAR MEDICAL PROBLEMS IN OUR TIMES

44. Organ donation how far is progressed?	
Guido Bellinghieri.....	289
45. Innovative approaches to prevent frailty: overcoming bottlenecks to validation and scale-up	
Maddalena Illario, Giovanni Tramontano, Vincenzo De Luca, Lorenzo Mercurio.....	295
46. Did the legal protection of academic freedom in European university hospitals leave much to be desired at the turn of the millennium?	
Jochen Ehrich.....	301
47. Trends in renal replacement therapy in Bosnia and Herzegovina in the last decade	
Halima Resic	305
48. The Mediterranean federation for advancing cardiovascular surgery	
Giancarlo Bracale and Umberto Marcello Bracale	311

CONTEMPORARY HOT TOPICS

- 49. Vocational learning the art of reflectivity**
Liv Mjelde 317
- 50. The right to knowledge of European Citizens**
Luigi Campanella 323
- 51. Integrity of science, the information industry and the myth of excellence**
Alberto Girlando 327
- 52. The European Union and its cultural heritage.**
Stella Priovolou 333
- 53. The relevance of social and professional masks**
Dana Baran 339
- 54. Maturity and wisdom of young people**
Hendrik Ehrich, Mara Ehrich, Eric Schiffer, Jochen Ehrich..... 345

HISTORY

- 55. Dogs, vultures and the victims of mass destructions**
Athanasios Diamandopoulos..... 349
- 56. Birds as artistic expression of the ancient Pompeii**
Gaetano V. Pelagalli and Giuseppe Paino..... 355
- 57. Ancient chemical technology: The invention of mineral acids and aqua regia is an Arabic or Hellenistic achievement? An interdisciplinary approach**
Dimitrios Yfantis 359
- 58. The dawn of cardiovascular medicine at the University of Padua, Land of the Doges**
Gaetano Thiene 365
- 59. Georgios Gemistos “Pleton”: An exceptional Greek scholar at the 1438 Florence council and his influence in Italian Renaissance**
Christos Bartsocas 373
- 60. On the admirable creativity of Roman pontiffs reigning in the years 1492-2005**
Natale Gaspare De Santo, Carmela Bisaccia and
Luca Salvatoe De Santo 379
- 61. The Fonifero of Giovanni Paladino (1876) first hearing aid**
Giuseppe Paino, Gaetano V. Pelagalli, Italo Cantore 387

62. Light for diabetic patients thanks to Eva Maria Kohner (1929-2021), A Jewish baroness from Budapest	
Oliver Rácz , József Fövényi	391
63. Robert Schrier – a world leader in nephrology (1936-2021)	
Malcolm Phillips, Natale Gaspare De Santo	399

**2nd INTERNATIONAL CONGRESS
EUROPEAN ASSOCIATION
OF PROFESSORS EMERITI**

THE CAPITAL OF KNOWLEDGE

APRIL 28/30, 2022

NAPLES, ITALY

The Congress was recipient of the
Medal of the President of the Italian Republic
Hon. Prof. Sergio Mattarella

Vincenzo Bonavita and Natale G. De Santo (Naples)
Presidents of the Congress

SCIENTIFIC COMMITTEE

Sir Leslie Ebdon (Luton) and Stella Priovolou (Athens):Co-Chair
Niki J Agnantis (Athens), Patrick Berche (Garces), Dana Baran (Jazy) ,
Michael Botbol (Brest), Giancarlo Bracale (Naples),
Luigi Campanella (Rome), George Christodoulou (Athens),
Dennis V. Cokkinos (Athens), Vasile Cristea (Cluj-Napaca),
Spyridon Flogaitis (Athens), Hartmut Frank (Bayreuth),
Judith Hall (Vancouver), Illario Maddalena (Naples),
Dimitrios Kouremenos (Athens), Michael Kunze (Vienna),
Sherban Lupu (Bucharest), Nicholas-Christos Markatos (Athens),
Joannis Meletis (Athens), Liv Mjelde (Oslo)
Judith Nagy (Pécs), Maria Ochsenkühn-Petropoulou (Athens),
Francesco M. Raimondo (Palermo), Halima Resic (Sarajevo),
Mirjana Sander (Zagreb), Ulrich Sigwart (Geneva),
Mario Spagnesi (Bologna)

ADVISORY COMMITTEE

Raymond Ardaillou (Paris) and Dennis V. Cokkinos (Athens): Co-Chair
Guido Bellinghieri (Messina), Giancarlo Bracale (Naples),
Luigi Campanella (Rome), Paolo Ciambelli (Salerno),
George Christodoulou (Athens), Michael Kunze (Vienna),
Demetrios Kouremenos (Athens), Jochen Ehrich (Hannover),
Anton Fabian (Kosice), Leon Fine (Los Angeles), Jože Gričar (Maribor),
Anna Iervolino (Naples), Ljubisa Mitrovic (Nis), Dimitri Nenov (Varna),
Franco Pedrotti (Camerino), Malcolm Phillips (London),
Daniel Rukavina (Rijeka), Costantin Soldatos (Athens),
Giovanni Tramontano (Naples)

ABSTRACTS SELECTION COMMITTEE

Lucija Čok (Koper) and Lorenzo A. Pinna (Padua): Co-Chair
Ferdinando Auricchio (Naples), Christos Bartsocas (Athens),
Biörn Berg (Gavle), Orazio Ciancio (Florence),
Athanasios Diamandopoulous (Patras),
Rumyana Dimitrova (Varna), Michael Kunze (Vienna),
Dusanka Micetic Turk (Maribor), Sandro Lovari (Siena),
Francisco Garcia Novo (Seville), Dianne Newell (Vancouver),
Nancy Papalexandris (Athens), Gaetano Pelagalli (Naples),
Maria K. Papathanassiou (Athens), Vincenzo Savica (Messina),
Robert van Hee (Antwerp), George Vasilikiotis (Thessaloniki)

ITALIAN COMMITTEE

Vincenzo Bonavita (Napoli), Luigi Campanella (Roma),
Natale G. De Santo (Napoli), N. Carlo Lauro (Napoli),
Massimiliano Marotta (Napoli), Giuseppe Marrucci (Napoli),
Goffredo Sciaudone (Napoli), Ortensio Zecchino (Ariano Irpino)

**BOARD OF DIRECTORS
OF THE EUROPEAN ASSOCIATION
OF PROFESSORS EMERITI 2020-2022**

President: Natale Gaspare De Santo (Naples)

President Elect: Sir Les Ebdon (Luton)

General Secretary: Luigi Campanella (Rome)

Treasurer: Patrick Berche (Paris)

Members:

Maria Ochsenkühn-Petropolou (Athens)

George Christodoulou (Athens)

Liv Mjelde (Oslo)

Michael Kunze (Vienna)

Nikos Markatos (Athens)

**BOARD OF DIRECTORS
OF THE EUROPEAN ASSOCIATION
OF PROFESSORS EMERITI 2022-2024**

President: Sir Les Ebson (Luton)

President Elect: George Christodoulou (Athens)

General Secretary: Nikos Markatos (Athens)

Treasurer: Patrick Berche (Paris)

Members:

Paolo Ciambelli (Salerno)

Gincarlo Bracale (Naples)

Dušica Lečić Toševski (Belgrade)

Hartmut Frank (Bayreuth)

Halim Resic (Sarajevo)

Dana Baran (Iași)

FOREWORD
ON THE CREATIVITY OF PROFESSORS EMERITI(AE):
THE KEY TO AGING YOUNG

Natale Gaspare De Santo, Vincenzo Bonavita, Luigi Campanella,
Malcolm Phillips, Dennis V. Cokkinos

European Association of Professors Emeriti
e-mail: NataleGaspare.Desanto@unicampania.it

The Second International Congress of the European Association of Professors Emeriti on the *Capital of Knowledge* took place in Naples on April 28-30, 2022. The Congress was the recipient of the Medal of the President of the Italian Republic Hon. Prof. Sergio Mattarella. We thank him sincerely for that honour.

The Congress might be seen as the second festival of creativity of professors emeriti, as attested by the material of this book. Of course, this material cannot transfer to the readership the particular atmosphere enjoyed at the congress site, the mythical place where the body of the siren Parthenope, daughter of Achelous and sister of the muse Terpsichore, won by Odysseus creativity, was buried (1,2).

The proceedings provide an additional proof that the European Society of Professors Emeriti, six years after its birth, is healthy and creative. Its members seem to have been lucky to discover the “fountain of youth: a spring whose water was healing and which could make even the oldest person young again” (3).

The book explores the reasons why professors emeriti claim to be granted a life-long role in mentoring and in research (4). Indeed, teaching is a call and a vocation. The vocation for teaching is for life. Professors emeriti are a creative minority. Creative minorities devised solutions that oriented the entire society as discussed by Arnold J. Toynbee.

Any retiring scientist “looking back at the end of his career upon a normal life span, will find that 80 to 90 percent of all scientific work achieved by the end of the period will have taken place before his very eyes, and that only 10 to 20 percent will antedate his experience” (5). That is to say that retired scientists are ambulant, gigantic libraries and are living witnesses that what happened before their personal advent in science is not critical for further development. Furthermore, during their academic lifespan, they have been

able to meet the wants and needs of many generations of students in order to make them ready to be responsible for their personal future as well as for that of humankind (6,7).

In *Der Tod des Tizian*, Hugo Hofmannsthal narrates that Titian, on his last day of life, while furiously working on the *Danae*, repeatedly asked the fellows of his atelier near Venice, to bring his previous works. He wanted to demonstrate to them that “bis jetzt ein Matter Stumper war”, meaning that until then he had been just a “dauber”, and that his most recent works were his real masterpieces.

Gottfried Benn in *Altern as Problem für Künstler* (8) reports on 150-200 geniuses who made Europe as we inherited it: a Europe of arts and science granting Europe its relevant role. The majority of the geniuses were 75 years or older (those who we currently define old-old). He quotes Titian (died at 99), Michelangelo (89), Franz Hals (86), Verdi (88), Goethe (83), Shaw (93) and so on. In their latter days they continued to produce masterpieces. We would like to add to the list Gorgio de Chirico who produced masterpieces after the publication of Benn’s monograph, during his neo-metaphysical period (9). Indeed, many renowned artists have left unfinished works, also masterpieces. We want to just mention Michelangelo’s *La Pietà Rondanini*, and Leonardo’s *Adorazione dei Magi*.

We now know that although Vasari did not mention any of Titian’s work after 1460, the artist, in his last years, produced masterpieces and introduced methodological innovations, painting with brush and fingers and with finger only. He used to perform “sfregazzi” a difficult Italian term to explain, indicating “application of pure pigment (not mixed with a medium) on dry canvases” (10).

There is great interest in aging at present as demonstrated by the number of publications on longevity. We have already quoted before *Jellyfish Age Backwards* by Nicklas Brendborg a molecular biologist, Ph.D. trainee in Copenhagen, where the possibility of eternal life is disclosed, for example looking into telomeres and cellular re-programming. However, the goal now is not living eternally but being young at or near the end of life. No longer the quest of Eos to Zeus to provide eternal life for Titonus-forgetting eternal youth-rather an answer to *Who wants to live forever?* chanted by the Queen. Thus, the need to live and die young prevails.

Judith G Hall, University of British Columbia and Children’s and Women’s Health Centre of British Columbia, Department of Pediatrics and Medical Genetics, Vancouver, BC. thinks “there is still a push for older academics to

retire, perhaps even earlier, to make room for “new blood” and new ideas; and that older folk should just enjoy life and fulfill one’s “bucket list”. It is true that, as senior academics retire, health permitting, he or she should get to do what they want. There is evidence that on average people become happier as they age. Furthermore, data show older workers are more reliable, see the “big picture” and are better at finding solutions in the work place. Several studies indicate that they mentor the younger workers and lead to more collaborative work. We are a terribly privileged group, but theoretically we can model new roles for those over 65 as more and more of us live longer and longer in a healthy stage. We represent an enormous human capital that should not be waste” (11).

However, according to Martin Rees (b.1944) – Lord Rees of Ludlow – “It is a conventional wisdom that scientists do not improve with age, they “burn out”. The physicist Wolfgang Pauli had a famous put-down for scientists past thirty. “Still so young, and already so unknown” (11). For Rees the best for retired “is to continue to do what one is competent at, accepting that there may be some new techniques that the young can assimilate more easily than the old and that one can probably at best aspire to be on a plateau rather than scaling the heights. There are however exceptions” (12).

Probably professors emeriti can also be instrumental in identifying the students capable of building castle sands”, made of minute silica particles. “Tiny physical forces govern how each particle interacts with its neighbours, keeping the castle together” (12). Nicholas A. Christakis also thinks that “they give a practical demonstration of the scientific principle of holism.....The properties arise because of the connections between the parts. I think grasping this insight is crucial for a proper scientific perspective on the world. You could know everything about isolated neurons and not be able to say how memory works, or where desire originates. It is also the case that the whole has a complexity that rises faster than the number of its parts” (13).

For Pope Francis older persons are special, being memory keepers. A role of the utmost importance since – as Edith Bruch says – “memory is life” (13). Pope Francis has declared the richness of older age that gives the possibility to transfer their richness to humankind. For Pope Francis older persons who have never been so many are a real” new people”, “the people of the future”. They are the roots of the tree, they are the history, they produce flowers and fruits (14).

We think that this book will also enhance interest “for the nature of science of longevity and a healthy life” and that emeriti have discovered the key to the mysteries “on how to die young as late as possible” (3).

This book comes to light thanks to the continued interest and generosity of the Society for the Propagation of Useful Books which, in 2019, celebrated 120 years since its foundation in Athens, and again afforded us its generous support, as it did for the edition of the proceedings of the First International Congress. The Society has advanced education in Greece through printing and offering useful books to the public, school and pedagogical libraries.

Additional activities: (i) **School Libraries:** Approximately 600 have been founded; to these 50,000 books have been donated; (ii) **Pedagogical Libraries:** designated for public education; (iii). **Educational Museum:** this consists of educational paintings and charts, instruments, natural history, insect and botanical collections; (iv) **The Folk Songs Musical Collection:** this was founded in 1935 and contains recordings of more than 650 folk songs; (v) **The Sebastopoulean Practical Occupational School:** this was founded in 1909 and functioned until 1982; it contributed to the vocational training of indigent young boys. Thoughts of reinstituting this school are under way; (vi) **The Center for Female Education:** this was a pioneering Institution, founded in 1937 which contributed greatly to the then non-existent educational activities for women; (vii) **The House of the Blind:** this was founded in 1906; (viii) **The School of Marksmanship:** this was founded in 1907.

We are indebted to the Board of Directors of this historic and illustrious Society, and especially to its President, Christos Geraris, former President of the Supreme Court of Greece. Our two societies share the same ideas to promote knowledge, culture and social justice.

We sincerely hope that this collaboration will continue in the years to come.

References

1. Bonavita V, Campanella L, Cokkinos DV, De Santo NG. Welcome letter. *Hellenic Cardiac Society* 2022; 63 (1):10.
2. De Santo N, Campanella L, Cokkinos DV, Bonavita V. Welcome letter. *Bull Eur Assoc Profs Emer* 2022; 3(3): 56.
3. Brendborg N. *Jellyfish Age Backwards: Nature's Secrets to Longevity*. London, Hodder Studio, 2022.
4. Cokkinos DV. Foreword by the President of the European Association of Professors Emeriti. In Cokkinos DV, Agnantis N, Gardikas K, Soldatos CR, eds, *The Capital of Knowledge*. Society for the Propagation of Useful Books, Athens, 2020.
5. de Solla Price D. *Little Science, Big Science*. New York, Columbia University Press, 1963.
6. De Santo NG. *Créativité et découvertes scientifiques après 65 ans*. Science, Art et

- Vieillesse Bull. Acad. Natle Méd., 2017, 201, nos 7-9, 1335-1347, séance du 10 octobre 2017 1346.
7. De Santo NG. The Role of Emeriti: Maintaining the Link with Universities and Europe. Bull Eur Assoc Profs Emer 2020; 1(2): 40-41.
 8. Benn G. Altern as Problem für Künsler: Ein Vortrage. Stuttgart, J.G Gotta'sche Buchhandlung Nachfolger GMBH, Gegr. 1659, 1954.
 9. Canova L. Il grande ritorno. Giorgio de Chirico e la Neometafisica. Milan, La Nave di Teseo, 2021.
 10. Laneyrie-Dagen N, Archat C. L'Art au Risque de l'âge. Paris, CNRS Éditions 2021.
 11. Hall J G. The Challenge of Developing and Evolving Career Pathways for Senior Academicians. Bull Eur Assoc Profs Emer 2021;2(6): 120-121
 12. Rees M. On the Future: prospects for Humanity. Princeton University Press, 2018.
 13. Christakis, www.edge.org.
 14. Pope Francis. La Vita Lunga. Lezioni sulla vecchiaia. Milan and Rome, Corriere della Sera, Libreria Editrice Vaticana, Solferino, 2022.

**THE HUMAN CAPITAL OF AGE:
PROTECTING THE CREATIVITY
OF PROFESSORS EMERITI(AE)**

Natale Gaspare De Santo, MD

Professor Emeritus University of Campania Luigi Vanvitelli, Naples
e-mail: NataleGaspare.Desanto@unicampania.it

The German poet, essayist and physician Gottfried Benn-nominated for a Nobel Prize five times-wrote, in 1954, *Old age as a problem for the artists* (1) that in the last four hundred years 150-200 geniuses determined the cultural progress of Western Europe. Half of them were old-old. Benn reported on three groups of geniuses; the first included 25 sculptors and painters, the second 35 poets and writers and the third. 16 composers (Table 1).

The European Union (EU) protects the creativity of emeriti professors and allows them to coordinate and direct projects which are financed by EU. However, the permission to sign and direct a project proposal must be firstly granted by the institution where the professors emeriti(ae) work.

By studying the constitutions of various Italian universities, I have learned that each of them has particular characteristics (i) in terms of rules for appointment, as well as (ii) in terms of opportunities for professors emeriti to conduct research and teach. Such possibilities are very limited and differ from university to university. Ideally it might be appropriate to have, for the whole country, identical rules for the effective participation of emeriti in research and mentoring. This possibility should be explored in order to develop a European plan allowing emeriti to utilize their talents, and creativity if they are willing to participate in the making of new knowledge, provided that they have enough physical resources to continue to work.

There are two universities that protect and promote the role of emeriti that deserve particular mention. Their constitutions are exemplary and should be taken as models to be adopted by Europe as a whole; they are; the Ca' Foscari University in Venice (2) and that of the University of Calabria at Rende (3).

The University of Ca' Foscari, the first Italian school devoted to commerce, was founded on August 6, 1868. Structured on 8 departments and 3 schools, Ca' Foscari meets the needs of 21,000 students served by 1100 investigators and professors. Its constitution states (2) that professors emeriti and honorary professors can:

1. *Continue to undertake research in the departments where they worked.*
2. *Continue coordinating research projects for which they are responsible, including those financed by public and private institutions.*
3. *Receive remuneration for work in research or for advisory activities from third parties.*
4. *Coordinate projects from third parties only after approval of the Council of the Department.*
5. *Teach on official courses, usually at no cost, or even be remunerated, if law allows, after being nominated by the Council of the Department*
6. *Be a member and preside on committees for curricular exams and for Degree Exams.*
7. *Teach on PhD courses after approval of the Council of the PhD School.*
8. *Participate in meetings of the departments in which they were active at the time of retirement, and have an advisory vote.*
9. *Participate in the meetings of the Didactical College and those of the College for the PhD if they are titular of a course.*

The University of Calabria at Rende (Province of Cosenza), founded in 1972, is structured on 14 departments. It is a university for 30,000 students served by 1200 investigators and professors. Its constitution (3) states that professors emeriti can:

1. *Be nominated after retirement having held, for a minimum of 20 years, a full professorship. They shall not have disputes with the University of Calabria. They shall not have been subject to disciplinary measures or criminal or civil convictions. They shall have held roles of significant responsibility in the University”.*
2. *Continue research activities, at no cost to the University, in its department.*
3. *Be responsible for projects including those financed by public and private institutions. In this case the department shall provide appropriate logistic support to perform the studies, including an office equipped with technical support. In such status they can activate research contracts and participate in committees selecting the recipients of those contracts.*
4. *Participate in teaching on official and supplementary courses but at no cost to the University.*
5. *Be members and preside in Degree Examination Committees;*
6. *Teach on PhD courses - following ad hoc deliberation of the College of Professors - and participate, with an advisory vote, in the activities of the Council of Professors for PhD.*

7. *Attend, and have an advisory vote at, meetings of the department where they research and teach.*

Both of these Universities allow full participation of professors emeriti allowing them teaching official and supplementary courses and, at the same time, let them be responsible for projects financed by private and public activities. In other words, both constitutions allow the unity of research and mentoring that is the main pillar of strength on which universities rest.

AN APPEAL FOR PROTECTING THE CREATIVITY OF PROFESSORS EMERITI IN EUROPE

These two successful models offer the possibility of solving the problem of insufficient effective participation of emeriti in research teams. Young researchers and emeriti scientists should sit together, with the former taking the helm. At present, it is difficult to adopt, in Europe, the model of the U.S., where the retirement age limit has been removed. The USA is the country where seniors are allowed to “age thoughtfully” (4) regardless of “hostile age” (5). Indeed, “old people have something to say to young people”(6).

The European Association of Professors Emeriti should strive for the practical use of the two well-functioning models than to try to establish a uniform rule for the appointment of emeriti(ae) binding for all countries, which is in contrast to the multifaceted history of Europe, the so-called “creative Europe of bell towers”.

Table 1. Age at death of painter and sculptors, poets and writers and of composers (1).

A. Painters and sculptors

Titian 99 years, Michelangelo 89, Franz Hals 86, Goya 82, Hans Thoma 85, Liebermann 88, Munch 81, Degas 83, Bonnard 80, Maillol 83, Donatello 80, Tintoretto 76, Rodin 77, Käthe Kollwitz 78, Renoir 78, Monet 86, James Ensor 89, Menzel 90, and among those living Matisse 89, Nolde 86, Gulbransson 81, Hofer and Scheibe more than 75, and Klimsch 84.

B. Poets and writers

Goethe 83, Shaw 94, Hamsun 93, Maeterlinck 87, Tolstoj 82, Voltaire 84,

Heinrich Mann 80, Ebner Eschenbach 86, Pontoppidan 86, Heidenstam 81, Swift, Ibsen, Bjørnson Rolland 78, Victor Hugo 83, Tennyson 83, Ricarda Huch 83, Gerhart Hauptmann 84, Lagerlöf 82, Heyse 84, D'Annunzio 75, Spitteler, Fontane, Gustav Freytag 79, Frenssen 82 and among those living Claudel 85, Thomas Mann, Hesse, Schröder, Döblin, Carossa, Dörffler 75 or more, and Emil Strauss 87.

C. Composers

Verdi 88, Richard Strauss 85, Pfitzner 89, Heinrich Schütz 87, Monteverdi 76, Gluck, Händel 74, Bruckner 72, Palestrina 71 Buxtehude, Wagner 70, Georg Alfred Schumann 81, Reznick 85, Auber 84, Cherubini 82 and Sibelius 89.

References

1. Benn G. *Alters als Problem für Künstler (Aging as a problem for artists)*. JC. Cotta'sche Buchhandlung Nachfolger GMBH, Gegr. 1659, Stuttgart, 1954
2. Università Ca'Foscari. Regolamento Didattico di Ateneo. Emanato con D.R. n. 726 del 27/11/2012, modificato con D.R. n. 79 del 05/02/2016 e con D.R. 1149 del 21/12/2018, accessed on Line June 3, 2022
3. Università della Calabria. Regolamento di Ateneo per il conferimento dei titoli di Professore Emerito e di professore onorario (Emanato con decreto rettorale 3 febbraio 2021, n. 168)Oggetto: Decreto rettorale di emanazione del Regolamento per il conferimento del titolo di Professore Emerito. Accessed online on June 3, 2022
4. Nussbaum MC, Levmore S. *Aging thoughtfully: Conversations about retirement, romance, wrinkles, and regret*. New York, NY: Oxford University Press, 2017.
5. Corneille P. *Le Cid*. Scene IV. Paris, Augustin Courbé, 1636.
6. Segal L. *Out of Time: The Pleasures and the Perils of Ageing*. London, Verso, 2013.

PROFESSORS EMERITI(AE): THOSE WHO HAVE WISDOM AND LOOK FOR “THE BEYOND” AND UNKNOWN

**Building a European alliance of those who have nurtured wisdom and
those who could not**

Adolfo Russo

Emeritus Professor of Theology, Delegate for Culture of the Church of Naples,
Director Diocesan Museum “Donnaregina” – Archiepiscopal Curia,
Church of Naples, Naples, Italy
e-mail: russo.adolfo@libero.it

ABSTRACT

The focus is on the concept of wisdom, which distinguishes those who have dedicated their lives to research and teaching, acquiring a critical and high view of one's life and the world. In the biblical tradition, wisdom is the highest level which the human mind can reach and also a training ground for exercising the dialogue between different knowledge and cultures.

Areas of lay collaboration are then proposed between the ecclesiastical structures present in the area and the skills of the professors emeriti to make the third mission of universities current. Among the possible themes of convergence, the construction of an inter-ethnic and inter-religious city is suggested, in an inclusive vision of different peoples who live in the same territory. It is a highly topical civil and ethical objective with an enormous impact on the concrete experience of citizens

Keywords Professors emeriti; wisdom; the beyond; interethnic-interreligious city

INTRODUCTION – THE CAPITAL OF KNOWLEDGE

Archbishop Don Domenico Battaglia thanks you for the invitation and apologizes for his absence. He would have gladly participated in this prestigious meeting on *The Capital of Knowledge*, which brings together many professors emeriti and emeritae from different European countries (1, 2). Unfortunately, this appointment coincided with the opening of the Synod, an event that engages the whole Neapolitan church in a journey of revision of life and understanding of today's times. He therefore decided to send me, because I too am an emeritus, having taught at the Theological Faculty of Naples for forty years.

I express - also in his name - deep esteem for you as persons and for the task you have carried out to educate generations of students to assume roles of responsibility in the world. You have spent long years between research and teaching, I imagine the many faces of the students that you have formed in the profession and in life, and I know with certainty the sacrifices that have accompanied your steps.

Emeriti and emeritae professors of science: you are above all men of science. You have cultivated it for years with passion and sacrifice. You have made it the reason for your life, sometimes even renouncing the legitimate joys of life. Society is in great need of your high skills, thanks to which it can progress and bequeath to the future a world more aware of its possibilities, freer in its choices, more capable of defending itself from disease and adversity.

But you have gone beyond this goal, albeit noble and necessary for the development of man and society. Today I see in you, above all, “wise men”. You have reached an even higher vision of reality, combining different skills with the maturity of an outlook that comes from the experience of life, from the dialogue of the various schools of thought and from the awareness that only a life lived intensely can offer. In Italian we have a distinction between the verb “sapere” and verb “conoscere” whereas you use just ‘to know’ for both. For us “sapere” is much more than “conoscere”: it is having the flavor of life in a world begging for meaning.

“Denken heißt immer überschreiten”

I am reminded of the words that a great German thinker Ernst Bloch (3), who died in Tübingen in 1977 who used to repeat: “Denken heißt immer überschreiten”, meaning “to think is to always go further”. Words that the disciples wanted to remain engraved on the headstone of his tomb. To think is to transgress, in the Latin sense of “*transgredior*”, to go beyond borders, to go beyond limits. After all, the man of thought, the wise, is always a “transgressor”. A mind that knows how to go beyond the acquired data, beyond the conventions, beyond the established schemes. And perhaps the best compliment you can pay to a professor emeritus is to call him a “transgressor”. In fact, wisdom is never a definitively conquered goal, but a direction of travel, the desire to go further, perhaps to meet the “*Beyond*”.

THE BOOK OF WISDOM IN THE BIBLE

I remember that the Bible dedicates an entire book to Wisdom (4,5). It is presented as more beautiful than the sun, because the light of day can be conquered by the

night, while wisdom always remains invincible, as an absolute value (6). It is a precious and rare virtue, because it is the result of a long maturation and an arduous path, never taken for granted. Suffice it to recall that in Greece in so many centuries of history there were only seven wise men. Only seven, who built the foundations of that civilization from which Europe and the West also originated. They have enriched the whole of humanity with works of art, thought, philosophy, law (7).

But perhaps it is also worth remembering that this book dedicated to wisdom - even though it belongs to the Jewish tradition - is written in Greek. An exemplary model of dialogue between different cultures, languages and religious affiliations. As if to suggest to us that true wisdom does not close us in ideological presuppositions, nor in the presumption of being enough for ourselves, but opens us up to others, allowing us to critically appreciate other concepts of life and different perspectives on reality. A book written - according to some scholars - in Alexandria in Egypt, a city that in the first century B.C. was a melting pot of civilizations, a cultural pole, an international study center, with a huge library, the only one of its kind in the whole Mediterranean area (8).

THE CAPITAL OF KNOWLEDGE: A DIALOGUE OF KNOWLEDGE THAT CAN LEAD TO A CONCRETE INITIATION OF GREAT SOCIAL IMPACT

I am therefore convinced that the meeting on these days of Congress is not just the meeting of old friends who have in common that they have spent their lives in research and teaching. Above all, it is the occasion for a dialogue of knowledges that can lead to concrete initiatives of great social impact. I am currently thinking of interactive symposia on topics of general interest. But I think above all of how much your knowledge can benefit the growth of the territory and the solution of the many problems that often afflict our people, because it is only through the production of knowledge that the university can fully realize its propulsive role in society (9).

As I often travel through ancient Naples, it strikes me to see the headquarters of the various Universities of Naples (University of Federico II, University Luigi Vanvitelli, University Pathenope, University Suor Orsola Benincasa, University L'Orientale, The Theological Faculty) which look like citadels of knowledge, immersed in a web of alleys where people have almost forgotten to read and write. This is certainly not attributable to the University. We all need its research and its high knowledge nourishes the hope of progressing towards future goals. Perhaps the cause of this degradation is linked to a lack of relapse

on the territory of this cultural heritage, because without it the university can never be an engine of social and economic development, it will never become a generator of opportunities and innovation policies.

THE ROLE AND RESPONSIBILITIES OF THE UNIVERSITY

It is useful to recall, in this regard, that universities are called to carry out a triple, classic mission: research, teaching, social impact. We know that little is usually invested in the latter field. You could be the innovators that the territory needs, thanks to the third mission. You can provide solid basic skills, make your scientific skills available, as a function of a sustainable and inclusive society, which has the creativity of good ideas, which is able to launch start-ups with new job opportunities, enriching the entrepreneurial and social aspects of the territory.

The responsibility of universities towards the territories in which they operate constitutes an objective that cannot be renounced and which can be applied to every activity. The cultural, ethical and social values that the university is able to induce are precious elements for the growth of the community. Without them, the global development of a country's civic awareness cannot be achieved.

Obviously, intermediation structures, the social involvement of institutions, public utility projects, scientific dissemination initiatives and animation are required, making the community an active component and participant in these innovative paths. On this level you will find us at your side, available to support your commitment and to make it concrete and aimed at the real growth of civil life.

Of course, I am not thinking of a collaboration with a sectarian purpose. It is a question of putting ourselves together at the service of the city. You, with your knowledge; we, with the local service structures. The church in fact has a network in the territory made up of parishes, associations, religious orders, archconfraternities. A widespread network that knows the needs of each area, perhaps better than any other institution. The parish priest, perhaps more than the mayor, knows the poor of the neighborhood, those who live alone, those who are forced to sleep on the street.

A VAST CULTURAL HERITAGE CURRENTLY UNDERUSED OR FROZEN IN YOUR MINDS, PLACED AT THE SERVICE OF THE NEEDS OF CITIZENSHIP

I imagine how many projects could develop from this collaboration. A vast cultural heritage, currently underused or frozen in your minds, placed at the service of the needs of citizenship! A very precious resource which is not used

adequately. An unforgivable waste of culture and civilization. Among the many strands of commitment, one could start with a project that has, as its objective the construction of an inter-ethnic city (10). This is not an easy goal, not reachable only thanks to the coexistence in the same territory of people of different geographical origins. It requires first of all the formation of a ruling class, of managers capable of considering immigrants a great resource to be exploited to redesign cities and regions, united in diversity, using their energy, culture and passion for the sustainable development of future societies in Europe (11).

CONCLUSION – A GIGANTIC CHALLENGE. TRANSFORMING THE DIVERSITY OF CULTURES INTO A CULTURE OF DIVERSITY

We are faced with a scenario of complexity, which affects contemporary urban systems and postulates diversified economic strategies: a social sensitivity for integration, technological innovations, the recognition of settlement typologies, the transition from a multi-ethnic to an inter-ethnic vision of relationships between the various populations present in the area, a circular economy, the use of disused urban space. These are interdisciplinary issues that require the collaboration and integration of various scientific skills. We have a gigantic challenge ahead of us for the next few years: transforming the current diversity of cultures into a culture of diversity, which promises to be not only possible, but heralds great opportunities for the future. This is not only a project for Naples, but for the whole Europe. Who more than you can welcome it?

References

1. De Santo NG, Campanella L, Cokkinos D, and Bonavita V. Welcome. *Bull Eur Assoc Profs Emer* 2022; 3(3): 56.
2. Bonavita C, Campanella L, Cokkinos D, De Santo NG. Welcome Letter. Special Edition of Hellenic Society of Cardiology; 2nd International Congress EAPE 2022 p10
3. K. Bloch K, A. Reif A. “Denken heist überschreiten”: in memoriam Ernst Bloch 1885-1977, Ullstein, Berlin 1982.
4. Sapienza, in McKenzie JL, Maggioni B, Eds, *Dizionario Biblico*, Cittadella Editrice, Assisi, 1981, 872-877.
5. The wisdom books. The New Jerusalem Bible. Darton, Longman Ltd, London, 1980; pp. 540-877.
6. Sapienza, 7, 29-30.
7. Plato. Protagoras 342c-343e. English version by C.C.W. Taylor, Plato. Protagoras. Translated with notes, Oxford, Clarendon Press 1976.

8. Ravasi G. *Sapienza*, in P. Rossano P, Ravasi G, Girlanda A, Eds, Nuovo Dizionario di Teologia Biblica, ed. Paoline, Cinisello Balsamo, 1442-1447.
9. Frondizi R. La terza missione delle Università. Strategia, valutazione e performance, Giappichelli, Torino 2020.
10. Russo A. L'identità della città futura, in Beguinot C, Ed, Città di genti e culture, Giannini, Napoli 2004, 61-64.
11. Cuturi C., La sfida dei nuovi scenari multietnici, in Beguinot C, Ed, La formazione dei "Manager della città interetnica, Francesco Giannini, Napoli 2005, pp.117-182.

SCIENCES FROM BELOW CHALLENGES IN THE SOCIAL DIVISION OF WORKING AND KNOWING

Liv Mjelde

The Senior Centre, Oslo Metropolitan University, Norway
e-mail: mjeldeliv@gmail.com

ABSTRACT

My research field has been vocational/technical education, including the chasm between vocational and academic approaches to learning, as well as women's and men's spheres in vocational/technical education. Epistemologically, I draw on Thomas Kuhn's and Edgar Morin's call for changes of paradigms in both natural and social sciences. New voices from women scientists who call for "sciences from below" – an inductive approach to scientific enquiry in education which will give voice to vocational students. The sociologist Dorothy Smith's "standpoint of knowing" is central to my understanding, that is, situating the researcher concretely in relation to the field of research. Another point of departure is comparative historical sociology, i.e., studies of the past to know the future. In this light I discuss the works of Maria Montessori, a pioneer in both medicine and education. She put her scientific experiences into praxis long before the women's movement of the 1970's challenged the hegemonic order in the sciences.

Keywords: Vocational/academic education; feminist standpoint of knowing; paradigms of complexity

INTRODUCTION

I am honored to be asked to share some thoughts with you at the opening of the Second Congress of EAPE in this historic city of Naples. I have had the pleasure of being part of this organization since its foundation in Athens in 2016 and having been a member of the board for 5 ½ years – a time that has enriched my life as a human being and as a sociologist. One of my research interests is the social division of knowledge which has developed during industrial capitalism, penetrating our lives in both work and family life with a specific division of masculine spheres and feminine spheres. This division manifests and replicates

itself in schools and universities and is under constant challenge. Today we are all engaged in globalization and gender issues, two unavoidable subjects integral to facing complexities in educating future generations (1). I have been inspired by Professor Natale De Santo's interest in and knowledge of Edgar Morin, a fellow sociologist whose later work in complexity theory has been recognized as an important tool to the sciences (2).

Edgar Morin has, just now in his 100th year, received the Nobel Laureate "Albert Camus Mediterranean Price", for his contribution to the world of science and to ways of posing new questions. Albert Camus, Edgar Morin and Natale De Santo have all given me inspiration (3)

VOICES OF WOMEN IN SCIENCE

Women's relatively recent entrance into the world of science has given me cause for reflections. The marine biologist Rachel Carson with her combination of "scientific knowledge and poetic writing", and women scientists of the 1970s who posed questions on the "situated gaze" in the sciences have all been important to how I pose questions. The philosopher Sandra Harding (4) devoted many years of work to standpoint theory, the origins of recent feminist epistemology. She shows how standpoint theory originated while trying to explain two phenomena. First, asking how the kind of research recognized as "good science" or "good social science" could produce such sexist and androcentric results as that which feminist social scientists and biologists started to document in the 1970s. The second was how to explain the successes of feminist work which violated the norms of good research, such as subjective engagement in research guided by feminist politics. Dorothy Smith's standpoint of knowing, that is, situating the researcher materially in the realm of the research instead of seeking a vantage point from outside the frame of study, is central in my understanding of the social relations of working and knowing. Her works, *"The Everyday World as Problematic"* and *"Doing Sociology for People"* show ways to do what Harding calls *"Sciences from Below."* (5) Academia is still very suspicious of "subjectivity", which essentially amounts to including the everyday experience and subjectivity of particularly, the academic. Edgar Morin (6) points out that it is acceptable to engage in phenomenological research of someone else's lived experience, but it is largely only feminist scholars who have stressed the importance of the presence of the knower in all her vulnerabilities. Morin insists on reminding us that life is not confined to one or two disciplines,

but life involves one's "*whole everyday life struggles*". This is central to his scientific thinking. A philosophy of life cannot exclude these moments from its purview. Natale De Santo also stresses the separation in disciplines: "*Although 'disciplines' are indispensable in our professional lives to solve general and fundamental problems; we have to unify knowledge which is now dispersed in many disciplines. It is necessary to develop a more complex method of thinking and a more complex paradigm of knowing* (2,7-8)

THE MONTESSORI MIRACLES

On this occasion I want to honor an Italian pioneer who overcame enormous obstacles in the world of science in the late 1800s. I speak of the Italian physician and educator, Maria Montessori ⁽⁹⁾. She is best known for the philosophy of education that bears her name, and her writing on scientific pedagogy. I share her grounded belief in human beings' ability to learn from birth to grave.

She was one of the first women to be allowed into the study of medicine in Italy in 1896. She became world famous as a practitioner and philosopher in educational science. One of Maria Montessori's path-breaking discoveries was that children with development disabilities had presuppositions if they met engaging and problem-solving activities. As newly educated, she became a supervisory doctor in psychiatric hospitals. Through this work she discovered the appalling conditions endured by children considered to be fools and idiots. They were hidden away in institutions and given no learning or development possibilities. She took practical initiatives to give them possibilities both for playing and learning. She discovered within these children hidden potentials and with time they learned reading, writing and arithmetic. The results were impressive and were called "*Montessori's first miracle*".

She opened her first school in Rome 1907. It was a school combined with a day-center directed towards working-class kids. In Casa de Bambini learning was intended to take place through the child's creative potentials and natural learning desire. This way of thinking about learning stood in sharp contrast to the classical cathedral views of learning of the time where children were supposed to absorb knowledge through blackboard education and memorizing. She built on her experiences which had shown that children had huge potential for self-discipline and self-learning. *The results in the Casa de Bambini were so impressive that it was called "Montessori's second miracle"*.

Her devotion to research and practice has spread far beyond Italy. There are Montessori-inspired kindergartens and schools in many parts of the world: in

Scandinavia, as well as in Africa and Latin America. Together with her belief in everybody's ability to learn was also her thinking about the teacher's ability to adjust and redeem the inherent abilities in all human beings. *A teacher, she argued, should be a guide and a mentor.* This thinking is at the centre of our discussions on learning and teaching in EAPE.

CONCLUSION

I have been deeply inspired by the transdisciplinary and complex thinking that penetrates EAPE. We come from different professions, but what we have in common is our praxis as teachers/mentors and researchers in search for new complex knowledge and development in our scientific fields as well as in the art of teaching and contributing to the furthering of knowledge. To recite our colleague, Professor Dennis Cokkinos: *"A teacher holds the philosopher's stone which can convert the novice to the gold of knowledge."* The program of the second congress in Naples was rich and varied. I am sure it will be an inspiration for us all as we continue to contribute to building a brighter future for humanity.

References

1. Morin, E. 1999. Seven complex lessons in education for the future. Paris. UNESCO 1999.
2. De Santo, ND. Teaching Complexity. The Case of medicine. In Cokkinos, D, Agnantis, N. Gardigas, K., Soldatos, C: The Capital of Knowledge. Proceedings of the First International Congress. Athens: Society for the propagation of useful books. 2020. 127-142.
3. https://www.eldiario.es/cultura/filosofo-edgar-morin-reencuentra-camus-companero-resistencia_1_8054431.html
4. Harding, S. Sciences from below. Feminisms, Post-colonialities and Modernities. Durham and London: Duke University Press, 2008.
5. Mjelde, L. Canada's highest award, the Order of Canada to Professor Emerita Dorothy E. Smith. In Bulletin of EAPE Athens 2020. 25-26.
6. Montouri, A. Foreword. Edgar Morin's Path of Complexity. In Morin, E. On Complexity. New Jersey: Hampton Press, Inc 2008.
7. De Santo, NG. Nephrology a discipline evolving into complexity: between complex systems and philosophy. J Nephrol 2017; 33(1):1-4. doi: 10.1007/s40620-019-00674-3.
8. De Santo NG. 2020. Nephrology between Reductionism and Complex Systems: the Role of Philosophy – Review of Evidence and Opinion. European Journal of Molecular & Clinical Medicine, 2020; 7(1), pp. 59-69, DOI: <https://doi.org/10.5334/ejmcm.280>
9. Befring, E. De pedagogiske kvalitetene: løfterike muligheter for barn og unge. Oslo Universitetsforlaget. 2018.

ACTIVE AGEING: THE ROLE OF PROFESSORS EMERITI

Nancy Papalexandris

Professor Emerita, Athens University of Economics and Business,
Athens, Greece
e-mail: npapal@aueb.gr

ABSTRACT

The proportion of older people in our societies is increasing fast due to low birth rates, ageing baby boomers and rising life expectancy. By 2060 in EU countries, 29% of people will be over 65.

Countries need to adapt their economic planning including social services, pension and health systems to an older and potentially shrinking population, a phenomenon often called the “Silver Tsunami”. One of the solutions offered is “active ageing” which means helping people stay in charge of their own lives for as long as possible while providing them with opportunities to contribute to society and the economy.

Universities should address this problem by inviting and utilizing retired academics, taking advantage of their accumulated knowledge and experience. Appropriately designed age-inclusive projects, flexible working arrangements and recognition of their potential to explore new ways of implementing their ideas, can add value to science and research.

Professors emeriti can serve as role models by adapting active ageing principles which can also prove a strong asset for younger academics and lead the way to a more inclusive society.

Keywords: Ageing population; retired academics; silver tsunami; active ageing; inclusive society

INTRODUCTION

Europe and the western world are facing a demographic situation where births are shrinking while people live longer. The proportion of people over 65 will reach 29% by 2060 meaning that while Europe now has 4 working age adults for every dependent, by 2060 it will have only 2 (1)

At the same time while a 2.1 fertility rate is necessary for generational replacement, the EU fertility rate is around 1.6 with great disparities ranging from 2.0 for France to 1.3 for Greece, Spain and Portugal. These changes mean that EU countries need to change their economic programs, social services and pension and health systems for an older and potentially shrinking population. (2)

One of the solutions offered is active ageing which means helping people stay in charge of their own lives for as long as possible while providing them with opportunities to contribute to the economy and society. Businesses and organizations are already preparing for a workforce that is increasingly older and age diverse.

Universities are getting the message and many institutions are inviting retired academics to continue offering their services in teaching and research and also participate in various activities to enhance active ageing in their communities, acting as role models for a more inclusive society. This paper will examine the role professors emeriti can play in this process with the assistance of their universities.

RESEARCH ABOUT AGEING AND RETIREMENT

Starting in the 1960's three major psychosocial theories describing ageing were developed.

The Disengagement theory of ageing states that ageing is an inevitable mutual withdrawal resulting in decreased interaction between older persons and other members of their social system (3). Cummings and Henry received strong criticism as their theory runs counter to the other two theories that followed.

The Activity theory proposes that successful ageing occurs when people stay active and maintain social interactions-something which delays the ageing process and enhances the quality of life (4). Robert Havighurst, who developed this theory, received criticism for overlooking inequalities in health and economics.

The Continuity theory states that older adults will usually maintain the same activities, behaviours and relationships as they did earlier in their lives. In order to maintain this continuity of lifestyle, they adopt strategies that are connected to their past experiences (5). Atchley implies that this sense of continuity contributes to well-being in later life.

Time has shown that both activity and continuity theories better explain what enables adults to adjust to retirement. They also predict that older adults facing role-loss can replace it by using various coping strategies.

While social scientists and health specialists examined ageing, researchers in organizational theory looked into how age and retirement impacted on the

workforce. Early retirement, which was encouraged by legislation in certain countries, lost its legitimacy due to the shrinking population after 2000. In the EU measures to encourage older employees to remain in the workforce were introduced. Researchers, looking for reasons urging people to retire, found that, besides health and work/family reasons which were more frequent among the female population, (6) withdrawal attitudes were seen as coping responses to age-related stigmatization as older workers are wrongly perceived as less competent and less motivated than their younger colleagues (7). A study conducted in Belgium showed that when individuals categorized themselves as older workers, they were more likely to engage in conflict with younger colleagues to gain age-related benefit (8). However, social recognition of the positive role of older workers and positive intergenerational attitudes prevailing in companies, enforced decisions to stay. Today due to labour shortages many companies have introduced human resource policies to retain their employees which include reskilling and upskilling, diversity and inclusion, opportunities to participate in Corporate Social Responsibility (CSR) and volunteer programs, flexible working patterns, mentoring and reverse mentoring and events to acknowledge the loyalty and contribution of older employees.

ACTIVE AGEING, SILVER ECONOMY AND THE SILVER TSUNAMI

As years progressed, the concept of active ageing gained popularity as an answer to maintaining the health, the social involvement and the labour shortages of our shrinking and ageing population.

Active Ageing is defined as the process of optimizing opportunities for health, social participation and security in order to enhance quality of life as people age. The EC and WHO promote the idea of longer activity with a higher retirement age and working practices adapted to the age of the employee. Increased longevity together with declining birth rates have reversed the population pyramid. In 2018 the 65's surpassed the under under-fives for the first time in the history of humanity.

This is also affecting the economy of the future which has been labeled the Silver Economy (9). The Silver Economy includes all these economic activities, products and services designed to meet the needs of older people. Sectors as diverse a health, banking, social security, housing, leisure and tourism are facing the challenge of serving a population whose characteristics are more free time, demand for products and services adapted to their needs and more

healthcare services. More age-friendly digital devices will be required together with opportunities for training in new skills and new professionals and caretakers must be recruited and trained.

This unprecedented increase in older people is often referred to as the Silver Tsunami. As we all know a tsunami is a large wave that results in vast destruction and mass casualties. It is therefore preferable to use the term Silver Wave because a tsunami reminds us of a catastrophic phenomenon whilst longevity has many positive aspects.

By planning ahead and educating people in health prevention, by using innovative technology, by removing negative stereotypes about older people, by providing them with opportunities to stay active, we can take advantage of what the Silver Economy has to offer and help people live longer but better lives. Table 1 summarizes changes anticipated in various sectors of the economy in response to the silver economy.

Table 1. Changes due to the silver economy

Banking Sector	Low-Risk, Long Range Investments
Educational Sector	Adult /Continuing Education Programs
Telecommunications	User-friendly, easily accessible technology
Leisure Sector	Tourist and entertainment opportunities all year round
Health Sector	Preventive Medicine, expansion of health facilities
Social Assistance	Day centers, rehabilitation centers, fitness facilities
Labour Market	Recruitment and training of health practitioners, social workers, fitness practitioners for aging population

THE ROLE OF UNIVERSITIES AND RETIRED ACADEMICS

Universities and professors emeriti in particular can play a major role in addressing the issue of active ageing and there is much evidence about this (9). Some successful examples include:

- Offering courses to the local community in-class or distance-learning to strengthen attendants' resilience in coping with everyday situations and ways to improve their health, social participation and safety. A very good example is offered by Brazilian universities which, apart from lectures, workshops and group dynamics, offer a range of sport and leisure activities to their communities, thus providing a more holistic approach to active ageing.
- Lifelong learning in various scientific areas with the contribution of professors emeriti who can transfer their accumulated knowledge to wider

audiences willing to keep their minds active and learn new things. Lifelong learning has been promoted in several countries through universities of third age enabling retired people to remain active, take part in social life and establish relationships with others.

- Universities can take examples from human resource practices applied by companies, such as policies for upskilling and reskilling, diversity and inclusion, flexible working schemes, mentoring and reverse mentoring and ways to acknowledge the loyalty and contribution of their associates.
- Universities can organize and involve emeriti in opportunities for volunteer work in their communities. Acting as a volunteer can help a person substitute for the loss of role suffered due to retirement and find meaning in life together with social recognition. This is true both for retired employees and for retired academics.
- Emeriti can offer their advice through their associations or through their universities to not-for-profit organizations who often lack the expertise or the resources to accomplish their goals.
- Professors emeriti can lead the way in research about ageing, demographic challenges, ways to improve age-related inclusion and removal of stigmatization associated with old age.
- Professors emeriti can contribute with their experience and accumulated knowledge in finding solutions to all issues emerging from the Silver Economy as they themselves can better understand the needs of an ageing population.
- Above all they can continue lecturing and participating in research projects, often with the help of younger colleagues, in order to help them in the transfer of the tacit or implicit knowledge they possess, acting as mentors and role models for an age-inclusive society.

Table 2 summarizes activities which Universities and Professors Emeriti can offer to Society in an effort to support active ageing.

Table 2: The Role of Universities and Professors Emeriti/ae in Active Ageing

EDUCATION & TRAINING

General Knowledge subjects
Health prevention
Self-resilience & empowerment
Age related Fitness training

RESEARCH

Research in areas of existing expertise
Research on stereotyping and ageism
Research in diversity and inclusion
Research in silver economy issues

COUNSELLING & ADVISORY ROLE

Advice on Study Programs
 Advice on Research Programs
 Mentoring to Students
 Acceptance of reverse mentoring
 especially for digital skills

VOLUNTEERISM

Support to Non Profit Organizations
 Organization of Services to local
 Community
 Support to Cultural organizations
 Participation in University sponsored
 Corporate
 Social Responsibility (CSR) initiatives

CONCLUSION

In view of the demographic challenges facing our society, Professors emeriti can become champions of inclusion and promote the idea of age diversity by showing how intergenerational collaboration and transfer of accumulated knowledge and experience can help society. By participating in active ageing efforts, they can help both their communities and improve their own wellbeing, showing the way towards an inclusive society where age-related stereotypes have no place and intergenerational collaboration rather than conflict is the norm.

Universities at the same time should provide the necessary framework for the utilization of the accumulated capital of knowledge and experience possessed by retired academics.

References

1. European Commission, Population Ageing in Europe: Facts, Implications and Policies, 2014.
2. Eurostat, Fertility Statistics, 2016.
3. Cumming E, Henry W, Growing Old, New York: Basic Books; 1961, p. 227.
4. Havinghurst R, Successful Ageing, The Gerontologist, 1:8-13,1961.
5. Atchley RC, Continuity and Adaptation in Aging, Johns Hopkins University Press Baltimore, 1999.
6. Adams GA, Prescher J, Beehr TA et al. Applying work-role attachment theory to retirement decision-making, International Journal of Ageing and Human Development, Vol. 54 No. 2, 2002 pp, 125-37.
7. Chiu W, Chan A, Snape E, et al, Age stereotypes and discriminatory attitudes towards older workers, Human Relations, Vol. 54, 2001 pp. 629-61.
8. Desmette D, Gaillard M, When a worker becomes an older worker, Career Development International, Vol. 13, No. 2, 2008, pp. 168-85.
9. Greenlee K, Overcoming the Silver Tsunami, retrieved 9/4/22 from <https://generations.asaging.org/>
10. Koopman-Boyden P, MacDonald L, Ageing, Work Performance and Managing Ageing Academics, Journal of Higher Education, Policy and Management, Vol. 25, Issue 1, 2003, pp. 29-40.

ETHICAL AND LEGAL ASPECTS RELATED TO THE CONTRIBUTIONS OF EMERITI PROFESSORS TO THE PUBLIC GOOD

**Lucija Čok, Gregory Sadlek, Luigi Campanella, George Christodoulou,
Jože Gričar, Carole-Lynne Le Navenec, Heinrich C. Mayr**

Universities: Primorska and Maribor (Slovenia), Sapienza (Rome), Athens Medical School,
Alpen Adria (Klagenfurt, Austria), Calgary (Canada), Cleveland (USA)

ABSTRACT

As the lifespan of people increases, many retired citizens are now envisioning an increase of potentially active years during which they can use their talents to contribute to the public good. This is especially true for professors emeriti, retired university professors and researchers (ERPs), whose many years of study and professional experience are certainly a valuable resource for society. However, not all governmental or university policies make it easy or even possible for ERPs to remain fully active. This paper offers a review of the current professional situations of retired professors from the perspective of scholars from a number of countries in the EU and North America. In doing so, we hope to highlight facilitating factors as well as constraining factors faced by retired professors who wish to continue to contribute to the public good and, further, to suggest minimal university standards to enable these contributions.

Keywords: Emeriti professors; retired professors; teaching; research; IT services

INTRODUCTION

An increasingly commonly-shared conviction is that society should support all members of the academic community, including retired or emeriti professors, in their desire and efforts to contribute to the public good, i.e., non-profit contributions for the benefit of the public (1). However, the legal contexts within which ERPs in Europe and North America may accomplish this vary from country to country and even from university to university.

The three primary goals of our paper are: (i) to pave the way for advances by developing preliminary proposals regarding minimum university standards for involvement and support of ERPs across the EU, (ii) to prepare a joint statement

on the working status of ERPs and, (iii) to invite the EAPE leadership to prepare a memorandum on the issues highlighted in this paper.

Our overview illustrates the different realities faced by ERPs in Australia, Austria, Canada, Finland, France, Greece, Italy, Norway, Slovenia, and the United States. It is based on three different surveys of ERPs carried out by members of our team in 2021. Although the surveys were not comprehensive and statistically valid, we believe that they offer a valuable starting point for understanding the situations and opinions of ERPs in Europe and North America. The picture that emerges from this preliminary study confirms the experiences that have been discussed in the Emeriti Network.

GENERAL OBSERVATIONS ON LEGAL ISSUES AND EMERITUS STATUS

In a comparative study from six countries (Austria, Canada, Greece, Italy, Slovenia and United States of America), and based on the results of our Survey A, we tried to ascertain whether (i) universities and research institutes have criteria as well as benefits for emeriti that are defined nationally and (ii) whether laws exist in various countries prohibiting discrimination against seniors, including retired professors and researchers.

The procedures to gain professor emeritus status (PE) are generally in line with the requirements of relevant national legislation but may vary from university to university. They are clearly specified in some countries (Greece, Slovenia, USA) while in others the title is no more in use (Austria after 2004) or can be gained only after a long period of effort (Canada). In other cases, no sufficiently precise provisions for acquiring the title exist. In fact, many professors retire without knowing about the benefits of PE (2).

Opportunities as well as constraining factors for carrying out post-retirement activities such as teaching, mentoring, research, grant-seeking, university governance, and other professional involvement vary from university to university or from country to country. We review the specifics below¹.

Our general impression is that universities are not particularly enthusiastic about the continuing presence or activity of ERPs even if they had been university leaders. Other findings include:

1. Our findings are treated more fully in a paper posted on *eRegion*, a publication of the Professors Emeriti Network. <http://eregion.eu/Slovenia-professors-emeriti/> (3).

It can be partially confirmed that universities have nationally defined criteria as well as benefits for emeriti status, where such a designation exists. However, the process by which one is awarded the title may vary from university to university.

Laws or regulations prohibiting discrimination against seniors or retired professors and researchers exists only in select countries. In Europe, the formal and social status of PEs varies widely, reflecting cultural and traditional attitudes towards older people in general.

VARIETIES OF EMERITI CONTRIBUTIONS AND INTERGENERATIONAL COOPERATION

In this section we review current opportunities for retired professors to contribute through continuing research, teaching, mentoring, and university-level governance. Our comments are based on data from an online survey using the soSci tool (Survey B) as well as Survey A.²

The results can be summarized as follows: with regard to the continuing participation of ERPs in research, the Part B participants estimate that an average of 22% of their emeriti or retired colleagues are still active. The strongest research participation is observed in Australia and France. With respect to carrying out research, few respondents indicated that ERPs are authorized to carry out funded projects, except those involving support for PhD students. The rules that do exist mostly restrict the possibility of project management by an ERP. However, some allow an ERP to participate on project teams if allowed by the respective project donors.

Many respondents stated that they continue to have access, not only to their respective university libraries, but also to online databases. It is notable, however, that few reported that their universities have codified these practices.

With respect to continuing involvement of ERPs in teaching, almost all participants indicate that they may continue to teach at their institution. Respondents estimate that the number of ERPs involved range from 10% to a maximum of 30%. In some countries ERPs generally have the right to teach, while in other places this right is limited to a defined number of years after

2. <https://www.soscisurvey.de/admin/index.php>.

retirement and/or by the demands of local needs. In only about half of the cases reported are ERPs compensated for their teaching. Moreover, only a very small number of written regulations on ERP teaching were identified.

ERPs in general do not seem to play a significant role in academic self-governance, nor does this seem to be desired by their institutions and/or colleagues. Written rules regarding such participation are reported in only two cases, in Germany and the USA.

Beyond the university, ERPs serve as members of governmental advisory bodies, ministries, or cultural commissions, but they can never serve as official representatives of university units. ERPs may serve with a University Foundation, where they can contribute to cultural projects. ERPs also remain active as members of independent professional associations, such as the national emeriti associations (Canada, Slovenia), national or international organizations like the Modern Language Association or the EAPE (Slovenia, United States).

Given that we have assessments from ERPs in ten different countries, we can begin to draw a certain picture regarding their opportunities. Surprising to us, for example, were the low levels of ERP participation in teaching and research. While it is possible that large numbers of ERPs are simply ready to retire completely, we suspect that a constraining factor may be that there are hardly any defined rules for ERP involvement. Even across the universities in single countries, the rules for ERP participation can vary widely. In terms of teaching opportunities, ERPs in almost all countries are dependent on the goodwill of institute directors or deans. In addition, with respect to research, ERPs are generally allowed to lead funded projects for a transitional period at most, but they have no possibility of employing scientific staff. No country-specific conditions can be derived from the respondents' assessments.

SPECIAL PROBLEM: ACCESS TO IT

Probably the greatest challenge to certain groups among the ERPs with respect to necessary support services is the lack of availability of IT services and IT continuing education. To help us understand the current state of affairs, we asked the members of the Professors Emeriti Network to assist in helping us understand the IT policies of their universities (Survey C). We also searched university websites to find links to where the universities publish their IT accessibility policies for ERPs.

We found that policies on IT availability for ERPs vary widely among universities. On the one hand there are universities that offer ERPs³ continuing and unchanged access to IT. To the best of our knowledge, this is true for all retirees who have been granted emeritus status. This is not universally true, however, for those retired professors who are not emeriti. In all cases, the university administration independently determines the policy of access to IT for ERPs. From the published policies, it is not clear why some universities deny IT access to select ERPs. We did not find any justifications based upon some government measure or law for such restrictive policies. It is noteworthy that, as early as 1988, the American Association of University Professors recommended that retired professors should not be disadvantaged in their use of IT (4).

In summary, at some universities, a significant constraining factor with respect to ERPs' ability to contribute to the public good is the discontinuation of access to IT. In addition, since IT is becoming increasingly complex, another constraining factor is lack of access to IT training and support, which is often available only through the goodwill of the IT department⁴.

RECOMMENDATIONS

In the light of our findings and in accordance with the mission set by the European Emeriti Association, we conclude with some recommendations:

It is appropriate for the EAPE to seek to improve the legal and ethical aspects regarding the contributions of European PEs. The first step would be for the EAPE to focus on minimal standards and approaches for all universities.

Universities should publish, on their websites, the process by which one is awarded the title of Professor Emeritus/a.

An ERP's use of the university IT should be provided under the same terms and conditions as those enjoyed by regular employees. The rights to IT access of retired professors not having emeritus status should be the same as those of emeritus professors.

3. Gričar, Jože. 2022. Retired professors' entitlements for access to university IT. file:///C:/Users/Joze/Downloads/Retired-professors-entitlements-for-access-to-university-IT-March-2022-2%20(3).pdf

4. Details on the survey's results, Retired professors entitlements, 2022.

We suggest that Associations of University Professors, Rectors' Conferences, and similar organizations encourage their members and universities to establish age-friendly policies for the use of university IT after retirement.

The European Association of Professors Emeriti is invited to issue a *Position Paper on Retired Professors Entitlement for Access to University IT*.

CONCLUSION

The impressive abilities of ERPs to contribute to the public good are too valuable to be wasted through lack of opportunity. By highlighting various facilitating or constraining factors regarding issues and practices related to this group, we hope that our broad and international overview will serve as an impetus for continuing professional discussion. We are, thus, eager to help facilitate a future in which society fully benefits from the talents of those ERPs who wish to continue making contributions.

References

1. Albert, S. »Retirement: From Rite to Rights.« *Academe*. 72.4 (July-August 1986): 24-26.
2. De Santo, N. G. "Transparency and equity". International Sociological Association, 2013. <https://www.isa-sociology.org/en/about-isa/policy-statements>
3. "Retired professors' entitlements for access to university IT". March 2022. <https://eregion.eu/Slovenia-professors-emeriti>.
4. Fishman, S. M. "The Merits of Emeriti: Providing Campus Community to Retired Faculty". American Association of University Professors. May-June 2012. <https://www.aaup.org/article/merits-emeriti> (accessed 18 May 2022).

THE TRANSITION TOWARD THE ECOLOGICAL MODERNIZATION OF SOCIETY: WHICH CONTRIBUTION OF EMERITI PROFESSORS IN THE CONTEXT OF THE KNOWLEDGE ECONOMY?

Luigi Fusco Girard^{1,2}

¹Department of Architecture, University of Naples Federico II,
Via Roma, 402, 80132, Napoli, Italy

²Institute for Research on Innovation and Services for Development,
National Research Council (CNR-IRISS), 80134 Naples, Italy
e-mail: luigi.fuscogirard@gmail.com

ABSTRACT

In the general “entropic” context we live, which possible role can be proposed for Emeriti Professors?

The thesis here is that Emeriti Professors can provide not only a contribution to the elaboration of new technical/scientific knowledge but (first of all) in contributing to the civic culture, proposing interpretative criteria of the current reality and its evolutionary dynamic: for critical thinking, for distinguishing the true from the false, the right from the wrong, the good from the bad. Thus to contribute to offer a vision of reality and of its desirable future with respect to which to elaborate new better choices, becoming able to transform data, information, knowledge into wisdom.

The role and mission of the Emeriti Professors proposed here is in particular to contribute in the direction of enhancing and operationalizing the “transformative potential of the city for the common good”.

Keywords: Ecological modernization; knowledge economy; common good; third mission

INTRODUCTION

The thesis here is that Emeriti Professors can provide not only a contribution to the elaboration of new technical/scientific knowledge but in contributing to the civic cultural forming, operationalizing the “*transformative potential of the city for the common good*” (1). Thus to contribute to offer, more generally, a vision of reality and of its desirable future with respect to which to elaborate new better

choices, regarding the ecological/digital transition and the distribution of costs and benefits.

In which way? lacking shared values and shared priorities?

The contribution of Emeriti Professors can be proposed in general in the twofold directions aimed at contributing to produce new knowledge of excellence (to achieve for example the objectives of the 2030 Agenda (2), and also for stimulating the critical discernment capacity, to promote the value of autonomy and freedom not detached from any reference to responsibility/relationality/general interest: to share the values of solidarity, inclusion, community, grounded on trust. Trust is the force that holds together a society: that produces a community (3).

This proposal, framed in the Third Mission of the University, relaunches networks of all educational agencies, starting with the schools.

“Third mission” aims in general to implement a circular virtuous process/relationship between the city and the University, thus strengthening the interactions between the “ivory tower” of the Academy and the city in which it is inserted. In short, the “Third mission” creates a bridge between the University and a plurality of other players well beyond the students of the University system: companies, associations, professional representatives, public bodies, operators in the financial system and various institutions. But also should be able to build a bridge between “high culture” and “current culture”.

The two perspectives of the Third mission are: – the direct economic valorization of knowledge and research for productive purposes, i.e. for the transformation of knowledge into useful knowledge; – the production of cultural and social values through the production of public goods that contribute indirectly, especially in the medium and long term, to increasing the well-being and quality of life in the city.

Here we would insist on this last aspect. It is linked to the production of cultural public goods outside the academic context with the aim of contributing to local development.

The result is an improvement in the capacity for collaboration and cooperation between different actors, which in turn is based on the regeneration of the value of trust.

The starting point should be, in any case, the 2030 Agenda: climate change, energy transition, environmental pollution, growing social inequalities and so on are all over the world the new common challenges to be faced as soon as possible, for promoting development.

But the role of Emeriti Professors should be to contribute to give a “human dimension” to the local development. The “human dimension” is linked to the capacity to generate an environment characterized by values as cooperation,

collaboration, inclusion, capacity to take care of others and of nature, reducing social inequalities, generating new jobs, enlarging the time horizon.

The enhancement/valorization of the European cultural heritage can become a starting point for what has been defined as the “*transformative potential of cities toward the common good*” because of the multidimensional consequent impacts and benefits.

The proposed interpretation of the third mission falls within the framework of this “transformative potential of cities” referred in the above European Union document on the promotion of an *ecological, productive and just city*.

The city is the space of creativity, of pluralism, of systemic interdependences.

In short the city is the space where it is required to contribute not only to the production of the most effective tools for achieving the 2030 Agenda goals but also to the production of a culture of transformation/transition. This culture addresses the ecological/economic/social issues from a technical point of view but also offers a perspective of meaning to society, i.e. a direction in which to go, interpreting culture as a fundamental energy generator of transformation, able to shape a more desirable future.

The need is to regenerate the commitment of each inhabitant to pursuing values that contribute to the general interest, regenerating their critical and civic spirit: taking care of each other and also of the natural ecosystem, thus guaranteeing the good of each individual but also the common good.

In order to regenerate a culture capable of promoting attention to the common good, the ‘category’ (or the perspective) of the city helps because it stimulates convergence / attention to the general interest of the city, to the good of all, putting in relation the “particular” and the “general” interest of people: public services, decent house, good environment, jobs, quality of life.

The city is the space of competition and also of cooperation in the search of common interests. It is the space where the “particular good” and the “general good” meet together: converging and/or conflicting. Where not only creativity/innovation is concentrated, but above all where the ability to stay together, that is to say where the social capital, or the community, is experimented and built. In fact, the city represents the project of mankind in the relational dimension where civic virtues are educated, for example by creating significant forms of public debate and participatory processes ; where deliberative democracy is experimented.

In fact, culture is at the heart of any sustainable development strategy: through culture the city defines its identity and learns from past and ongoing experiences and thus improves its ability to adapt to change, cooperating with the extra-urban context, i.e. with all the different actors.

The principle of subsidiarity referred to in the European Constitutional Charter of Maastricht (4) finds its most effective implementation in the city.

Urban design and planning becomes fundamental tools for realizing the principle of (circular) subsidiarity and thus for improving the well-being and quality of life of all, interpreted as the overall objective of any city transformation/transition for development.

Health/well-being/quality of life is the general aim of development.

THE CONTRIBUTION TO THE “HUMAN SCALE” OF DEVELOPMENT: TOWARDS THE CIVIC CULTURE OF COOPERATION/PARTICIPATION

Initiatives and investments, projects and plans for transformation/development towards ecological modernization from the national institutions must be supported also “from below” in order to improve their effectiveness.

In fact, the real challenge today is ‘inside’ people: it is an ‘inner’ challenge, in the way of thinking of every subject that must be enriched and modified in a systemic and critical perspective.

The above means helping to build a public opinion, a critical conscience on the territory in the era of the explosion of social networks that guarantee nothing in this sense.

This means, first of all, helping to promote participation as a tool through which to achieve the common good, i.e. a fairer city, capable of guaranteeing equal opportunities for all; a greener city, i.e. capable of incorporating nature as its most important infrastructure by regenerating the capacity to produce ecosystem services (by improving nature-led solutions that safeguard biodiversity and the well-being/health at all scales); a more economically prosperous city (by transforming urban areas into sites capable of attracting new activities).

The above translates in particular into a renewed focus on co-programming and co-planning processes in the new city participation arenas/spaces.

But it also means new attention to the ethical dimension of urban design/planning as a fundamental ground for achieving the general interest of the city itself: the well-being and the health of all its inhabitants.

Also the new dramatic conflicts confirm that the fundamental challenge today is ‘humanization’, i.e. the preservation of a human dimension. This human dimension seems to have been lost. Instead, it must be “resurrected” with determination.

Humanization refers not only to the well-being and health of people or to the participation to public choices. It refers also to the common roots of European culture:

as the search of meanings for a more human life (linked to the vision of the human being characterized by an “intrinsic value” which reflects his dignity). European cultural heritage reflects the above and can contribute in the above direction.

The Third mission to which Emeritus Professors should contribute, is in particular, to help toward an effective ecological transition based on a human scale: on responsibility, on cooperation, trust and not just on technical and/or technological tools (necessary but not sufficient).

The trust we are talking about is the interpersonal one, the one between citizens and institutions, between generations (5). But it is first and foremost trust in oneself, in one’s own traditions, in one’s own identity. Trust that the status quo can be transformed into a more desirable one, as so many good practices show in practice. Trust, that is the connective force of the society, produces community and “humanity”.

WHICH POSSIBLE ROADS?

Here we want to propose a specific perspective: the valorization and management of local commons as the entry point for contributing to the production of a civic culture, toward a neo-humanistic development. Examples of commons are the cultural urban and natural assets.

The historical centers of cities are particular areas characterized by a human scale. Historic districts “contain” an extraordinary equilibrium that is the secret itself of their attractiveness (6).

This particular equilibrium offered contrasts the general disorder of the industrial city and of perimetral metropolitan quarters. Ancient districts show how the particular interest of individuals and the common interest have been creatively combined in a specific relationship between private (residential/commercial) spaces and public spaces (squares intended for social /civic relations).

Operationally, and in particular to contribute to the human scale of urban development, it is necessary to:

1. regenerate public spaces, transforming them into places, i.e. spaces that are recognized as having a specific meaning by the community;
2. to regenerate common goods (represented for example by the architectural/artistic/cultural/landscape and heritage (located in the historic centres) – as expression of an extraordinary balance between private and public spaces/interests;
3. to regenerate networks of social/civil relations, i.e. community;
4. to regenerate work/employment as a fundamental expression of personal dignity;

5. to change the mentality of the inhabitants, transforming them into active/participant citizens (and not spectators) capable of co-production, co-creation, co-operation in the choices that concern the general city interest, capable of co-programming, co-design and co-planning;

6. to regenerate the resources and energy that the city needs by promoting circular economy strategies, imitating the organisation of nature's economy, thus guaranteeing the well-being/health of each one (7).

In short, the ecological transition and the neo-humanistic paradigm require for their effective implementation both 'green' and financial tools, both but also cultural processes.

The circular economy model that characterises the ecological transition not only proposes a new urban metabolism, but is also based on and proposes a culture of cooperation - collaboration with many actors in the spatial and temporal dimension (see the experiences in industrial symbioses).

The culture underlying the circular model creates links in space and time. This culture is able to orientate the ecological transition in the perspective of the human scale of development, combining ecological and human dimensions.

The ecological transition in the perspective of the humanistic paradigm should be the great theme around which to mobilize public opinion in the European countries. And therefore also the general theme to which Emeritus Professors can contribute.

Ecological transition certainly means adopting the model of a circular economy as the model for sustainability/self-sustainability: new energy sources, nature recognized as the main infrastructure that supports all human activities, clean air, health and well-being of human beings and of ecosystems. But not only that. Circular economy means recover, re-use, regeneration of used materials, thus activating the second hand market. Circular economy requires and means cooperation.

In more operational terms: the valorization of cultural heritage is here proposed as the entry point for the implementation of the circular city model, i.e. as a spatial-territorial aspect of the circular economy, characterized precisely by a human scale (8).

The real "added value" to be achieved in the here proposed interpretation is consequent to the fact that the enhancement and the management of cultural heritage strengthens and promotes the culture of collective memory in a circular process: in the temporal dimension, that is, between past, present and future. And also in the space dimension.

The above for determining a stimulus to the regeneration of the values of inclusion, solidarity and integration. These values are not “given” but must be regenerated as quickly as they are consumed, as happens in nature. Otherwise they will be lost.

The above represents a concrete perspective that opens up to contribute, within the framework of the Third mission of the University: to the promotion of a human scale of development, through the production/regeneration of cultural values starting from the enhancement of cultural heritage located in the city/territory system, as an implementation of the principle of subsidiarity. Through taking care of cultural assets as commons, to be managed as common goods.

The implementation of the constitutional principle of subsidiarity in the city is a key step.

In Italy, an operational juridical instrument to regenerate these cooperative/civic values in line with the subsidiarity principle is incorporated in the art.118 of the Constitutional Law (last comma). It can be operationalized by some specific tools. The “Collaboration pact for a shared administration” (9) is an example. It generates community values, mutual trust, self-organization and self-sustainability. It expresses strong attention for humanistic values, moving towards the paradigm of ‘human-centered development’.

“Collaboration Pacts for shared administration” are an effective entry point for participatory processes, public engagement, co-design and co-programming in conservation/valorization/management of built cultural assets and urban parks, gardens, historic sites. They are based on (and in turn regenerate) the value of trust and the ability to critical evaluate the results achieved. They represent a very useful tool to be promoted both with the University and with educational institutions, schools of different degree and local administrations.

Another possible contribution of Emeriti reflects to the role within the framework of the “public debate” (the one that accompanies major works/investments). This is a procedure that requires, first and foremost, the absolute independence of the coordinator together with a high evaluation capacity.

Following the French example of the Commission Nationale du Debat Public, a new instrument of participatory democracy/deliberation has also been introduced in Italy, with the aim of improving the quality of participatory processes in the identification of project choices for projects of major interest (10).

Other contributions by Emeriti Professors can be proposed to collaborate in achieving the desirable and sustainable city for example through the proposal of Participatory Budgets (11).

But there is a specific condition. The contribution of the Emeriti Professors can be of particular effectiveness to the extent that they are really recognised in the existing context as “competent and independent” subjects.

Thus they can help to regenerate immaterial, i.e. cultural energy. Culture is the fundamental energy for any transformation.

Cultural values, starting with the value of trust, must be regenerated starting with the contents of the United Nations 2030 Agenda, because the 17 strategic objectives represent the common good of humanity in the current historical context at different scales.

The ground to build a bridge between citizens and institutions is represented by a shared culture of evaluation, i.e. by transparent and “third-party” evaluation/co-evaluation processes, attentive to the long term, attentive to the Common Good, i.e. to the interests of all subjects, open to the analysis of systemic interdependencies between impacts in all different dimensions (12).

The evaluation culture contributes to the production of a civic culture, for a better human life in cities because it stimulates a critical approach about priorities and satisfying alternatives.

CONCLUSION

The European built environment incorporates historic/cultural/civic/economic/spiritual values. They determine the particular European landscape/heritage and its specific identity. European cultural city heritage has a high transformational potential. Its wise management moves toward a civic formation of different subject, of students and of all inhabitants.

References

1. EU, The New European Leipzig Charter, 30 November 2020.
2. UN, Agenda 2030 for Sustainable Development, 2015.
3. Genovesi A. Lezioni di Economia Civile, Napoli, 1765.
4. EU, Treaty on European Union, Maastricht (Consolidated version), 1992.
5. Zamagni S., Zamagni V., La Cooperazione, il Mulino, 2008.
6. Fusco Girard L., Verso una nuova economia: il contributo del patrimonio paesaggistico/culturale, in Bobbio R. Editor, Bellezza ed economia dei paesaggi costieri, Donzelli, 2016.
7. Fusco Girard L., Trillo C., Bosone M. (editors), Matera, Città del Sistema Ecologico Uomo/Società/Natura, Giannini, 2019.
8. CLIC Horizon Research project.
9. Labsus 2015, Regulations for cooperation between citizens and local government, for the care/regeneration and shared management of urban commons, Roma.
10. DM 12/11/2021, n 442; DPCM 10/5/2018, n 76; DL 31/5/2021, n 77.
11. Allegretti G., L'insegnamento di Porto Alegre, Alinea, 2003.
12. UN Habitat, New Urban Agenda, 2016.

ABOUT THE “ASSOCIATION OF PROFESSORS EMERITI FRIDERICIANS” (APEF) WITH A LOOK TO THE FUTURE

Carlo Lauro

Professor Emeritus University Federico II, President of APEF

e-mail: carlo.lauro@unina.it

ABSTRACT

The Association of Professors Emeriti of the Federico II University (APEF) is a non-profit association that, in a subsidiary perspective, intends to carry out voluntary work in the service of the community, inspired by the values of solidarity, fairness, civil and social awareness and environmental sustainability.

According to its Statute, APEF is configured as a scientific and cultural laboratory whose objective is to offer an intellectual service to the University, to society and to institutions.

The “added value” of the Association is represented by the contribution to the study of issues that affect the future of our society and that are connected in particular to the “third mission” of the University.

Keywords: APEF; professors emeriti; University third mission; subsidiarity

INTRODUCTION

With the aim of making available to institutions and civil society the fruit of their knowledge and experience acquired over decades of teaching and scientific work in one of the oldest universities in the world, 16 professors emeriti of the University of Naples Federico II, following the example of similar initiatives at national and international level, on September 4, 2018, established the Association of Professors Emeriti Fridericians (APEF) (1).

Currently, the Association consists of 83 ordinary members consists of 83 ordinary members (29% Social and Humanities Sciences, 30% Polytechnics and Basic Science, 41% Life Sciences and Biotechnology).

APEF is a non-profit association that, in a subsidiary perspective, intends to carry out voluntary work in the service of the community, inspired by the values of solidarity, fairness, civil and social awareness and environmental sustainability. While continuing to carry out scientific research, professors

emeriti are ready, if requested, to support university and post-graduate training. It will not replace tenured professors in this function, but will broaden the field of interdisciplinary research through cultural initiatives of social interest with educational purposes, provide elaboration and implementation of projects aimed at preventing and combating school and university drop-outs, give assistance to young people in the transition from secondary school to university, offer intellectual support to graduates for the start of their work; make promotion in society of the culture of legality and the protection of human, civil and social rights, as well as cultural integration and the reduction of inequalities.

In this perspective, the APEF proposes to collaborate first of all with the Federico II University, grasping its statutory spirit, for which, according to art. 2, para. 10, of its Statute, *“the University contributes to the development of culture, of the social and economic welfare and of the productive level of the country, also through forms of collaboration with national and international, public and private entities which promote cultural and research activities (2).*

APEF RELATIONSHIP WITH THE FEDERICO II UNIVERSITY

The University:

- hosts the headquarters of APEF for meetings of the Council of the Association and meetings of working groups;
- periodically makes a classroom available for APEF assemblies, conferences and seminars;
- hosts on the University website information and activities of the Association (Statute, list of members with brief biographies, communications on the activities and digital publications of APEF and Forums);
- may participate with its own structures in joint projects on the institutional activities of APEF as per art. 2 of its statute, but also in other activities, if of interest, or future projects to be defined, according to the modalities of art. 2 para. 2 of the statute of APEF and, if necessary, on the basis of appropriate agreements, art. 14 para. 1.
- appoints a special delegate for relations with APEF.

Through its Departments, the University:

- encourages the enhancement of the scientific relations of the emeriti with the colleagues of the University, supporting, in particular, interdisciplinary initiatives;

- promotes the involvement of the emeriti in departmental research and in activities of support to teaching (supplementary lectures, seminars, tutoring/coaching of doctoral theses) and in cultural and social initiatives;
- favours emeriti in the use of departmental facilities such as libraries, computing resources, and research laboratories, in order to carry out research activities;
- provides visibility to the research activities of professors emeriti on the University and Department websites;
- maintains, for APEF, e-mails and PEC addresses.

OUR ACTIVITIES

Our activities are listed in detail on the Association's website (<https://www.apef.unina.it>). Despite the pandemic due to Covid-19 which limited our work, the APEF has carried out various initiatives that have been successful among the members but also in our city to which the topics dealt with were often dedicated. Among them are the following: round table (hybrid): "What future in the Piano Nazionale di Ripresa e Resilienza/ National Recovery and Resilience Plan for Naples as a sustainable city?"; videoconferences: "Covid-19 infection in Italy: geriatric aspects" : "Cities for all: the ecological and human-centred development strategy of metropolitan cities: the circular city model in the Covid-19 context"; joint conference : "Inversion of the paradigm between aging and disease"; webinars : "The circular economy for a new development of the South: the role of cities as laboratories for change"; the enhancement of research seminars: "Sustainable development and culture of sustainability from the circular economy to the circular city", "Health and well-being: don't add years to life but life to years", The role of scientific research in the South for overcoming territorial inequalities" ,"Reflections for a new university system"; Lectio_Magistralis : "Knowledge does not age" .\

THE FEDERICO II's "ROSTA"

The APEF's vision is well summarized by the "rosta" (fanlight) located on the main doors of Federico II, which we have taken as our symbol. Originally, this architectural element had the function of bringing light into the entrance halls, which are usually not very bright. In some manner its role can be assimilated by way of access to the university world for the instances of culture, and nevertheless for the real-life experiences that come from society in a broad

sense. At the same time, in a symmetrical way, we can suppose “rosta” to be the path to convey knowledge and values, matured inside the university, to the society itself. It is in this dual function that the “rosta” acts as a sort of osmotic cell in which the role of professors emeriti can be fully exercised.

CONCLUSION

The Association of Professors Emeriti of the Federico II University is configured as a scientific and cultural laboratory whose objective is to offer an intellectual service to the University, to society and to institutions.

1. The mission of the Association is not in competition with the academic roles of teaching and research at Federico II, but is complementary to it, being oriented to contribute to its statutory objectives in a subsidiary logic, through unconventional methodologies of interdisciplinary research, but also contributing to the growth of civil consciousness of students (according to art.2 of the Statute of Federico II), as an indispensable element for democratic, social and economic development.

2. The “added value” of the Association is represented by the contribution to the study of issues that affect the future of our society and that are connected in particular to the “third mission” of the University. In this respect, APEF, by making available its human capital of knowledge, proposes:

- to offer contributions to the city and society in general, the interpretation of megatrends (such as aging, migratory phenomena, new technologies and their impacts on well-being, environmental protection, etc);
- to give a contribution to public and social institutions on aspects concerning the great challenges of the present and future in relation to sustainable development. These challenges have been identified and placed in the form of strategic objectives in the United Nations 2030 Agenda for Sustainable Development. For these achievements the university system is at the very heart of their implementation. That is the place where the new knowledge of excellence indispensable for tackling the great challenges of the 21st century is produced.

I conclude this resume of our Association by referring to a paper published in the EAPE bulletin three years ago, written with Natale G. De Santo, trying to answer the question “*Professors Emeriti: still the invisible academics?*” (3).

The final answer to this question was “*we are inclined to think that visibility will be regained*”. Since then, APEF has worked to pursue this goal. We stated in

the above mentioned paper that *“a relevant role can be especially played by our Associations, called not only to valorise traditional emeriti’s activities aimed at qualifying the human capital (Education), and for producing new knowledge (Research), that correspond to the University first and second missions respectively, but also by involving themselves in new scenarios regarding the so called third mission, according to which universities are more and more engaged with societal and market demands. Current government policies tend to favour such a mission guaranteeing great funding for this role”*.

The pandemic is now behind us so we can resume our journey with more and more strength and collaborating with international (EAPE) and national associations that share our goals. For this it seems appropriate to make full use of Dante “E quindi uscimmo a rivedere le stelle/ And thence we came forth to see again the stars” (Divine Comedy, The Hell XXXIV, 139)

References

1. APEF Statute, <http://www.apec.unina.it/statuto.htm>
2. University of Naples, Federico II, <http://www.unina.it/ateneo/statuto-e-normativa/statuto>
3. De Santo NG and Lauro C. Professors Emeriti: still the invisible academics? The role of Associations of Emeriti, EAPE - European Association of Professors Emeriti e-newsletter, Issue 05, April 2019

LIFE AND ACADEMIC ACTIVITIES OF PROFESSORS EMERITI AND RETIRED PROFESSORS IN THE UNIVERSITY OF MARIBOR

Presenting Author: **Mičetić-Turk Dušica^{1,2},
Šikić Pogačar Maja², Turk Zmago¹**

¹Professors Emeriti Network University of Maribor, Centre for Professors Emeriti and Retired
Higher Education Teachers

² Medical faculty University of Maribor, Maribor, Slovenija
e-mail: dusanka.turk13@gmail.com

ABSTRACT

University professors go through a long developmental path from graduate students to the academic title of professor. On this path, the most delicate period is retirement. The age of 65, which is approximately the same as the retirement age, is supposed to be the onset of old age. Today, when we live longer and healthier, irreparable damage would occur if society and the state didn't take advantage of the knowledge, wisdom and skills that senior professors have accumulated throughout their careers. The vast majority of senior professors can still contribute and participate in the development of society. We present the results of a survey regarding the academic and life activities of professors, members of the Center for Retired Professors and Professors emeriti of the University of Maribor. The results show that the vast majority were still active in academic life and contributed to the development and functioning of the University.

Keywords: Professors emeriti; retirement; life and academic activities

INTRODUCTION

Population aging is one of the most pressing political issues in the 21st century. Life expectancy has increased in recent decades thanks to better living conditions, better medical care, new technologies in medicine and better healthcare in general.

The culture of modern society glorifies youth and youthful appearance as an ideal to be worshiped throughout life. The marketing of beauty and youth is extremely active, the social pressure to be in 'good shape' without wrinkles and

extra pounds is strong! In real life, the image of older people in our country is widespread, where the deterioration of physical and mental abilities progress and their contribution to society decreases. They draw from society instead of contributing and they are unable to adapt to new technologies. Last, but not least, they spend huge funds on healthcare and long-term care (1-3).

The age 65, the retirement age in most developed countries, represents the onset of old age. Retirement is defined as the completion of a job or career, usually in late adulthood, due to the age or length of service required for retirement. It is the time of termination of employment with the simultaneous commencement of receiving a pension, which represents a milestone in an individual's life. Retirement brings various psychological, social and economic changes in the life of the retiree, so it cannot be perceived solely as an objective event, and coping with retirement strongly depends on personality traits, professional role, social networks and self-image.

OBJECTIVE OF THE RESEARCH, POPULATION AND METHOD

The aim of our research was to assess the academic and life activities of retired professors of the University of Maribor.

The study involved 50 retired professors from the University, of which 34 were men (68%) and 16 women (32%), age ranged from 64 to 87 years.

For the purposes of the research we designed an anonymous questionnaire which covered three different areas. The questionnaire was prepared with online application and it was distributed to the study participants through e-mail. Data were collected from January to March 2021 and statistically processed using IBM SPSS 27.0 (IBM Corp. Armonk, NY)

RESULTS

The mean age of participants included in the study was 76.2 ± 5.7 ; for men it was 78.2 ± 4.9 years and for women 71.9 ± 5.1 years (range from 64 to 87 years). The largest number of the participating retired professors had 40 years of service (48%), fewer had 45 years of service (26%), and the least number of the participants had 35 years of service (10%); eight (16%) of retired professors who participated had 50 years of service. Participants of the study had been retired for an average of 10.1 ± 5.4 years (from 1.5 to 27 years). The results showed that retired professors mostly lived in their own houses (64%) and their pensions were sufficient for the lifestyle they enjoyed in retirement (88%).

Table 1: Academic work of participating professors

	n=50	%
Field of education/working		
Humanities	4	8.0
Medicine	13	26.0
Art	0	0.0
Natural sciences	4	8.0
Social sciences, law and economics	14	28.0
Technical and environmental sciences	18	36.0
World religions	0	0.0
Area change and interdisciplinary work	22	44.0
Attending scientific and professional meetings	32	64.0
Attending scientific or professional conferences	15	30.0
Member of the committee for defending doctoral dissertations	19	38.0
Reviewer of research projects	13	26.0
Reviewer of articles in domestic scientific or professional journals	22	44.0
Reviewer of articles in international scientific or professional journals	19	38.0
Writing recommendations for younger colleagues	26	52.0
Member of habilitation commissions for election to academic titles	14	28.0
Working as researchers	17	34.0
Leader of a research project	3	6.0
Subject holder in Faculty	15	30.0
Lecturing to the same extent as before retirement	7	14.0
Lecturing to the lesser extent as before retirement	13	26.0
Lecturing in foreign language	12	24.0
Being invited lecturer at a foreign university	7	14.0

Legend: n=number of answers,%=share

These results show that retired professors were still quite active and more than half still attended scientific and professional meetings (64%), while 15 (30%) of them still attended conferences. 26 (52%) stated that they still write recommendations for younger colleagues and 7 (14%) of them are still lecturing as invited lecturers at foreign universities.

The study also assessed the health status of the retirees. Our results showed that most of the participating professors enjoyed a normal mixed diet (n=45; 90%). Retired professors also enjoyed dietary supplements; 8 (16%) of them

were taking probiotics; 19 (38%) were taking vitamins and 5 (10%) of them antioxidants.

Half (50%) of the participants had a diagnosis of chronic disease, 6 (12%) suffered from high blood pressure, 4 (8%) had diabetes, and 13 (26%) declared having other chronic diseases. 32 (64%) wore glasses; normal hearing was reported by more than a half (56%).

Table 2: The social life of retired professors

	n=50	%
	Yes	
Do you always insist on your rights	26	52.0
Do you feel that your rights have been violated due to age	6	12.0
Do you feel discriminated because of your age	4	8.0
Do you say what you think	40	80.0
Hobbies		
painting	0	0.0
literature	7	14.0
sport	9	18.0
politics	2	4.0
music	4	8.0
other	20	40.0
no answer	8	16.0
Do you devote more time to reflection and spirituality	28	56.0
Activities during the day		
you get up in the morning the same as always	29	58.0
you get up later in the morning	15	30.0
no answer	6	12.0
Do you still have a valid driver's license	41	82.0
Do you still drive long distances	32	64.0
Do you avoid driving long distances	14	28.0
Do you take advantage of "senior" discounts in stores	21	42.0
Do you attend cultural events	38	76.0
Do you attend events at a university or college	37	74.0
Do you travel to distant places		
on your own	24	48.0
organized	12	24.0

no answer	14	28.0
Social contacts		
with family members	42	84.0
with colleagues	34	68.0
with friends	39	78.0
different interest circles	1	2.0
on social networks	1	2.0
What sport do you do?		
walking	36	72.0
exercise	11	22.0
hiking	10	20.0
cycling	11	22.0
swimming	13	26.0
organized sports	3	6.0

Legend: n=number of answers,%=share

26 (52%) of retired professors stated that they insist on their rights. Only 6 (12%) believed that their rights had been violated due to age, and 4 (8%) of them felt that they are discriminated in some way due to their age. More than a half of retired professors kept their work rhythm as during their active years and continued waking up in the morning as before retirement (58%).

The results show that retired professors were still traveling long distances (64%), attending cultural events (76%), faculty and university events (74%) and still travelling to distant destinations on their own (48%) or organized (24%). More than a half of participants (56%) devoted more time to reflection and spirituality in retirement.

They also stated that they have more time for reading philosophical literature, for regular recreation and sports, for long nature walks (72%), music and ate a healthy diet. Some are engaged in forensic expertise. Others devote more time for working in the garden, vineyard, and have more time for family (84%) and friends (78%).

DISCUSSION

Retired and professors emeriti most likely represent privileged retirees. They had had a secure and solidly paid work, received a good pension and, most importantly, most did their job with joy, in constant contact with young,

bright students, whose questions needed to be answered according to the latest scientific knowledge.

Many retired professors belong to the »baby boom« generation that has aged, fulfilled the conditions for retirement but still, more or less, postpone retirement. In their professional and academic paths, they have developed a lot of intellectual and social capital, have international scientific and friendly connections around the world through which they can help younger colleagues open paths to the world of science. Therefore, it would be expected that these »veterans« are strategically involved in serving the University. What an great pity it is not to take advantage of such intellectual capital!

The fact that we live longer and healthier than the generations before us is also reflected in the results of our research, which showed that the majority of the retired professors were in good health and still quite active with more than half of them still attending scientific and professional meetings and conferences. Some of participants still lectured at foreign universities as invited speakers.

In November 2019, a group of retired professors of the University of Maribor established the Center of Professors Emeriti through which long and hard-earned experience and knowledge will be used in a new way of contributing to the development of the University and society.

CONCLUSION

Retirement causes changes in life, but this does not mean that creativity and energy dry up. They only need to be redirected and continue to have and achieve goals in life, because whoever has »what« to live for, carries almost every »how« (4).

The results of our research showed that the majority of retired professors are still academically active and associated with the University of Maribor. We identified the following main categories of activities in retirement - *dedication to family and friends, continuation of academic life and use of knowledge and experience in a different way and in a different field.*

References

1. Aronson L. Elderhood. New York, NY: Bloomsbury, 2019.
2. Grewe W, Bjorklund D.F. The Nestor effect: Extending evolutionary developmental psychology to lifespan perspective. *Developmental Review*, 2009, 29, 163-179.
3. Hall J.G. Continuing contribution of older academics, *Am J Med Genet*. 2020; 1:11
4. Frankl E.V. Yes To Life In Spite of Everything. Rider; 1st ed., 2020.

THE HUMAN CAPITAL OF AGE

Presenting Author: **Luigi Santini,**
Olimpio Guerriero,
Stefano Sepe

University Luigi Vanvitelli, Naples
e-mail: luigi.santini@unicampania.it

ABSTRACT

In the last century mean life-span increased significantly, mainly due to (i) progress in basic science, medicine, surgery and above all pharmacology and (ii) generalized improvement in living conditions due to welfare, housing standards and mobility. Social politics also improved by protecting pensions in aging without really protecting the capability of the aging persons to be productive. A kind of discrimination towards knowledge of aged persons that should be considered a resource rather than a weight for general economy. There is a need for a National and European Authority aiming to promote full utilization of memories, knowledge and wisdom of older persons. Memory is a primary value of social and cultural identity of the community where we live: for Marc Bloch (1886-1944) it is impossible to understand the present without knowing the past. Competence is the patrimony of new knowledge acquired over the years (professions, arts, crafts).

Keywords: Trans-generational pact, social treasure, Covid-19 pandemics, memory, cultural identity

INTRODUCTION

At the time of the Covid-19 pandemic all those who have experience and are willing to collaborate should be invited to contribute to abolish the discrimination and the injustice that affects the young generation. Thus professors, entrepreneurs, freelance in profession, experts in technology and agriculture, should work together with those who care for the young generation in order to build a strong and new transgenerational pact aiming to fully use the energy of the young generations as well as the experience of aged persons.

Thus, we have to make full use of the fundamental elements turning senior persons into “a social treasure”. In the last century – especially in the most economically advanced societies – mean life-span has increased to an extent never recorded in the history of humanity. This phenomenon is the result of a series of factors: from scientific advances in the medical, surgical and pharmacological fields, to the improvement of living conditions obtained thanks to the support of the welfare state. In reality, however, social policies have often been limited to pension support, rather than facilitating full integration of the elderly in the socio-economic context. In this scenario – in which public financial resources tend to become more and more of a limitation – the elderly, or rather the old people, for public organizations responsible for health care and assistance, are often perceived as an entity in their own right, as if they were a burden rather than a resource (1). Furthermore, in recent decades, the growing economic crisis has led governments to reduce social spending in some crucial sectors such as health and education, making it difficult to guarantee levels of performance appropriate for the needs and the demands of less-protected segments of society.

THE SOCIAL FUNCTIONS OF CRISES

As the history of people teaches, crises have the social function of highlighting personal or community circumstances that otherwise one would not have the courage to face. With regards to the life of the elderly, this is exactly what happened: due to Covid-19 they entered the cone of light of collective attention and, on this beam of light, aggression arose (the old man who steals work and wealth from the young, the old who cost so much for health services, the old who with their conservative position prevent the cultural renewal of their country, etc.), but also moments of strong defence of the role of the elderly in the family and community, up to the demonstrations of affection. Without the old we cannot live, because it would be like cutting off our roots.

In summary, the dramatic experience of the pandemic has made the existing contradictions even more evident, radicalizing their effects. The elderly have sometimes been sentenced to death early, perhaps even for triage evaluations, knowingly ignoring that the elderly are all of us, potentially or actually.

BUT HOW MUCH IS A LIFE WORTH?

To answer this question, in the early stages of the pandemic, the British magazine “*The Economist*” provided a rational answer, in line with the great tradition of

Anglo-Saxon utilitarianism according to which “the good is the greater happiness of the greatest number of people”. This objective can certainly conflict in some cases with the happiness of the “least number”, in our case the victims of the pandemic, in the context of a crude cost-benefit assessment regularly performed in British hospitals. Certainly, there are cases in which a community is forced to choose “the lesser evil”, as in a war or an epidemic. And in the early days of the Covid pandemic, this newspaper reported that letting the virus do its part by distributing death and immunity could have cost 1 million more deaths in the US, but trying to save them would have cost \$60,000 per family! Such an amount seems to be the price of life in affluent American society!

In Italy, the opposite path was chosen, with the politically-declared goal of saving the greatest number of people, at any cost! This orientation is linked to the universalistic and solidarity conception of our National Health Service, as well as to compliance with Article 32 of the Constitution which includes the protection of health among the primary tasks of public authorities. We are convinced that it was the right choice and not only for moral reasons but also because the current risk of death does not seem to be comparable with the threat of a possible future economic recession. Furthermore, the commitment to protect everyone, from the rich to the poor, from the young who risk less to the elderly who risk more, strengthens social cohesion (2).

In this context, the role and commitment of doctors and health personnel in tackling the pandemic emerged clearly. There has been a large number of doctors who, for their old age, if they were not in the healthcare role, should have stayed home to minimize the risk of exposure. Instead, they kept going to work every day.

During the pandemic, it was reassuring that a large number of old doctors (3,4) took care of the patients. The decades of knowledge, experience and relationships with colleagues have been more than ever necessary to intervene with an adequate professional background to face the tremendous emergency resulting from the large number of patients hospitalized with Covid-19. These clinical leaders proved to be an essential and vital component, especially as they typically had experience of disasters, triage, complex decision making and personnel management. Thus, when some of these older doctors were infected, the consequences were significant, not only in terms of loss of their clinical experience and presence when it was most needed, but also of loss of leadership and coordination (5).

RETIRED DOCTORS ASKED TO RETURNING TO WORK

It is also known that older retired doctors were asked to consider returning to work during the epidemic (6,7,8) and many of them have joined and some have made themselves available spontaneously. In all cases, their contribution was invaluable, from consulting for the younger staff, to evaluation of the use of resources and to their willingness to solve complex clinical and organizational problems.

The experience of these difficult years necessarily imposes reflections. Institutions should carefully consider how best to protect and preserve their workforce, with careful consideration aimed at involving and valuing older doctors and nurses as well.

The changes in our society – according to research by ACLI (9) – have made the figure of the elderly essential both within the family nucleus and at the social level to the point of defining it as “social capital”: the elderly are often still able to produce a lot, through their ability to work, to do business, but also as simple actors of welfare implemented within families (economic support, practical services, etc.). If we reduce their capacity for life, we also lose these contributions to collective life. The same research found that a large part of the over 65s “can’t stand” being called elderly. The valuing of the elderly must necessarily go through the promotion of “active aging” initiatives. An example of this is the Veneto regional law significantly entitled “Law for the promotion and valuation of active aging”. It allows the elderly to work as volunteers, with a reimbursement of expenses, in some activities of social utility. This allows, moreover, a fruitful integration between the elderly and the young. An example is the opportunity that young people in turn have in helping older people in the use of new technologies.

Therefore, on a general level, it is necessary to reflect on how to better evaluate the human capital of age, in all areas of the Country’s social life. Only in this way the goal of maximizing the potential of the elderly can be achieved (10).

In many sectors of the Italian public service, authorities or regulatory agencies have been established with the task of ensuring the widest protection of citizens both in the economic and social fields. Consider, as an example, the authority on privacy, the antitrust authority, and the authority that controls the energy market. It is surprising that it was not considered appropriate to create an ad hoc body for the elderly with the task of providing guidelines, indicating policy objectives, coordinating operational interventions and adopting measures aimed at the possible contribution of the elderly in the civil and cultural progress of the

country. In some countries there is a special ministry dedicated to this function. In Italy it is appropriate (if not urgent) to consider the possibility of a proper solution. There are two possibilities: an independent authority from the government; or a government agency, located within the Presidency of the Council of Ministers.

CONCLUSION

The issues to be resolved in order to enhance the “social heritage” of the third age are many and complex, but they must be addressed without hesitation.

The future horizon proposes again what Immanuel Kant wrote in the “Foundations of the Metaphysics of Morals”: “Act in such a way that you always treat humanity, whether in your own person or in the person of any other, never simply as a means, but always at the same time as an end”.

References

1. Abbate F. I vecchi, con le bandiere al vento salveranno la nostra umanità. Il Fatto Quotidiano, 2020-04-05.
2. Polito A. Ma quanto vale una vita? La via inglese e quella italiana. Il Corriere della Sera, 2020-04-05.
3. Modern Healthcare. Two emergency physicians in critical condition after becoming infected with Covid-19. Published March 15, 2020. Accessed March 20, 2020. <https://www.modernhealthcare.com/providers/two-emergency-physicians-critical-condition-after-becoming-infected-Covid-19>.
4. Centers for Disease Control and Prevention; Covid-19 Response Team. Severe outcomes among patients with coronavirus disease 2019 (Covid-19)—United States, February 12–March 16, 2020. *MMWR*. 2020;69(12):343-346. doi:10.15585/mmwr.mm6912e2.
5. Buerhaus, P I, Auerbach, D I, Staiger D I. Older Clinicians and the Surge in Novel Coronavirus Disease 2019 (Covid-19). *JAMA* Published online March 30, 2020 doi:10.1001/jama.2020.4978.
6. WIFR TV. Pritzker asks retired physicians, doctors and nurses to come back to work during the Covid-19 outbreak. Posted March 21, 2020. Accessed March 23, 2020. <https://www.wifr.com/content/news/Pritzker-asks-retired-physiciansdoctors-and-nurses-to-come-back-to-work-duringthe-COVID-1o-oubreak-568997121.html>.
7. Norman G. Fox News website. Britain asking 65, 000 retired nurses and doctors to return to work to help fight coronavirus. Posted March 20, 2020. Accessed March 23, 2020. <https://www.foxnews.com/world/britain-coronavirus-retired-nurses-doctors>.
8. Marsh J; New York Post. In one day 1000 NYC doctors and nurses enlist to battle Coronavirus. Posted March 21, 2020. Accessed March 23, 2020. <https://nypost.com/2020/03/18/in-one-day-1000-nyc-doctors-and-nurses-enlist-to-battlecoronavirus>.

9. Fap ACLI, una ricerca sugli anziani come “Capitale Sociale”. XXVI Congresso Naz ACLI, Venice, 2018-04-28.
10. Trabucchi: M Gli anziani: verso una cultura dello scarto? Istituto della Enciclopedia Italiana, founded by Giovanni Treccani, 2020-11-15.

A PORTRAIT OF THE ARTIST AS AN OLD MAN PATHS AND SECRETS OF CREATIVE LONGEVITY IN MUSICAL ART

Vincenzo Viccaro

Nuova Orchestra Scarlatti, Naples, Italy

e-mail:enzo.vic60@libero.it

ABSTRACT

The aim of this work is to reverse the perspective of the title of Joyce's 'Bildungsroman' – *A Portrait of the Artist as a Young Man* – by comparing some Western composers characterized by a fruitful longevity of life and creativity, to try to extract some key words for a first draft of an 'Identikit of the Artist as an Old Man'. Literature on the subject is scanty, perhaps because research in this field has been trapped in the gravitational field of the romantic myth of the precocious or prematurely deceased genius (such as Pergolesi, Mozart, Schubert). By an initial investigation of some emblematic cases of longevity, some notable traits emerge, such as creative resistance, cosmopolitanism, humanism, irony, eclecticism, ethical passion, pedagogical eros. Also, a common characteristic seems to emerge: the ability to transform the challenge of time into a chance for a creative synthesis between old and new things.

Keywords: Longevity; music; history; art; psychology

INTRODUCTION-FOR AN IDENTIKIT OF THE LONG_LIVED ARTIST

The title of this work reverses that of the famous 'Bildungsroman' by James Joyce, *A Portrait of the Artist as a Young Man*, in which the young Stephen Dedalus (alter ego of the writer) gives birth to himself as an artist in a progressive path of liberation through the secret ways of 'silence, exile and cunning'. Reversing Joyce's perspective, I try to extract some key words for a first provisional sketch of an 'Identikit of the Artist as an Old Man', by comparing some Western long-lived musicians - from the seventeenth century of Monteverdi to today - in whom the lifespan has been accompanied by an uninterrupted creativity and a real capacity for continuous renewal.

Literature on the subject is scanty, perhaps due the prevalence of the romantic myth of the prematurely deceased genius (such as Pergolesi, Mozart, Schubert).

PATHS OF CREATIVE LONGEVITY-MUSIC

Dealing with the crisis

When Claudio Monteverdi entered the seventeenth century, he was the most advanced European composer: in his vocal madrigals he overturned the millennial relationship of subordination of word to music, finally putting music at the service of the expression of the poetic text. With this Copernican revolution he faced the catastrophe that inaugurated the modern era: the Thirty Years' War that plunged Europe into a global crisis, economic, demographic, social, cultural, spiritual, between epidemics and witch hunts.

The Renaissance image of a social harmony (reflection of the harmony of the spheres), of which the petrarchist madrigal had been the sound symbol, collapsed (1). Claudio, who from 1613 was at the service of the Republic of Venice, in 1638 dedicated to Emperor Ferdinand III his 8th book of madrigals: 'warriors' and amorous'. Like an old Ulysses, at the age of 70, he faced the open sea of experimentation: music followed poetry and took on a form 'in progress', seething, harsh, full of dissonances and sensational instrumental effects such as the 'tremolo' of the strings, the so-called 'stile concitato', exalted in *The Combat of Tancredi and Clorinda*, a great dramatic madrigal taken from Torquato Tasso's *Gerusalemme liberata* (2). The dying madrigal was resurrected in a modern theater of passions. The 'concitato' style finds a parallel in the swirling movement of the oil on canvas *Consequences of War*, an *ante-litteram* Guernica by Peter Paul Rubens: Monteverdi and Rubens, in old age, responded to the global crisis by looking to the future.

Eclecticism and Classicism

A century later, we find again humanism and creative generosity in the German Georg Philipp Telemann: perhaps the most prolific composer of Western music with a huge catalog of over three thousand compositions. Telemann was an extraordinary eighteenth-century pop star, capable of an eclectic synthesis of French elegance, Italian cantability, German constructive rigor, Slavic colour, according Enlightenment cosmopolitanism. Born in 1681, around 1760 Telemann was still composing while Haydn was about to become the father of Classicism.

Franz Joseph Haydn in his Sonates, Quartet, Symphonies transformed the Baroque geometries into a language capable of expressing all the gradations of feelings: with Haydn psychology entered music. In 1791 the sixty-year-old musician left for London, to get back into the game in front of the most advanced and demanding public in Europe. And he triumphantly won the challenge with his latest magnificent 12 London Symphonies, that starting from a basic thematic material achieved the greatest variety of invention, movement, surprise: maximum yield that reflected the productive ideals of the industrial revolution. In 1795, the year of the last of his 104 Symphonies (3), Haydn was the ‘youngest’ of European composers! Another great old man, Goethe, in *Kunst und Altertum* (‘Art and Antiquity’) saw in Haydn a synthesis of the characteristics of genius: ‘ingenuity and irony’, that is balance between art and life: the secret of the Olympic longevity of the classical artist, like Haydn and Goethe himself.

On the other hand, not a few romantic artists were precociously worn out by an excess of identification between art and life, often somatized in the romantic illness par excellence: phthisis. (As Susan Sontag reminded us, illness is always a great metaphor) (4).

Intergenerational co-creation

But in that same romantic century, Giuseppe Verdi found the secret of longevity in a rigorous ethical conception of art. When in 1863 the twenty-one-year-old poet and musician Arrigo Boito, the most gifted exponent of the Milanese Scapigliatura (‘scapigliati’ meant ‘dishevelled’) – a handful of young poets, artists, intellectuals inebriated by a certain easy bohemian faustism - in a goliardic ode accused the fifty-year-old master of having smeared the altar of art “like a brothel wall”, Verdi felt struck in the ethical value of his art, the authentic soundtrack of the Italian Risorgimento. But time was preparing an incredible revenge! Around 1880 Arrigo Boito finally understood that the only one in Italy able to realize his difficult ideals of fusion between music and scene was the old Verdi. As Massimo Recalcati observes, in life there is no fruitful heresy without inheritance (5), and so in art. Boito reconciled with his ‘father’ Verdi and became his formidable right-hand man as a librettist.

The younger offered the older his intact intellectual energy, the older realized the goals of the younger by applying this renewed energy to his artistic magisterium: an exemplary case of intergenerational creative collaboration, which produced the gems of *Otello* (in 1887), a masterpiece of dramaturgical and musical coherence

(6) and *Falstaff* (in 1893), the miracle of Verdi's eighty years. For *Falstaff*, Boito gave him a libretto (from Shakespeare) that was a sparkling invention: the spirits of the subversive irony of the Scapigliatura, once pointed at him, now had become the weapons by which Verdi reinvented himself in an amazing style, which suddenly went from transparent nuances to portentous symphonic waves, from Rossini to Wagner, and at times prefigured Puccini (7): a syncretism between tradition and innovation that is typical of the late style of some great artists.

Tradition and avant-garde

Talking about longevity in music, one cannot fail to mention Igor Stravinsky, the demiurge of modern twentieth-century music. In 70 years of an inexhaustible experimental eclecticism, this irreverent Picasso of music had fun shuffling the cards between tradition and avant-garde, between fauvism, neoclassicism, twelve-tone music. The masterpiece of his 84 years: *Requiem Canticles* (1966), for alto and bass soli, chorus, and orchestra (8), envelops us in a hypnotic compendium of all his previous styles; Stravinsky mixed rigor and lightness, in the sense of Paul Valéry's famous verse: "il faut être léger comme l'oiseau, et non comme la plume" ('one must be as light as the bird, and not as the feather'): a lucid lightness, the secret of the last Stravinsky.

On the path of lightness, we meet the long-lived musician par excellence: the American Elliott Carter, who was born in 1908 in New York and died in his beloved city (dynamic and cosmopolitan like him) in 2012, just before turning 104 years, lived until the last day in intellectual and creative fervor (Fig.1). After an energetic neoclassic phase, in the fifties his inspiration converged in a deep stylistic remediation. There was no longer a sound flow with a linear temporal direction (the one that we have found, to be clear, from Monteverdi to Stravinsky); one was suddenly immersed in a kaleidoscopic 'sound multiverse', animated by a superimposition of divergent musical lines, with rhythms, speeds and directions independent of each other: so, for example, in *A Symphony for Three Orchestras* of 1977, evoking the cosmic 'infinite dance' of the Latin poet Lucretius. (9). Crossing this grandiose complexity, Carter's latest works reached a 'second-level' simplicity (typical of many long-lived artists), such as we find in *Epigrams* for piano trio (2012), composed at almost 104 years of age (10): a concentration of sudden sound illuminations in an atmosphere of freedom and dream.

The history of music has for centuries been declined to the masculine. Now we begin to discover the very rich world of women composers (11), from

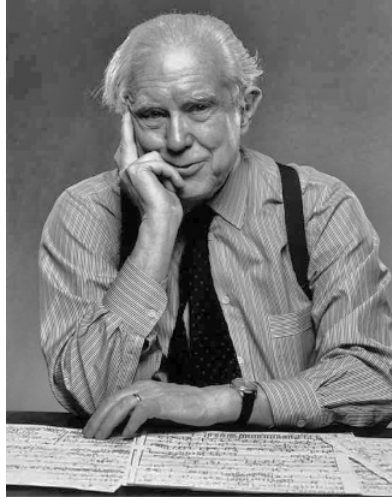


Fig.1: Elliott Carter

Hildegard von Bingen, poet, theologian, mystic, scientist and musician of the twelfth century, to Sofia Gubajdulina, a great spiritual witness of our time. Crossing this theme with that of longevity, we find the great Nadia Boulanger, born in Paris in 1887 and died here in 1979 at the age of 93: enfant prodige, in 1918 Nadia abandoned creativity to give others her extraordinary musical science. In about 70 years of activity in Europe and the United States, she was the beloved teacher of composition of thousands of classical and non-classical musicians: from George Gershwin to Philip Glass, the father of minimalism; from Elliott Carter to Leonard Bernstein; from Astor Piazzolla, the prophet of the new tango, to Herbie Hancock, an icon of modern jazz. She did not impose patterns; she made each one grow according to his individual talent: a unique case of maieutic generativity in art.

CONCLUSIONS: THE FORCE OF LONGEVITY

Through this very rapid overview some significant traits emerge, such as the ability to transform an epochal crisis into an opportunity for radical renewal, for example in Monteverdi; qualities of intellectual and human generativity, as in Telemann's cosmopolitanism; irony and humanity in Haydn; the ability to make creative syntheses between opposites: between tradition and avant-garde

in Stravinsky, between complexity and simplicity in Carter; and then, long-lived passions: for example the ethical passion in Verdi and the pedagogical eros in Nadia Boulanger. And a constant fact emerges that, according to James Hillman, we may define ‘the force of character’ (12), that is an idea of character as a fundamental energy that governs and unifies individual existence: an ‘aesthetic style’ even more than an ethical one, and for this reason we can try to transpose it on an artistic level, as strength and coherence of creative energy. If a strong personal identity is not afraid to open up to the other self, by analogy, a strong artistic identity should be able to welcome the change of the times not as a threat, but as a chance for a creative syncretism between tradition and vision of the future: a characteristic not exclusive, but that we certainly find in the late style of all the long-lived artists mentioned here, all active experimenters of their long time. Really, as Eliot wrote: “the old ought to be explorers”.

References

1. Bianconi L. *Il Seicento (Storia della musica vol. V)*. New ed. Turin: EDT; 1991. p. 3.
2. Monteverdi C. *Il combattimento di Tancredi e Clorinda (8th Book of Madrigals)*. Le Concert d’Astrée Abbaye de Saint-Denis; 2008.
<https://www.youtube.com/watch?v=xd13sePBlpU> (accessed April, 23, 2022)
3. Haydn F. J. *Symphony in D major No. 104 ‘London’*. Vienna Philharmonic Orchestra / B. Haitink; 2012. <https://www.youtube.com/watch?v=OitPLIowJ70> (accessed April 23, 2022)
4. Sontag, S. *Illness as Metaphor and AIDS and Its Metaphors*. Penguin Classics; 2003.
5. Recalcati M. *Il complesso di Telemaco. Genitori e figli dopo la morte del padre*. 5th ed. Milan: Feltrinelli UE; 2016. p. 121-144.
6. Verdi G. *Otello*. Pesko/Atlantov/Te Kanawa /Cappuccilli. Arena di Verona.
<https://www.youtube.com/watch?v=ETsneoOfOIA&t=4s> (accessed April 23, 2022)
7. Verdi G. *Falstaff*. Harding/Terfel/Frittoli/Polverelli/Giordano. Munich, Philharmonie im Gasteig; 2017.
<https://www.youtube.com/watch?v=6CcGi4E3fuQ> (accessed April 23, 2022)
8. Stravinskij I. *Requiem Canticles for contralto and bass soli, chorus, and orchestra*. Berliner Philharmonic Orchestra /Jurowski.
https://www.youtube.com/watch?v=2cFwu196A_w (accessed April 23, 2022)
9. Carter E. *A Symphony of Three Orchestras*. P. Boulez / New York Philharmonic Orchestra.
https://www.youtube.com/watch?v=5_kBl_xzpQM (accessed April 23, 2022)
10. Carter E., Weilerstein A. *The Last Interview. When Alisa met Elliott*. New York; July 2012.
<https://www.youtube.com/watch?v=1stGn4NA-tU> (accessed April 23, 2022)
11. Venezi B. *Le sorelle di Mozart. Storie di interpreti dimenticate, compositrici geniali e musiciste ribelli*. Turin: UTET; 2020
12. Hillman J. *The Force of Character*. New York: Random House; 2000. (Italian ed. *La forza del carattere*. Milan: Adelphi Edizioni; 2000. p. 31)

ACCADEMIA PONTANIANA: A BRIEF HISTORY

Giuseppe Marrucci

President, Accademia Pontaniana, Napoli, Italy

e-mail: marrucci@unina.it

ABSTRACT

As long ago as in 1443, Alfonso V of Aragon, new King of Naples, founded the Pontaniana Academy. The second President of the Academy was the humanist and literary man Giovanni Pontano, from whom the Academy takes its name. However, just a century later, in the troubled times of the Protestant Reformation, the Academy was felt to be politically dangerous, and it was suppressed by the Spanish Vice-King, Peter from Toledo, in 1542. The Pontaniana Academy was born again more than two centuries later in 1808, when the Neapolitan Kingdom was part of the Napoleon Empire. In the new atmosphere of freedom, a group of intellectuals under the leadership of Vincenzo Cuoco re-founded the Academy, which then succeeded in surviving the Restoration, i.e., the coming back of the Bourbon king. The Pontaniana Academy went on successfully up to the present day, with the exception of difficult times in the last years of the fascist regime, resulting in yet another (masked) suppression, followed by a second restoration under the Military Government of the Allies in 1944. Today, the Pontaniana is made up of the following five classes: Pure and Applied Mathematics, Natural Sciences, Moral Sciences, History, Archeology, and Philology, Letters and Beaux Arts. The academicians of these classes meet once a month, to support communication among the different disciplines.

Keywords: Pontaniana; academies; Alfonso of Aragon; Vincenzo Cuoco

INTRODUCTION

Not much is known on the history of the Pontaniana Academy because the library of the Academy, with all the documents and archives, was burned down by the retreating Nazi army in 1943. We report here the main known facts. For a more detailed information on the Neapolitan academies, we refer to the book of Fausto Nicolini, first printed in 1957, and reprinted in 2017 with some additions (1). Further readings on the Pontaniana Academy are found in other academic publications (2, 3).

THE ORIGIN

The Academy was founded in 1443 by the Aragon King, Alfonso the Magnanimous, new king of Naples. Hence, the Pontaniana is thought to be the oldest academy still active to this day. The first President was Antonio Beccadelli, called Panormite, who had, in common with King Alfonso, an admiration for the Roman historian Titus Livius. After the death of the Panormite in 1471, the President was the great humanist and politician Giovanni Pontano, to whom the Academy owns its name.

In 1516 the Kingdom of Naples ended, and was replaced by a Spanish vice-kingdom. A notable President of the Academy during the vice-kingdom was the poet and humanist Jacopo Sannazzaro, author (among other things) of the famous *Arcadia*. It is worth noting that, a century later, in 1690, inspired by the poem *Arcadia*, a new Academy with this name was created in Rome. There, a few years before (in 1603), the botanist Federico Cesi had created the now famous *Accademia dei Lincei*. He adopted a naturalistic, scientific approach, quite different from the humanistic one of the Pontaniana and of the *Arcadia*.

In 1542, when the protestant reform had conquered many places in northern Europe, the Vice-King Pedro de Toledo, worried by political and religious matters, decided to close the center of independent thinking represented by the Pontaniana academy. The Academy was then suppressed; it had lasted almost-exactly a century of glorious life.

THE REBORN PONTANIANA

Two-and-half centuries later, in 1808, during the French rule of the Neapolitan kingdom, the Pontaniana Academy came to new life. The first president was the writer, historian, economist, and politician Vincenzo Cuoco. This reborn Pontaniana was now multi-disciplinary, that is, both humanistic and scientific.

Although created in the French period, the new Pontaniana survived the Restoration and the return of the Bourbons. Ferdinand the First honored the Casalanza treatise and recognized the Academy, which he located in S. Pietro a Maiella, no longer a convent.

The Academy had some difficulties under the next Bourbon king, Francesco the First, because of the uprising of the Carbonari sect in 1820 asking for a liberal Constitution. But later, peace was made with King Francesco, and in fact, under the following king, Ferdinand the Second, the Academy flourished. Among other things, the Pontaniana members contributed significantly to the Seventh Congress of Italian Scientists, held in Naples in 1845, fifteen years

before Italy was politically united (in 1860-61) under the constitutional Savoia Kingdom.

THE LAST CENTURY

Moving on to more recent times, it is worth mentioning that the renowned philosopher Benedetto Croce, a member of the Academy since 1892, was very active in the Pontaniana for many decades. He published innumerable important papers in the *Acta* of the Academy. Under the influence of Croce, the Pontaniana was increasingly critical of fascism, and, consequently, the fascist Government eventually suppressed the Pontaniana, masking the suppression by incorporating the Pontaniana into the Academy of Moral and Political Sciences, at the time more aligned to the prevailing politics.

Following the landing of the Allies in Salerno, who were marching towards Naples, and probably in retaliation of the uprising known as the Four Days of Naples, on September 30, 1943, the retreating Nazi army burned down most of the State Archive and the library of the Academies. A great loss.

Finally, the Allied Military Government, adopting the requests of Croce, fully re-established the Pontaniana Academy on February 19, 1944. The members who compromised with the Nazi-Fascists were fired, and the surviving Hebrew members were reinstalled, as well as the few members that had not sworn adhesion to the fascist rules. The new President (up to 1949) was the famous chemist Maria Bakunin.

The present-day Pontaniana is made up of 5 classes with a total of 300 members, elected in three categories: Residents, non-Residents, and Correspondents. The 5 Classes are as follows:

1. Pure and Applied Mathematics
2. Natural Sciences
3. Moral Sciences
4. History, Archaeology, and Philology
5. Letters and Beaux Arts

Once a month, all five classes meet in a common assembly, so that members of different disciplines can fruitfully exchange their experiences.

CONCLUSION

During its whole life, the Pontaniana Academy has been a place of free thinking, and because of such quality it was suppressed twice. In the present troubled times,

it is the hope of all academicians that the tradition of independent thinking might remain.

References

1. Nicolini F. Cenni storici (1957), reprinted in *Annuario dell'Accademia Pontaniana*, 2017.
2. Pugliano G. *Le Accademie napoletane di via Mezzocannone. I restauri dell'antica Sede e la rinascita del secondo dopoguerra. Memoria dell'Accademia di Archeologia, Lettere e Belle Arti*, Napoli, 2012.
3. Nazzaro AV. *La Società Pontaniana e un diploma del 1811. Atti dell'Accademia Pontaniana*, 2018, 67, 187 - 194.

THE NEED FOR A UNIFICATION OF “KNOWLEDGE” IN MEDICINE TO PROTECT THE PATIENT

Goffredo Sciaudone¹, MD

Carlo Melodia²

¹ University of Campania “Luigi Vanvitelli”, Naples,
President Società Nazionale di Scienze, Lettere e Arti in Napoli, Italy

² President Associazione per la libera Università di medicina Omeopatica, LUIMO Naples, Italy
e-mail: studio.sciaudone@libero.it

ABSTRACT

Eurispes and WHO data from 2019 revealed an increase in the demand for unconventional medicines: 600 million citizens with about 500,000 doctors in the world. More than 76% of requests are for homeopathy. In Italy, the practice of non-Conventional. Medicine (NCM) is the exclusive responsibility of the medical doctor registered with the professional association and the drugs are on the AIFA (Agenzia italiana del farmaco, Italian drug agency) lists. From all this emerges the need for a multidisciplinary training of health professionals that overcomes the limitation of only the specialist areas of competence, in order to recover a unitary vision of the patient. We will retrace the historical events that saw Naples (1821) as the first city in Europe, to encounter homeopathy and to welcome it at the Academy of Sciences (1822), then to develop it and transmit it to the rest of the world. In the contemporary era, from the 1980s, the need for a cognitive investigation into homeopathy and homeopathic medicines in Italy emerged, also to conform to the European reality. This path saw us present the active support of many Institutional Authorities who had understood the need to recover the figure of the patient in his state of illness. For this purpose, and motivated by exclusive ethical interest, for many years, in the respective roles of competence, we have been engaged in the training of the homeopathic doctor using, in addition to a group of classical homeopathy teachers, a large group of University Professors, not only from medical disciplines, to guarantee a capacity for judgment at the service of the patient according to Hippocratic indications.

Keywords: Naples, crossroad of Homeopathy; 1822; Royal Academy of Sciences and Homeopathy; homeopathy and the role of Naples; The University of Naples and Homeopathy; regulation of Homeopathy in Italy

INTRODUCTION

Medicine has always aimed at one goal-treating the sick person in line with the indications of the doctrine of Hippocrates, according to the aphorism *observatio et ratio*.

The art of medicine was born as a humanistic discipline that uses science; it is by definition a human science. Already in the Renaissance era, Thomas Sydenham, the English Hippocrates, taught his pupils not to focus on the theory of the disease but to engage in the practical clinical needs of the patient (1). Sticking to a strictly specialized medical approach, disease is defined as a nosographic entity. But when doctors extend their unitary observation to the historical subject as a whole - who carries the disease - it becomes difficult to confine the disease within a specialist's boundaries, given the peculiar way it resonates with the organism and the sensitivity of the patient, the human person. Eurispes and WHO data from 2019 reveal an increase in the demand for unconventional medicines: 600 million people with about 500,000 doctors in the world. More than 76% of requests are for homeopathy (2). These figures indicate that a growing number of people are turning to physicians with a humanistic training who consider illness as an essential aspect of every patient's unitary synthesis of mind, body, and relations; at a time when doctors are increasingly moving away from the clinical practice with the patients, relying uncritically on the statistical theory of disease (3).

THE HISTORY OF HOMEOPATHY AND THE ROLE OF NAPLES AND THE ROYAL ACADEMY OF SCIENCES (4).

The "homeopathic medical system" was born in Germany in 1796, during the Age of Enlightenment. The new medical paradigm was the result of years of study and research by its founder, C.F.S. Hahnemann (1755-1843), a famous scholar, chemist and physician. For his perfect knowledge of chemistry, he was appointed as *Stadtphysicus*. He controlled medicines and their preparation in Germany. Then, in 1786, he became coroner in Dresden and published a work dedicated to Kaiser Joseph II entitled "On arsenic poisoning: its treatment and forensic investigation" (5). This work marked the transition to a new era, paving the way to more effective analysis and methods to identify poisoning from arsenic, which was often contained in the complex drugs of the time. Later, Hahnemann drew from Hippocrates the notions of the sick human being, of *vis medicatrix*-small doses of medicines taken sparingly, of hygiene and of the

principle of similarity. Hahnemann then experimented, first on himself, then on healthy subjects, taking some natural substances in small doses to study their pharmacological properties and to be used to treat patients, by similarity (6).

In 1801, the journal “*Medical Observer of Naples*” was the first in Europe to publish the news of the “*cure and prevention of scarlet fever*” in central Europe - at the time devastated by epidemics - using *homeopathic Belladonna* (7).

This news aroused the curiosity of the historian, philosopher and academic Melchiorre Delfico who shared them with his intellectual circle, among whom we find Francesco Romani, doctor and pupil of Domenico Cotugno.

On March 23rd, 1821, Austrian troops escorted Ferdinand I of Bourbon to Naples to protect the monarchy from revolutionary uprisings. The Austrian military doctors officially practiced homeopathy as Matthias Marenzeller, chief physician of the Austrian army, was a homeopath and Karl Philipp, Prince of Schwarzenberg, Austrian Feld-Marshal, was treated homeopathically since he was a patient of Hahnemann himself.

The Royal Academy of Sciences of Naples played a central role in promoting the new medical system that was then practiced by hundreds of physicians of the Kingdom under the protection of the Royal Family.

After the revolutionary thrust in 1822 was quelled, the Austrian General Von Köller, for diplomatic purposes, visited the Royal Academy and made a gift to the academics “of the Organon of the Art of Healing” and Hahnemann’s “*Materia Medica Homoeopatica*”.

The representatives of the Royal Academy felt, in this political-cultural operation, an act of relaxation and of mutual recognition and, in response, wishing to express a proactive interest, commissioned Dr. Alberto di Schoenberg, an Austrian military doctor, to go to Hahnemann to learn more about the foundations of the new doctrine, bring them to Naples and make them known to the doctors and professors of the city. On his return, Schoenberg made a learned presentation on the basic principles and homeopathic methodology at the Bourbon Academy: “The medical system of Dr. Samuel Hahnemann”, exhibited at the Royal Academy of the Sciences of Naples and edited, published and printed, in 1822, by the Royal Academy itself.

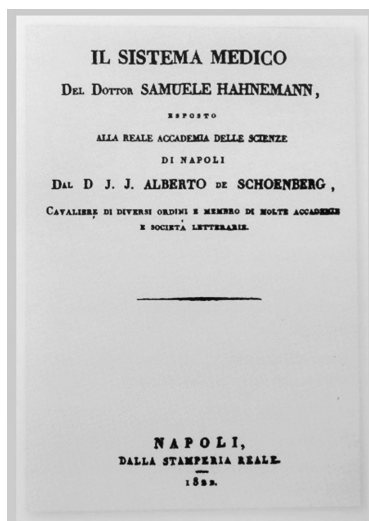


Fig. 1. “The Medical System of Doctor Hahnemann

ILLUSTRIOUS DOCTORS CONVERT TO HOMEOPATHY, THE CENTRAL ROLE OF NAPLES

Many physicians converted to homeopathy; we remember:

C.M. de Horatiis, director of the Surgery Department of the University of Naples, who became the homeopath of King Francis I of Bourbon and director of the Royal Institute of Vaccines. The position was assigned to him for the affinity between Jenner’s principle of similarity and Hahnemann’s homeopathy. Francesco Romani, a pupil of Domenico Cotugno, became the leader of homeopathy in Italy and trained numerous physicians from various regions. Naples became the crossroads of homeopathy in the world:

Germany–Austria
↓
Naples
↓
France
↓
England ÷ Sicily ÷ Brasil
↓
Rest of the world

From Naples homeopathic medicine arrived in France through Dr Sebastiano de’ Guidi, a pupil of Francesco Romani, who founded a school of homeopathy in Lyon.

Then, homeopathy spread to England thanks to Dr Frederic Hervey Foster Quin, who came to Naples to learn from George Necker from Melnik, near Prague, who had opened a homeopathic ambulatory department in Naples. In 1844 Quin founded the British Homeopathic Society, to which he was elected President. In 1850, the Royal London Homeopathic Hospital was built.

In 1875 Tommaso Cigliano was appointed professor of homeopathic medicine at the University of Naples. He was very well known in the world for his research work on the treatment of 40 cases of childhood leukemia with homeopathy. This paper was published in the “Omiopatica” journal in Rome in 1876. The work on “Linear Leukemia observed in children and treated homeopathically gave Cigliano the Honorary Degree in Homeopathy from the medical Faculties of New York and Philadelphia (8).

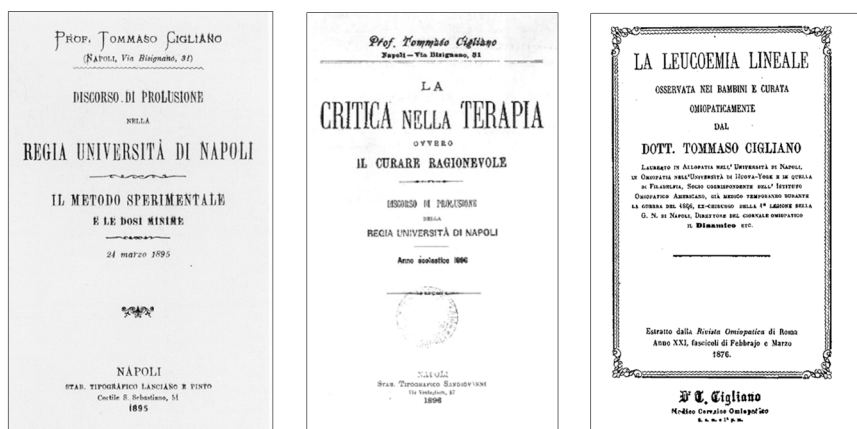


Fig. 2. Books written by Tommaso Cigliano, professor of homeopathic medicine at the University of Naples

POSITIVISM AND THE RETURN TO THE CENTRALITY OF THE DOCTOR

Since the early twentieth century new technologies have been developed, with breakthroughs in biochemistry and electron microscopy, and even molecular complexes such as DNA can be visualized.

Pharmacology has developed antibiotics, then steroids, replacement therapies and more recently pharmacogenomics and biological drugs.

Meanwhile homeopathic medicine, based on the clinical observation of the patient and on drugs administered in small doses, prescribed according to the principle of similarity, has progressively been considered outdated and has remained as a sort of prerogative of few doctors who have preserved it. However, nowadays, as evidenced by statistical data, people are turning again to homeopathy as they look for person-centered medicine based on the administration of small doses.

Among the illustrious homeopaths who were the custodians of the homeopathic paradigm, we remember Professor Antonio Negro (1908-2010), endocrinologist and pupil of Pende and Martiny. In 1954 he founded AIMOH (Italian Academy of Hahnemannian Homeopathic Medicine) to meet the demands of many doctors. In 1971, Dr A.A. Rodriguez (1931-2018) together with Professor A. Negro, Dr T. P. Paschero (Argentina) and Dr P. S. Ortega (Mexico), founded the Tommaso Cigliano study center, which later became “Libera Università Internazionale di Medicina Omeopatica” LUIMO, based in Naples.

In 1985 Professor Negro was invited to present homeopathy at the *Higher Institute of Health*. The Italian Healthcare Authority was interested in acquiring knowledge of an expanding phenomenon in Italy and in Europe: that conference was published in the ISTISAN (Istituto Superiore di Sanità) report (9).

In 1994 there was the recognition by AIFA of homeopathic drugs.

Subsequently the State-Regions Permanent Conference (10) has regulated the education of the homeopathic doctor and their registration in the lists of Unconventional Medicine Specialists established by the professional registry, thus acknowledging private educational institutions (11).

CONCLUSION

The history of Naples, an international crossroads of culture and its intellectual openness to new knowledge in medicine, saw the central role of the Royal Academy of Sciences of that time. All this affirms the need for a multidisciplinary knowledge of the doctor, as indicated by Hippocrates, for a unified vision of the patient in his illness.

References

1. Latronico N. Medici nel loro tempo. Casatenovo: Vister Vismara Terapeutici; 1954.
2. Novellino E., Iadevaia V. La Gestione Tecnico-Professionale della Farmacia. Milano: Punto Effe Srl; 2012 – cap. 31 di Melodia C. 31.2.1 Natura e definizione della Medicina Omeopatica, Rodriguez A.A.
3. Novellino E. Iadevaia V. La Gestione Tecnico-Professionale della Farmacia. Milano: Punto Effe Srl; 2012 – cap. 31 di Melodia C. 31.1 Introduzione.
4. Melodia C. 1821-2021 – Il bicentenario dell’arrivo della medicina omeopatica a Napoli. L’Omeopatia al tempo dei Borbone. Napoli: Ed. LUIMO; 2022.
5. Bradford T. L. La Nascita dell’Omeopatia: vita e lettere di Samuel Hahnemann. Milano: Perla ed.; 1993.
6. Novellino E. Iadevaia V. La Gestione Tecnico-Professionale della Farmacia. Milano: Punto Effe Srl; 2012 – cap. 31 di Melodia C., 31.3.3, Le radici culturali e la nascita del metodo della medicina omeopatica; l’influsso di Ippocrate e la centralità del concetto di malato rispetto a quello di malattia, Melodia C.
7. Osservatore Medico di Napoli, year II pages 48-49 and year III pages 104-147, Lodispoto A. Storia dell’Omeopatia in Italia: storia antica di una terapia moderna. Roma: Edizioni Mediterranee; 1989.
8. Palombi Martorano V. Napoli e la nascita dell’Omeopatia in Italia (1822). Napoli: Le Stagioni d’Italia, Fausto Fiorentino; 1996.
9. Publication of a lecture by Prof. Antonio Negro at Istituto Superiore di Sanità, ISSN 0391-1675 – ISTISAN 85/11.
10. State-Regions Permanent Conference n. 54 / C5R of 7th February 2013.
11. Novellino E., Iadevaia V. La Gestione Tecnico-Professionale della Farmacia. Milano: Punto Effe Srl; 2012 – cap. 31 di Melodia C. 31.4.1 Tematiche deontologiche e formazione nell’esercizio della medicina omeopatica, Sciaudone G.

MANMADE CLIMATE CHANGE AND THE WORLD CULTURAL AND NATURAL HERITAGE

Christos Zerefos

Secretary General, Academy of Athens, Climate Envoy for Greece
Research Center for Atmospheric Physics and Climatology, Academy of Athens, Greece
Biomedical Research Foundation of the Academy of Athens, Greece
Navarino Environmental Observatory (N.E.O.), Messenia, Greece

ABSTRACT

Following the recent Intergovernmental Panel on Climate change (IPCC) report in 2021, there is high certainty that global warming is proceeding faster than thought before. This has resulted in the destabilization of our climate, seen clearly in the past few decades by the increase in the number and intensity of extreme weather and geophysical events. As a result of this, cultural and natural heritage became increasingly vulnerable to the adverse effects of global climate change. This unfortunate consequence of climate change has not yet been systematically integrated in global climate change mitigation and adaptation estimates. There is an immediate need for action before the damage to our common heritage becomes irreversible. In this paper examples of climate-related damage seen on our natural and cultural heritage are presented. The analysis presents results on climate changes of extreme events indices at 275 UNESCO cultural and natural heritage sites in the Mediterranean. Regional model simulations from the Cordex EU project have been used to estimate the changes of extreme precipitation frequency, the fire weather risk index and mean sea level rise at coastal sites in the Mediterranean. The analysis has been done under two climate change scenarios namely RCP4.5 and RCP8.5 for which the changes between 2071-2100 relative to 1971-2000 have been calculated. It has been found that the vast majority of UNESCO heritage sites in the Mediterranean are threatened in a destabilized climate.

Keywords: Climate change; natural heritage; UNESCO monument; climate action summit

INTRODUCTION

Cultural and natural heritage is increasingly vulnerable to the adverse social and environmental effects of global climate change. Yet, it is not systematically integrated in global climate change mitigation and adaptation processes. There is an immediate need for action before the damage to our common heritage becomes irreversible.

Following the International Conference on “Climate Change Impacts on Cultural Heritage – Facing the Challenge”, held in Athens, 21-22.06.2019, Greece launched at the UN Climate Action Summit (September 2019), an initiative which was supported by a number of international institutions, including the UN Framework Convention on Climate Change (UNFCCC), UN Educational, Scientific and Cultural Organization (UNESCO), World Meteorological Organization (WMO), International Council on Monuments and Sites (ICOMOS), UN Sustainable Development Solution (UNSDSN), Group of Earth Observations (GEO), Europa Nostra and the Academy of Athens. By COP26, more than 100 UN member states had expressed their support to the initiative. The UN Secretary-General included the Greek proposal in the “Report on the 2019 Climate Action Summit and the Way Forward in 2020” among the most ambitious initiatives.

Climate change is a single threat for monuments among a number of threats, including the effects of air pollution, invasive species, and war aggression (1,2). However, several studies point out that climate change is one of the most significant threats and its importance is growing fast (3-7). For natural heritage sites, climate change has already become the most prevalent threat as stated in the latest International Union for Conservation of Nature (IUCN) World Heritage Outlook (8). In view of pollution abatement efforts globally, the importance of pollution as a threat is decreasing, with few exceptions, worldwide. That decrease is giving space to climate change as an emerging hazard as well as to the synergistic effect of both (9-11)

In this paper examples of climate-related damage seen on our natural and cultural heritage are presented. The analysis is based on the results of extreme event indices as a result of climate change at 275 UNESCO cultural and natural heritage sites in the Mediterranean, using regional model simulations.

DATA AND MODELLING ANALYSES

In the present study the results of a set of 7 high spatial resolution simulations namely: CNRM-CERFACS-CNRM-CM5_KNMI-RACMO22E, ICHEC-EC-

EARTH_DMI-HIRHAM5, ICHEC-EC-EARTH_CLMcom-CCLM4, MOHC-HadGEM2-ES_KNMI-RACMO22E, MOHC-HadGEM2-ES_SMHI-RCA4, MPI-M-MPI-ESM-LR_MPI-CSC-REMO2009, MPI-M-MPI-ESM-LR_SMHI-RCA4, are used in order to identify the upcoming changes in extreme climate event at 275 UNESCO cultural and natural heritage sites. The simulations are part of the of the EURO-CORDEX program (<https://euro-cordex.net/>) and cover, in a daily time resolution, a continuous time period analysis from 1971 to 2100 based on 2 different emission scenarios, RCP4.5 and RCP8.5. The climatic parameters used are temperature, relative humidity precipitation, and wind speed.

From the daily gridded climatic data, the respective climatic data for each of the 275 UNESCO monuments belonging to Mediterranean countries were calculated using statistical interpolation methodology.

For each monument, using the daily precipitation data, the 99th percentile of the precipitation of the reference period 1971-2000 was calculated, and then the number of days / years during which the value of the precipitation exceeded the 99th percent of the precipitation of the reference period (days with extreme precipitation) was quantified for both the reference period and for each decade of the period 2001-2100 based on the two emission scenarios under study.

Furthermore, for each monument using the data of temperature, precipitation, relative humidity and wind speed the values of the index FWI (Fire Weather Index) were estimated and then the number of days/year that the value of FWI exceed 45 (extreme forest fire risk) was computed for both reference periods as well as for each decade of the period 2001-2100 based on the two emission scenarios under examination.

In addition, for each coastal monument, the average sea level was calculated from the Extreme Sea Level (ESL) dataset of the Large Scale Integrated Sea-level and Coastal Assessment Tool (LISCOAST) program developed by the Joint Research Center (JRC) of the European Commission.

Based on the above data, the changes of the days/year with extreme precipitation, the days with extreme risk of forest fire, and the sea level between the period 2071-2100 under the two emission scenarios and the reference period 1971-2000 were mapped for each monument. In addition, the change for each decade of the period 2001-2100 from the reference period of the average for all the monuments of the above parameters was reflected in time series which show the gradual increase of the extreme precipitation during the days with extreme risk of fire and sea level more intense for RCP8.5 and relatively milder for RCP4.5.

RESULTS AND CONCLUSIONS

Figure 1 presents the percentage change relative to the reference period (1971-2000) of the number of days with extreme precipitation for the two scenarios in 2071-2100 for all UNESCO sites in the Mediterranean. In both scenarios there is a clear north-south divide with most of the northern parts of the region, including Europe and Turkey, dominated by increase and most of the southern parts, including Africa and the Middle East, dominated by decrease. This distinction is not clear-cut near the borderline, most notably some locations in Spain, Greece and Cyprus show negative trends while many locations in the Levant and in and near Tunisia have positive trends. In the RCP4.5 scenario the increase is up to 50% in most locations with only a few sites reaching an 80% increase. Similarly, the decrease reaches -30% or less in most locations. Similar changes can be seen in the RCP8.5 scenario, except that the change is stronger. In France, northern Italy, the Adriatic and Turkey several sites have a pronounced increase of more than 50% and up to 100%. Increases can be seen also in most European sites and in Tunisia. In the south stronger decreases up to 50% can be seen, most notably in Morocco and the Levant.

The course towards the end of the century can be seen in Figure 1, which shows the mean number of extreme precipitation days in each decade for both scenarios. The increase is gradual for both scenarios and stronger change for the RCP8.5 with moderate fluctuations.

Figure 2 shows the change in the number of days per year with extreme fire risk for 2071-2100 according to the two scenarios relative to the 1971-2100 reference period. An increase is projected in the whole Mediterranean, but is most pronounced in a region extending from the Iberian Peninsula to Tunisia and to a somewhat smaller degree over Greece and Turkey. The increase in RCP4.5 scenario is as high as 25 days per year in the first region and 15 in the second region while it is smaller in other regions, such as Italy, and almost negligible in others, such as France. In the RCP8.5 scenario the increase is stronger, exceeding 40 days per year in most locations of the first region, 25 in most locations of the second region and 15 days per year in most parts of Italy while it is not negligible in any location.

The mean value of the index for all locations throughout the 21st century is presented in Figure 2. In both scenarios the increase is gradual and greater for the RCP8.5 than for the RCP4.5.

Concerning the sea level rise for coastal UNESCO sites (not shown), sea level is projected to rise by 0.3 to 0.55 m in the RCP4.5 scenario and by 0.45 to

0.8 m in the RCP8.5. The increase is gradual throughout the 21st century with almost no fluctuations for both scenarios.

Following the above discussion, we can easily conclude that in almost all 275 UNESCO cultural and natural heritage sites in the Mediterranean, the expected changes in the basic indices describing extreme events in relation to climate change all point to an increase in the destabilizing conditions of cultural and natural heritage sites in the Mediterranean. The Mediterranean has been determined as a hot spot mostly in the recent IPCC reports (12).

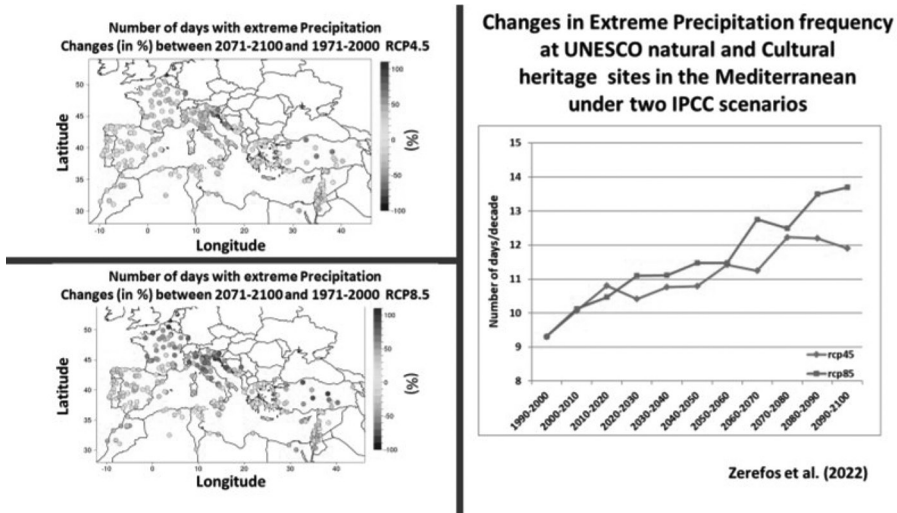


Fig. 1.

Left: Percentage change in number of days exceeding the 1971-2000 reference period's 99th percentile of precipitation height in 2071-2100 for the scenarios RCP4.5 (top) and RCP8.5 (bottom) at the locations of the UNESCO sites in Mediterranean countries.

Right: Number of days per decade exceeding the 1971-2000 reference period's 99th percentile of precipitation height in the 21st century for the scenarios RCP4.5 (blue) and RCP8.5 (red). Mean value for the locations of the 275 UNESCO sites in the Mediterranean region.

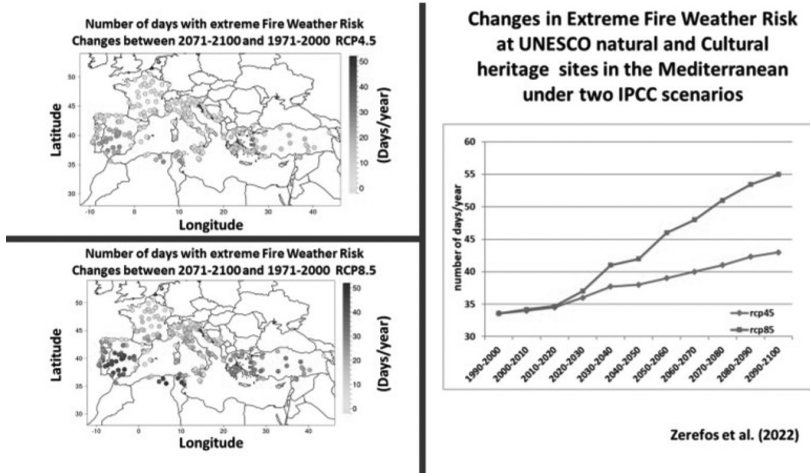


Fig. 2.

Left: Change in number of days with Fire Weather Index exceeding 45 (days with extreme forest fire risk) in 2071-2100 for the scenarios RCP4.5 (top) and RCP8.5 (bottom) relative to the 1971-2000 reference period at the locations of the UNESCO sites in the Mediterranean region.

Right: Number of days per decade with Fire Weather Index exceeding 45 (days with extreme forest fire risk) in the 21st century for the scenarios RCP4.5 (blue) and RCP8.5 (red). Mean value for the locations of the 275 UNESCO sites in the Mediterranean region.

References

1. Veillon, R. State of conservation of World Heritage properties – A statistical analysis (1979-2013). 2014, (p. 102), UNESCO, World Heritage Centre.
2. ICOMOS. The Future of Our Pasts: Engaging Cultural Heritage in Climate Action. ICOMOS, Climate Change and Cultural Heritage Working Group. 2019
3. Fatorić, S., & Seekamp, E. Are cultural heritage and resources threatened by climate change? A systematic literature review. *Climatic Change*, 2017a, 142(1-2), 227.
4. Fatorić, S., & Seekamp, E. Securing the Future of Cultural Heritage by Identifying Barriers to and Strategizing Solutions for Preservation under Changing Climate Conditions. *Sustainability*, 9(11), 2017b, 2143. <https://doi.org/10.3390/su9112143>
5. Reimann, L., Vafeidis, A., Brown, S., Hinkel, J., & Tol, R. Mediterranean UNESCO World Heritage at risk from coastal flooding and erosion due to sea-level rise. *Nature Communications*. 2018, 9. 10.1038/s41467-018-06645-9.
6. Day, J. C., Heron, S. F., & Markham, A.. Assessing the climate vulnerability of the world's natural and cultural heritage. *Parks Stewardship Forum*, 2020, 36(1). <https://doi.org/10.5070/P536146384>

7. Osipova, E., Emslie-Smith, M., Osti, M., Murai, M., Åberg, U., & Shadie, P. IUCN World Heritage Outlook 3: A conservation assessment of all natural World Heritage sites. International Union for Conservation of Nature. 2020
8. Berenfeld, M. L. Climate Change and Cultural Heritage: Local Evidence, Global Responses. *The George Wright Forum*, 2008, 25(2), 66-82.
9. Bonazza, A., Messina, P., Sabbioni, C., Grossi, C. M., & Brimblecombe, P. Mapping the impact of climate change on surface recession of carbonate buildings in Europe. *Science of TheTotalEnvironment* 2009, 407(6) 3039-2050. <https://doi.org/10.1016/j.scitotenv.2008.10.067>
10. Brimblecombe, P., Grossi, C. M., & Harris, I. Climate Change Critical to Cultural Heritage. In H. Gökçekus, U. Türker, & J. W. LaMoreaux (Eds.), *Survival and Sustainability*, 2010, (pp. 195–205). Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-540-95991-5_20
11. Grøntoft, T. Climate change impact on building surfaces and façades. *International Journal of Climate Change Strategies and Management*, 2011, 3(4), 374-385. <https://doi.org/10.1108/17568691111175669>
12. IPCC 2021: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, In press, doi:10.1017/9781009157896.

THE ITALIAN INSTITUTE FOR PHILOSOPHICAL STUDIES

Antonio Gargano

Executive Committee Italian Institute for Philosophical Studies

e-mail: agargano47@gmail.com

We live in an age of deep changes in every field of human life. We feel the coming of a social, political, cultural revolution. The roots of civilization are wakening. Traditional values are criticized or refused. The behaviour of people is more and more inspired by subjective statements of the motives; objective and institutional principles are rejected. The most different irrational experiences are exalted. The lack of cultural and scientific contents leads to arbitrary, senseless behaviour. This dangerous trend can be opposed only by the full rationality, expression of a reason which indicates goals, aims, values and is not limited to propose instruments, means. Such a kind of rationality finds its expression in philosophy, a creation of the Greek spirit developed by all mankind, as reason is present in every human being. Philosophy, with its universal perspective, can support equality, freedom encounter of cultures and peoples.

Education and the theoretical nobility of philosophical thought are prerequisites for a nation's material and moral wellbeing. They enable a public spirit to flourish. This spirit is vital for combatting the weakening and corruption of public consciousness. It cures the deep malaise that pervades people when they lose their awareness of their identity and can no longer make their own history. They become embittered in a grey routine, cut off from culture and so without any chance of developing self-awareness.

On the basis of such considerations, in 1975 the Neapolitan avvocato Gerardo Marotta founded the Italian Institute for Philosophical Studies (Istituto Italiano per gli Studi Filosofici), which is the heir of the long and rich tradition of the Neapolitan schools (1, 2). This tradition stretches from the university founded by Frederick II, through the seventeenth-century République des Lettres and the clubs of the Enlightenment to the schools of the nineteenth century and the university of Francesco De Sanctis and Bertrando Spaventa, up to the college founded by Brenedetto Croce and the Italian Institute for Historical Studies (Istituto Italiano per gli Studi Storici).

The Institute has established strong and prosperous ties with the world's most prominent institutions, promoting Italian culture at international level, and

has connected the best international culture with thousands of grant holders, professors and scholars, at a time when our universities have virtually closed their doors to young researchers, and the Ministry of Education has ceased to organize refresher courses (3).

“The purpose of the Foundation, which is non-profit oriented,(as set forth in article 2 of the Bylaws) , is to promote the advancement of philosophical, historical, juridical, economic and scientific studies, with the contribution of lectures and scholars and through research and advanced learning programs capable of providing the new generations with a humanistic and scientific education”.

To mention a few examples of this extraordinary wealth of works: the critical edition of the *Herculaneum papyri*, *La Scuola di Epicuro*, the only unpublished ancient sources to have been actually recovered from the classical world, the critical edition and French translation – promoted by the Institute – of the entire works of Giordano Bruno at Les Belles Lettres in Paris (several volumes have been translated into Japanese and Chinese).

The French philosopher Paul Ricoeur once declared: “As a foreign friend, first of all I wish to acknowledge the extraordinary contribution made by the Istituto Italiano per gli Studi Filosofici to the cultural splendour of Southern Italy. Such a contribution is also worthy of the shining history of the cultural institutions of the Mezzogiorno, of this great Latin country, proportionate to the expectations of various European institutions regarding the harmonious development of the European Union. On the one hand, by measuring itself with the Neapolitan culture of the past, the Institute is steeped in the finest traditions of philosophers of world renown such a Giambattista Vico and Benedetto Croce, furthering their work by entrusting philosophy with the task of melting disciplines that transcend university philosophy, moving into ever more varied scientific domains. This task is entrusted to philosophy because of the name itself of the Istituto Italiano per gli Studi Filosofici. On the other hand, to fulfil the expectations of Europe, the Institute anticipates the cultural integration of the Continent, organizing a multitude of seminars, meetings and conference, becoming a meeting place of scholars, writers and artists coming from the north, south, east and west of the great Europe. Furthermore, thanks to its generous scholarship policy, the Institute offers young generations of researchers the opportunity to take part, through oral teaching, in the creation of contemporary learning”. Over the years, the involvement of individual scholars was followed by accolades bestowed by universities and academies of various countries, such

as the *honoris causa* degrees conferred to the President of the Institute by the University of Sorbonne, the Erasmus Universiteit of Rotterdam, the Universities of Bielefeld, Bucharest, Urbino, Pavia, and the Second University of Naples, the Goethe Medaille of the Goethe-Institute Inter Nationes, and the Petr, Great Prize of the Russian Academy of Natural Sciences. In 2004, the President of the Institute received the Legion of Honour of France (4).

The appeal of *Avvocato Marotta* for humanistic research was signed by hundreds of scholars: We are convinced, as was Epimenides, that history is a prophecy of the past. And we are also convinced that historiographical research has indicated, without hesitation, that the human person, in his nature and in his relationships, has never been so enlightened as in humanistic culture. At the heart of all its discoveries and instances, Humanism affirms that the person is identical and progressive in any culture. Humanists themselves believe that the dignity of man coincides with freedom and that, thanks to rationality, he is divine: he is *imago Dei*. In this sense, Humanism is the permanence of roots, seeds and customs. Human dignity is the possibility of governing life and influencing history, because against the forces of Fortune he opposes the active Virtue, that is, creative. Human dignity is still the active right to freedom of thought, conscience and demand against all compulsion. The humanist is therefore alien from the hierarchy of civilizations, because he believes that everywhere and at all times man has the same essential virtues. Indeed, the humanist proposes the osmosis of these virtues, that is, of the thoughts, institutions and achievements of every culture, past and contemporary. This is demonstrated by the concordances caught in the civilizations of Egypt, the East, Judaism, Christianity, Islam and every other known human experience: Humanism is therefore a crucible. And it is also the idea, expressed above all by Dante, that what the individual man cannot do, *humanitas*, that is, the coordination, ideal and effective, of human capacities, can do. Without this vision humanity would have remained substantially immobile, neither poetry nor science would have been born. And by losing this vision, modern science, born of Humanism, would no longer be an instrument of knowledge and liberation, but scientism, the annihilation of the spirit and therefore of ethics. This is why in the very serious and yet fruitful crisis that the whole of humanity is going through – with the risk of replacing ethical and historical values with individual profit, aggressive divisions and the lazy need for ordering authorities – it is necessary to rethink Humanism. For Leonardo, the effort of the mind in the search for truth is a primary value. We have learned from teachers of every time and every people that in the hours

of confusion the foundation must be found. Therefore, we make our own, and extend it, a thought of Rainer Maria Rilke according to which at every historical turning point humanity must question Michelangelo, whom Kant considers the first of the moderns. We propose to question Humanism and we ask the leaders of the civil government of every nation, and especially those who recognize their roots in Humanism, to encourage or institute humanistic research wherever and in every possible way, beginning with the school. But immediately, before the universal sense of the human person is completely lost and before the perception of the spirit and its needs to dissolve.

When the Appeal was presented, during the address by Paul Oskar Kristeller, on September 24, 1993, at the United Nations, the President of the General Assembly, Samuel R. Insanally, welcomed the delegation of the Istituto Italiano per gli Studi Filosofici, declaring: “I read the Appeal with great interest. Their vision fully coincides with the attitude the international community must decide to try to solve the problem we face today. I learned with pleasure of your efforts, and I wish to encourage your work. (...) I feel the need for a humanistic spirit. I am delighted to see that we share the same approach to world development, and I encourage and concur with such approach”.

References

1. Gargano A. L'attività internazionale dell'Istituto Italiano per gli Studi Filosofici. Istituto Italiano per gli Studi Filosofici, Naples 2003.
2. Gargano A. The Italian Institute for Philosophic Studies, 1975-2005. Istituto Italiano per gli Studi Filosofici, Naples 2006.
3. Prigogine I. La Nuova Alleanza: il ruolo dell'Istituto Italiano per gli Studi Filosofici, in “Le scuole internazionali di Biofisica e Biocibernetica dell'Istituto Italiano per gli Studi Filosofici”, (ed.) Cloe Taddei Ferretti, Naples 2000.
4. De Santo NG, De Santo RM. Avvocato Gerardo Marotta (Naples April 26, 1927 – January 25, 2017): in memoriam. *G Ital Nefrol* 2018; 35 (Supplement 70). ISSN 1724-5990.

ON THE HISTORY OF BIOGEM

Ortensio Zecchino

Biogem, Ariano Irpino (AV), Italy

e-mail: Presidenza@biogem.it

INTRODUCTION

In my third age, by chance, I had the gratifying opportunity to give life to a small-large enterprise with high scientific and social value. The story is as follows. In the mid-nineties, when I was chairing the Senate's Culture, Education and Scientific Research Commission, together with Gaetano Salvatore, my beloved friend and renowned physician, and the Nobel laureate Renato Dulbecco, we submitted the proposal for a biology and molecular genetics institute to be financed by the Ministry of Research and University in order to invest money in the biomedical field. With the support of Dulbecco, who loved to remember having realized his Salk Institute in a desert area, because the scientific community can better live a real community life in a closed space rather than in a big city, I suggested to build the research institute in Ariano Irpino, my home town.

THE BIRTH OF BIOGEM

Our project was eventually selected, and the Biogem consortium was born in 1997 and publicly presented soon after the unexpected death of Gaetano. He was the first president elected, and we proposed to elect one of his fellows after his death. At that time, I considered my work done. In 2001, because of political disagreements, I resigned as Minister of the Republic and, after 35 intense years of political work, I ended up with active politics and returned, full time, to my historical-legal studies. Yet in 2004, 7 years after the selection of the project, Biogem was still 'stuck'. Funding for building the physical structure was finished, but the institute was unfinished, and the funding for scientific activities, which had specific deadlines, was used for activities in institutions in Naples. Dulbecco eventually went back to the States. I was finally asked to take responsibility for Biogem, which had huge difficulties in starting its activities. Thus, after having abandoned my life plans, I found myself living 'a bet' that is bold and stimulating at the same time. Bold, because the adventure was to set up a research institute far from the pulsating centers of the scientific world, in

an area traditionally used for agriculture. I still have in my mind the words of an important professor of the Milan medical faculty, coming from this area, who tried to dissuade me with a mercilessly negative prognosis.

Despite only half of the structure being ready, the institute was opened in 2006 in the presence of Rita Levi Montalcini. During the following years we have been working hard to complete the structure and to develop scientific activities.

BIOGEM TODAY

Today, Biogem (Figure 1 and 2) is not only a biomedical research centre very much appreciated at the scientific level, but it has also become a centre of cultural activities that have given new life to a peripheral reality, thus offering a small signal of inversion of the planetary trend towards the conurbations that are causing so much damage to the ecosystem equilibrium.

With this logic, a Museum of the History of the Earth and Life was opened in Biogem and in 2012, an annual meeting, titled “The 2 Cultures”, was created to support the dialogue between scientists and humanists about great topics for humanity. Eight Nobel laureates have been hosted by the meeting so far. As a small contribution to the environmental crisis, Biogem has achieved energy self-sufficiency, using renewable resources, and has created a park with 2000 tall trees, 300 secular olive trees, 500 young olive trees and a small botanical garden in the area surrounding the institute, which was a desert area.

Many important judgments have confirmed the Biogem’s scientific relevance. Among them, of particular significance, is the one by the Nobel Laureate Mario Capecchi, who had been in Biogem for 4 days. He wrote:

“...the animal facility [of Biogem] is exceptional. It was designed with much more foresight than the facility that hosts my mice The Biogem’s animal facility is the best I’ve seen in Europe. I hope that the government’s scientific institutions understand the peculiarities of your animal facility and will continue to finance it I am sure that the productivity and levels of excellence of your animal facility will be maintained thanks to the excellence of the researchers working at Biogem” (1).

Confirming its social value, Biogem recently received an endorsement from two *maîtres à penser*, Ernesto Galli Della Loggia and Aldo Schiavone (2), who in a book on the condition of the South of Italy, in which they stigmatized a certain negative vocation for not doing and for a fatalistic resignation, wrote: “The creation and the work of Biogem, the biology and molecular genetics research

institute chaired by Ortensio Zecchino, is an exemplary model". Finally, in 2018, the official visit of the President of Italian Republic, Sergio Mattarella, certified the Biogem's relevance within the Italian scientific research and culture.

Biogem is currently organized in three functional areas:

- *Scientific Research*. Biogem works in the field of biomedical research with the aim of facilitating the transfer of results into new and more effective diagnostic and therapeutic applications. The peculiarity of the Biogem research is the realization of murine and fish models of human pathologies.
- *Preclinical (GLP) and non-GLP Research*, including a test facility, aimed at developing new drugs.
- *Higher Education and Dissemination of Scientific Culture*. In collaboration with the University of Sannio, Biogem organizes a Master's Degree in Genetic and Molecular Biotechnologies. It also organizes post-graduate training courses with leading companies in ICT services.

Biogem has a student house including small apartments with common services, for up to 36 students.

Biogem also has a *Museum of the History of Earth and Life*, equipped with advanced multimedia technologies and with paleontological findings.

A total of 174 scientific papers have been published by Biogem researchers over the past three years. Sixty-seven of them were authored by a Biogem scientist as first or last author.

References

1. Capecchi M. Letter to Ortensio Zecchino. Archives Biogem, 2010.
2. Galli della Loggia E, Schiavone A. Una profezia per l'Italia. Ritorno al sud. Mondadori 2021.



THE COMMUNICATION OF SCIENCE IN A PANDEMIC

Professor Sir Adrian Smith

President of the Royal Society
e-mail: president@royalsociety.com

The past two years have seen science thrust, very publicly, into the very heart of all our societies. Virology, epidemiology and complex mathematical modelling have moved from the scientific journals to the front pages of national newspapers and websites and led all news reports. Science has been celebrated for the speed at which it provided understanding of the virus and the scientific community has been lauded for the success of treatments and ultimately for delivering vaccines that have changed the game. However, there have been major challenges to how we communicate science and the inherent uncertainty that lies at the heart of the scientific endeavour.

Before I go any further, I want to say that I think scientists and the wider community of science journalists and other communicators have done a great job communicating ‘the science’ or rather I should say ‘science’ – a point I will come back to later - during the pandemic. Trust in science has always been high and that has been strengthened during the pandemic. The Wellcome Global Monitor, published in November, showed that, globally, those who said they trust scientists ‘a lot’ rose from 34% in 2018 to 43% by the end of 2020. That was before mass vaccination programmes altered the trajectory of the pandemic.

In a time of crisis people want certainty and they often think that is what science is about. They think of the lists of scientific laws they learnt at school. But science, particularly at the cutting edge, is all about uncertainty and it is vital that people understand that. It is vital that scientists communicate not only what they do know, but how confident they are in that knowledge and, importantly, what they do not know.

An example of this during the pandemic was around the mathematical models that were suddenly headline news and the modellers who presented them, who became headline makers. Those of you familiar with modelling will know the care with which possible outcomes will be presented. You will know the precarious nature of the outcomes that can turn on single variables. You will understand the range of possible outcomes that will be presented. But suddenly the modellers were being seen as modern-day oracles. Single figures would be

plucked from a range of data and presented to terrify the public or indeed to try and convince them there was nothing to worry about.

The modellers, supported by some excellent journalists and commentators battled valiantly to ensure that the context was provided. In the UK people like Royal Society Fellow and statistician David Spiegelhalter, Tim Harford economist and broadcaster and Tom Whipple science editor at The Times, helped people navigate the evidence - and the lack of evidence - to gain an understanding of the situation we were in. I am sure each of you will have names from your own countries that spring to mind, champions of the evidence and masters of the statistics.

The value of a strong group of science journalists was key to this in the UK. They played a key role in helping their editors and political correspondent colleagues, with little background in science, in filtering the hype from the evidence.

We need our media and opinion leaders to accurately reflect what the scientists are saying. That also requires scientists to be putting themselves forward too. And it has been great to see so many researchers step forward to share their evidence and their insight during the pandemic. It is not for everyone, but we do need good people to step up and take their work to the public, whether via news outlets, social media or via the range of other routes people get their information from.

And it is important that the scientists are able to do that - unencumbered by interference from government oversight. Independent scientists must be allowed to communicate their research independently. Where findings are unclear or inconvenient, they cannot be massaged to fit a particular narrative by overzealous government communications teams. Public funding for research should guarantee the independent voice and not mean that the findings should be subject to government control of the message.

Getting the science out there is only one part of the equation. Many policy makers in the UK initially used a mantra of 'following the science' as though somehow there was a simple set of instructions and that if mistakes were made it was the fault of 'the science'. I drew a distinction earlier between 'the science' and 'science'. Of course, 'the science' does not exist. There is no single, simple answer. What we have is the best available set of data. At the start of the pandemic, that set of data was very, very limited. Different people legitimately drew different conclusions and politicians took different actions based on how they saw things.

Science can often be a very slow process. We establish a hypothesis and carry out experiments to back it up - or knock it down. We gradually build up the evidence that gives us confidence in our ideas. It takes time. In a pandemic, time is something that we rarely have.

Science is full of uncertainty; the job of scientists is to try and gather the evidence that reduces that uncertainty and it all plays out in an open and transparent way with papers published and then debated. The speed at which that happened during the pandemic was, at times, dizzying.

Early data can be acted upon but later, when new information comes to light, we may need to re-evaluate and change course. These are not U-turns, they are just how science is done. We have to do more to ensure a greater public understanding of that process and a greater acceptance of the uncertainty. That will raise the quality of debate and lead to better policy making.

Some countries may be better placed for that than others. In the UK, most 16-year-olds abandon all but three subjects for their post 16 education. That often means an end to science. For those of you who have baccalaureate style education systems that allow a broader, more balanced education, cherish them!

But back to communicating the science. The scientific evidence is also only one part of the policy making process and we must recognise that. A government will have to take other factors into consideration, they will have to factor in the unintended consequences of a policy decision – if you tell everyone to wear FFP2 level face masks, are there enough supplies for those that need them the most to be able to get their hands on them? We have also seen the huge economic impacts of policy decisions taken over the last two years; and what about the impact on mental health? Good policy making requires the best scientific advice but we must be cognisant of the fact that it is not the only advice. Ultimately it is the politicians that make the decisions.

There have also been lessons to learn from the pandemic in how science is communicated to politicians. The UK's Chief Scientific Adviser, Sir Patrick Vallance, recently commented on how leaders around the world initially struggled to understand the growth pattern of infections, they struggled to get to grips with the idea of exponential growth. He feels that a factor in that was how the data was presented - that column of data, easily read by data experts, were simply not accessible to non-experts. Encouragingly, he feels that the use of effective data visualisation tools has now been imbedded in policy advice processes. He also believes lessons have been learned about being open with data and how it is fed into government.

There was one other major challenge to effectively communicating the science and that was the spread of misinformation. This was perhaps most clear in relation to vaccines. We do not know how much impact it had on vaccination rates but such scientific misinformation can impact on individuals and do wider societal harm now and to future generations if left unchecked.

Banning scientific information is not the solution – given what I said about the uncertainty surrounding science in the early stages of a pandemic, it could be hard to know what to ban. It could also drive misinformation underground. What we need is to support media plurality and independent fact checking – make sure people have access to plenty of good science. And we need to invest in lifelong information literacy so that people are confident in identifying what information is reliable.

A little over two years ago, no one had heard of Covid-19. A huge, open, international collaboration sequenced its genome with amazing speed but today we can still not predict where or when significant variants will emerge or what they will look like. The exposure to so much scientific information for so many people will have raised the general level of scientific literacy and that is a good thing – it will hopefully have not just allowed people to gain knowledge but also to gain an understanding of how that knowledge was acquired and what its limits are. That will be the measure of how well we have communicated science in the pandemic.

CLIMATE CHANGE AND THE CHALLENGES OF A RAPID ECOLOGICAL TRANSITION: THE ROLE OF FOOD

Riccardo Valentini

University of Tuscia, Viterbo, Italy

CMCC Foundation, Viterbo, Italy

e-mail: rik@unitus.it

ABSTRACT

The Mediterranean is at the center of an unprecedented climate change. Currently, the average terrestrial temperature of the region has exceeded 1.5 °C. Extremes of summer heat and drought are intensifying. In this context, the climatic scenarios foresee already in 2030, that the 2° C threshold will be exceeded. Increasing population, food consumption and greenhouse gas emissions are pushing our planet through a transformation never experienced before.

The Paris Agreement has recognized the fundamental priority of safeguarding food security and ending hunger and the vulnerabilities of food production systems to impacts of climate change.

We need to manage the human demand-side drivers to make food production and food supply chains more virtuous, more sustainable and resilient. To fully reach the target of limiting the temperature increase below the 1.5-2.0°C target, a shift of our actual behavioral paradigm and perception of climate change is essential.

Keywords: Climate change; agriculture; greenhouse gases; carbon neutrality

INTRODUCTION

According to the IPCC's Sixth Assessment Report working group 1 (AR6 WG1) (1), atmospheric concentrations of greenhouse gases (GHG) are at their highest in 800,000 years. In the last 50 years alone, they have increased 2.5 times, freshwater withdrawal has doubled, and the availability of agricultural land per capita has halved from 1.4 to 0.7 hectares. This is an unprecedented speed of transformation.

The AR6 WG1 report contains an updated assessment of how much the Earth's temperature has risen and how 'climate factors' - mainly GHG - have led to this change. The information that feeds into the report includes the latest land and ocean observations, remote sensing measurements from satellites, and data from climate proxies that indicate long-term changes in the Earth's climate.

The report takes into account a range of new and revised data and includes a reassessment of the metrics used to assess global warming. Each year during 2015-20 was warmer than any previous year for which records exist. As it stands, 2021 is also shaping up to be among the seven warmest years on record.

The rate of warming has accelerated over the past four decades compared to the previous 80 years. Overall, temperatures have risen faster than in previous IPCC assessment cycles. With great certainty, the report states that:

“Observed changes in the atmosphere, oceans, cryosphere and biosphere provide unequivocal evidence of a warming world. In recent decades, key indicators of the climate system are increasingly at levels not seen in centuries or millennia, and are changing at rates unprecedented in at least the last 2,000 years.”

In particular, the global mean surface temperature (GMST) increased by 1.09 °C between the pre-industrial reference period of 1850-1900 and the most recent decade of 2011-20. This was most likely the warmest period in about 125,000 years.

As for the GHG driving global warming, the report states that CO₂, methane and nitrous oxide concentrations “have increased at rates unprecedented on centennial time scales for at least the past 800,000 years” and atmospheric CO₂ concentrations are higher than they have been in at least the past two million years. The report also says quite confidently that changes in the effective radiative forcing from natural factors - such as changes in solar or volcanic activity - since pre-industrial times are “negligible” compared to anthropogenic drivers.

Today, the agri-food sector uses about 80% of the world’s freshwater needs, 30% of the world’s energy demand and more than 12% of man-made GHG emissions, including indirect emissions such as those from deforestation (2).

In some regions of the world, e.g., the tropics and parts of the temperate regions, increased climate extremes will negatively affect agriculture, forestry and fisheries sectors with a 35% reduction in yields in African countries and 2% globally per decade, while increasing food demand (3). Global warming may also expand the suitability of land for some crops, such as wheat, in high latitudes (4).

The significant role that agriculture can play in climate change has been relatively underrepresented in previous discussions and decisions under the United Nations Framework Convention on Climate Change (UNFCCC) (5), before the Paris Agreement was adopted by the 21st Conference of the Parties (COP21) of the UNFCCC on 12 December 2015, in which food security and food production are explicitly mentioned: in its preamble, the parties recognise

‘the fundamental priority of safeguarding food security and ending hunger, and the particular vulnerabilities of food production systems to the adverse impacts of climate change’, and Article 2 emphasises the importance of ‘enhancing the capacity to adapt to the adverse impacts of climate change and fostering climate resilience and the development of low greenhouse gas emissions, so as not to threaten food production’.

Furthermore, the role of agriculture in PA is also linked to its ability to be a possible GHG sink in soil and plant biomass.

Indeed, climate-related risks to food security are projected to increase due to global warming, with net reductions for maize, rice, wheat and potentially other cereal species in many regions of the world (6). On the other hand, rice and soybean yields are expected to increase in the tropics, as the positive effect of CO₂ fertilisation is expected to offset the negative impacts of climate change (7).

AGRICULTURE FROM SOURCE TO CARBON SINK

Agriculture, forestry and land use change produce 21% of global GHG, the second largest after the energy sector (8). The agricultural sector, in particular, is the largest contributor to global anthropogenic non-CO₂ GHG, which accounted for 56% of emissions in 2005 (9). At the same time, agriculture has great mitigation potential: among the most cost-effective mitigation options are cropland and grazing land management and restoration of organic soils (8). The balance between emissions and mitigation potential is further challenged by the growing global food demand due to the projected increase in world population and changing dietary habits (10). Therefore, to fully address all the challenges raised by the Paris Agreement and contribute to the goal of limiting temperature rise to less than 1.5-2.0 °C, requires more than supply-side options for mitigation (e.g., changes in land management, etc.), starting with the effects of unsustainable food systems and considering a shift in consumer behaviour and perceptions of the environmental impacts of climate change. As shown by Smith et al. (11) demand-side mitigation measures (e.g., lifestyle changes, reduction of food loss and waste, changes in human diet, etc.) offer greater potential in reducing GHG emissions while meeting food security than supply-side measures.

SOLUTIONS AND MEANS

Agriculture has too often been accused of being the cause of climate change, while its potential as a solution for climate change mitigation and adaptation is

not recognised. Harnessing the drivers above in the right way will facilitate the transition from conventional to ecologically- based agriculture, which would ensure food security by reducing GHG and other impacts on the environment. This transition can be promoted by an ecological approach to cultivation, with the focus on increasing ecosystem resilience rather than yield. To this end, strategies such as the implementation of multi-crop systems and the use of local varieties more resistant to climate variability, insects and pathogens, habitat diversification, natural pest control and the minimisation of external inputs (including fuel) are proposed. These strategies can also improve food security, nutrition, health, environmental protection and many socio-economic challenges associated with the food system as a whole. Therefore, the ecological approach should be promoted by all actors managing the food supply chain: farmers, consumers, policy makers, the business sector.

Food systems must also be sustainable in terms of prevention, recycling and up-cycling of agricultural waste and losses. Supply chains are still inefficient in terms of food loss and waste, which globally amount to about 40% of total food production (2).

Positive externalities, such as carbon sequestration, can convey financial benefits. True costs must be factored into business models, based on local food cultures, availability and sustainable use of natural resources. Progress can be made using the Rio + 20 agreement on the value of natural capital.

The fundamental concept is that protection and conservation of carbon stocks is even more important than carbon emissions. This implies reducing tropical deforestation and improving agricultural productivity per unit area. Since climate change can have a negative impact on the agriculture and forestry sectors, adaptation is needed to make the entire agri-food system more resilient. This should be seen in the context of a broader vision to link global ecology with the global economy by developing macroeconomic policies based on carbon and its storage and value. The city-country relationship must also be seen as an opportunity for the development of more sustainable food systems. Urbanisation is a major challenge not yet adequately considered by the agri-food sector. On the one hand, there is an urgent need to reverse the rural-urban migration pattern in most countries by providing more jobs in and out of agriculture and the food system and by investing in rural areas. On the other hand, agricultural production in urban and peri-urban areas should be improved, including space for agriculture in urban areas and the promotion of self-production and zero-mile food.

More generally, action is needed at all levels, including more conscious consumption behaviour, diversifying food processing along different lifestyles, changing packaging to reduce waste and pollution, ensuring access to adequate food and nutrition for the poor, and preserving the cultural importance of traditional foods.

CONCLUSION

Humanity needs to act urgently and swiftly, pushing the agenda of government, industry and citizens in the most difficult and challenging transformation of our society to feed the expected 2 billion new people by 2050 and, at the same time, stabilising the climate below 2.0° (possibly 1.5°) while reducing pressures on natural resources. Current climate change scenarios at both 2 ° and 1.5 ° require large-scale mitigation in the terrestrial sector, both in the form of soil and biomass carbon sequestration and reduction of agricultural greenhouse gas emissions. This large-scale effort is likely to interact with food security, water resources, biodiversity and the need for further land transformation. These goals cannot be achieved without a parallel reduction of fossil fuel emissions in other sectors, e.g., energy and transport, and without a comprehensive approach to the entire food system. Enhancing the points mentioned above will facilitate the transition from conventional agriculture to ecologically-based agriculture, which ensures food security and reduces GHG and other environmental footprints.

References

1. IPCC, 2021: Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 3-32.
2. Foley, J. A., et al., 2011. Solutions for a cultivated planet. *Nature*, 478(7369), 337.
3. Barros, V. R., et al., 2014. Climate change 2014: impacts, adaptation, and vulnerability-Part B: regional aspects-Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.
4. A Di Paola, L Caporaso, F Di Paola, A Bombelli, R.Valentini 2018- The expansion of wheat thermal suitability of Russia in response to climate change, *Land Use Policy*.
5. UNFCCC, 2017. United Nation Framework Convention on Climate Change. Decision 4/CP.23 Koronivia joint work on agriculture.

6. IPCC, 2018. Summary for Policymakers. In: Global warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [V. Masson-Delmotte, P. Zhai, H. O. Pörtner, D. Roberts, J. Skea, P. R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J. B. R. Matthews, Y. Chen, X. Zhou, M. I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, T. Waterfield (eds.)]. World Meteorological Organization, Geneva, Switzerland, 32 pp.
7. Schleussner, C. F., et al., 2016. Science and policy characteristics of the Paris Agreement temperature goal. *Nature Climate Change*, 6(9), 827.
8. Smith, P., et al., 2014. Agriculture, forestry and other land use (AFOLU). In *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press.
9. IPCC, 2007. *Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Inter-governmental Panel on Climate Change* [B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer (eds)], Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA., 863pp.
10. FAO, 2017. Food and Agriculture Organization of the United Nations. *The Future of Food and Agriculture. Trends and Challenges*.
11. Smith, P., et al., 2013. How much land-based greenhouse gas mitigation can be achieved without compromising food security and environmental goals? *Global change biology*, 19(8), 2285-2302.

THE COVID-19 SYNDEMIC, A NEW PUBLIC HEALTH CONCEPT

Patrick Berche

Professor Emeritus at the University of Paris Cité

e-mail: patrick.berche@gmail.com

ABSTRACT

The innovative concept of syndemic opens new perspectives in the management of pandemics such as AIDS, tuberculosis and malaria, and also applies to Covid-19. Indeed, this pandemic is superimposed on other contagious (AIDS, malaria, tuberculosis) and chronic, non-infectious pandemics (diabetes, obesity, cardiovascular diseases, cancers, malnutrition), which are genuine, silent pandemics affecting hundreds of millions of people worldwide. These chronic diseases contribute to the high mortality rate of Covid-19 observed in elderly and high-risk patients, especially in low-income countries. The concept of syndemic includes socio-cultural determinants that play a major role in the development of pandemics. To combat the pandemic it is necessary to consider the living conditions, cultural contexts, mentalities and behaviours of populations. Covid-19 highlights the social disparities and the inequality of exposure, particularly the promiscuity linked to cramped housing and precariousness, but also the importance of at-risk behavior. Moreover, the emergence of this new coronavirus SARS-CoV-2 creates stress and fear that might lead to the stigmatization of infected people, denial of the pandemic, rejection of science and vaccines, disinformation and fake news that create an irrational suspicion. Fear is also related to social isolation induced by barrier measures and lockdown, with consequences for the mental health of individuals. The robustness of the health and social assistance system, which depends on long-term political decisions, also plays an important role in the impact of Covid-19. This new approach highlights the major role of management of a pandemic taking into account the health status of populations, living conditions, cultural contexts, mentalities, behaviors, but also the social, political and economic forces at play.

Keywords: Pandemic; syndemic; Covid-19; SARS-CoV-2; chronic diseases; socio-economic factors; AIDS; tuberculosis

INTRODUCTION

Since its emergence in late 2019, the Covid-19 pandemic has been evolving in seasonal waves, with the continual emergence of new variants. The case-fatality rate is estimated to be around 0.6% in Western countries and more than 1-2% in low-income countries. According to the WHO, Covid-19 has killed more than 15 million people since 2019. The pandemic has caught all countries off guard. It teaches us humility in the face of the Darwinian struggle between an unknown, highly contagious virus that seeks to survive and a population that is gradually becoming resistant. Science has responded with an unprecedented mobilization: a virus isolated and decrypted as soon as January 2020, diagnostic tests, real-time characterization of new variants often more contagious, highly effective RNA vaccines developed in a few months, and antivirals. In two years, tens of thousands of publications, countless daily reports on the evolution of the pandemic in the world and in each country and mathematical models predicting the evolution. No pandemic in the past has benefited from such a thorough epidemiological follow-up. However, most of these advances are limited to a causal and therapeutic approach, which is certainly very useful but insufficient and restrictive to manage a pandemic in all its dimensions, particularly socio-cultural and environmental, which have a crucial influence on the course of the pandemic and its mortality.

THE CONCEPT OF SYNDEMIC

In the 1990s, the American anthropologist Merryl Singer introduced the innovative concept of syndemic, which opens up new and global perspectives in the approach to pandemics such as AIDS (1). A syndemic disease is defined by the intermingling of several diseases that interfere with each other, but also with biological, environmental and behavioral factors related to the culture and beliefs of each individual. This can aggravate the consequences of these diseases and impact the mortality of pandemics. This concept of syndemic was first applied to major pandemics such as AIDS, tuberculosis and malaria (2,3). It emphasizes that the management of a pandemic cannot be effective without taking into account the health status of populations, living conditions, cultural contexts, mentalities, behaviors, etc., as well as the social, political and economic forces at play during a major health crisis (4).

The Covid-19 pandemic is superimposed on other contagious pandemics (AIDS, malaria, tuberculosis) but also on non-infectious and often silent

pandemics, such as those due to chronic, non-communicable diseases, such as diabetes, obesity, cardiovascular diseases, cancers, and also malnutrition. These pathologies are true pandemics, since the same diseases affect millions of people around the world. All of these chronic diseases contribute to a higher mortality rate of Covid-19, which mainly affects the elderly and those at high risk with comorbidities.

The impact on indirect mortality caused by the severe disruptions induced by Covid-19, was highlighted as early as 2020 by the WHO. The difficulties of access to healthcare and prevention (hygiene, vaccinations) of poor populations, has led, in Africa, to an increase of more than one million deaths by tuberculosis, more than 600,000 deaths from AIDS, and the same for malaria. Moreover, in Africa, for example, there has been a significant decline in routine childhood vaccinations and in access to care and drugs, particularly those used to treat AIDS and tuberculosis (5,6). In developed countries, excess mortality has been observed due to the stop or delay in the implementation of many treatments due to the collapse of health systems. The Covid-19 pandemic has highlighted the importance of social disparities on mortality rates, which are much higher in poor countries where populations are poorly vaccinated and often live in disastrous conditions (7). Economists have shown that this pandemic has led to the greatest increase in poverty since 1945.

The concept of syndemic also includes the socio-cultural determinants that play a major role in the development of the pandemic. It is necessary to consider not only the health status of populations, but also their living conditions, their cultural contexts, their mentalities, their behaviours. Covid-19 suddenly highlights social disparities and inequalities in exposure, particularly promiscuity linked to cramped housing and precariousness (8), but also the importance of risky behaviors and the importance of modest jobs essential to the survival of the population. In addition, the emergence of this unknown virus creates stress and fear that can lead to stigmatization of infected people and their contacts, denial of the pandemic, rejection of science, misinformation and fake news that create irrational suspicion that can lead to violence. Fear is also linked to the social isolation induced by barrier measures and containment, with consequences on the mental health of individuals. For example, the Covid-19 has a strong impact on mental illness, including depression (9), with a marked increase in suicide rates.

In addition, the robustness of the health and social welfare system, which depends on long-term policy decisions, also plays a role on the consequences

of Covid-19. In most countries, political leaders were incredulous at the start of the Covid-19 pandemic and then surprised and dismayed by the magnitude of the phenomenon. Later, the consequences of poor policy decisions during this major health crisis were unfortunately marked by the disastrous mortality rates observed in some countries whose leaders had denied or minimized the existence or severity of the pandemic.

BEHAVIORS AND MENTALITIES

The history of past pandemics reveals the consistency of people's reactions, which is reflected in the Covid-19 pandemic. First, incomprehension in front of a new disease disrupts the social organization and short- and medium-term projects. This is followed by fear, anxiety and stress in the face of an unknown and uncertain fate. Added to this is a distrust of institutions, politicians (masks, vaccines), experts and journalists... Then come the rumors amplified on social networks, anonymous and unbridled words, all the more listened to as they are vehement and full of pseudo-certainties. Thus appear, among others, the denial of the pandemic, the rejection of science and vaccines that crystallize conspiracy theorists, catastrophists, charlatans, gurus, all those who hunt in packs to make emulators. We are not far from the plague "sowers" of the 14th century. It is clear that there is an abysmal lack of scientific culture in the public, which facilitates blind beliefs and irrational positions. Fear also gives rise to stigmatization and the search for scapegoats (the infected, the young, the old, politicians, others...). We have also seen behaviours of flight from big cities, rebellions refusing sanitary measures and vaccines (non-respect of quarantine, frauds to the sanitary pass...), under the cover of Freedom.

The concept of syndemic also includes the socio-cultural determinants that play a major role in the development of the pandemic. To fight against it, it is necessary to consider not only the health status of populations, but also their living conditions, their cultural contexts, their mentalities, their behaviours... Covid-19 suddenly highlights social disparities and inequalities in exposure, particularly promiscuity linked to cramped housing and precariousness (8), but also the importance of risky behaviours and of modest jobs essential to the survival of the population. In addition, the robustness of the health and social welfare system, which depends on long-term policy decisions, also plays a role in the consequences of Covid-19. In most countries, political leaders were incredulous at the start of the Covid-19 pandemic and then surprised and

dismayed by the magnitude of the phenomenon. Later, the consequences of poor policy decisions during this major health crisis were unfortunately marked by the disastrous mortality rates observed in some countries whose leaders had denied or minimized the existence or severity of the pandemic.

CONCLUSION

The syndemic approach can lead to effective prevention strategies at multiple levels (taking into account mentalities, socio-economic factors, behavioural, environmental, climatic, pollution...). This means that the strategy defined by decision-makers may vary according to the cultural context of each country. It is clear that the management of the current pandemic must be global. This health crisis raises many ethical questions: what is freedom? Is it the same in a threatened human society? What are the limits of individual freedom in relation to life in society? What is the scientific truth, which can vary with the progress of knowledge? Is it necessary to vaccinate children with very little benefit for them in order to protect unvaccinated adults? Can we accept the anonymous diffusion of lies and fake news, under the pretext of freedom of opinion? How to fight fake news? So many questions are raised by this health crisis at the beginning of the 21st century. The syndemic approach opens new perspectives in the management of a major health crisis that must be considered globally, not only at the level of a country but also at the level of the whole world.

References

1. Singer M, *Introduction to Syndemics: A Systems Approach to Public and Community Health.*, San Francisco, CA, Jossey-Bass, 2009.
2. Singer M, Bulled N, Ostrach B, Mendenhall E, Syndemics and the biosocial conception of health, *Lancet*, 2017, 389:10072, 941-950.
3. Velavan T P, Meyer C G, Esen M, Kremsner P G, Ntoumi F, PANDORA-ID-NET and CANTAM consortium COVID-19 and syndemic challenges in 'Battling the Big Three': HIV, TB and malaria, *Int J Infect Dis.* 2021; 106: 29-32.
4. Roberts L, How COVID is derailing the fight against HIV, TB and malaria, *Nature* 597, 314 (2021)
5. Roberts L, How COVID hurt the fight against other dangerous diseases *Nature* 592, 502-504 (2021)
6. WHO The impact of COVID-19 on global health goals, 21 May 2021 www.who.int/news-room/spotlight/the-impact-of-covid-19-on-global-health-goals?
7. Horton R, COVID-19 is not a pandemic *Lancet*, 396, 10255, 874, 2020.
8. Islam N, Lacey B, Shabnam S, Erzurumluoglu AM, Dambha H, Chowell G, Kawachi

- I, Marmot M, Social inequality and the syndemic of chronic disease and COVID-19: county-level analysis in the USA, *J Epidemiol Community Health*, 2021;75:496–500. doi:10.1136/jech-2020-215626.
9. Shim RS, Starks SM, COVID-19, Structural Racism, and Mental Health Inequities: Policy Implications for an Emerging Syndemic, *Medical Psychiatric*, 24 Feb 2021, <https://doi.org/10.1176/appi.ps.202000725>.

CARDIOLOGY IN THE 21ST CENTURY

Dennis V. Cokkinos

Professor Emeritus (Cardiology) University of Athens
Research Associate Biomedical Research Foundation Academy of Athens
Founder of EAPE
e-mail: dcokkinos@bioacademy.gr

ABSTRACT

The 20th Century, was a very good era for cardiology and cardiac surgery, bringing cardiac catheterization, coronary arteriography, coronary care units, open-heart surgery, pacemakers, defibrillation, ablation and interventional cardiology, together with new drugs. The past century can be seen as the triumph of analogue technology. In the 21st Century we are moving to the digital era, characterized by artificial intelligence, machine learning and precision medicine, molecular mechanisms, gen- and the many other -omics, high-throughput techniques, genetic editing, and many others which cannot be readily guessed, given the fact that medical knowledge currently doubles every 13 months; this trend is expected to increase. Predictions can easily be proven wrong. However, I would venture the following expectations: heart surgery and interventional cardiology will decrease, the former to a greater extent, with a new focus on valvular lesion corrections.

Lipid-lowering, molecular interventions will combat atherosclerosis and its sequelae. In heart failure and also, in arrhythmias, cell therapy will finally come of age under many new guises. Cell death of the myocardium will be prevented.

Human survival has increased very strongly in the last century. However, it is becoming apparent that this improvement is stalling, and may be reversed by 2040; this trend has become apparent even before the advent of the Covid-19 pandemic which has already cost 6 million lives and a huge economic backlash. However, every war, and this pandemic is already an Armageddon, inevitably brings progress. I remain confident that cardiology, a major branch of medicine, will overcome.

Keywords: Artificial intelligence; cardiology; industrial revolution; 21st Century

INTRODUCTION

To predict the future we must appreciate, the past.

The most prominent cardiologist of our era:

Eugene Braunwald listed, in 2014, the 10 most important cardiological achievements of the past century (1): electrocardiography, cholesterol-induced atherosclerosis, cardiac catheterization, cardiovascular surgery, coronary angiography and percutaneous coronary angioplasty, the coronary care unit, the development of new cardiovascular drugs, preventive cardiology, cardiac imaging, and implanted cardiac pacemakers/defibrillators.

It must be appreciated that, apart from the electrocardiogram which was invented by Willem Einthoven in 1901, all the other major advances which have changed our lives, emerged after World War II.

Also, we must not forget that up to the 1950s medicine was mostly concerned with the control of infections.

As regards cardiology, the greatest problem up to the introduction of penicillin was rheumatic heart disease which has now been eradicated in the developed world. Since the middle of the 19th Century life expectancy has increased incredibly, together with the advances of science.

It is difficult estimate how much capital of knowledge and age was lost during the very long time of low life expectancy.

A DISQUIETING OBSERVATION

Lieberman et al (2) have recently remarked that in the USA, although life expectancy is currently at 77 years,

health life only reaches 63 years. Thus, we should try not only to increase survival but also to attain more healthy years.

Additionally, Ortendahl et al (3) have offered a disquieting observation: Although up to 2020 life expectancy had kept increasing, but since then a decreasing trend is occurring which is attributed to ageing of the population and the rise of obesity and diabetics together with hypertension. They proposed that more potent drug therapy is needed together with greater progress in invasive cardiological procedures, mostly valve interventions. Significantly this unfavourable trend was recorded before the Covid-19 pandemic, which has variably been recorded to cause between 6 and 15 million deaths worldwide. Additionally, the invasion of Ukraine by Russia is expected to cause a major health catastrophe.

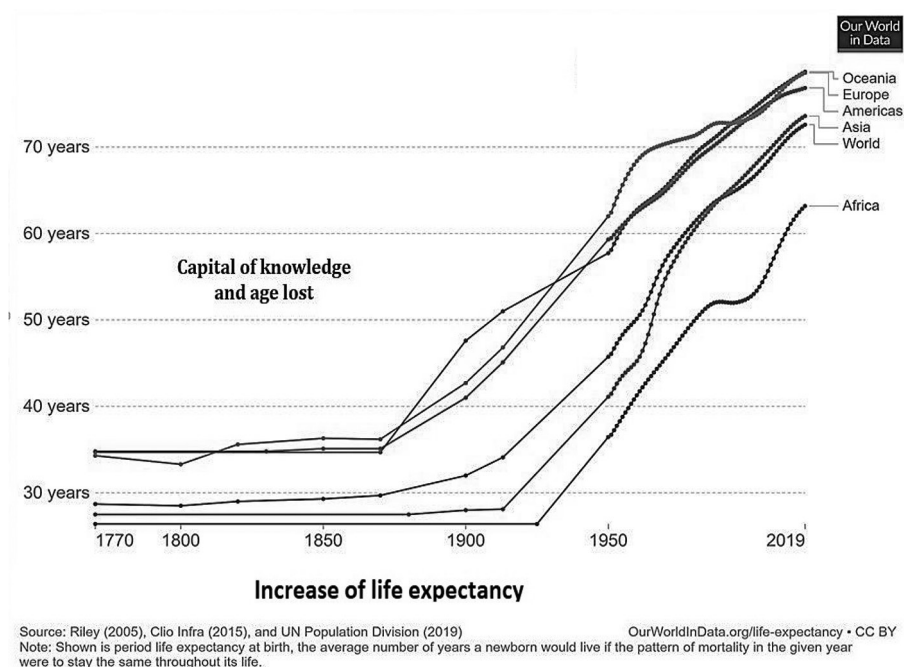


Fig. 1

Characteristically, most experts estimate that by 2040 a major crisis will characterize cardiovascular health. To combat it we must mitigate social inequalities, and problems arising from immigration and refugee waves, which bring about malnutrition, infections and epidemics. Dame Ann Johnson, current president of the Academy of Medical Sciences has also proposed that citizen participation and its product, citizen science, should be promoted (4). In January 2021, upon assuming her responsibilities as president of the Academy, she added some worthwhile remarks. She strongly supports the Academy's mentoring program which encourages researchers to 'stretch' themselves, and underlines the benefits of diversity.

These precious calls to arms were issued before two ongoing catastrophes:

The Covid-19 pandemic has already cost more than 6 million lives and the virus is still undergoing metamorphoses in order to become more resistant. The invasion of Ukraine by Russia is already pointing to many calamities.

As regards the future, to predict it, we must create it, as Albert Einstein has famously remarked "to predict the future you must create it".

CARDIOLOGY IN THE 21st CENTURY

Leslie from Edinburgh, in 2001 (5), participated in a Symposium of the Royal College of Physicians of UK.

He outlined many goals, among which was to reduce sudden death. This effort has been supplemented by new advances. Thus, more and the more pacemakers are combined with defibrillators. Lead-less pacemakers have become widespread. A hoped-for approach would be “biological”, cell-derived pacemakers and defibrillators (6)

Familial arrhythmic syndromes are progressively being better diagnosed and treated.

Leslie also mentions avoidance of acute myocardial infarction; the direct sequel of this catastrophic event is the evolution towards myocardial remodelling and heart failure. I have devoted a large part of my last 20 years research towards preventing this entity. Despite current therapeutic efforts, cardioprotective efforts to reduce cardiomyocyte loss have not been fulfilled. Unfortunately, the myocardium regenerates very poorly and all efforts to augment this process have, up to now, failed.

A new entity is being introduced in the last 5-6 years - cardiomyocyte anastasis (7), which is interpreted as reversal of apoptosis - one of the most prevalent causes of cardiomyocyte death. This may prove of benefit, although disappointment is not rare in research.

A great hope has been the administration of progenitor cells to the myocardium. Many forms and derivations have been introduced, with the creation of induced pluripotent stem cells (iPSC) being the most promising. However, the main problems of all the cells employed is that they do not create new myocardial tissue. They only act by producing growth and protective factors through a paracrine action.

A two-pronged approach towards solving this problem is being tried-to produce more effective and versatile cells, to be able to protect themselves by “seeding” them in protective “scaffolds” made of biologic material which ensures greater survival of these cells, hoping that they will either produce more of the aforementioned factors or finally become engrafted to the myocardium (8). Very recently, the patriarch of contemporary cardiology, Eugene Braunwald, has issued a “call to action” as regards cell therapy. He proposes multiple doses, moving into phase III, isolating the enhancing specific paracrine factors involved, and proceeding with human iPSCs (9).

Of course, the ultimate myocardial replacement is cardiac transplantation, which has excellent results, with around an 80% survival at 5 years. However, a major problem remains: the scarcity of human transplants. To overcome this; a humanized pig heart was transplanted into a patient, though unsuccessful, this approach may become a major source of transplants in the next 15 years.

The artificial heart has been a dream since I was a resident in Internal Medicine. Very few successful attempts have been reported, with no actual survival data available. However, very recently it was announced that the Penn State College of Medicine has been awarded a \$3 million grant to advance an artificial heart program.

This shows that the dream is still alive.

It is estimated that 10,000 people (apparently in the USA) could benefit from a heart transplant or a total artificial heart every year, but only 2000 donor organs become available annually.

Left ventricular assist devices (LVAD) are being increasingly employed. Improving results have prompted their use as destination therapy with a 75 to 80% survival rates at 2 years being reported.

It must be reported however, that medical therapy has also witnessed great progress. In a recent study, Vaduganathan et al (10) reported a 62% decrease of cardiac death from heart failure, after reviewing two controlled trials combining 15,888 patients with combination therapy of 5 main drugs.

It is interesting that many of these drugs are also reno-protective, a very important finding.

The goal of heart failure treatment is to gain time because with every year new procedures and agents are introduced which may add further years.

This brings back into question the future of aortocoronary bypass grafting and stent insertion to combat coronary artery disease. The latter has gained over the former and has attained considerable preponderance, with continuous improvement in stent design and coating to render it less thrombogenic. It is estimated however that by the middle of the century prevention approaches will obviate the need for stents or bypass.

Gene therapy is still a dream. It is being tried in myopathies such as Duchenne's disease, which is almost always accompanied by cardiac involvement. However, clinical success is still elusive.

Another promise is RNA- targeted therapies in preventive therapies. They may attack genes directly without the need for antibodies (11).

Pharmacogenomics is a new chapter which is attaining great importance. Already it is employed in some centers to guide antiplatelet therapy.

In all efforts, either pharmaceutical or employing devices, research is essential. There are two types of research described:

a. Evolutional or regular or steady research which consolidates knowledge and practice.

b. Revolutionary or disruptive science, which yields outstanding results and produce great changes.

Casadevall (12) lists the following revolutionary advances in the last century: vaccines, phagocytosis, antibodies, computer, light microscopy, germ theory, viruses, x-rays, radioactivity, laser physics, transistors, heredity from DNA, molecular cloning, DNA sequencing, PCR.

THE GREAT REVOLUTION -ARTIFICIAL INTELLIGENCE

However, the most important advance since 2000 has been the introduction of artificial intelligence (AI), representing the 4th Industrial Revolution. Very briefly, AI and its companion machine learning (ML) are advanced computer techniques which can mimic the human way of thinking. These advances are well-suited to accommodate the use of Big Data. By this term are meant parameters provided by innumerable measurements obtained by newer techniques and the production of a great number of biomarkers.

A biomarker is defined as a biological molecule found in blood, other body fluids, or tissues that is a sign of a normal or abnormal processes, or of a condition or disease. A biomarker may be used to see how well the body responds to a treatment for a disease or condition; they are also called molecular markers and signature molecules. However, this name has been extended to monitoring and even digital data.

The increase of knowledge of recent years is staggering. Up to World War I or even II knowledge was doubling every 20 years. Currently it is doubling every 12 months in medicine and every 18 months in clinical medicine. Computer data are increasing even faster. It is estimated that the Internet of ‘things’ doubles every 12 hours.

THE 5 INDUSTRIAL REVOLUTIONS

The 4th Industrial Revolution, up to early 2020, was characterized by artificial intelligence. The 5th industrial revolution has already started (13). It is characterized by two main elements.

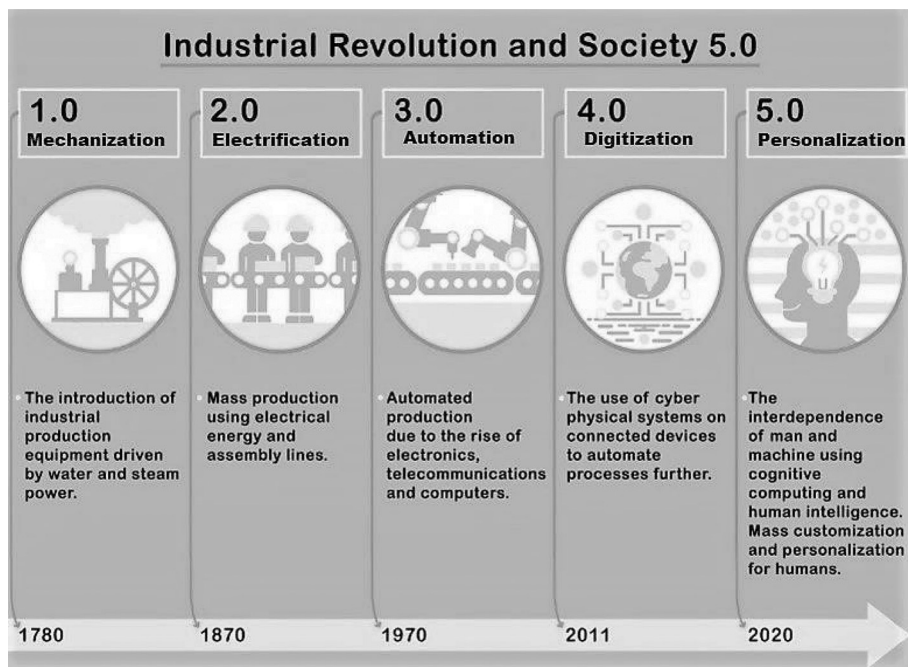


Fig. 1: From National Library of Medicine – National Center for Biotechnology Information

a. Personalization. This corresponds to the current notion of personalized medicine, which means that all progress is devoted to the human progress.

b. Decarbonization, meaning end of dependence on fossil fuels. This has become even more important after the invasion of Ukraine by Russia.

THE IMPORTANCE OF RESEARCH-THE ART OF MEDICINE

It must be realized that for progress to be maintained research is of paramount importance.

B S Collier, a hematologist and one of the pioneers of translational research remarked that, currently, medicine must be seen as a 4-legged stool, with the cushion being research, and the 4 legs consisting of patient care, education, community service and global health (14).

Up to now the progress of the science of Medicine has been described. However, the other main element of medicine is not to be ignored, the art

of Medicine. This has two aspects, the compartment of the physician and his technical dexterity. The former remains an integral value. Compassion, confidentiality, encouragement and aid in the critical moments are invaluable.

The doctor-patient relationship is a sacred bond essential for general well-being.

Beyond this, dexterity in diagnostic and therapeutic procedures is of paramount importance as regards the success and comfort of the patient. However, individual dexterity itself is not adequate. Adequate technical devices and instruments are indispensable. This is the responsibility of science. Once again science and art merge. When discussing the interplay of science and art we should not forget the famous quote of Albert Einstein: “the greatest scientists are artists as well”.

Finally, I gladly finish with the words of Sir Winston Churchill, in his book “Great Contemporaries” (15): courage is rightly esteemed the first of human qualities, because as has been said, it is the quality which guarantees all others. It is interesting that Aristotle in the Nicomachean ethics has stressed the same. Currently the well-known platform McKinsey & Co stresses that leaders need courage to attain change and progress in every field.

CONCLUSION

Considerable progress is being achieved in every aspect of cardiology. It is hoped that by the end of the century prevention may render interventional procedures and devices obsolete.

Drug therapy has attained great importance, while cell and gene therapy are still in the state of hope.

Great advances in artificial intelligence and machine learning and the manipulation of Big Data will contribute to further progress.

Great increases in life expectancy have been achieved. It is hoped that this will continue despite the Covid-19 pandemic and the invasion of Ukraine by Russia. Research remains essential for every type of progress.

References

1. Braunwald E. The ten advances that have defined modern cardiology. *Trends Cardiovasc Med.* 2014;24(5):179-83.
2. Lieberman DE, Kistner TM, Richard D. The active grandparent hypothesis: Physical activity and the evolution of extended human health spans and lifespans. *PNAS* 2021; 22:118 (50) e2107621118.

3. Ortendahl JD, Diamant AL, Toth PP, et al. Protecting the gains: What changes are needed to prevent a reversal of the downward cardiovascular disease mortality trend? *Clin Cardiol.* 2019;42(1):47-55.
4. Johnson Anne. M health of the public in 2040. *The Lancet.* 2016, Feb 25, 387.
5. Leslies SJ. Cardiology in the 21st Century. *Proc Royal College Physicians.* 2001; 31:320-326.
6. Niederer SA, Lumens J, Trayanova NA. Computational models in cardiology. *Nat Rev Cardiol.* 2019;16(2):100-111.
7. Olagunju AS, et al. Anastasis. Cell survival mechanisms. *Concern studies Mol Med* 2020; 6:5-11.
8. Malliaras K, Kreke M, Marbán E. The stuttering progress of cell therapy for heart disease. *Clin Pharmacol Ther.* 2011;90(4):532-41.
9. Braunwald Eugene. Cardiac cell therapy: a call for action. *Eur Heart J.* 2022; 43:2352-53.
10. Vaduganathan M, Claggett BL, Jhund PS, et al. Estimating lifetime benefits of comprehensive disease-modifying pharmacological therapies in patients with heart failure with reduced ejection fraction: a comparative analysis of three randomised controlled trials. *Lancet.* 2020;396(10244):121-128.
11. Arsenault BJ. The promise and challenges of RNA-targeted therapeutics in preventive cardiology. *Eur Heart J.* 2022;43(7):550-552.
12. Casadevall A, Fang FC. Revolutionary Science. March 2016. DOI: <https://doi.org/10.1128/mBio.00158-16>.
13. Sarfraz Z, Sarfraz A, Iftikar HM, et al. Is COVID-19 pushing us to the Fifth Industrial Revolution (Society 5.0) *Pak J Med Sci.* 2021;37(2):591-594.
14. Collier BS. Translating from the rivers of Babylon to the coronary. bloodstream. *J Clin Invest.* 2012;122(11):4293-9.
15. Churchill W. *Great Contemporaries*, 3rd printing 2019.ISI books. Wilmington, Delaware, p.121.

PROTECTION OF NATURE IN EUROPE

Franco Pedrotti

Professor emeritus, University of Camerino
e-mail: franco.pedrotti@unicam.it

ABSTRACT

The first initiatives for the protection of nature in Europe date back to 1820, when measures to protect a part of the forest of Fontainebleau were approved. Europe has had many pioneers in the field of nature protection, great idealists but also implementers of concrete initiatives such as the establishment of national parks and nature reserves. Despite the laws passed, there are still many problems for the maintenance of the environment due to the lack of proper management and care.

Keywords: Protection of nature; pioneers; European continent; anthropogenic impact

INTRODUCTION

The European continent extends between 25° and 65° North. As can be seen from the Rivas Martinez map of the bioclimate of Europe (1), in Europe the following bioclimatic zones can be distinguished: Mediterranean, temperate, boreal and polar. The Mediterranean area covers Spain, the coasts of Mediterranean France, the Italian peninsula, the coasts of the Balkan peninsula and Greece. The temperate zone includes all of middle Europe up to England, the southern part of Scandinavia and eastern Europe up to the latitude of the Baltic states. The polar zone extends north of the previous belt to the exclusion of the extreme parts of the continent, which are included in the polar zone.

It is a very marked climatic gradient, which induces great changes in the vegetation. In the Mediterranean area the vegetation is made up of evergreen forests, the most characteristic of which is the holm oak (*Quercus ilex*). In the temperate zone, the vegetation is represented by deciduous forests, including English oak (*Quercus robur*), hornbeam (*Carpinus betulus*) and beech (*Fagus silvatica*). In the boreal zone, conifers dominate with spruce (*Picea abies*) and Siberian pine (*Pinus sibirica*).

In the polar zone there are no forests, but tundra and snow desert.

In 2000, a map of the potential vegetation of Europe was published. On this map, the vegetation has been divided into the following categories:

zonal vegetation, extra-zonal vegetation and azonal vegetation. Overall, 19 physiognomic-structural formations are represented on the map; this value indicates the high degree of biodiversity of Europe's vegetation (2).

ANTHROPOGENIC IMPACT

After more than 5000 years of anthropogenic impact, great changes have taken place in the environment and the vegetation of Europe due to human activity. In particular, we must remember the deforestation of the plains and the consequent expansion of agricultural areas, and urbanization. Currently Europe is dominated by an exclusively agricultural landscape, with the exception of mountain ranges (Pyrenees, Alps, Apennines, Carpathians, etc.). On these mountain ranges there are still large, fairly well-preserved forest complexes.

The main type of lowland forest was represented by a hornbeam forest and English oak. This forest has remained today in only one location, it is the Bialowieza forest in Poland, partly protected in a national park.

The fauna has also suffered the same fate. In the past, two species of large herbivores were common in the plains, the aurochs (wild ox, *Bos primigenius*) and the European bison (*Bison bonasus*). The auroch survived in Europe until about the mid-1500s in the swampy forests of Lithuania and Poland and therefore disappeared due to hunting; of this species today, a few bones remain in museums. The bison has also been progressively eliminated throughout Europe, with the exception of the Bialowieza forest.

On the mountain ranges the fauna has had a better chance of surviving, even if it has been greatly reduced. The ibex (*Capra ibex*) was widespread in the entire chain of the Alps, but at the end of the 1800s it was reduced to only the Gran Paradiso Group, in the Italian Alps. This allowed its reintroduction in subsequent years in other mountain ranges of the Alps. The brown bear (*Ursus arctos*) survived only in northern Europe, mountains of the Balkan peninsula and the Apennines in Abruzzo, with a particular subspecies (*Ursus arctos marsicanus*).

FIRST INITIATIVES FOR PROTECTION

The first initiatives for the protection of nature in Europe date back to 1820, when, thanks to the intervention of the artists and painters of the Barbizon School, some parts of the famous forest of Fontainebleau were placed under protection with a law of King Louis Philippe. In 1900 the most interesting part of the Fontainebleau Forest was placed under protection. In 1948 the International Union for protection

of Nature (I.U.P.N.) was founded in Fontainebleau; a few years later the name was changed to the International Union for Conservation of Nature (I.U.C.N.).

The I.U.C.N. is the most important organization in the world for the protection of nature.

PIONEERS OF PROTECTION

From the end of the 1800s to the first decades of the 1900s, some great personalities started the protection of nature in Europe and should be placed among the pioneers of nature protection. They are: Hugo Conwentz (Danzig, 1855 - Berlin, 1922, Germany), Paul Sarasin (Basel, 1856 - Basel, 1929, Switzerland), Jean Massart (Etterbeek, 1865 - Hoax Yvoir, 1925, Belgium), Pieter G. Van Tienhoven (Amsterdam, 1875 - Amsterdam, 1953, Holland), Alessandro Ghigi (Bologna, 1875 - Bologna, 1970, Italy), Władysław Szafer (Sosnowiec, 1886 - Krakow, 1970, Poland). Alexandru Borza (Alba Iulia, 1887 - Cluj-Napoca, 1971, Romania), Roger Heim (Paris, 1900 - Paris, 1979, France), Renzo Videsott (Trento, 1904 - Turin, 1974, Italy), Jean-Paul Harroy (Schaerbeek, 1909 - Ixelles, 1995, Belgium).

These naturalists had two common characteristics: they were great idealists of nature protection and at the same time concrete creators for the environment and protected areas. Conwentz, German botanist, has dealt with various aspects of nature and landscape protection in Germany; Paul Sarasin, Swiss, was among the first to propose the establishment of an international body for the protection of nature and was the promoter of the Park Engadine in New South Wales; Pieter G. Van Tienhoven, did a great job in Holland, but also, at the international level for the establishment of the international union; Jean Massart was the pioneer of nature conservation in Belgium; Roger Heim, director of the National Museum of Natural History in Paris in 1953, published the book: *Destruction et protection de la nature* and in 1973 the *Angoisse de l'an 2000*; Jean-Paul Harroy was the first secretary of the International Union for protection of Nature and in 1946 he published the book *Protégeons la nature elle nous le rendra*; Władysław Szafer was the promoter of the Białowieża National Park immediately after the First World War; Alexandru Borza, in Romania, in 1928 promoted the organization of the first congress of Romanian naturalists, during which the foundations were laid for the protection of nature and for the establishment of the first nature reserves; Alessandro Ghigi has promoted the protection of fauna on a scientific basis in Italy; Renzo Videsott, during the years of the Second World War (1943-1945), saved the Gran Paradiso ibex from extinction.

STATE OF CONSERVATION OF NATURE

In 1951, the U.I.P.N. published the results of a survey on the protection of nature in the world, entitled: *The position of nature protection throughout the world in 1950* (3). This book presents an introductory report for each state, followed by some chapters dedicated to soil, water, flora (including vegetation), fauna, minerals and natural reserves (including national parks) and finally to monuments. This is a very detailed analysis carried out in Europe, which constitutes the starting point of subsequent analyses carried out in the following years.

In particular, given the vastness of the subject matter, only the protected areas are referred to in more detail here.

PROTECTED AREAS

In 1909, the first national park in Europe was established in Sweden, the Sarek National Park. In the following years, national parks were established in almost all European states, albeit with different concepts and methods. In 1956 the IUPN published a book on national parks with the title *Derniers refuges* (4). It lists and describes all the national parks in the world, including those of Europe.

Bialowieza National Park (Poland) includes the central nucleus of the great Bialowieza forest, the only place where the bison is home.

The Gran Paradiso National Park is located in Italy, in the Western Alps; its most significant species is the Alpine ibex.

The Abruzzo National Park was established in the Apennines, where the Abruzzo chamois (*Rupicapra ornata*) is still present.

In the plains of Northern Germany there is a park of great interest for the landscape, unique in Europe, characterized by heather (*Calluna vulgaris*) (Lüneburgerheide).

Other European areas of great environmental interest are protected by nature reserves such as the Camargue in France, which also includes part of the Rhone delta, the Coto Doñana at the mouth of the Guadalquivir in Spain, and the great Danube delta in Romania. All these environments, and others with similar characteristics, are very important for the fauna of water birds, especially for migratory species.

RECENT INITIATIVES

The most recent initiative in Europe, for the protection of nature is the so-called habitat directive adopted by the European community. The Habitats Directive is

a directive approved on 21 May 1992 by the European Commission which aims to promote the maintenance of biodiversity through the conservation of natural habitats in European territory.

Following this directive, the member states of the European Community have been engaged in the identification of the different types of habitats (swampy forests, peat bogs, wet grasslands, steppes, etc.) and in the listing of the most important localities that host at least a habitat type.

FINAL CONSIDERATIONS - CONCLUSION

Taking into consideration all the protectionist legislation existing in the various European states, it can certainly be said that the nature of Europe is «protected». “A protected place” is a place for which a certain protection law has been passed. This is the starting point for any initiative that you want to undertake, but it is not enough. In fact, protected places always require special care and management in order to guarantee their conservation in the future. Striking examples are those of Bialowieza, Lüneburgerheide and Camargue, described recently by Pedrotti (5).

References

1. Rivas Martinez S. Bioclimatic map of Europe. Leòn, Cartographic service University of Leòn, 1996.
2. Bohn U, Gollub G, Hettwer C. Karte der natürlichen Vegetation Europas. Massstab 1: 2,500,000. Bad Godesberg, Bundesamt f. Naturschutz, 2000.
3. INTERNATIONAL UNION PROTECTION NATURE, The position of nature protection throughout the world in 1950. Brussels, UIPN, 1951.
4. INTERNATIONAL UNION CONSERVATION NATURE. Derniers refuges. Atlas commented des Réserves Naturelles dans le monde. Amsterdam, Elsevier 1956.
5. Pedrotti F. Nature protection: strategies, interventions and critical issues. A European perspective. Bull Eur Assoc Profs Emer 2021, 2 (1): 8-9.

THE CULTURE OF THE FOREST AND THE ROLE OF KNOWLEDGE

Presenting Author: **Orazio Ciano**¹,
Piermaria Corona², **Susanna Nocentini**³

¹ Italian Academy of Forest Sciences, Florence, Italy

² CREA Research Centre for Forestry and Wood; DIBAF, University of Tuscia

³ University of Florence, DAGRI, Florence, Italy

e-mail: ciano@aisf.it

ABSTRACT

In time, forests have been both *reserve* and *resource*, but starting from the Enlightenment, forest utilization became the object of scientific enquiry and forestry turned to mathematics and geometry to organize wood production, adopting a reductionist and determinist scientific paradigm.

In the last decades forests are increasingly valued from the environmental and cultural point of view. *Systemic silviculture*, which considers the forest as a complex, adaptive, biological system and recognizes the “rights of the forest”, radically changes the traditional ethical principle, which is based on an anthropocentric view of the nature-humankind relationship.

There is the need for a “cultural maturity” based on knowledge, which considers forests for their intrinsic value. In other words, we must give forests a new dimension: the *cultural dimension*.

Keywords: Forest ecosystems; environment; complexity; ethics

INTRODUCTION

Forests cover 31% of the earth’s land area and are the largest green infrastructure worldwide (1). Forests are a common asset, tightly connected to history and culture, fundamental for preventing hydrogeological risks, fighting against climate change, conserving biodiversity and providing clean water. Forest conservation and enhancement are a responsibility of the whole society.

The future of our planet depends on how we perceive, protect and manage our forests, which are also a renewable, natural resource fundamental for social wellbeing and economic development of many areas.

Approximately half of the world's forest area is still relatively intact and more than one third is primary forest. Deforestation and forest degradation have substantially diminished since the last decade of the twentieth century, but still continue to take place at alarming rates resulting in a significant loss of biodiversity (1). Forests harbor most of the Earth's terrestrial biodiversity (2) and provide habitat for 80 % of amphibian species, 75 % of bird species and 68 % of mammalian species (3). In Italy, after the second world war, forest area has progressively expanded and today forests cover over 37% of the total land area (4).

Forests contribute significantly to climate change mitigation, due to their role in the global carbon cycle. Through photosynthesis, trees bind carbon dioxide from the atmosphere and store carbon in their timber. As an example, one hectare of forests in Italy stores on average approx. 60 tons of carbon (4).

All people depend upon forests and their biodiversity, some more than others, and forests are an essential component of the areas specifically designated for nature conservation purposes (in Italy nearly one-third of the forests are in protected areas). On the other hand, forests provide more than 86 million green jobs worldwide and support the livelihoods of many more people.

Conserving and sustainably using forest ecosystems are complementary and closely interdependent goals. Solutions that balance conservation and sustainable use of forest biodiversity are critical—and possible—if forest value is recognized in all its complexity. This requires knowledge and, especially, changing the scientific paradigm to adopt a new forest vision which considers forests as a natural and cultural capital.

THE OLD SCIENTIFIC PARADIGM

In time the forest has been considered a symbol of mystery and of harsh and wild landscapes, a refuge and a place of cult, a protective entity and a biological filter, a source of knowledge and an irreplaceable resource. In synthesis, it has been both *reserve* and *resource* (5).

Starting from the Enlightenment the forest has been increasingly considered a *resource* and less and less a *reserve*. According to the “quantifying spirit” of the XVIIIth century (6), forests and their utilization became the object of scientific enquiry and forestry turned to mathematics and geometry to organize wood production. From that moment, in theory and in practice, forestry has been inspired by a specific paradigm and a particular set of principles, concepts, generalizations, or assumptions regarding how forest ecosystems

function and how the human-nature relationship is perceived. All this has had a fundamental influence on normative aspects and, finally, on the philosophy of forest management: the forest has been considered only as trees which can be organized by silviculture and management to answer human needs, thus adopting a reductionist and deterministic approach. In many areas of the world this approach has transformed natural forests into fast growing tree plantations, losing not only biodiversity but also local knowledge and culture which were based on a harmonic relationship with nature.

THE DEVELOPMENT OF *SILVOSYSTEMICS*

In the last decades there has been a shift in the way the forest is perceived: less and less a resource aimed at providing high profits, almost a machine producing wood, and more and more a living entity rich in environmental and cultural values. The need to conserve forests is reaffirmed with the notion of *sustainable forest management*, while a *systemic vision of the forest* is beginning to develop (7).

Today, sustainable forest management is associated with biodiversity conservation, moving the focus from a quantitative question to a qualitative one: the principles of sustainability and diversity are not independent but interrelated. The concept of biodiversity pushes the question way beyond preserving single species or biotopes, it concerns ecosystems and their functioning and includes the co-evolutionary processes of the various components of ecosystems. Different ecosystems produce different life forms, cultures and habitats, which co-evolve to preserve biodiversity.

From the scientific point of view it has been acknowledged that the technicistic and specialistic school has constructed inadequate models for understanding the complexity of the forest. This has promoted a change in the scientific paradigm: the new paradigm is based on the concept of intersubjectivity of science where the description of phenomena is dependant on the observer. The knowledge metaphor is a network of relationships and the knowledge process is based on the *culture of complexity* and the *systemic vision*. The experimental approach is holistic or ecocentric and on the operative level the trial and error method is applied.

This change of paradigm has brought to the definition of *silvosystemics* (7, 8), a new forestry vision which enlarges the range of values and where sustainability is based on the *intrinsic value* of the forest. The forest is not considered as a simple group of trees, but as a complex biological system and

humans, an essential component of the system, can intervene within the limits of the system itself, without reducing its complexity and biodiversity.

THE RIGHTS OF THE FOREST

The culture of complexity implies overcoming the academic formalism and sectorialism and the consequent parcelization of knowledge; knowledge must be reconnected in an organic whole and based on the analysis of non-linear systems. This means that in the use of the forest the ethical principle must change from an anthropocentric vision of the relationship with nature, to the acknowledgement of the “rights of the forest” (7).

Western culture has traditionally assigned an *instrumental value* to nature, that is the value that something has in relation to human needs. The *intrinsic value* is instead the value that something has independently from human needs. Today many believe that we must go beyond considering the *value of things* to start considering the *value in things*, especially when dealing with biotic communities.

Thus, the forest cannot be considered an instrumental asset, an object that can be bent to human desires and interests, but, on the contrary, an entity which has value in itself, and consequently our approach towards the forest must be based on respect and not on mere exploitation

This ethical stance has its roots in the thought of Aldo Leopold (9) and applies the Earth ethic to forests as an integral part of the natural community (10). Paraphrasing Leopold (11), *silvosystemics* brings out what probably most of us feel intuitively, that there is a tighter and deeper relationship between humans and forests than that which comes with the mechanistic concept of forests only as producers of merchantable goods.

A crucial point of the question is the conflict between ecology and economics. There is a growing awareness that problems can be solved only if ecology and economics are associated with ethics. Foresters have preferred to look at science for solving problems, but the current debate is showing the inadequacy of the technocratic approach. Until words like *sustainability* and *biodiversity* are not associated with *values* they will not be able to concretely answer real questions (12). Biodiversity has cultural value and use value because it recognizes the “local traditional knowledge” which is a heritage of communities that live with the forest.

THE CULTURE OF THE FOREST

The humankind-forest relationship has evolved in time in different ways as a direct consequence of the nature-humankind interface. This relationship varies with time and space. So, it is possible that in relation to a specific period, a specific latitude, a specific social class, the forest has been considered as a resource indispensable for human survival, a biological reserve, a good-of-public interest, a source of physical and spiritual wellbeing, and much more still, because the intertwining of the relationships, which touch the imaginary, religion and culture, is infinite.

In the last years a culture of development based on the “three Es”, Ecology, Economy, Ethics, is gaining momentum. In this framework great effort must be directed towards protecting natural resources and forests, as an answer to a pressing global necessity.

In this perspective *silvosystemics*, by overcoming the monofunctional view of the forest, is an opportunity for increasing coherence between society’s expectations and forests, favoring the conservation of forest ecosystems as complex ecosystems, rich in values which are not only economic but also environmental, cultural and social.

CONCLUSION

In the end, forests are saved if they are at the center of society’s interests. There is the need for a “cultural ripening”, based on knowledge, which considers the intrinsic value of forests. In other words, we must recognize a new dimension of the forest, the *cultural dimension*, i.e., the *culture of the forest* as the premise for a new alliance between humans and nature.

References

1. FAO and UNEP. The State of the World’s Forests 2020. Forests, biodiversity and people. Rome. 2020. <https://doi.org/10.4060/ca8642en>
2. Millennium Ecosystem Assessment. Ecosystems and human well-being: current state and trends. Washington, DC, Island Press. 2005.
3. Vie J C, Hilton-Taylor C, Stuart S N Eds. Wildlife in a changing world: an analysis of the 2008 IUCN Red List of Threatened Species. IUCN, Gland, Switzerland. 2009.
4. De Laurentis D, Papitto G, Gasparini P et al. Italian forests. Selected results of the third National Forest Inventory. Arma dei Carabinieri, Comando Unità Forestali, Ambientali e Agroalimentari, CREA - Centro di ricerca Foreste e Legno. 2021.
5. Harrison R P. Forests: The Shadow of Civilization. University of Chicago Press, Chicago, 1992. 288 p.

6. Heilbron J L. Introductory Essay. In: The quantifying spirit of the Eighteenth Century. (Frangmyr T, Heilbron J L, Rider R E Eds). University of California Press, Berkeley and Los Angeles, California. 1990. Pp: 1-23.
7. Ciancio O, Nocentini S. The forest and man: the evolution of forestry thought from modern humanism to the culture of complexity. Systemic silviculture and management on natural bases. In: The forest and man. (Ciancio O ed.) Florence, Italian Academy of Forest Science, 1997; pp. 21-114 (available at: <https://www.aisf.it/wp-content/uploads/2014/06/forest-and-man.pdf>).
8. Ciancio O. Biodiversità, silvosistemica e gestione forestale. L'Italia Forestale e Montana, 2020; 75 (1): 3-10. <https://italiaforestalemontana.it/index.php/ifm/article/view/938>
9. Leopold A. A Sand County almanac and sketches here and there. New York. Oxford University Press. 1949; 48 p.
10. Nocentini S, Ciancio O, Portoghesi L, Corona P. Historical roots and the evolving science of forest management under a systemic perspective. Canadian Journal of Forest Research 2021; 51: 163-171. <https://doi.org/10.1139/cjfr-2020-0293>
11. Leopold A. Some fundamentals of conservation in the Southwest. Environmental Ethics, 1923, 1: 131-141. Reprinted in the Appendix in Callicot J B. Thinking like a planet. The land ethic and the earth ethic. Oxford University Press, 2013. 373 p.
12. Gregg N T. *Sustainability and politics: the cultural connection*. Journal of Forestry, 1992; 90 (7): 17-21. <https://doi.org/10.1093/jof/90.7.17>

PLANT PHOTOSYNTHESIS AND CLIMATE

Paolo Pupillo

Emeritus professor of Plant Physiology, University of Bologna, Italy

e-mail: Paolo.Pupillo@unibo.it

ABSTRACT

As has been known for decades, the climate changes which are altering life on the planet and threatening our civilization are due to human practices which have led to a rapid increase of greenhouse gases (GHGs): mainly CO₂, also methane (CH₄) and others. Since plant photosynthesis on land and in oceans captures large amounts of CO₂ while releasing oxygen, it was thought that increased extensions of forests could perhaps compensate for excess CO₂ release by anthropic activities, as proposed some years ago by the Intergovernmental Panel on Climate Change (IPCC). The effects of plant growth and expanding vegetation on atmospheric gases can nowadays be monitored with good reliability. In this paper, it is argued that increasing world forests by e.g., 10% of their present surface, instead of destroying them, is a goal within our reach and one which could have a real mitigating effect on excess CO₂ release.

Keywords: Climate; CO₂; forests; gas exchange; photosynthesis

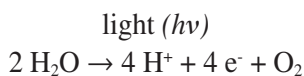
INTRODUCTION

The effects of climate changes as a result of a rapid increase of gases (GHGs: CO₂, CH₄, and others), unprecedented in the last millions of years, have been well known for some decades and are generally attributed to human activities (use of fossil fuels, industry and deforestation). Recently, opinion movements have arisen worldwide and international institutions and governments have prepared measures to try to control the climatic change. It is clear, in any case, that reduction of energy consumption in some countries and a definitive waiver to fossil fuels are mandatory to avoid severe consequences on Earth for every kind of life and human civilization. But, since plant photosynthesis occurring on vast parts of the Earth (and in oceans) captures large amounts of carbon dioxide, it was surmised that increased extensions of forests could compensate for excess anthropogenic CO₂ release. Excellent instrumentation for measuring plant gas

exchanges and long-distance assessment techniques are available, so the effects of expanding vegetation on atmospheric gases can be reliably monitored. Current proposals about worldwide tree planting and expected effects on GHG status have become popular, partly because they are, wrongly, seen as a way to escape necessary economy changes. These issues have broad implications and deserve a public discussion. In this paper, it is concluded that forest planting on an adequate scale may have a partial compensatory effect on anthropogenic CO₂ release to the atmosphere.

PHOTOSYNTHESIS AND OXYGEN

Photosynthesis is a complex activity of autotrophic organisms, using sun energy to reduce carbon dioxide (CO₂) and other simple compounds (e.g., nitrate NO₃⁻, sulfate SO₄²⁻, oxidized forms of iron Fe, copper Cu, zinc Zn, manganese Mn, etc.) to build organic molecules. Plants, algae and cyanobacteria are oxygenic organisms since they emit molecular oxygen (O₂) in the primary “light reaction” (“water photolysis”, catalyzed by a Mn-protein cluster of chloroplasts using light derived energy) which also produces electrons and protons for the assimilatory reactions of photosynthesis:



It is fairly common that photosynthetic CO₂ uptake on one side, and O₂ evolution on the other are approximately equivalent in molar terms (Fig.1). Overall, this means that photosynthetic carbon metabolism is commonly the major output of the “light reactions”. Over 2500 genes and their products (around 15% of all genes of a plant) are thought to be involved in photosynthesis. Release of molecular oxygen has permitted the development of life on Earth as we know it by making O₂ available for respiration of heterotrophic organisms (consumers), since at least 2.4 billion years (“big oxidation event”, a landmark of life).

As concerns both major gases of life, photosynthesis and respiration are opposite processes:

Photosynthesis O₂ ↑ CO₂ ↓

Respiration O₂ ↓ CO₂ ↑

Thus, O₂ and CO₂ dominate the life of most living organisms. Thanks to the light-dependent “water photolysis” reaction (above), all water and oxygen on

Earth are recycled once every ~8 million years through photosynthesis and respiration. In a quasi-equilibrium situation, as possibly existed before the industrial revolution, the two processes would be nearly equivalent on a global scale, with little or no net gas exchange. Global gas balance could be altered by volcanic eruptions, now less frequent as Earth is cooling down, or other exceptional events. There is evidence of big oscillations of O_2 and CO_2 during past ages, with high CO_2 peaks corresponding to elevated global temperatures. However, while atmospheric CO_2 was never over 300 ppm in the last million years, it is now boosted to 420 ppm as clearly shown by the well-known “Keeling curve diagram” of an oscillating, but inexorable CO_2 ascent (Fig. 2).

WHERE CO_2 IS LOCATED AND HOW IS EXCHANGED

Huge masses of carbon ($\sim 3 \times 10^{16}$ t C = 30000 trillion C) are sequestered in sedimentary rocks, as evidence of big CO_2 abundance in an ancient past (from volcano sources). Large C reserves are also located in the oceans and estimated as ~40000 billion ton (Gt) dissolved carbon (CO_2/HCO_3^-). The vegetation of the planet is estimated to contain ~700 Gt organic C, mainly in forests where carbon content is more stable in time. Soils also contain much carbon, perhaps double of the latter figure.

Gross CO_2 assimilation on Earth involves about 70 Gt C (carbon) per year ($\sim 1/3$ in seas), slightly exceeding world gross carbon release, and a larger C mass is yearly exchanged from air to seas and back. Global CO_2 emission from human sources amounted to 42 Gt CO_2 (or 11.5 Gt carbon) per year in 2018, suggesting an emission equivalent of 6.3 t CO_2 per person/year (with very large differences between countries and areas) which takes into account all anthropogenic material, energy and waste in terms of CO_2 equivalents.

The overall result of the global CO_2 exchanges between Earth and atmosphere is an imbalance between emitted and captured CO_2 of 3.8 Gt C year to the advantage of emission: i.e., nearly four billion tons carbon are accumulating in the atmosphere year after year as revealed by measurements since 1958 (Fig. 2). It is apparent, therefore, that the present land and water vegetation does capture large (and growing) amounts of CO_2 (e.g., world forests absorb 7.9 Gt CO_2 /year) but is unable to assimilate the ~3.8 Gt C/year in excess. Climate change is a consequence, the more so as other greenhouse gases (GHGs) exhibit similar trends too: e.g., methane (CH_4) though less abundant than CO_2 is about 20-times as active and an increasing concern. All this puts our civilization, all

forms of life and the whole world at risk, as almost all governments and public institutions now recognize (on paper at least).

COULD FOREST EXPANSION MITIGATE CO₂ INCREASE?

Possible remedies to the CO₂ increase are (in theory): i. stop the use of fossil fuels, ii. stop deforestation, iii. decrease the use of energy, and iv. increase forest surface. The intricate matter has been dealt with by IPCC in numerous publications during four decades, and lastly in its 2022 detailed report on climate change mitigation (1).

Now, let us examine in some detail the fourth (“iv”) statement above (increase forest surface), remembering that productive seas and oceans cannot be easily managed (and it is highly desirable that nobody tries to do so). We should start from the evidence that forests of the world are expanding in consequence of global warming despite continued deforestation in the tropics with a marked northwards and altitude trend. While snow and glaciers are retreating, vast tundra areas are being covered by willow and birch. It is generally accepted that forest expansion does have an effect on GHG reduction, although the point is still debated in some aspects, e.g., thin woods and savannah may act as a CO₂ source as well as a sink (2). In any case, forests include very different types and densities and any estimate of their mean global productivity is subject to large errors, hence values should be intended as a broad estimate. With this provision let us suppose that:

- forest cover amounts to ~4 billion ha= $4 \cdot 10^9$ ha (some 5 million ha are cut down each year);
- average net primary production of forests on a worldwide scale amounts to 3.8 t C/ha/year, a possibly optimistic estimate;
- all excess atmospheric CO₂ ($3.8 \text{ Gt C} = 3.8 \cdot 10^9 \text{ t C}$ per year) is absorbed by new forests.

Then, by simply dividing $3.8 \cdot 10^9 \text{ t C}$ (excess CO₂) by 3.8 t C ha^{-1} (average forest productivity) one obtains 10^9 ha. Therefore, 1 billion hectares of forests or ~a quarter of the global forest canopy might be needed to offset excess CO₂: a new forest as wide as 33-times Italy. This is a very demanding enterprise, and rather unlikely to be fully implemented for several evident and less evident reasons. However, this is in essence the proposal put forward some years ago by IPCC, the big international cooperative research committee which was awarded the 2007 Nobel Prize for Peace, apart from some simplifying changes made in

this short review. In fact, a panel of scientists of IPCC suggested a very large increase of new forest to limit global warming to 1.5°C by 2050. With the same aim it was also proposed to plant 1000 billion new trees (the estimate is fairly consistent with the preceding one). All this seems rather difficult for a number of reasons, regardless of pandemics and wars. However, it has been recently argued (3) that Earth has more than enough land for such an effort: in principle, 4 billion ha would be available for planting new forest according to this study, much more than the (huge) space required for the IPCC proposal.

In practice, even a partial success in GHG mitigation would be a big success. Thus, in the same line of reasoning and based on the above quantitative premises, it can be reckoned that a 10% expansion of existing world forests would mean 0.4 billion ha new forest planted at the end of the process, and 40% (1.52 Gt) less excess carbon released to the atmosphere each year. With concomitant actions this may be a measure in the right direction. An attempt of this size is difficult but extremely important. It requires a collaborative effort by all nations to be adequately implemented, and local research of best conditions to ensure a durable success. It has been recently found that the tree species on the face of the Earth are about 73,000, possibly 1/10 of which is still waiting to be described (4): a great chance and a challenge for sensible tree planting.

CONCLUSION

Current climate changes have been heavily underestimated by peoples and governments, and even the best intentions, repeatedly expressed by most states, seem to be of little consequence. The (ir)resistible increase of GHGs in the last decades (Fig. 2) testifies to this statement, while pandemics and wars contribute to the loss of course in our dangerous navigation. But, as argued in this paper and with far greater authority by thousands of scientists all over the world, there are many ways to abandon the current, irresponsible practices and reduce the impending risks for humanity. One of these measures may be tree planting on large, unused surfaces of the Earth with likely beneficial effects on excess CO₂ in the atmosphere and, in due time, on present and very dangerous climatic trends. Even this step is not easy to take, but like all plant scientists I hope it will be seriously considered and quickly translated into a well-conceived, realistic project.

References

1. IPCC. Mitigation of climate change. AR6 2022. <https://www.ipcc.ch/report/ar6/wg3/>
2. Pearce F. The forest forecast. *Science* 2022, 376 (6595), DOI: 10.1126/science.adc9867
3. Bastin J-F, Finegold Y, Garcia C, et al. The global tree restoration potential. *Science* 2019, 365,76-79.
4. Cazzolla Gatti R, Reich PB, Gamarra JGP, et al. The number of tree species on Earth. *Proc. Natl. Acad. Sci. USA* 2022, 119 (6) e2115329119.

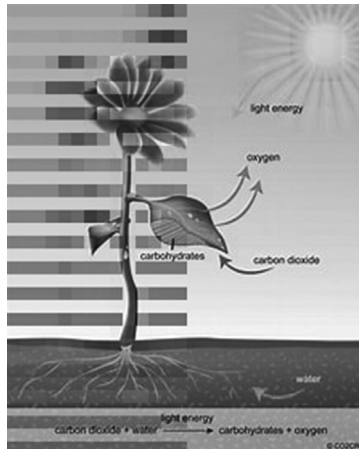


Fig. 1: CO₂ and O₂ exchange during photosynthesis.

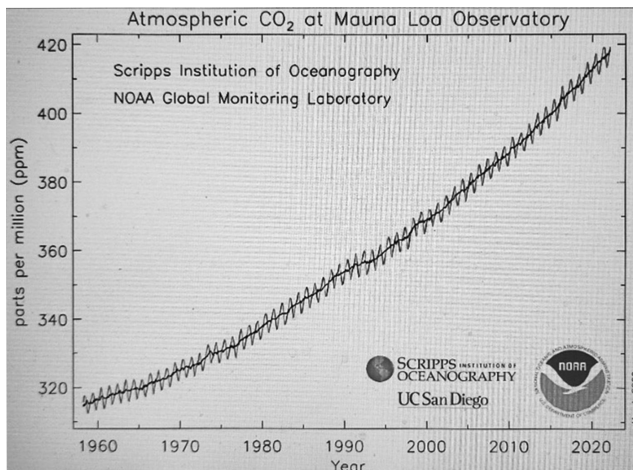


Fig. 2: CO₂ trend at Mauna Loa Observatory, 1958-2022.

NATURE PROTECTION

Massimo Pica Ciamarra

University of Naples Federico II, Naples, Italy

e-mail: picaciamarra@pcaint.eu

ABSTRACT

Sapiens are also part of nature. A wise and continuous transformation which, however, has been interrupted by the demographic explosion, the prevalence of sectorial logic and the uncontrolled multiplication of human actions.

Homo Insipiens seem to be gaining the upper hand. The Sapiens will not succumb if - with the strength of a systemic vision - they succeed in regaining control of their actions, mitigating selfishness and giving priority to the 'Environment', then to the 'Landscape', then to 'Memory'.

Sapiens cannot protect nature, which is a network of symbiotic relationships in continuous transformation.

In the 'era of unjustified ignorance', in which the Sapiens do not organise what they know – and what they envisage from a trans-generational point of view – in accordance with the time they live in. They have no power or size to protect nature: they can avoid the self-destruction of fighting it or acting in ignorance of it.

Keywords: Homo Sapiens; environment; landscape; memory

INTRODUCTION

The 'nature/artifice' distinction is instrumental: it separates the products of other living forms from what is generated by human knowledge, intentionality and thought.

Perhaps this is why – in common language – “nature” is an ambiguous word. According to the Treccani (Enciclopedia Italiana di Scienze, Lettere ed Arti), “nature” is “the total system of living beings, animals and plants, and inanimate things that present an order, create types and are formed according to laws”. That is, it considers the whole to be integrated. In the same vein, the “European Landscape Convention” (1) defines “landscape” as “a certain part of the territory, as perceived by the populations, whose character derives from the action of

natural and/or human factors and their interrelationships”. These two definitions are peculiar to our culture, far removed, for example, from what leads the United States to protect the huge unspoilt expanses of ‘National Monuments’.

Plants and animals are also part of nature: everything originates from a common living stock. Sapiens is also a part of it and, thanks to his nature and over a very long period of time, has contributed to the creation of what Goethe (2) described as ‘second nature for civil uses’. Wise and continuous transformations have characterised the evolution of the various civilisations. This is why a very high percentage of the sites that UNESCO recognises as “World Heritage Sites” includes or concerns artificial elements. Few, if any, sites are devoid of significant Sapiens contributions.

Demographic explosion (the world population is now eight times higher than in Goethe’s time); sectorial logic (the accentuation of distinctions and subdivisions between “disciplines” with the consequent domination of “terrible simplifiers” (3), the uncontrolled multiplication of human actions (starting from the industrial revolution), have meant that positive characteristics no longer prevail in what the Sapiens produce today: the long virtuous process has weakened, almost to the point of being interrupted.

Promoted by the Club of Rome - exactly fifty years ago and published by M.I.T. – “The Limits of Development” (4) was an unprecedented call, a well felt shock, but still with weak concrete consequences.

The impetuous contemporary technological development is accompanied by the exaltation of the self-destructive capacities of the Sapiens: not so much because he has instruments ready to generate immediate planetary catastrophes, but because with his behaviour-habitual and widespread - he compromises balances that are at the basis of his own survival.

It seems that Homo Insiapiens has taken over from Homo Sapiens.

THE PRESENT CONDITION

Many factors characterise the Anthropocene: there is no full scientific agreement on when this geological era began, but the increasing violence of climate change is increasingly evident. Just as evident is the continuing decline in the ecological quality of the new living environments: they not infrequently produce insecurity, slow down the economy, and reduce the social and welfare of communities. The definition of ‘sustainable development’ appeared for the first time thirty-five years ago in the Brundtland Report.

Sapiens can avoid succumbing if - by freeing himself from the era of separation and immersing himself in that of integration, with the strength of a systemic vision - he takes control of his actions, mitigates his innate selfishness, transforms his living environments by recognising three interrelated priorities (5): that of the “*Environment*” (a planetary issue), that of “*Landscapes*” (in the European meaning of the term: what characterises a community) and that of “*Memory*” (what identifies a place or remains in the collective imagination). Of course, everything is a relationship, and relationships have inter-scalar characteristics.

Sixty years ago, opening the Academic Year of the University of Milan (6), Rodolfo Margaria (physiologist, Academician of the Lincei) observed that our planet was formed about 4.5 billion years ago; that the first most elementary form of life appeared 3 billion years ago; that the presence of life capable of acting and transmitting, in trans-generational terms, conscious relationships is only a few hundred thousand years old. For this reason, he considered the possibility of contact with possible, and certainly different, living beings on other planets unlikely. He argued for the probable extinction of man’s dominion on Earth in a time of the same order of magnitude as that which has elapsed since his first presence, concluding that even a million years is a derisory interval compared to that of any planet. The simultaneous presence and encounter of possible life forms from different planets is therefore highly unlikely, even though in 1961 it was not foreseeable that the ‘Doomsday Clock’ (7) would more than halve the number of minutes to X time in 2021.

Among the phenomena of nature, the Sapiens has an infinitely smaller scale than others. At this stage of his journey “From animals to gods” (8), he can no longer delude himself that he can dominate Nature, an immense web of relations and a symbiotic whole in continuous transformation. Avoiding distinctions and conflicts - thus with a continuous and simultaneous γνῶθι σαυτόν - he must continue to deepen his knowledge of the whole of which he is a part, understand it and continually surprise himself with how naïve his previous beliefs were.

When Bacon claimed that ‘the ancients are us’ he did not mean to signal the impermanence of achievements and ways of thinking: only to dispel that feeling of admiration for the ancients and that inferiority complex towards golden ages which in a sense permeates the Renaissance period. Bacon prophesied a new world, founded on the unlimited dominion of nature and its exasperated exploitation. Predatory visions have no place today. What is needed is the mitigation of inequalities, sharing and participation. In 2008, the “Déclaration

des Devoirs des Hommes” (9) – concerning habitats and lifestyles with respect for diversity - was an attempt to call Sapiens back to their responsibilities.

The same cultural matrix gives rise to the urgent need to abandon the “era of unjustified ignorance”, in which Sapiens – although equipped with increasingly surprising tools and technologies – does not effectively structure, i.e., does not yet manage to fully relate what he already knows and what he gradually outlines or envisages from a trans-generational perspective. Yet his distinctive features – spirituality, hope and confidence in the future – are based on knowledge and the ability to understand.

CONFIDENCE IN THE FUTURE

Sapiens does not have the power or the size to protect nature: he can avoid the self-defeat of fighting it or acting as something other than himself, or selfishness that leads him to ignore it. Organised and integrated knowledge, the logic and practice of “Everything is relationship” (10) together with the growing capacity to “Deal with complexity” (11) will be able to better introduce the future.

Sapiens must protect himself so that he can continue to be part of nature; he must avoid the dominance of Insipiens; increase its knowledge; face complexity; equip himself with the right tools to transform his living environments so that he improves well-being, security, sociality, economy, equity and spirituality. Therefore, not naive environmentalism or a ‘return to the good savage’, but an evolutionary leap, the ability to understand, an increasingly integrated vision. He has a duty to “Survival Through Design” (12), or rather to proceed in the “Ecological Restructuring of Civilisation” (13). It should not be forgotten that history presents examples of groups - albeit small and perhaps lacking in advanced knowledge - and communities that have in fact chosen to die and others that have instead been able to survive. This is well documented by Jared Diamond in a book of the early 2000s (14).

The Encyclical Letter “*Laudato Si*” (15) calls for an integral ecological approach.

Protecting nature means, above all, protecting all forms of life: we have the tools to do this, but not yet a suitable change of mentality, an essential prerequisite for the real conversion of living environments.

Since the current pandemic is no accident, in July 2020 the European Commission approved the Recovery Fund, with six priorities: at the top of the list is the “green transition”.

However, “transition” means a change of state, and as such is reversible (through “critical points” -reversible- matter can pass from the solid state to the liquid, gaseous or plasma state), so it is an insufficient expression. It is essential to promote an ‘ecological conversion’, an expression that indicates a profound change of mentality reflecting principles of faith, opinion, art, literature or politics. Unlike ‘transitions’, mutations are irreversible: subsequent ones only produce new developments.

CONCLUSION

“The eight deadly sins of our civilisation” analysed the reasons why Homo Sapiens tends towards Insiapiens, interrupting the long path ‘from animals to gods’. In order to return to Sapiens conversions of meaning are needed. By focusing on architecture – the instrument that makes it possible to create well-being in living environments – it is possible to set out the prerequisites in eight conversions of meaning.

Once again, ‘we are the ancients’, but not in the sense of Bacon, but in the sense of ‘the day will come when ...’, thus prompting us to act with determination and confidence in the future.

References

1. Treaty Office of the Council of Europe. European Landscape Convention, Article 1. Strasbourg, 1 March 2004.
2. Goethe Johann Wolfgang. *Italianische Reise* [1816-1817], München, DTV, 2006.
3. Burckhardt Jacob. *Weltgeschichtliche betrachtungen*. Berlin, Stuttgart: W. Spemann; 1905.
4. Prati Donella H., Meadows Dennis L., Randers Jorge, Behrens III William W.. *The Limits to Growth*. M.I.T.: Potomac Associate; 1972.
5. Pica Ciamarra Massimo. *Ecological conversion and poetics of the fragment*. Napoli, CivETS; 2021.
6. Margaria Rodolfo. *Possibilità di vita extraterrestre dell'uomo*. Roma: Parenti, “Il Contemporaneo” Anno IV n.33, febbraio 1961, pp.3-25.
7. Bulletin of the Atomic Scientists of Chicago, *Rivista bimensile* dal 1945.
8. Harari Yuval Noah. *Sapiens: A Brief History of Humankind*. London : Harvill Secker ; 2014.
9. Le Carrè Bleu, *feuille internationale d'architecture*, Paris, n°4/2008.
10. Capra Fritjof. *Scienza per una vita sostenibile*. in “Re-humanise Urban Areas”, Firenze 12.10.2013; <Bioarchitettura> n°83/2015 pp.61-67.
11. Butera Federico. *Affrontare la complessità*. Milano: Edizioni Ambiente; 2021.

12. Neutra Richard. *Survival Through Design*. New York: Oxford University Press; 1954.
13. Silvestrini Vittorio. *Ristrutturazione ecologica della civiltà*. Napoli: CUEN; 1990.
14. Diamond Jared. *Collapse - how societies choose to live or die*. London: Viking Penguin; 2005.
15. Pope Francis. *Laudato si* (English: "Praise Be to You!"). Segrate: Piemme edizioni; 2015.

TOWARDS A HYDROGEN ECONOMY? WHERE WE ARE

Presenting Author: **Paolo Ciambelli**^{1,2},

Marcel Van de Voorde³

¹University of Salerno, Fisciano, Italy

²Narrando Srl, Salerno, Italy

³Delft University of technology, Delft, Netherlands

e-mail: pciambelli@unisa.it

ABSTRACT

To date, designing a hydrogen economy means to assign to hydrogen a fundamental role to reach a climate-neutral economy. Hydrogen will be used to power mobility, supply electricity and heat, and decarbonise industrial sectors, allowing public health improvements but also employment benefits.

In less than 3 years all technologically world-leader countries have established strategies to produce, store, and use low-carbon hydrogen to reach a CO₂-free economy in the next 30 years. We will discuss assumptions and planned road maps to reach this goal and the expected difficulties. Major critical issues are the current, almost entirely fossil-dependent hydrogen production, –the intermittent electricity production by renewable energies, the fueling stations for fuel cell mobility. Safety and standardization rules, research and international cooperation, public incentives and private/public financial support are necessary.

Keywords: Hydrogen economy; decarbonization; green hydrogen; energy storage; hydrogen for mobility

INTRODUCTION

Today, the serious concerns about our changing climate lead to the categorical imperative of decarbonizing the energy system to reach a “zero carbon” scenario. The just published Intergovernmental Panel on Climate Change (IPCC) Report has warned us of the decisive fate that this decade represents to act on climate. Above the 1.5 °C limit the chances of extreme weather and collapsing ecosystems grow (1). Therefore, the key issue that faces the world is: what can be done to completely remove fossil fuels from the energy system?

In this regard, hydrogen is emerging as one of the most important answers, offering potential and technological solutions (2). Designing a CO₂-free hydrogen economy means to assign to it a fundamental role to reach a climate-neutral economy (Figure 1).

Hydrogen is the most energy-dense fuel by mass (142 MJ/kg higher heating value), even though the least per unit volume (11 MJ/m³). As a fuel, it produces only water, a major feature to help combat climate change. Hydrogen can store renewable and low-carbon energy sources, is transportable, can be used for heating and cooling, and can be a viable source of energy for cars, buses, and trains. Hydrogen may be produced by various routes, has many applications, and can be efficiently converted to other forms of energy. However, for energy storage it must be compressed or liquefied, and pipeline transport needs to move larger volumes. Hydrogen gas requires safe handling, due to its reactivity, but solving technologies are available (3).

In only 2 years after the International Energy Agency's (EIA) report for the 2019 G20 meeting, twenty governments have released hydrogen strategies addressed to reach a net zero emission goal with the essential contribution of hydrogen, including China, the largest carbon emitter and energy consumer. There are titanic challenges to achieve such a revolutionary transition from today's fossil fuel to a low-carbon energy system by having decarbonization in all energy demand sectors.

Therefore, a question is: where are we today along this way?

HYDROGEN PRODUCTION, FROM FOSSIL TO GREEN

Hydrogen gas is rare on Earth, it must therefore be produced. Hydrogen demand in 2020 reached about 90 megatons (Mt), close to 7 Mt being produced and used in the European Union. Almost all was dominated by oil refining, ammonia and methanol production, where hydrogen is only a chemical reactant. Moreover, more than 95% of hydrogen is produced from natural gas, oil, coal, resulting in close to 900 Mt of CO₂ emission.

The methane steam reforming (MSR) is the current prevailing process,



producing H₂ at very low cost of 0.5-1.5 euro/kg. However, it produces roughly 10 ton of CO₂ per ton of H₂ (at least 3 times more are generated from coal gasification). The alternative production of green hydrogen by renewable energies (RE) driven water electrolysis (4) will be, inside the EC vision, the

main route to the target of 55% reduction in emissions by 2030 and carbon neutral by 2050. Water electrolysis is the thermodynamically unfavoured, energy intensive, water conversion to hydrogen and oxygen, performed inside electrochemical reactors (electrolysers).



Water splitting reaction REs (mostly solar, wind, and hydropower) must be used, since the CO₂ intensity of water electrolysis depends on the CO₂ intensity of the electricity used for the reaction.

The EC strategy implies three main milestones: 6 gigawatts (GW) to decarbonise current production capacities and moving to new uses (e.g., heavy-duty transport) by 2024, 40 GW for new applications (e.g., steelmaking or shipping) by 2030, deployment of mature renewable hydrogen technologies to reach all hard-to-decarbonise sectors. Considering that more than 60% of global electrolysis manufacturing capacity is in Europe, it is also seen as a great business opportunity for EU companies.

It is a Herculean task, since to date hydrogen accounts for only a small fraction of the world energy mix, less than 1 GW from electrolyzers is available, and about 50 kWh per kg of hydrogen is the energy duty. The share of hydrogen in Europe's energy mix is projected to grow from the current less than 2% to at least 13-15% by 2050.

Moreover, despite tremendous advances in efficiency, power density, the current cost of electrolytic hydrogen is still high (3-7 euro/kg), the larger contribution depending on both electricity costs and the full-load hours of the renewable electricity supply. It is expected to fall 30% by 2030 as a result of declining costs of renewables and scaling up of hydrogen production.

Therefore, in the short-to-medium term it will be necessary to resort to low-carbon hydrogen, while supporting the growth of renewable hydrogen. To lower the carbon footprint, CO₂ emissions during the production of hydrogen could be captured, stored, converted (CCUS). However, these technologies still require higher capture efficiency and lower cost.

In the net-zero emissions scenario, by 2030 70% of 200 Mt H₂ total production will come from electrolysis or fossil fuels with CCUS. Hydrogen production then grows to over 500 Mt H₂ by 2050, almost all by low-carbon technologies. In the IEA's Roadmap, installed electrolysis capacity would increase from 0.3 GW today to close to 850 GW by 2030 and almost 3,600 GW by 2050, while CO₂ captured in hydrogen production must rise from 135 Mt today to 680 Mt in 2030 and 1,800 Mt in 2050 (5).

Recently, methane pyrolysis has emerged as a potential alternative to methane reforming with CCUS. This technology produces hydrogen from natural gas and generates a solid carbon as the only by-product (6). Membrane reactors are attracting solutions, but they are still at lab-research state.

HYDROGEN STORAGE

The intermittent nature of REs requires electricity to be stored on a daily, weekly, and seasonal timescale (7). At present, there are no technologies for storing hydrogen at scale (e.g. underground caverns, under sea).

Chemical energy storage potentially offers large volume and large time scale solutions, deriving from excess renewable power in the grid. Electrolytic hydrogen is an example (fuel combustion, fuel cell); an indirect solution is the conversion with CO₂ to methanol or linear liquid hydrocarbons (kerosene), to be easily transported (tracks, pipelines, ships), in particular from regions with large RE resources to energy-hungry far away areas (8).

Hydrogen can also be transported as a mixture gas in existing natural gas or future dedicated pipelines.

By the “power to gas” process methane is produced from green hydrogen and different sources of CO₂ (atmospheric air, industrial and power plant emissions, raw biogas from waste).

MOBILITY APPLICATIONS

Hydrogen can feed Fuel Cells (FC), which produce electricity to power the motor of electric vehicles (FCEVs). FC is based on the reverse reaction of water splitting, and hydrogen is stored at 350 or 700 bar in special cylinders. Around 60% engine efficiency in theory could be achieved and FC emits only water [9].

After space and military applications, the adoption of FCEVs from 2015 until today has been very slow: 30,000 FCEVs, against 11 million EV stock at the end of 2020, is an impressive figure of the distance to the objectives of 2030 (5-15 million FCEV stock) (4). Advanced fuel cells are needed with high power density, extended lifetime (> 40,000 hrs), versatility, and low cost (10). Novel materials are needed as hydrogen conversion catalysts.

Moreover, the FC mobility needs refueling station infrastructures (HRS), whose cost depends of the size and the capacity utilization (11). The growth of HRS was even slower than FCEVs. A total of only 540 HRS were installed

around the world by the end of 2020: Asia 278, Europe 190, North America 68. Currently, 200-400 kg H₂/day and about 50 % utilization are a reality, but higher size and utilization are expected to strongly reduce the dispensed H₂ cost. 1 kg of hydrogen is consumed per 100 km journey, 500 - 750 km autonomy, 5 minutes to refuel [4].

FCEVs are a complementary solution to battery electric vehicles (BEV) in the sector of electric mobility (12). They are preferred for heavy vehicles with longer driving daily distances and the need for fast refueling, while for lighter vehicles, BEVs offer unbeatable advantages, especially efficiency of charge/discharge-cycles, albeit at the price of long charging time, high weight, battery metals recovery.

Relevant actions such as “Mobilité hydrogène France”, “Scandinavian Hydrogen Highway Partnership”, and “H2 Mobility in Germany, can be mentioned. Alstom pioneered hydrogen as a fuel in rail transport in Germany. Airbus plans to develop a 200 passengers hydrogen aircraft by 2035. KLM carried out the first flight using synthetic kerosene in 2021. In the net-zero emissions scenario, synthetic kerosene meets more than 1.6% of aviation fuel demand in 2030, 28 % in 2050.

Decarbonising industrial sectors is a necessity and use of green hydrogen in the production of energy-intensive materials, including cement, and glass are at the beginning. Steel production is worldwide testing the potentiality of decarbonised technologies.

CONCLUSION

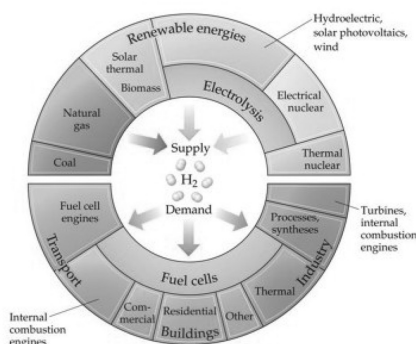
We have tried to present the current, expected and realistic state of the role of hydrogen for a zero-carbon scenario with main reference to technology. It is clear that this aspect is only a fraction of an integrated approach to develop a Hydrogen Economy, which requires a primary joint contribution coming from political choices, by developing strategies and roadmaps on the role of hydrogen in energy systems; related financial investments and incentives, appropriate certification, standardization of infrastructures and safety regulation regimes to develop a global hydrogen market; international cooperation; education, by designing specific academic programmes; research, by increasing funding of programmes on hydrogen, e.g. by updating the experience of FCH JU; convincing the society, especially for security and safety fear.

A tremendous but undeniable and not postponable effort for our future.

References

1. IPCC, Climate change 2022, Sixth Assessment Report, Cambridge University Press.
2. Ciambelli P, van de Voorde M, Hydrogen Technology - Innovations and Applications, Vol. 1-3, M van de Voorde Ed., De Gruyter 2021.
3. Molkov V, Hydrogen Safety Engineering: The State-of-the-Art and Future Progress, Comprehensive Renewable Energy. 2012; 4, 97-129.
4. Buttler A, Spliethoff H, Current status of water electrolysis for energy storage, grid balancing and sector coupling via power-to-gas and power-to-liquids: A review. Renew Sust. Energ. Rev. 2018; 82, 2440-245.
5. IEA, Global Hydrogen Review 2021, IEA, Paris.
6. Schneider S, Bajohr S, Graf F, et al., State of the Art of Hydrogen Production via Pyrolysis of Natural Gas. Chem Bio Eng Rev. 2020; 7, 1-10, 2020.
7. Breeze P, Hydrogen energy storage, in Power system energy storage technologies, chapter 6, pp 69-77, Academic press, 2018.
8. Nocera DG, Solar fuels and solar chemicals industry, Acc. Chem. Res.2017; 50, 616-619.
9. Ajanovic V, Haas R, Prospects and impediments for hydrogen and fuel cell vehicles in the transport sector, Int J Hydrogen Energy. 2020; 46, 1049-1058.
10. Thompson SB, James BD, et al., Direct Hydrogen fuel cell electric vehicle cost analysis: System and high-volume manufacturing description, validation and outlook, J Power Sources. 2018;399, 304-313.
11. Riedi SM, Development of a Hydrogen Refueling Station Design Tool, Int. J. Hydrogen Energy.2020; 45, 1-9.
12. Cano ZP, Banham D, Ye S, et al., Batteries and fuel cells for emerging electric vehicle markets. Nature Energy.2018; 3, 279-289

The Hydrogen Economy



<https://www.charleyrattan.com/business-opportunities-for-the-hydrogen-economy/>

Fig. 1.

MODERN COMPUTATIONAL ORACLES IN ENVIRONMENTAL ENGINEERING AND RISK ANALYSIS

Nikos C. Markatos

School of Chemical Engineering,
National Technical University of Athens, Greece
e-mail: n.markatos@ntua.gr

ABSTRACT

This paper describes the mathematical modeling and associated computer simulations of environmental problems related to flow and heat/mass transfer. Many key “issues” in designing environmental protection systems, and in performing environmental risk assessment and control, are related to the behavior of fluids in turbulent flow, often involving more than one phase, with chemical reaction or heat transfer. Computational-Fluid-Dynamics (CFD) techniques have shown great potential for analyzing these processes and are very valuable to the environmental engineer and scientist, by reducing the need to resort to “cut and try” approaches to the design of complex environmental-protection systems and to any relevant decision-making process. Multi-dimensional, multiphase dynamic models for the dispersion of air, water and soil pollutants and for the prediction of environmental risks are presented. Results using model simulations are presented for some cases of atmospheric and marine pollution, as well as for the environmental risks of fires and of petrol-tank explosions. It is concluded that the results are physically plausible and can be used with confidence. Air, water and soil management systems can be improved by the application of these computational prediction techniques.

Keywords: Environmental Engineering; dynamic modeling; turbulence; CFD; Algorithms; risk assessment

INTRODUCTION

Computers and computational methods have been used since the early 1970's to approach engineering problems in design, control, and operations (1-3). Progress has been slower in the environmental field of applications as the scale of the environmental problems is orders of magnitude larger than that of equipment

design, and therefore, awaited the appearance of large-capacity computers and/or sophisticated solvers and techniques, as for example parallel processing (4). The modern computer's ability to handle complex mathematics and to permit the solution of detailed models allows present-day scientists, engineers and policy makers to model environmental process physics and chemistry at all scales, to construct models that incorporate all relevant phenomena (emissions, diffusion, convection, radiation, chemical reaction, etc.) and optimize, more on the basis of computed theoretical predictions and less on empirical. This development allows us today to conduct, for example, the prediction of Volatile Organic Compounds (VOC) dispersion emitted from flooring materials in buildings (5), the prediction and control of water pollution in Trans Boundary Ecosystems, and environmental risk assessment and emission control (6)

Apart from air and water quality studies, the models must also be capable of being used in other environmental applications, e.g. in porous media or, in general, in the subsurface (7).

In summary, the mathematical model we present can simulate environmental problems ranging from simple pollutant-diffusion assessments to complex multi-dimensional, multiphase applications, for the purposes of:

- Prediction/evaluation of environmental dispersions/spills
- Evaluation of environmental changes
- Evaluation of thermal discharges
- Temperature modeling
- Evaluation of atmospheric pollutants transport
- Evaluation of water and soil contaminant transport
- Determination of maximum ground-level concentrations
- Computation of effective stack height
- Prediction of particulate distributions outdoors and indoors
- Prediction of deposition of particulate matter from stacks, etc.
- Estimation of industrial emissions impact
- Modeling of emissions from landfills
- Modeling of atmospheric impacts from mobile sources.
- Computation of the release of VOCs from petroleum storage tanks and from waste water treatment plants
- Modeling contaminants fate in aquatic ecosystems
- Modeling CO₂ sequestration in geological formation
- Performing risk assessments in cases, for example, of fires in buildings/forests/public transport, etc., pool fires or/and explosions in industrial storage tanks, etc.

It is obvious from the above arguments that the process of modeling as described above can (and must) serve also a consensus-building function. It can help to build mutual understanding, solicit and test input from a broad range of stakeholder groups, and sustain dialog between members of these groups, by presenting objective scientific findings rather than individual beliefs that may be biased, and cause disagreements.

THE MATHEMATICAL MODELLING

The Differential Equations

A convenient assumption, based on the concepts of time-and-space-averaging, is that more than one phase can exist at the same location at the same time. Then, any small volume of the domain of interest can be imagined as containing, at any time, a volume fraction r_i of the i -th phase.

The required differential equations are the ones for the conservation of phase mass, of phase momentum, of phase energy and of species-in-phase mass.

All the above equations can be expressed in a single form as follows (1):

$$\frac{\partial}{\partial t}(\rho_i r_i \varphi_i) + \text{div}(\rho_i r_i \vec{V}_i \varphi_i) = \text{div}(r_i \Gamma_{\varphi i} \text{grad } \varphi_i) + \dot{m}_i \Phi_i + r_i s_{\varphi i} = \text{total source of } \varphi_i$$

Where: φ_i is any extensive fluid property; the first term on the right-hand side expresses the whole of that part of the source term which can be so expressed, with $\Gamma_{\varphi i}$ being the exchange coefficient for φ_i .

$s_{\varphi i}$ is the source/sink term for φ_i , per unit phase volume; and $\dot{m}_i \Phi_i$ represents the contribution to the total source of any interactions between the phases, such as nay phase change (with Φ_i being the value of φ_i in the material crossing the phase boundary, during phase change). Distribution of effects between $\dot{m}_i \Phi_i$ and $s_{\varphi i}$ is sometimes arbitrary, reflecting modelling convenience. For single-phase situations, the above equations are valid by setting the r 's to unity.

For turbulent flow, averaging over times which are large compared with the fluctuation time leads to similar equations for time-average values of φ_i with fluctuating-velocity effects usually represented by enlargement of $\Gamma_{\varphi i}$. More details on the above concepts and equations may be found in (1-3,8-13).

SOLUTION PROCEDURE

The equations are both non-linear and strongly coupled, necessitating an iterative solution procedure. There are several such procedures for single-phase flows.

An early publication described the MAC procedure, which has subsequently been refined. The SIMPLE procedure of Patankar and Spalding (1) combined some of the features of MAC with new ones and was also subsequently refined into SIMPLER (11) and SIMPLEST (8,10,13)

An extension of SIMPLE (and SIMPLEST) to multiphase flows is IPSA (Inter-Phase Slip Algorithm) (8,12,13) a version of which is used for the present work.

MODEL OF TURBULENCE AND RADIATION.

For the problems under consideration, turbulence and radiation are important and must be modeled appropriately. The interested reader is referred to the appropriate literature for further details and different models.

The Radiation Model

The basis of all methods for the solution of radiation problems is the radiative transfer equation (RTE):

$$\underline{s} \cdot \nabla I(\underline{r}, \underline{s}) = -\kappa(\underline{r}) I(\underline{r}, \underline{s}) + Q(\underline{r}, \underline{s}) \quad (2)$$

which describes the radiative intensity field, I , within the domain, as a function of location vector (\underline{r}) and direction vector (\underline{s}); Q represents the total attenuation of the radiative intensity due to the gas emission and to the in-scattered energy from other directions to the direction of propagation, and κ is the total extinction coefficient.

Turbulence Description

Turbulence modeling requires models to close the unknown Reynold stresses in the Favre- averaged Navier-Stokes equations important step to improve numerical simulations of turbulent reacting flows. For the computations presented in this work the Renormalization Group model, the RNG $k\sim\epsilon$ model (13) has been used.

EXAMPLES OF APPLICATIONS

Marine Pollution

Prediction of the behavior of oil spills at sea is of crucial importance for impact assessment studies, as the effects of oil toxicity on the marine ecosystem create major environmental problems. The impact of oil toxicity on marine organisms depends on the organism itself and its age, on oil concentration, on the water

salinity, its temperature and pH, and on the presence of nutrients, pollutants (sulphides, phenols, detergents) and/or dispersants. The model described in this paper can account for the above considerations and can therefore predict the environmental impact of an oil-spill.

The model capabilities are demonstrated by applying it to near Carava, at the island of Lesbos, for a surface of $12 \times 9.5 \text{ km}^2$ and a maximum depth of 55m.

The fate of hypothetical oil spills in the sea was simulated, under transient, two-phase flow conditions, using salt water and meteorological/oceanographical data for a given period of time. Figure 1 presents the hydrodynamic field as predicted by the present model.

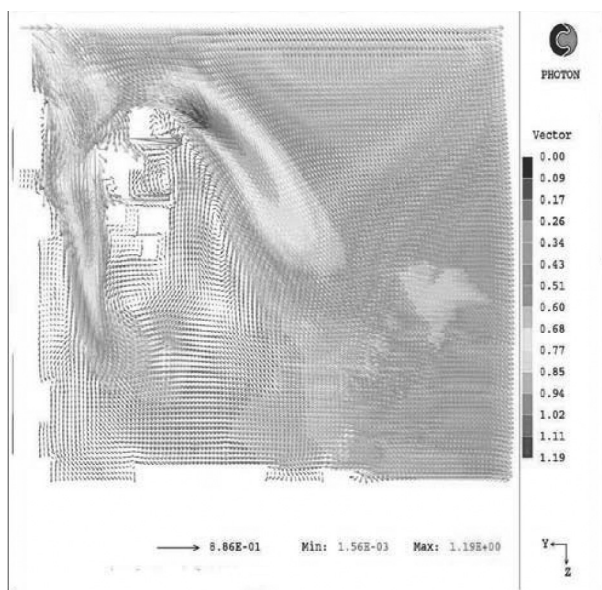


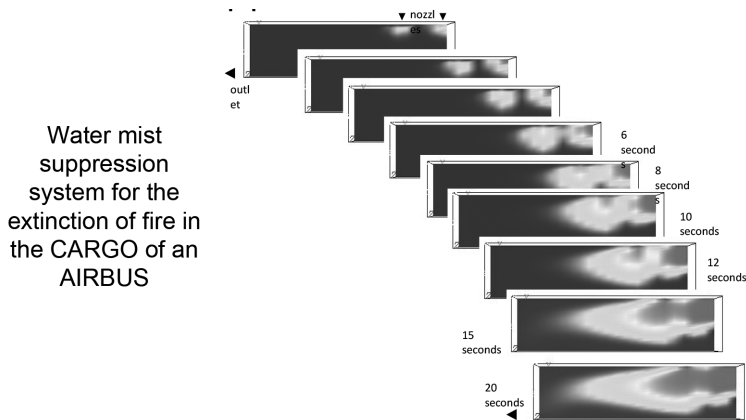
Figure 1. The hydrodynamic field at the surface

Although full runs were performed for several case-studies, space restrictions dictate that the interested reader may read (14) for further information.

Fire Simulations

Fire may take place in buildings, in industrial complexes, in public transport or in forests. Fire simulations are necessary for designing reliable systems for fire extinction and for the protection of life and property.

Simulation of ejection of Inert Gas (NEA- AirLiquide) for the extinction of fire at the CARGO of an AIRBUS



Simulation of ejection of Inert Gas (NEA- AirLiquide) for the extinction of
fire at the CARGO of an AIRBUS

Fig. 2 presents the transient development of fire in the cargo compartment of an airplane and the performance of a water mist system as well as of an inert gas for its extinction. The figure presents temperature contours at different times, in seconds, after the fire initiation. The benefit of using fire simulation tools is now obvious, as it allows engineers and designers to decide on the most efficient type of fire extinction, to be fast, safe, practical, and not to create toxic by-products.

More details may be found in (15)

Atmospheric pollution-Street Canyons in Cities

Figure 3 presents results that refer to atmospheric pollution. The case is that of a street canyon, i.e., the canyon formed between high buildings in a city (seen on the right and on the left in fig. 3). The results show that there are cases of recirculation in the canyons. The practical effect of that fact is that, while there may be windy above the buildings and somebody may think that the atmosphere is clear at certain time, pollutants may have been trapped in the street canyon from previous days, and therefore at the height of a walking human the atmosphere is still polluted.

Hazard identification analysis is performed with the characterization of risk zones, by comparing the ground level concentration of the pollutants with the safety limits.

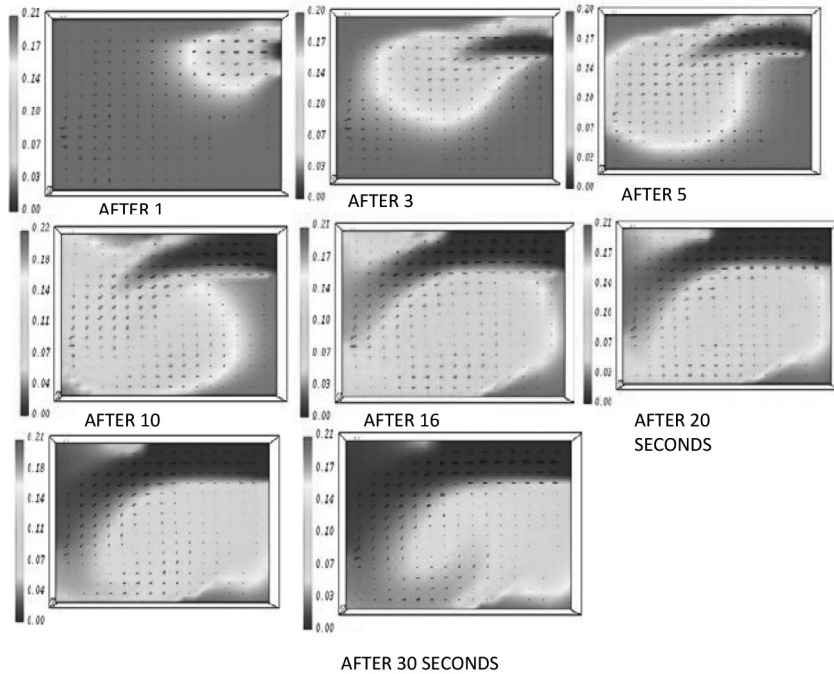


Fig. 3: Flow fields for two sets of conditions.

CONCLUSION

Methods now exist for computing complex phenomena with a view to protecting the environment, saving energy, and controlling major hazards. These methods can be of great help to the environmental engineer and scientist, for the design of complex environmental-protection systems and for any relevant decision-making process.

Uncertainty remains for turbulent transport and combustion in single and particularly in two-phase flows. Hypotheses are needed, guided by experimental observations. Numerical computations can assist with the comparisons.

Acknowledgements: The author wishes to thank all of his students over the last thirty five years, for their assistance in all work reported here. Thanks, are also due to CHAM Ltd of London, for permitting the use of the software PHOENICS with which most of the reported calculations were performed. The financial support of the EEC and of several Greek Ministries through the years is gratefully acknowledged.

References

1. S.V. Patankar and D.B. Spalding "A calculation procedure for heat, mass and momentum transfer in parabolic flows", *Int.J. Heat Mass Transfer*, Vol. 15, pp. 1787-1806, 1972.
2. N.C. Markatos, "Transient Flow and Heat Transfer of Liquid Sodium Coolant in the Outlet Plenum of a Fast Nuclear Reactor", *Int.J. Heat Mass Transfer*, Vol 21, 12, pp. 1565-1579, 1978.
3. N.C. Markatos and T.A. Chrysoloras, "Mathematical Modelling and computer simulation of the flow around a Formula 1 car", *Int.J of Mechanical Engineering*, Vol. 7, pp. 35-56, 2022. ISSN:2367-8968 <http://www.ias.org/ias/journals/ijme>
4. L. Giraud, A. Haidar, S.Pralet, "Using multiple levels of parallelism to enhance the performance of domain decomposition solvers", *Parallel computing*, 36(5-6), pp. 285-296, 2010.
5. K.A.Papakonstantinou, C.T., Kiranoudis, N.C.Markatos, "Numerical Simulation of volatile organic compounds dispersion emitted from flooring materials in buildings", *Proc. 3rd Int.Congress SITHOK-3*, 1998, 09-11 May, Maribor, Slovenia, 1998.
6. V.Penenko, A. Baklanov, E.Tsetova, A.Mahura, "Direct and inverse modeling for environmental risk assessment and emission control" *Geophysical Research Abstracts*, vol 11, EGU 2009-8486-1, 2009.
7. V. Martin, J.Jaffre, J.Roberts, "Modelling fractures and barriers as interfaces for flow in porous media", *SIAM J.Scient.Comp.*, pp. 1667-1691, 2005.
8. D.B. Spalding, "A General purpose computer Program for multi-dimensional one-and two-phase flow", *Maths and Computers in Simulation*, North Holland Press, Vol. 13, pp. 267-276, 1981.
9. L.Giraud, A. Haidar, "Parallel algebraic hybrid solvers for large 3D convention-diffusion problems", *Numerical Algorithms*, 51(2), pp. 151-177, 2009.
10. N.C. Markatos, "Computational fluid flow capabilities and software", *Ironmaking and Steelmaking*, Vol. 16, (4), pp. 266-273, 1989.
11. S.V. Patankar, *Numerical Heat Transfer and Fluid Flow*, McGraw-Hill Hemisphere, New York, 1980.
12. D.B. Spalding, "IPSA 1981: New Developments and Computed Results" *IMACS Conference*, Lehigh Univ., Oct. 1981; also, Imperial College Report HTS/81, 1981.
13. N.C.Markatos and D.P. Karadimou," The SUPER Numerical Scheme for the Discretization of the Convection Terms in CFD computations", in A.Runchal (eds) *50 Years of CFD in Engineering Sciences*, Springer, pp. 75-118, 2020.
14. J. Papadimitrakis, M. Psaltaki, M. Christolis, N.C. Markatos, "Simulating the fate of an oil spill near coastal zones: The case of a spill (from a power plant) at the Greek island of Lesvos, *Environmental Modeling & Software*, Volume 21, Issue 2, February 2006, pp. 170-177, Published by Elsevier Ltd., 2006.
15. G.M. Stavrakakis and N.C. Markatos, " Simulation of airflow in one- and two- room enclosures containing a fire source", *International Journal of Heat and Mass Transfer* 2009;52(11-12):2690-2703.

AEROSOL SCIENCE FOR ATMOSPHERIC QUALITY AND HUMAN HEALTH

Presenting Author: **Maria Ochsenkühn-Petropoulou^{1*}**,
Fotios Tsopelas¹, **Theopisti Lymperopoulou¹**, **Lamprini-Areti Tsakanika¹**,
Klaus-Michael Ochsenkühn¹, **Burkhard Beckhoff²**

¹School of Chemical Engineering, National Technical University of Athens (NTUA), Greece

²Physikalisch-Technische Bundesanstalt, Berlin, Germany

e-mail:oxenki@central.ntua.gr

ABSTRACT

Measurements of aerosols are of paramount importance for the protection of human health, the design of the appropriate measures and legislation as well as the investigation of climate change. Usually, the research focuses on PM₁₀ and PM_{2.5} particulates (aerodynamic diameter less than 10 µm and 2.5 µm, respectively). The level of uncertainty however, is too high and the traceability is insufficient. Solutions for such issues are proposed in the two European EMPIR (European Metrology Programs for Innovation and Research) projects, AEROMET I and the ongoing AEROMET II, funded by EURAMET. NTUA participated in these programs, among 25 participants from 15 EU countries, mainly National Metrological Institutes (NMI). In this paper the main objectives of the AEROMET projects are demonstrated, as well as the aerosol research made in our laboratory including the atmosphere of the Attica basin, the exhaust of automobile catalysts and the combustion of wood pellets.

Keywords: AEROMET Projects; aerosols; PM₁₀/PM_{2.5}; in field real time analysis; air quality

INTRODUCTION

Atmospheric pollution by airborne particles contributes significantly to climate change and has been linked to adverse health effects, such as respiratory and cardiovascular diseases and lung cancer. It has been estimated that in Europe alone, more than 500,000 deaths per year can be attributed to PM exposure (1,2). For the member states of the EU, the Air Quality Directive 2008/50/EC (3) is mandatory, comprising quantification of airborne particles and their

components. The most important metric to monitor particulates in air constitutes the total mass per unit volume of air of particles with aerodynamic diameter smaller than $10\text{ }\mu\text{m}$ or $2.5\text{ }\mu\text{m}$, commonly referred to PM_{10} and $\text{PM}_{2.5}$. Ambient limit values were established in Europe in Directive 2008/50/EC (3). All local, national or EU action plans and measures to reduce particulate air pollution rely on air monitoring networks (4), the quality of data they provide and the methods in use (5). It is recognised that the regulated metrics for particulate air pollution suffer from severe methodological deficiencies. The gravimetric filter-based reference methods for PM_{10} and $\text{PM}_{2.5}$ (EN 12341:2014; EN 14907:2005) fall short in areas such as sensitivity and ongoing Quality Assurance and Quality Control due to the hygroscopicity of particles impaction and diffusive losses during sampling, in addition to sampling issues relating to chemical interactions. Moreover, the use of automatic PM monitoring systems is problematic due to their inconsistency and the ambiguity of the aerosols used for comparison. The proposed solutions in AEROMET I (www.aerometproject.com) and the ongoing AEROMET II (www.aerometII), European EMPIR projects aim to the implementation of traceable reference methods for the lab-based calibration of automatic PM measuring instruments, including automatic pollen monitors. Counting of pollen particles and taxa identification are time consuming manual methods based on optical microscopy, but are currently used. In the framework of AEROMET II, the calibration of automatic pollen monitoring instruments, which provide real-time measurements and denser spatial coverage will take place using a new calibration procedure. Further targets of the projects are the measurement of the specific components of the aerosols (e.g., anions, cations, carbon species, metals) and the development of mobile X-ray spectrometers, for real time and on-site quantification of the particulates and the comparison with conventional techniques.

The selection of our Laboratory of Inorganic and Analytical Chemistry at the School of Chemical Engineering of NTUA to participate in these European projects was based on our extended experience in aerosol research. Three case studies which have arisen from European research projects and PhD theses will be presented in this article. Firstly, the influence of local and regional sources on the observed spatial and temporal variability of atmospheric $\text{PM}_{10}/\text{PM}_{2.5}$ aerosols and their chemical (carbon species, water soluble compounds, heavy metals and the species of toxic metals as arsenic and selenium) were investigated, as well as the structural characterization of the PM in the Athens metropolitan area (6). Secondly, the development of a novel sampling system for

particulates emitted from automobile exhaust catalysts of a variety of vehicles of different age and engine capacity and the determination of the containing platinum group elements (PGE) in the particulates in the nanogram range (7). It is observed that automotive catalytic converters cause a substantial increase of the concentration of PGEs in the environment, including airborne particulate matter. A rough estimation shows that the annual platinum emission from automotive converters is about 0.5-1.4 tons/year resulting in bioaccumulation in living organisms associated with serious health problems (8). Thirdly, the particulate matter emissions and their composition emitted from biomass combustion and the importance of biomass type and combustion conditions (9). Biomass is considered to be a “CO₂ neutral” fuel, with social-economic and environmental benefits. However, biomass, and specifically wood pellets, are responsible for air pollution that includes levels of particulate matter (PM), carbon monoxide (CO), volatile organic compounds (VOC) such as polycyclic aromatic hydrocarbons (PAHs), elemental carbon (EC), organic carbon (OC), and emissions of heavy metals and toxic elements that are found adsorbed to particulate matter emissions.

RESULTS AND DISCUSSION

AEROMETPROJECTS(coordinator: PTB(Physikalisch-Technische Bundesanstalt, Germany)

In Fig 1a the tri-modal size distribution of ambient aerosols is demonstrated. Aerosols or Particulate Matter (PM) do not have a distinct chemical composition, but they consist of salts, metal oxides, organic substances and other materials. Several factors affect the measured PM weight, such as humidity on filter material and on hygroscopic PM, loss of filter material, temperature during sampling, storage and transport on semi-volatile material, weather conditions in general, chemical reactions on the filter, static electricity, balance drift etc. Within the framework of AEROMET I a synthetic ambient aerosol was produced using a test dust having a representative aerosol composition (Fig. 1b). The design and construction of a mixing aerosol chamber based on computational simulations was developed for the generation of representative ambient aerosols used for the lab-based calibration of automatic PM instruments.

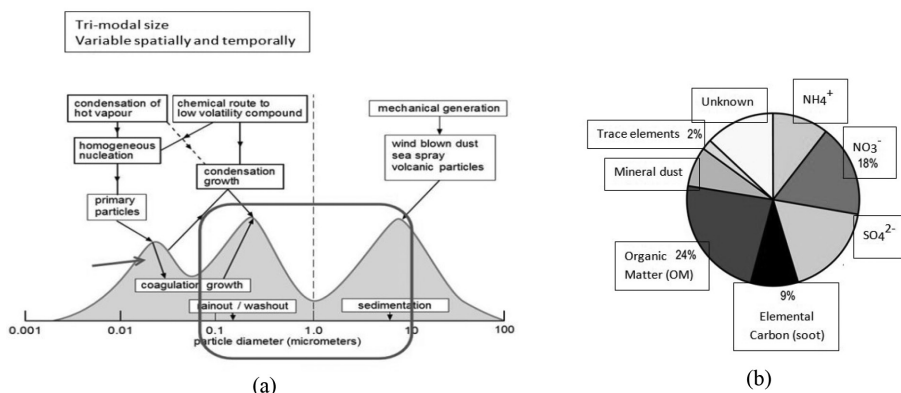


Fig. 1: (a) Tri-modal size distribution of ambient aerosols, (b) a representative aerosol composition

For the analysis of arsenic, cadmium, mercury, nickel and lead on reference filters, NTUA participated in Proficiency Tests (PT) using ICP-MS (10). A new TXRF (Total reflection X-ray Fluorescence) instrument was tested for independent chemical traceability chains and extended range of metals.

Application of the tested methods was performed in two representative sampling sites, an urban one in Cassino, Italy and a suburban background in Budapest, Hungary. Field campaigns (May-September 2018) were carried out by using multi-stage cascade impactors. The filters obtained were measured in-situ by the developed non-destructive mobile TXRF, for different daily time periods. A backup analysis of the same filters by conventional techniques (ICP-MS) gave comparable results (11).

A sampling field campaign in the Czech Republic for the determination of ambient particulate mercury with cascade impactors and TXRF will prove the suitability of the produced substrates after comparison with spectrometric methods (ICP-MS, CVAAS). Additionally, NTUA is participating in the pollen analysis of the most allergenic pollen taxa (birch, alder, hazel) collected in Norway, with the reference optical microscopy method and Environmental Scanning Electron Microscope as well FT-IR measurements.

For improving the impact of the AEROMET projects, NTUA organized two international conferences with the participation of 250-300 scientists, IMA2019 and IMA2021 (www.ima2021.gr), where the results of AEROMET projects were presented in special sessions.

MILESTONES of AEROSOL RESEARCH at the LABORATORY of INORGANIC and ANALYTICAL CHEMISTRY, NTUA

In the framework of projects and PhD theses supervised by Prof. Maria Ochsenkühn-Petropoulou the following highlights referring to the aerosol research resulted:

B1. The influence of different pollution sources on the spatial and temporal variability of atmospheric $PM_{10}/PM_{2.5}$ aerosols and their characterization in the Attica Basin.

$PM_{10}/PM_{2.5}$ from industrial, urban and background suburban areas of the Attica basin for a period of two years were collected (Fig.2a) and measured, associated with wind directions and combined with a statistical evaluation, resulting in an assessment of possible emission sources (12).

B2. A novel way of sampling particles containing platinum group elements from automobile catalysts

A new sampling system was developed for the quantitative sampling of particles emitted from the exhausts of automobiles and the emission rates of platinum, palladium, and rhodium (PGEs) in the environment were measured by ICP-MS and GFAAS (Fig.2b). Gasoline cars of different manufacturers, engine capacity and catalyst age were investigated. The results showed that fresh catalysts and bigger engine capacity vehicles release higher amounts of PGEs due to higher thermochemical stress on the catalyst (13).

B3. PM emissions: the importance of biomass type and combustion conditions

The aim of this study was to investigate various factors leading to PM emissions ($PM_{10}/PM_{2.5}$) and their composition (different carbon species, PAHs, main, minor and toxic trace elements) from burning of various types of biomass used in heating devices. A lab-scale device was developed in order to simulate the combustion process and the real combustion tests were carried out in domestic pellet-fired stoves and in an open fireplace. Wood fuel quality, the amount of fuel and the airflow setting are the main parameters that can influence PM emissions and their composition in toxic emitted substances (14). The results showed that pellet stoves present the lowest PM and toxic substances emissions contrary to the fireplace (Fig.2c).



Fig.2a

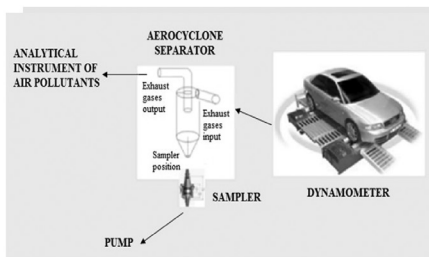


Fig.2b

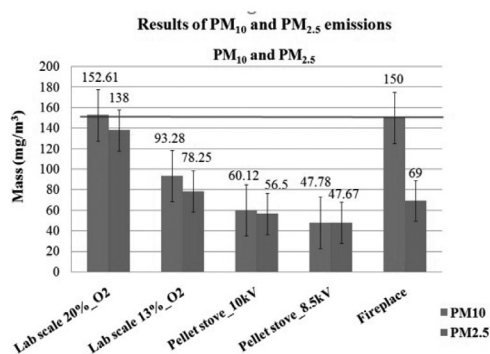


Fig. 2c

Fig. 2: Size fractionated $PM_{10}/PM_{2.5}$ aerosol sampling by Gent-stacked sampler (a), Developed sampling system for the simultaneous determination of PM and gases emitted from the exhaust pipe of vehicles (b), PM emissions from combustion of different types of biomass under different combustion conditions (c)

CONCLUSION

Over 20 years of aerosol research at NTUA has proved to have an impact on metrological, scientific and industrial communities. In the framework of the ongoing AEROMET projects, the new lab- based calibration procedure of PM-measuring instruments has direct impact on the revision of standards and air quality monitoring networks. The novel XRF methodologies enhance the quality of aerosol component analysis in air quality monitoring networks by providing flexible in-situ multielement analysis. The monitoring and measurement of the composition of particulates emitted from industry, exhaust of automobile catalysts, combustion of

biomass led to the assessment of the emission sources, to the evaluation of the car catalysts as well as to the type of biomass and combustion conditions, respectively. These findings are very important for the atmospheric quality and human health.

ACKNOWLEDGMENTS

This work is partially supported by the EMPIR program, co-financed by the Participating States and from the European Union's Horizon 2020 research and innovation program. The work is performed in the frame of the 16ENV07 AEROMET I and 19ENV08 AEROMET II projects.

References

1. S. A review on the human health impact of airborne particulate matter. *Environ.Int.* 2015; 74:136-143.
2. Review of evidence on health aspects of air pollution – REVIHAAP project: final technical report, WHO/Europe, 2013. accessed: <https://www.euro.who.int/en/health-topics/environment-and-health/air-quality/publications/2013/review-of-evidence-on-health-aspects-of-air-pollution-revihaap-project-final-technical-report>
3. Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe. European Environmental Agency 2008. Available from: <https://www.eea.europa.eu/policy-documents/directive-2008-50-ec-of>
4. WHO/GAW Aerosol Measurement Procedures, Guidelines and Recommendations. GAW Report No. 227. 2nd ed. Switzerland: World Meteorological Organization (WMO); 2016. 87p.
5. Guidance to the demonstration of equivalence of ambient air monitoring methods. Report by an EC Working Group on Guidance for the Demonstration of Equivalence. January 2010. accessed: <http://ec.europa.eu/environment/air/quality/legislation/assessment.htm>
6. Airborne particulates (PM₁₀/PM_{2.5}) in the Attica Basin. Temporal and spatial distribution, qualitative and quantitative composition, estimation of possible sources. Pythagoras-EPEAEK II project, co funded by European Social Fund and National Resources, 2003-2007, Proceedings in Greek pp.104-107 (2008)
7. Paraskevas M. Determination of Platinum Group Elements on particles emitted from gasoline automobile catalysts and evaluation of the state of the catalyst. Ph.D. Thesis, NTUA, Greece, 2013. 318p. Available from: <https://www.didaktorika.gr/eadd/handle/10442/37772>
8. Heck RM, Farrauto JR. Automobile exhaust catalysts. *Appl. Catal. A-Gen.* 2001; 221(1-2):443-457
9. Zosima A. Particulate matter from the combustion of various types of biomass. Size distribution and composition. PhD Thesis, NTUA, Greece, 2016. 330p. Available from: <https://www.didaktorika.gr/eadd/handle/10442/39193>
10. Bescond A, Oster C, Ochsenkuehn-Petropoulou et al. Method for Preparation of a

- Candidate Reference Material of PM₁₀ and PM_{2.5} Airborne Particulate Filters Loaded with Incineration Ash-Inter Comparison Results for Metal Concentrations. *Atmosphere* 2021; 12(1):67 doi: 10.3390/atmos12010067
11. Seeger S, Osan J, Ochsenkuehn-Petropoulou M et al. Quantification of Element Mass Concentrations in Ambient Aerosols by Combination of Cascade Impactor Sampling and Mobile Total Reflection X-ray Fluorescence Spectroscopy. *Atmosphere* 2021; 12 (3): 309. doi: 10.3390/atmos12030309
 12. Ochsenkuehn-Petropoulou M, Lyberopoulou T, Tsopelas F. et al. Chemical and structural characterization of airborne particulate matter in an industrial and an urban area in Greece. *Fresenius Environmental Bulletin*. 2009; 18:2210-2217.
 13. Paraskevas M, Papoutsi K, Ochsenkuehn-Petropoulou M. A novel way of sampling particles containing platinum group elements from automobile catalysts. *Analytical Letters* 2012; 45:539-550.
 14. Zosima A, Tsakanika L-A, Ochsenkuehn-Petropoulou M. Particulate matter emissions and metals and toxic elements in airborne particulates emitted from biomass combustion: The importance of biomass type and combustion conditions. *Journal of Environmental Science and Health, Part A*. 2017; 52:497-506.

FROM THE PARADIGM BETWEEN “AGING AND DISEASE” TO THE CONCEPT OF “BIOMEDICAL PERSON”

Francesco Salvatore

CEINGE-Biotecnologie Avanzate and Department Molecular Medicine and Medical
Biotechnology, University of Naples “Federico II” – Italy
e-mail: salvatore@unina.it

ABSTRACT

Aging has been considered a natural degenerative process common to all individuals. On the contrary, I argue that aging is caused by altered mechanisms that occur due to diseased states. Such processes are unique to each individual. I therefore propose a shift of paradigm from “aging” to “disease”. In this context, the analysis of the genotypic and phenotypic parameters of each individual, from a very early age, would allow mapping of the individual “normal status” and consequently detect signs of disease at a very early stage. Based on these considerations, I also introduce the concept of “biomedical person”, as opposed to “biological person”, to indicate the uniqueness of the biomedical status of each individual. In conclusion, a tailored holistic approach to prevention of diseases to each individual would counteract those illnesses that more often and inexorably lead to a “sad old age”.

Keywords: Aging; disease; prevention; biomedical person; healthy aging

The complexity of the human organism, and also of its single functions and operative mechanisms, particularly if seen at molecular and cellular level, is very difficult to understand in its entirety (1). Therefore, we must acknowledge that, notwithstanding the exponential progress of the biomedical sciences, much work and research is needed to fully understand the very complex mechanisms on which the functioning of our life are based. More importantly, while it is difficult to understand the whole complexity of our functions in the “normal” homeostatic state (provided such a state exists in some periods of our life), it is much more difficult to unravel the altered mechanisms that occur in our diseased state consequent to the *noxae* we receive from the environment (to single organs, tissues and functions, and even to our entire organism) (2).

The various environmental *noxae* to which we are slowly but steadily exposed, is known as “physiological aging”. I consider this a misnomer because there is no such thing as physiological aging. In fact, aging is invariably due to alterations at a molecular and more complex level than to so-called “normal functions”. All these various alterations, mixed together in each individual, result in multimorbidity, also called “aging” (3). In fact, many slowly progressive alterations (e.g., skin withering, sarcopenia, joint alterations, neurosensorial disorders, etc.) have not been considered diseases, but rather “physiological” occurrences, and, as such, no efforts are made to cure or prevent them.

Only recently have studies of what may be called “minor chronic degenerative diseases” received attention in research and medical areas, and prompted the need for preventive measures (physical exercise, healthy nutrition, healthy cosmetic approaches etc.) (4). These considerations cast doubts on the traditional belief that the passage of time is the cause of many, if not all, chronic degenerative diseases, while, as shown in Figure 1, it is just the opposite: it is the molecular and cellular alterations or overt diseases that cause many of the most severe chronic degenerative diseases. The inversion of the arrows in the figure illustrates the inversion of the paradigm between aging and disease, which is, in reality, the inversion of cause and effect: the cause being the disease and the effect being aging, and not vice versa (4).

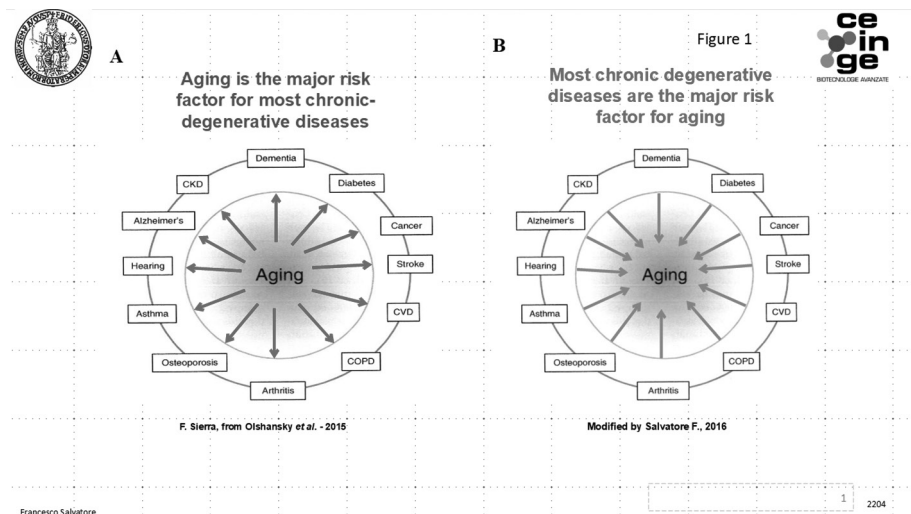


Fig. 1. “Aging” does not cause diseases, but diseases cause “aging”.

Time, in effect, is a complex philosophical concept, besides being a simple physical parameter with which to put “space and speed” in relationship. It is, according to what existentialists and many philosophers have stressed, a simple construct of our mind, and many of them argue that time does not even exist *per se* (5,6).

On the other hand, a study of lifespans over the last 150 years shows that life expectancy increases linearly with the chronology of human existence, as Vaupel (7) and others have illustrated by contextually associating life expectancy with the advance of medical sciences and technology. Furthermore, as shown in Panel B, the incidence of mortality increases with age, it starts to decrease around 80 years of age, and reaches a plateau around 105 years, thereby supporting the concept of “unlimited longevity” (8,9) (Figure 2).

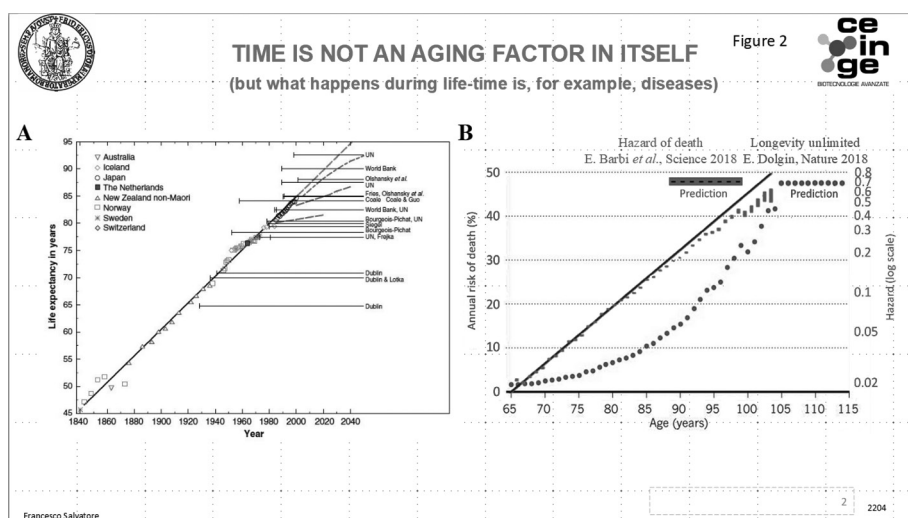


Fig. 2. A. Human life expectancy over the past 150 years (7); B. The risk of death increases with age up to about 80 years, then the progression decreases up to 50% at around 105 years of age (8,9).

Consequently, we should analyze the genotypic and phenotypic aspects and parameters of each individual so as to devise a “health status” score for him/her. Such a score is based on the “weight” of each disease in relation to the type and severity of each disease (10). I believe that a second paradigm depends on the fact that each single individual, in her/his complexity, can also have various diseases that must be treated. This is particularly the case when an individual, during his/her life, is moving towards the “syndemic aspects”

of health problems, as Merrill Singer put forward in 1990 (11), and that is now generally accepted (12-14). This concept led to another paradigm, namely, that each person should be treated in her/his integrity, particularly when several chronic degenerative diseases start to appear in the same person as opposed to a single disease (4,10). This would be possible if one starts to focus attention not only on a single disease, even if it is “precision type”, but to all the diseases of that patient. This “monitoring” should start very early in the life of each individual by collecting intra-individual parameters, thus obtaining better and more precise monitoring from 18-22 years of age (4,10).

The tests to be analyzed for each person are: (i) genomic predictive medicine so as to obtain information about the predisposition for diseases, including cancer (15); (ii) laboratory medicine in order to have more precise information and better monitoring of all metabolic functions and activities; (iii) imaging, starting with total body echography (because of its low cost) to obtain a complete pattern/visualization of the whole body; (iv) cognitive and neurosensorial functions tests; and (v) other instrumental tests such as cardio-respiratory tests, together with medical consultation (Figure 3). This approach would ensure that each person would receive efficient monitoring of his/her health status, and will reveal the first appearance of a trend of alterations from his/her so-called “normal status”. This approach covers most of the signs of predisposition to chronic degenerative diseases as well as very early signs or symptoms so that secondary prevention can be initiated (4,10).

These innovative approaches will result in a switch to preventive medicine from the current, almost exclusive, focus on treatment only. It will also increase the disease-free period of wellness and wellbeing of people throughout their life.

Another concept that I would like to propose and discuss in the final part of this article is the concept of “biomedical person”. This concept refers to a human being in his/her physical and mental essence (considered in its entirety), and which is continuously changing throughout his/her entire life in the complete terms of his/her physical status, moral values, sensations, moods, and ability to adapt and react to external stimuli, etc. As an example, I am a “biomedical person” continuously changing over time, thus becoming an individual. This concept substantially extends and differs from the old concept of “biological person”, which, in turn, is an abstract and homologating concept that is extended to all individuals. Notably, the continuous variation of health, expressed by each individual, is also his/her most evident and typical singularity, different one from another. In other words, from birth onwards, a “biomedical person” undergoes changes in his/her status of being a person and should be alert to symptom-onset

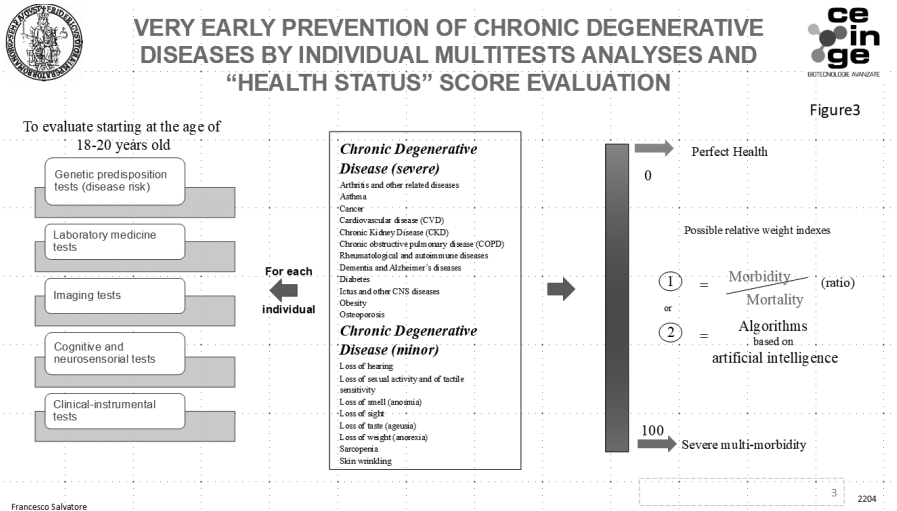


Figure3

Fig. 3: Monitoring of chronic-degenerative diseases (middle panel) should begin from the age of 18-20 years through panels of at least 5 types of tests, which can be continuously tailored in order to achieve the most precocious prevention (left panel) at individual level; each disease may contribute to a global individual evaluation of the state of health, after weighing the relative weight of each disease after finding appropriate indexes based on the typology and severity of the diseases (right panel).

starting from a very young age so as to identify some seemingly minor changes that may harbingers a disease and thus should be monitored, despite apparently being in good health. Consequently, besides population reference-values we should also consider intra-individual values throughout a person's life. Indeed, intra-individual values are the only ones that concern individuals in their “singular validity”. Thus, physicians should not consider a person to be a “patient”, but rather a “biomedical person” in whom he/she can identify signs, even initial, that may lead to a chronic-degenerative disease. In fact, it is precisely such initial illnesses that more easily and inexorably lead to a “sad old age”. This approach is based on a non-trivial revisiting of studies and training in today's medicine. Importantly, greater attention should be placed on disease prevention of each single individual.

CONCLUSION

The training of medical doctors and specialists should be modernized. Moreover, modernization should lead to programs and directives released by central and

regional governments to extend prevention to each individual, with the aim, not only of prolonging the length of life, but mostly for the well-being (or “disease-free” time) of each individual throughout his/her life.

References

1. Arber, W. (2020). Complexity of Life and Its Dependence on the Environment. In: Al-Delaimy, W., Ramanathan, V., Sánchez Sorondo, M. (eds) *Health of People, Health of Planet and Our Responsibility*. Springer, Cham. https://doi.org/10.1007/978-3-030-31125-4_1
2. Sturmberg JP. Health and Disease Are Dynamic Complex-Adaptive States Implications for Practice and Research. *Front Psychiatry*. 2021 Mar 29;12:595124. doi: 10.3389/fpsyt.2021.595124.
3. Preston J., Biddell B. The physiology of ageing and how these changes affect older people. *Medicine*. 2021;49(1):1-5. doi.org/10.1016/j.mpmed.2020.10.011
4. Salvatore F. The shift of the paradigm between ageing and diseases. *Clin Chem Lab Med*. 2020 Sep 25;58(10):1635-1644. doi: 10.1515/cclm-2020-0125.
5. Heidegger M. *The concept of time*. ed. Wiley; 1992. 62 p.
6. Rovelli C. *L'ordine del tempo*. Ed. Adelphi; 2017. 207 p.
7. Vaupel JW, Villavicencio F, Bergeron-Boucher MP. Demographic perspectives on the rise of longevity. *Proc Natl Acad Sci U S A*. 2021 Mar 2;118(9):e2019536118. doi: 10.1073/pnas.2019536118.
8. Barbi E, Lagona F, Marsili M., The plateau of human mortality: Demography of longevity pioneers. *Science*. 2018 Jun 29;360(6396):1459-1461. doi: 10.1126/science.aat3119.
9. Dolgin E. There's no limit to longevity, says study that revives human lifespan debate. *Nature*. 2018 Jul;559(7712):14-15. doi: 10.1038/d41586-018-05582-3.
10. Salvatore F. Longevità in buona e attiva salute. In: *Rendiconti e atti della Accademia di Scienze Mediche e Chirurgiche*. 2016;CLXIX:59-74.
11. Singer M. Reinventing medical anthropology: Toward a critical realignment. *Social Science & Medicine*;1990;30(2):179-187.
12. Singer M, Bulled N, Ostrach B, Mendenhall E. Syndemics and the biosocial conception of health. *Lancet*. 2017 Mar 4;389(10072):941-950. doi: 10.1016/S0140-6736(17)30003-X.
13. Pirrone I, Dieleman M, Reis R, Pell C. Syndemic contexts: findings from a review of research on non-communicable diseases and interviews with experts. *Glob Health Action*. 2021 Jan 1;14(1):1927332. doi: 10.1080/16549716.2021.1927332.
14. Willen SS, Knipper M, Abadía-Barrero CE, Davidovitch N. Syndemic vulnerability and the right to health. *Lancet*. 2017 Mar 4;389(10072):964-977. doi: 10.1016/S0140-6736(17)30261-1.
15. Nunziato M, Esposito MV, Starnone F., A multi-gene panel beyond BRCA1/BRCA2 to identify new breast cancer-predisposing mutations by a picodroplet PCR followed by a next-generation sequencing strategy: a pilot study. *Anal Chim Acta*. 2019 Jan 10;1046:154-162. doi: 10.1016/j.aca.2018.09.032.

CHRONIC KIDNEY DISEASE: A HUMAN MODEL OF ACCELERATED AGING

Presenting Author: **Alessandra F. Perna¹**
Yuselys García Martínez¹, Margherita Borriello²

¹Department of Medical Translational Sciences
University of Campania Luigi Vanvitelli, Naples, Italy

²Department of Precision Medicine
University of Campania Luigi Vanvitelli, Naples, Italy
e-mail: alessandra.perna@unicampania.it

ABSTRACT

Chronic Kidney Disease (CKD) is an important healthcare problem, easily compared to diabetes, for scope, impact, and consequences on wellbeing. CKD is a syndrome delineated as alterations in kidney function lasting more than 3 months, characterized by loss of nephrons and renal fibrosis. CKD is considered a “model” of accelerated aging in many respects, an aspect which is linked to the accumulation of uremic toxins: compounds such as p-cresyl sulfate, indoxyl sulfate, homocysteine, lanthionine, etc. Other compounds are reduced, such as Klotho, hydrogen sulfide, etc. In CKD, we have a premature aging phenotype, characterized by low grade chronic inflammation, sarcopenia, osteoporosis, frailty, and high cardiovascular mortality. In particular, early vascular aging is quite characteristic, sustained by vascular calcification, microinflammation, DNA damage, epigenetic alterations, gut dysbiosis, and is a hallmark of senescence. How to intervene in these processes with senolytic agents represents the emerging field of Geroscience.

Keywords: Chronic Kidney Disease; accelerated aging; uremic toxins; Geroscience; senolytic agents

INTRODUCTION

Chronic Kidney Disease is a healthcare problem, that can be easily compared to diabetes, for its scope, impact, and consequences on wellbeing. About 10% of the general population is affected by CKD, and it represents, by itself, the sixth cause of death worldwide.

CKD is a syndrome delineated as alterations in kidney function lasting more than 3 months, characterized by loss of nephrons and renal fibrosis. To classify CKD, glomerular filtration rate (GFR) and albuminuria must be used, since GFR is regarded as a marker of excretory function and albuminuria is an indicator of glomerular injury. Identifying the cause is important: diabetes and hypertension are the most common, but there are many other causes, such as polycystic kidney disease, glomerulonephritis, etc. There are also several contributing risk factors, for example sex, obesity, use of anti-inflammatory drugs, low birth weight, congenital abnormalities of the urinary tract, infections, etc. Although the prevalence of CKD is higher in women than in men, men are more likely to progress to advanced stages.

This disease tends to worsen. Glomerular hyperfiltration and hypertension occur as a physiological response to nephron loss; however, this compensatory mechanism with time frequently backfires, and in fact excessive intraglomerular shear stress causes podocyte detachment and more interstitial fibrosis.

To diagnose CKD, it is necessary to obtain initially blood creatinine, urea, electrolyte levels, a urinalysis, and an abdominal echography. In addition, there are steps to be taken addressing the cause of CKD. For example, if glomerulonephritis is suspected, a biopsy may be necessary, and once proven, immunosuppressant drugs may be utilized. Other diseases liable to therapy in recent years are polycystic kidney disease, Fabry's disease, and atypical uremic hemolytic syndrome. The field of so-called "rare diseases"-diseases with a low prevalence, but high complexity, such as tubulopathies, cystinuria, Bardet-Biedel disease, is also blooming, as knowledge increases. Onco-nephrology is another subspecialty gaining momentum as more and more people have access to oncological therapies. Furthermore, of paramount importance there is blood pressure control, as well as management of proteinuria with angiotensin converting enzyme inhibitors or angiotensin-II receptor antagonists. Recently, sodium glucose co-transporter (SGLT2) inhibitors, also called gliflozins, are available. These drugs have been proven in randomized clinical trials to retard progression of CKD in diabetes. Considering the stage, it could also be very useful to utilize low protein diets (the Neapolitan school was one of the first in the world to propose this therapy), erythropoietin, iron, various vitamins, etc. CKD is easily complicated by several issues: 1) anemia, due to accumulation of uremic toxins and relative erythropoietin deficiency, impacting on one's sense of wellbeing and quality of life; 2) the so-called CKD-Mineral and Bone Disorder (CKD-MBD). CKD-MBD determines a negative influence

on progression, and the deposition of calcium salts in blood vessels causes an increase in cardiovascular events. Several drugs can be of help, such as phosphate binders, vitamin D, and calcimimetics; 3) metabolic acidosis, hyperkalemia, hyperuricemia, dyslipidemia, etc. Most of these complications are due to “uremic toxicity”, the accumulation of uremic toxins referred above. Uremic toxins are numerous and can be classified considering their physico-chemical properties, such as their molecular weight (small molecules, middle molecules, protein-bound molecules), or on the origin of the molecule (diet, metabolism, microbiota), or their dialysability (capacity of different dialysis procedures to eliminate the molecule).

Renal replacement therapy (RRT) is necessary when the body can no longer cope with the excretory and homeostatic demands of our metabolism. RRT includes transplantation, peritoneal dialysis, and hemodialysis (1).

CKD AS A “MODEL” OF ACCELERATED AGING.

CKD can be considered a “model” of accelerated aging in many respects, and which is linked to uremic toxicity. In fact, in CKD we have a premature aging phenotype, characterized by low grade chronic inflammation, sarcopenia, osteoporosis, frailty, and the above-mentioned extremely high cardiovascular mortality. In particular, early vascular aging is quite characteristic of CKD, sustained by vascular calcification, microinflammation, DNA damage, epigenetic alterations, gut dysbiosis, and in general is a hallmark of senescence.

Aging, contrary to common perception, is not a process intervening in the last stages of life, but one that occurs slowly during the entire lifetime, and is characterized by the accumulation of various types of damage. The exposome, that is the hits we receive during our life just by living (through eating, exercise, psychological stress, diseases, etc.) plus our genetic blueprint, lead to the accumulation of physiological and molecular deficits and therefore physiological frailty and loss of resilience (2).

Uremic toxicity

In CKD, many uremic toxins, not normally present at all in the absence of this condition, are increased, sometimes to very high concentration, such as p-cresyl sulfate, indoxyl sulfate, homocysteine, lanthionine, to name a few. Many uremic toxins are linked to vascular calcification and inflammation, and therefore to vascular aging. For example, lanthionine is able to induce vascular calcification

by increasing intra- and extra-cellular calcium content in cell culture models and in zebrafish. Lanthionine levels are higher in CKD patients in whom the vascular calcium score is higher (3-6).

In addition, we have shown that DNA methylation, an important epigenetic regulatory mechanism, is lower in CKD, and this is a consequence of the accumulation of homocysteine, a cardiovascular risk factor, and of its precursor S-adenosylhomocysteine, a known methylation inhibitor (7). DNA hypomethylation is typical of the aging process. Another aspect of this complex and deranged sulfur metabolism is related to the levels of hydrogen sulfide- H_2S -a gasotransmitter with many biological properties; in CKD. H_2S is a powerful modulator of health span, severity of disease, and longevity, and we have demonstrated that H_2S is significantly lower in CKD (8,9).

CKD-MBD

Others have shown that in the CKD-MBD pathogenesis, the Fibroblast Growth Factor 23 (FGF23)- α -Klotho axis is altered, with low levels of α -Klotho and increased FGF23. α -Klotho converts the FGF receptor in its high affinity form towards its ligand, FGF23. When α -Klotho is low, as in uremia, this effect is lost. Membrane α -Klotho shedding yields its circulating form, which acts as a hormone by modulating several functions, such as intracellular insulin/IGF-1 signaling cascade. This activity likely contributes to the known antiaging effects of α -Klotho because inhibition of insulin-like signaling is an evolutionarily-conserved mechanism for extending life span.

We have shown that in the face of increased tumor necrosis factor- α in the circulation, both soluble and tissue α -Klotho are reduced significantly, despite increased tissue A disintegrin and metalloproteinase 17 (ADAM17), a metalloproteinase causing the proteolytic shedding of α -Klotho from the cell membrane (10).

Cellular senescence

Telomere attrition, mitochondrial dysfunction, stem cell exhaustion, and other markers of aging are also present in CKD. H_2S , Klotho, nuclear factor, erythroid 2-related factor 2, vitamin K, folates, the methylome and epigenome, the p53 pathway, senescent cells, etc. represent all interesting potential targets of senotherapies. Cellular senescence is activated via p53/p21, p16/pRB-dependent pathways. One typical feature of senescent cells, the senescent

cell anti-apoptotic pathways (SCAPs), predisposes senescent cells to be apoptosis-resistant, resulting in their accumulation in tissues. The SCAPs are thus key targets of senolytic drugs for targeting and inducing senescent cells to undergo apoptosis. Another feature of senescent cells is the senescence-associated secretory phenotype (SASP), characterized by a secretion profile of pro-inflammatory cytokines, growth factors and soluble receptors, which could further result in both local and systemic inflammation and tissue damage. Activation of interleukin-1 (IL-1), tumor growth factor β (TGF- β), nuclear factor (NF)- κ B (NF- κ B), p38 mitogen-activated protein kinases (p38 MAPK) and inflammasome signaling are factors promoting generation of SASP.

CONCLUSION

How to intervene in these processes represents the emerging field of Geroscience, with the aim of addressing the molecular and cellular mechanisms of aging and of aging in CKD, through the use of senolytic agents, for example, or other more conventional tools (exercise, nutrition, gut microbiota interventions, drugs, dialysis), acting therefore at different levels (10).

Undoubtedly, this field holds in store many exciting innovations in the near future, capable of turning the tables on the grim outcomes of this condition, and perhaps also for the aging field of studies in general.

References

1. Romagnani P, Remuzzi G, Glassock R, et al. Chronic kidney disease. *Nature Reviews Primers*, 2016;17088 doi:10.1038/nrdp.2017.88
2. Salvatore F. The shift of the paradigm between ageing and diseases. *Clin Chem Lab Med*, 2020; doi.org/10.1515/cclm-2020-0125
3. Perna AF, D'Esposito V, Formisano P, et al. Lanthionine, a Novel Uremic Toxin, in the Vascular Calcification of Chronic Kidney Disease: The Role of Proinflammatory Cytokines. *Int J Mol Sci* 2021; 22:6875-6889. <https://doi.org/10.3390/ijms22136875>
4. Coppola A, Vigorito C, Lombardi P, et al. Uremic Toxin Lanthionine Induces Endothelial Cellmineralization inVtro.2022;10, 444-463 <https://doi.org/10.3390/biomedicines10020444>
5. Vigorito C, Anishchenko E, Mele L, et al Uremic Toxin Lanthionine Interferes with the Transsulfuration Pathway, Angiogenetic Signaling and Increases Intracellular Calcium. *Int. J. Mol. Sci.* 2019; 20:2269-2284; doi:10.3390/ijms20092269
6. Perna AF, Anishchenko E, Vigorito C, et al. Zebrafish, a Novel Model System to Study Uremic Toxins: The Case for the Sulfur Amino Acid Lanthionine. *Int. J. Mol. Sci.* 2018; 19:1323; doi:10.3390/ijms19051323

7. Ingrosso D, Cimmino A, Perna A F, et al. Folate treatment and unbalanced methylation and changes of allelic expression induced by hyperhomocysteinaemia in patients with uraemia. *Lancet*, 2003; 361(9370):1693-9.
8. Perna A F, Di Nunzio A, Amoresano A, et al. Divergent behavior of hydrogen sulfide pools and of the sulfur metabolite lanthionine, a novel uremic toxin, in dialysis patients. *Biochimie* 127: 97-107. 10.1016/j.biochi.2016.04.018
9. Perna A F, Sepe I, Lanza D, et al. Hydrogen sulfide reduces cell adhesion and relevant inflammatory triggering by preventing ADAM17-dependent TNF- α activation. *J Cell Biochem* 2013; 114: 1536 – 1548 10.1002/jcb.24495
10. Perna A F, Pizza A, Di Nunzio A, et al. ADAM17, a New Player in the Pathogenesis of Chronic Kidney Disease–Mineral and Bone Disorder. *J Ren Nutr* 2017; 27: 453 – 457 10.1053/j.jrn.2017.05.007
11. Dai L, Qureshi A R, Witasz A, Lindholm B and Stenvinkel P. Early Vascular Ageing and Cellular Senescence in Chronic Kidney Disease. *Computational and Structural Biotechnology Journal* 2019; 17:721-729

NOTHOBRANCHIUS FURZERI: A TANKFUL OF OPPORTUNITIES FOR AGEING RESEARCH

**Livia D'Angelo
Paolo de Girolamo**

University of Naples Federico II, Dept Veterinary Medicine and Animal Production, Italy
e-mail: livia.dangelo@unina.it

ABSTRACT

Ageing research has been progressing rapidly due to the contribution of preclinical studies conducted on research organisms. In this scenario, the teleost fish, *Nothobranchius furzeri*, also known as the African turquoise killifish, entered the area of powerful model systems to study vertebrate ageing. Thanks to its very compressed life cycle of a maximum of 45 weeks (depending on the strain), characterized by a rapid development, sexual maturation, and a naturally fast-ageing process as part of its natural life history, this fish is today considered the shortest-lived vertebrate bred in captivity. Old turquoise killifish display typical hallmarks of ageing at both phenotypical and molecular level: decline in reproduction, fertility, cognition, mobility, regeneration, and tissue homeostasis, along with increased incidence of senescence, neural and muscular degeneration, and cancerous lesions. Notably, different experimental approaches i.e., caloric restriction, or longitudinal analyses are commonly performed in this model to identify key genetic and environmental factors related to vertebrate ageing.

Keywords: Model organism; ageing; hallmarks; vertebrates

INTRODUCTION

Vertebrate species exhibit a 500-fold difference in maximal lifespan - from ~0.7 years in the African turquoise killifish to ~400 years in the Greenland shark. Already Aristotle, in the treatise “*On Length and Shortness of Life*” highlighted the importance of studying long-lived and short-lived animals to understand the causes of both length and brevity of life. To address this issue, he developed a method not far from that of modern comparative gerontology. He, indeed, compared the life spans of: various animal species, various individuals or sexes of the same species, various life-styles and environmental conditions as well as animal habitats, attempting to find a correlation between all these variables.

BIOGERONTOLOGY

The modern approach in biogerontology, including high-throughput genomics, coupled with evolutionary studies and lifespan-extending interventions provide unprecedented opportunities to disentangle the natural lifespan diversity and extend healthy human lifespan, compress morbidity and counter age-related diseases. While species which are exceptionally long-lived and disease-resistant (i.e., naked mole rats, elephants) are key models for studies on the evolution of longevity. Those that are exceptionally short-lived help the investigation of mechanisms related to ageing and lifespan extension. The majority of ageing research relies on the exciting approach for treating or postponing the onset of age-associated pathologies, aiming at slowing down the ageing processes, thus extending human health-span (1).

FEATURES OF NOTHOBRANCHIUS FURZERI AS A RESEARCH ORGANISM

Non-vertebrate and vertebrate research organisms have strongly contributed to identify evolutionary-conserved ageing-related pathways (i.e., nutrient sensing-pathways). Among vertebrate species, the teleost fish, *Nothobranchius furzeri*, entered the arena of powerful model systems to study vertebrate ageing (2, 3). In its short lifespan, this fish recapitulates classical range of ageing phenotypes that reported in humans and other vertebrates (1) Fig. 1, including decline in fertility, in wound healing and regeneration, and in mitochondrial and cognitive functions (4). Additional histopathological markers include accumulation of lipofuscin in the liver, upregulation of glial fibrillary acidic protein (GFAP) in the brain (a marker of neuroinflammation), and increased incidence of neoplastic lesions (5). As a vertebrate, the killifish has an adaptive immune system, bone and brain structures (6) such as the hypothalamus, which are central features in vertebrate ageing.

Importantly, the lifespan of the turquoise killifish can be manipulated by dietary restriction, temperature modification, and drug treatments (7), as well as by acting on the gut microbiota (8).

POTENTIAL GENETIC STUDIES IN AGEING

In addition to exploring aging, the turquoise killifish possesses many experimental advantages, including an XY-based sexual determination system (7) which may facilitate studies on the influence of sex on lifespan. Interestingly, studies on

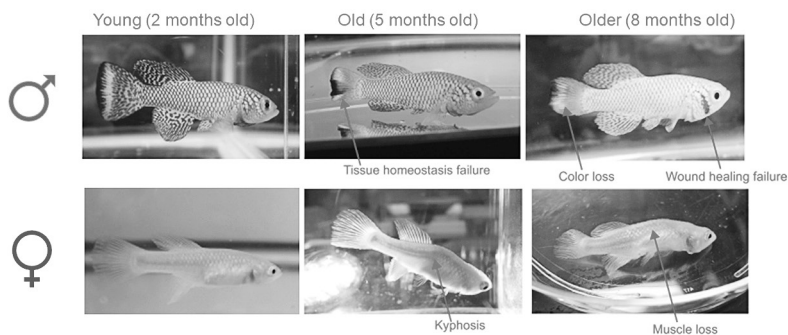


Fig. 1: Modified from Hu and Brunet, 2018 *Aging Cell*. Age-related phenotypes commonly observed in laboratory.

the genetic linkage maps for regions associated with lifespan have revealed that key regions are located near the sex-determination region and contains several interesting candidates for ageing regulation. Another key biological feature of the turquoise killifish is the embryonic diapause, a state of suspended development actively maintained by specific chromatin regulators, and this has implications for long-term organism preservation (9).

Finally, the killifish has been established as a genetically tractable system with the assembly of its genome as well as the development of transgenesis and CRISPR/Cas9 genome editing to generate mutants for known ageing genes. As an example, loss of function mutation of one of these genes, the telomerase reverse transcriptase *TERT*, results in phenotypes similar to the human disease Dyskeratosis congenita (blood, gut and testis defects) resembling aspects of premature ageing. Overall, this is the proof-of-principle that loss of function mutations of conserved genes in the killifish can model human diseases with ageing-like phenotypes (10).

CONCLUSION

Ageing studies should greatly benefit from studying species such as turquoise killifish as a platform to explore the hallmarks of aging such as stress resistance and nutrient sensing (11) by rapid functional *in vivo* validation (Fig. 2). Similarly, targeted screens could be directly performed in the turquoise killifish, as was recently shown for the zebrafish model. Combined, these approaches

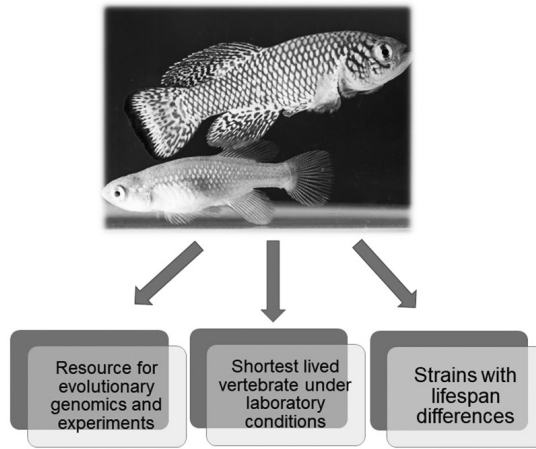


Fig. 2: Potential application of *Nothobranchius furzeri* in ageing research.

could significantly enhance our ability to explore the phenotypes and diseases of ageing, including neurodegeneration and cognitive decline, stem cell exhaustion, and frailty.

References

1. López-Otín C, Blasco MA, Partridge L, Serrano M, Kroemer G. The hallmarks of aging. *Cell*. 2013 Jun 6;153(6):1194-217.
2. Cellerino A, Valenzano DR, Reichard M. From the bush to the bench: the annual *Nothobranchius* fishes as a new model system in biology. *Biol Rev Camb Philos Soc*. 2016 May;91(2):511-33. doi: 10.1111/brv.12183.
3. D'Angelo L. An aquatic organism as time machine: *Nothobranchius furzeri*. *Journal of Gerontology and Geriatrics*., 2017/7 6: 307-310.
4. Harel I, Brunet A. The African Turquoise Killifish: A Model for Exploring Vertebrate Aging and Diseases in the Fast Lane. *Cold Spring Harb Symp Quant Biol*. 2015; 80:275-9. doi: 10.1101/sqb.2015.80.027524.
5. Di Cicco E, Tozzini ET, Rossi G, Cellerino A. The short-lived annual fish *Nothobranchius furzeri* shows a typical teleost aging process reinforced by high incidence of age-dependent neoplasias. *Exp Gerontol*. 2011 Apr;46(4):249-56. doi: 10.1016/j.exger.2010.10.011.
6. Montesano A, Baumgart M, Avallone L, Castaldo L, Lucini C, Tozzini ET, Cellerino A, D'Angelo L, de Girolamo P. Age-related central regulation of orexin and NPY in the short-lived African killifish *Nothobranchius furzeri*. *J Comp Neurol*. 2019 May 15;527(9):1508-1526. doi: 10.1002/cne.24638.

7. Singh PP, Demmitt BA, Nath RD, Brunet A. The Genetics of Aging: A Vertebrate Perspective. *Cell*. 2019 Mar 21;177(1):200-220. doi: 10.1016/j.cell.2019.02.038.
8. Smith P, Willemsen D, Popkes M, Metge F, Gandiwa E, Reichard M, Valenzano DR. Regulation of life span by the gut microbiota in the short-lived African turquoise killifish. *Elife*. 2017 Aug 22;6: e27014. doi: 10.7554/eLife.27014.
9. Hu CK, Wang W, Brind'Amour J, Singh PP, Reeves GA, Lorincz MC, Alvarado AS, Brunet A. Vertebrate diapause preserves organisms long term through Polycomb complex members. *Science*. 2020 Feb 21;367(6480):870-874. doi: 10.1126/science.aaw2601.
10. Harel I, Benayoun BA, Machado B, Singh PP, Hu CK, Pech MF, Valenzano DR, Zhang E, Sharp SC, Artandi SE, Brunet A. A platform for rapid exploration of aging and diseases in a naturally short-lived vertebrate. *Cell*. 2015 Feb 26;160(5):1013-1026. doi: 10.1016/j.cell.2015.01.038.
11. D'Angelo L, Lossi L, Merighi A, de Girolamo P. Anatomical features for the adequate choice of experimental animal models in biomedicine: I. Fishes. *Ann Anat*. 2016 May; 205:75-84. doi: 10.1016/j.aanat.2016.02.001.
12. Hu and Brunet. The African turquoise killifish: A research organism to study vertebrate aging and diapause. *Aging Cell* 2018, 17,3 <https://doi.org/10.1111/accel.12757>.

ZEBRAFISH: A MODEL ORGANISM FOR STUDYING THE FOCAL SEGMENTAL GLOMERULOSCLEROSIS

**Anna Iervolino^{1,2,3},
Florian Siegerist², Tim Lange², Sabrina Siccardi³, Francesca Pia
Caruso⁴, Michele Ceccarelli⁴, Karlhans Endlich², Nicole Endlich² and
Giovambattista Capasso^{3*}**

¹ Biogem Institute of Molecular Biology and Genetics, Ariano Irpino, Italy;

² Institute for Anatomy and Cell Biology, University Medicine Greifswald, Greifswald, Germany

³ Department of Medical Translational Sciences,

University of Campania “Luigi Vanvitelli”, Naples, Italy

⁴ Department of Electrical Engineering and Information Technology (DIETI),

University of Naples “Federico II”

anna.iervolino@unicampania.it

ABSTRACT

The zebrafish (*Danio rerio*) is a powerful model to study glomerular morphology and the function of the glomerular filtration barrier. As in mammals, the glomerular filtration barrier consists of a fenestrated endothelium, the glomerular basement membrane and interdigitating podocyte foot processes bridged by a slit diaphragm. By using genetically modified zebrafish strains with fluorescently labeled podocytes, it is possible to induce podocyte apoptosis and detachment from the glomerular basement membrane studying alterations of the glomerulus during the development of renal disease like focal segmental glomerulosclerosis (FSGS). The aim of our study was to collect glomeruli for the identification of mRNAs as well as miRNAs by RNA_Seq that are up- and down-regulated in the glomeruli of this focal segmental glomerulosclerosis like disease model.

Keywords: Zebrafish; glomerulus; FSGS; podocytes injury; mRNAs

INTRODUCTION

Zebrafish is a freshwater fish; since larvae develop quickly and can be bred to become transparent, *in vivo* observation of these animals is possible. There is a close functional analogy between zebrafish and mammalian kidneys. The zebrafish larvae’s pronephros, which is composed of two bilateral pronephric

ducts linked with fused glomeruli in the midline of the larvae, is very similar to the human metanephros (1, 2). The anatomy of the urinary system is slightly different but the composition along the nephron is broadly conserved. The pronephros tubular epithelium is composed of two proximal convoluted tubules, two proximal straight tubules, two distal early and distal late tubule segments, and a pronephric duct. The main difference between the pronephros of the zebrafish and the mammalian partner is that the pronephros does not have a thin limb segment (3). It is unnecessary in zebrafish as they are fresh water organisms with no need to conserve water or concentrate urine.

The pronephros in zebrafish is formed at 24 h post fertilization (hpf), and start blood filtration at approximately 48 hpf (2). Glomerular filtration begins as early as 48 hpf and a functioning pronephros is fully developed within 72 hpf. At 10 days post fertilization (dpf), in order to cope with the increased osmoregulatory demands of the growing, juvenile fish, mesonephric nephrons start forming from cell clusters of nephron progenitors embedded in stroma. These mesonephrons fuse with the distal pronephric tubules to eventually form the mesonephric kidney, which remains during the whole adult life of the zebrafish (4).

Adult zebrafish models are more suitable to certain types of studies, especially involving the endocrine function of the kidney or regenerative capacity of the adult zebrafish kidney (5, 6). Zebrafish embryos and larvae are far more commonly used to model genetic renal diseases. This is mainly due to the large number of embryos and larvae that can be generated and studied per mating, and also due to the anatomical simplicity and histological and functional similarity of the larval pronephros to the human nephron (2).

By using genetically modified zebrafish strains with fluorescently labeled podocytes, it is possible to study alterations of the glomerulus during the development of renal disease such as FSGS. FSGS is characterized by podocyte loss, the effacement of their foot processes as well as scarring of the glomerulus. To study FSGS in zebrafish larvae, we induced podocyte detachment by the use of a zebrafish strain expressing the enzyme nitro-reductase converting metronidazole into a toxic substance specifically in podocytes.

METHODS

Zebrafish were bred, maintained, and staged as described before (7). We used the double transgenic strain Tg (*nphs2*: GAL4); Tg (UAS: *Eco.nfsb*-mCherry) (8).

Larvae express the bacterial enzyme nitro-reductase and the fluorescent protein mCherry exclusively in podocytes. Prior to all experiments, larvae were selected for homogenous mCherry expression in the group within the glomerulus. From this selected group, larvae were randomly assigned to treatment and control groups. For drug treatment, 0.1% Di-methyl sulfoxide (DMSO) was freshly diluted in E3-embryo medium. Metronidazole (MTZ, Sigma-Aldrich, St. Louis, MO, USA) was added at a concentration of 80 $\mu\text{mol L}^{-1}$ for all experiments. Controls were treated with 0.1% DMSO-solution only. Treatment was started at 4 dpf and a treatment period of 48 hours was held for all experiments. In order to perform gene analyses of glomeruli, we established a method enriching glomeruli with an excellent quality. Treated and control larvae were homogenized at 6 dpf. The cell suspension was diluted, and red-fluorescent glomeruli were collected using a micropipette. Total RNA was isolated, and integrity was checked by a Bioanalyzer. MACE libraries were generated with a MACE kit for ultra-low input by GenXPro GmbH. Polyadenylated (poly(A)) mRNA was transcribed into cDNA with biotinylated oligo(dT) primers. The resulting biotinylated cDNA was randomly fragmented and the 3'-ends were captured with a streptavidin resin. A modified True Quant Illumina p5 adaptor was then ligated to the unbound end of each fragmented cDNA. These constructs were amplified by PCR and were sequenced on an Illumina Hiseq 2000. By this one single 'read' for each original transcript molecule was generated. Then the data set was cleaned by removal of duplicates and 'reads' were mapped to the *Danio rerio* genome. Normalization and statistical analysis for differential gene expression was done using the DESeq. Gene ontology (GO)-enrichment analyses were performed on the DEGs.

RESULTS

The transgenic zebrafish strain Cherry expresses the prokaryotic enzyme nitro-reductase fused to mCherry, a red fluorescent protein, under the control of the podocyte-specific podocin promoter in a transparent zebrafish strain. After addition into the tank water, the metronidazole is converted into a cytotoxin by nitro-reductase leading to dose-dependent apoptosis exclusively in podocytes (Fig.1).

Treated larvae after 48 hours developed periocular, yolk and pericardial edema (Fig.2). Edema progressively increased in a time dependent way and often associated with increased mortality due to podocyte damage and loss, which is the prerequisite for the development of FSGS.

To quantify proteinuria and to evaluate the integrity of the glomerular filtration barrier, we intravenously injected green fluorescent high molecular weight dextran 500kDa, directly after MTZ washout. 0.5 and 19 hours after the injection we determined the intravascular fluorescence in the caudal vein. The fluorescence of fluorescein isothiocyanate (fitc) decreased by 59% in MTZ-treated larvae after 19 hours. Therefore, MTZ induces apoptosis of podocytes resulting in the development of severe proteinuria.

Histological analysis showed a reduced glomerular cell density, a thickening of the PEC layer in MTZ-treated larvae compared to controls. Number of podocytes per glomerular remained significantly reduced. Moreover, we found that the Bowman's capsules were enlarged after treatment. Transmission electron microscopy (TEM) of MTZ- treated larvae revealed disintegrated cells along the GBM localized to podocytes. The foot processes of remaining podocytes of MTZ-treated larvae were severely effaced. Dilatations of the sub podocyte space were frequently found.

mRNAs as well as miRNAs Sequencing were performed to study the deregulation after the treatment. Gene ontology (GO) enrichment analysis of up-regulated genes revealed a total of 167 that are significantly enriched in GO terms (metabolic processes, immune response and ion transport). Down-regulated genes were enriched in 14 GO terms and most of them are linked to normal glomerular function. DESeq2 analysis identified 200 miRNAs of 777 small RNAs. Some of these miRNAs are already described to be regulated in different glomerular diseases like FSGS, lupus nephritis, IgA nephropathy and diabetic nephropathy.

CONCLUSION

We analyzed isolated glomeruli from transgenic zebrafish larvae that developed a FSGS-like disease. By sequencing, we have found mRNAs and miRNAs that were significantly regulated after the onset of disease. Detailed knowledge of these mRNAs and miRNA-based gene regulations will help to uncover the patho-mechanism as well as to develop therapeutics for the treatment of FSGS.

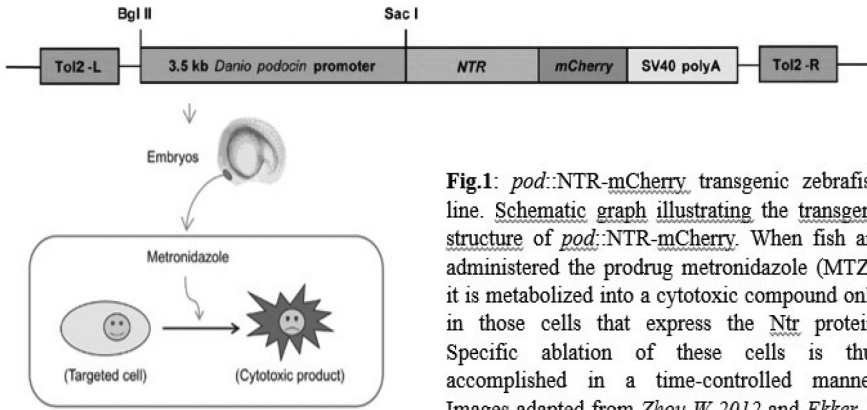


Fig.1: *pod::NTR-mCherry* transgenic zebrafish line. Schematic graph illustrating the transgene structure of *pod::NTR-mCherry*. When fish are administered the prodrug metronidazole (MTZ), it is metabolized into a cytotoxic compound only in those cells that express the *Ntr* protein. Specific ablation of these cells is thus accomplished in a time-controlled manner. Images adapted from *Zhou W 2012* and *Ekker M 2010*.

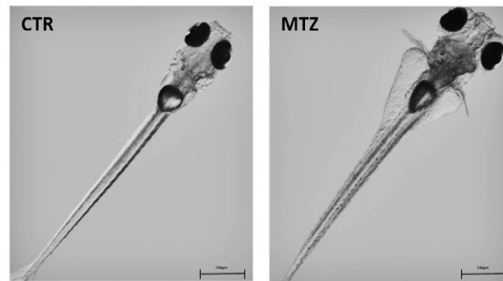


Fig.2: Micrographs of zebrafish larvae to demonstrate the developing edema after podocyte depletion. (CTR) normal larva, (MTZ) larva showing periocular, yolk and pericardial edema.

References

1. Diep, C.Q., Peng, Z., Ukah, et al. Development of the zebrafish mesonephros. *Genesis* 2015, 53, 257–269.
2. Drummond, I.A., Majumdar, A., Hentschel, H., et al. Early development of the zebrafish pronephros and analysis of mutations affecting pronephric function. *Development* 1998, 125, 4655–4667.
3. Mohamed A. Elmonem, Sante Princiero Berlingerio, Lambertus P. van den Heuvel et al. Genetic renal disease: the emerging role of zebrafish models. *Cells* 2018
4. Diep, C.Q., Peng, Z., Ukah, et al. Development of the zebrafish mesonephros. *Genesis* 2015, 53, 257–269.

5. Rider, S.A., Christian, H.C., et al. Zebrafish mesonephric renin cells are functionally conserved and comprise two distinct morphological populations. *Am. J. Physiol.-Ren. Physiol.* 2017, 312, F778–F790.
6. Diep, C.Q.; Ma, D.; Deo, R.C.; Holm, T.M.; Naylor, R.W.; Arora, N.; Wingert, R.A.; Bollig, F.; Djordjevic, G.; Lichman, B.; et al. Identification of adult nephron progenitors capable of kidney regeneration in zebrafish. *Nature* 2011, 470, 95–100.
7. Siegerist F, Zhou W, Endlich K, Endlich N. 4D in vivo imaging of glomerular barrier function in a zebrafish podocyte injury model. *Acta Physiol.* 220 2016;(1): 167– 173.
8. Kerrin Ursula Ingeborg Hansen, Florian Siegerist, Sophie Daniel et al. Prolonged podocyte depletion in larval zebrafish resembles mammalian focal and segmental glomerulosclerosis. *FASEB J.* 2020 Dec;34(12):15961-15974.

PHYSICAL INACTIVITY VS PHYSICAL ACTIVITY – WILL WE SURVIVE?

Rado Pišot

Science and Research Center Koper, Institute for Kinesiology Research, Koper, Slovenia
e-mail: rado.pisot@zrs-kp.si

ABSTRACT

Physical activity (PA) is more important for our health than ever. It is a lever for physical fitness, work efficiency, immune system resilience, and maintenance of psychophysical balance. PA is, of course, central to evolution, but evolution is being compromised by a new relationship with gravity, from opposing to acceding.

For decades, research has pointed to the beneficial health effects of PA. Despite the immense efforts that many professional and scientific organizations have made to raise the awareness of individuals and society about the role of an appropriate amount and intensity of PA in daily life, and to increase the level of adherence to their recommendations, the situation is still very worrisome. Particularly so is the fact that increasingly prolonged periods of physical inactivity (PI) are insidiously and aggressively taking over the lives of modern people - at school, at work, at leisure, at home. Though likely incomprehensible and difficult for many to accept, PI is becoming the first and worst enemy of health today.

The purpose of this article is to outline the consequences of PI studied using more aggressive models (bed rest case) or restriction periods (Covid-19), as well as to explain the effects of PA and its potential to counteract the negative effects of PI.

Keywords: Contemporary society; sedentary behavior; physical inactivity; health

INTRODUCTION

PA is more important for our health than ever. It is a lever for physical fitness, working efficiency, immune system resilience, and maintenance of psychophysical balance. PA is, naturally, central to evolution; however, evolution is being undermined by a new relationship with gravity, from opposing to acceding. High exposure to hypokinetic conditions is a phenomenon of the sedentary lifestyle that we have been witnessing for at least the last two decades, and restrictions

stemming from Covid-19 further exacerbated that. “Stay at home,” “schools closed,” “playgrounds closed,” were only a few of the restrictions imposed by governments and all greatly affecting PA patterns. Indeed, a ~50% decrease in moderate and vigorous PA (MVPA) and an up to ~50% increase in PI have been reported (1,2), making the past two years the most sedentary period in human history. A “sociology of sedentarism”(3) is emerging to study this new phenomenon. Although PI has progressed to the 2nd-highest risk factor of overall mortality (according to the 2019 WHO Report), from 7th place in 2006, it should be noted that it is also the most easily modifiable health factor for all age groups. Impacts of PI (“the silent killer”) may go undetected for years or decades before generating a preventable disease. PI is associated with the early onset of non-communicable chronic diseases and health problems leading to all-cause mortality.

The purpose of this paper is to outline the consequences of PI studied through more aggressive models (bed rest case) or restriction periods (Covid-19) as well as to explain the effects of PA and its dimensions in order to counteract the negative effects of PI.

MECHANISMS OF FUNCTIONAL DECLINE AFTER SHORT EXPOSURE TO COMPLETE INACTIVITY

In young adults PI leads to remodulation of motor units and the mechanisms of muscle deterioration, as shown in bed rest (BR) studies. The deterioration is very intense after just a few days of PI (4). Sudden exercise cessation has been associated with rapid onset of insulin resistance in muscle tissue, decreased muscle glucose utilization, and muscle protein degradation with consequent muscle atrophy. Loss of muscle structure and function (5,6) and increases in insulin resistance accelerate the risk of developing mechanisms leading to Type 2 Diabetes (T2D). Inactivity-related factors also contribute to reduction in cardiorespiratory fitness, bone mineral content, and physical function. PI is particularly deleterious in certain patient populations, such as those at high risk of T2D, cardiovascular disease, cancer, osteoporosis and mental health problems (7), and in the elderly, considering concomitant sarcopenia and/or osteoporosis.

Numerous BR studies demonstrate that the consequences of PI on physical and mental health are severe, and that the mechanisms of deterioration of certain body systems develop very rapidly - circumstances exacerbated when PI is coupled with ageing and/or comorbidities. PI has a negative impact on most subsystems of the human body, among which negative consequences have been reported on:

- muscle mass and architecture (5);
- muscle function (6);
- bones (7);
- metabolic balance (5);
- cellular oxidative metabolism (5);
- neural processing efficiency and cognitive functions (8);
- cardiovascular and respiratory functions (9).

The negative effect of hospitalization on the health of patients could be explained, in part, by disease-related problems, but also by the sudden reduction in PA. We are challenged by the clinically important question regarding how to overcome the disease and simultaneously prevent secondary consequences of disuse (1). Where is the line between necessary rest and unnecessary loss? Rest or PI is often inappropriately, overly, or unjustifiably prescribed for certain injuries and illnesses.

EFFECTS OF PHYSICAL INACTIVITY DURING LONGER PERIODS AND THE COVID-19 EXPERIENCE

As more governments tightened quarantines or considered various forms of lock-down to prevent the spread of Covid-19, a major concern arose regarding the potential negative impact of PI due to personal limitations (10). The consequences of Covid-19 restrictions were like those at post-complete PI. Subjects included in a BR study exhibited a comparable increase in insulin resistance after 2 months of lock-down as individuals subjected to 2 months of lock-down. Lock-down led to about a 75% decrease in daily step count, with concomitant ill effects (e.g., weight gain).

We conducted several studies during Covid-19 restrictions. Whereas even before the pandemic, most adults failed to meet the minimum daily recommendations, we noted an additional 40% decrease of MVPA, a 40% decrease in walking time, and a 30% increase in PI (2). Focusing on the prevalent PI, we soon discovered that the highest increase occurred in the amount of sitting time, and within that of screen time (by as much as 60%), which was related to weight gain (2). Before the pandemic as many as 80% of children were involved in organized sports activities; this turned around during the pandemic to the point where close to 90% of children did not/could not engage in them. The SLO Fit Study (11) revealed a striking deterioration of motor skills and physical characteristics of children in Slovenia, recording the lowest levels in the history of such monitoring.

Consistently meeting PA guidelines was strongly associated with a reduced risk for severe Covid-19 outcomes among infected adults. On the other hand, patients with Covid-19 who were consistently inactive were also at greater risk of hospitalization, admission to the ICU or death than patients who consistently met PA guidelines (12).

INTERACTION BETWEEN HEALTH, PHYSICAL ACTIVITY AND PHYSICAL INACTIVITY

Over three decades ago, the WHO issued recommendations regarding sufficient exercise, noting the correlation between regular physical exercise and health. Given that the most recent global estimates show that 27.5% of adults and 81% of adolescents fail to meet the recommendations for aerobic exercise, there is an urgent need to increase PA (13).

Exercise in one's life is, in terms of amount and intensity, correlated with health risk factors according to the U-shaped curve model. (Figure 1)

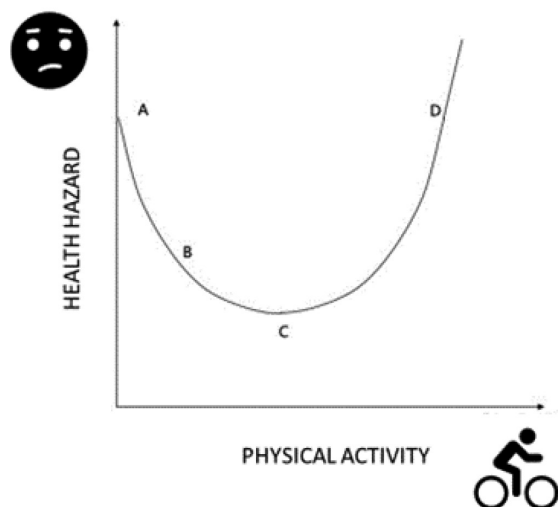


Fig. 1: *Correlation between amount and intensity of exercise and health hazard (1)*

Legend: A – 0 to LPA (low PA); B – MPA (moderate PA); C – MVPA (moderate-to-vigorous); D – VPA-OVERUSE/INJURY (vigorous-to-overuse)

Lack of PA (A) is a very strong health risk factor, moderate-to-vigorous PA (MVPA) represents the ideal ratio and stimulates the mechanisms for

preserving metabolic and cardiovascular health, while very vigorous PA can even be harmful, particularly due to strain and musculoskeletal injuries.

The worst threat to health remains PI, which shows little interdependence with MVPA. We are witnessing increasingly long periods of PI in both active and inactive populations (1). A recent study (14) of young college athletes and their inactive peers highlighted a very interesting phenomenon, finding no difference in mean sitting time (10.96 ± 2.98 hours) between athletes and non-athletes. The independent relationship between MVPA time and sitting time indicates that athletes can alternate between periods of high activity and high sedentariness, which can have a harmful net effect on their health. A meta-analysis (15) conducted to estimate the pooled mean of time spent by children in PA and sedentary time concluded that interventions delivered during childcare and school might produce better results if they focus on reducing PI/sedentary time, rather than promoting PA.

Studies indicate that a safe and responsible health-related behavior is that which makes sure we are sufficiently physically active every day and sedentary as little as possible (Figure 2): this equates to between 40 and 60 min of MVPA daily, as long as we are not physically inactive (sedentary) for more than 4 hours in total and these periods of inactivity do not exceed 40 minutes at a time.

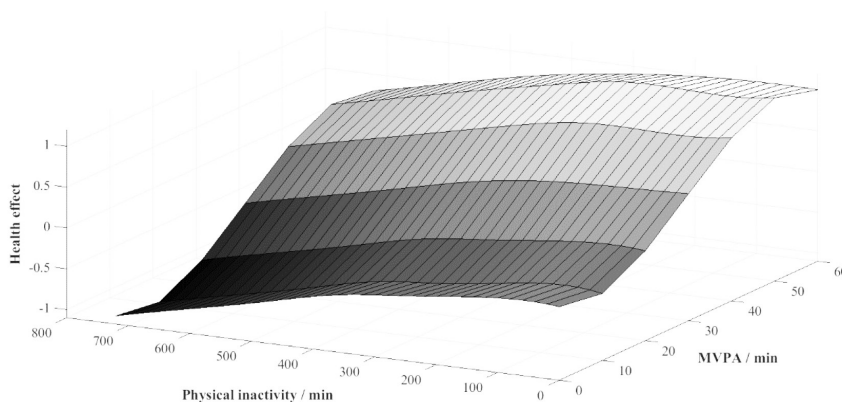


Fig. 2: Schematic representation of physical inactivity and MVPA effecting our health, (1)

Legend: Physical inactivity min/day; MVPA – moderate-to-vigorous physical activity min/day

CONCLUSION

Sedentary behavior is associated with the early onset of non-communicable chronic diseases that lead to health problems and to all-cause mortality, regardless of other risk factors. Although PI has progressed to the 2nd-highest risk factor of overall mortality – from the 7th-highest in 2006 (16) – it should be noted that it is also the most easily modifiable health factor in all age groups. But PI is “a silent killer,” with impacts that may go undetected for years or decades before causing a preventable disease.

Many scientific publications consider PI a pandemic, supporting the publication of the WHO Global Plan of Action for Physical Activity 2018–2030 (13). This document aims to encourage a relative reduction of 10% in PI by 2025 and 15% by 2030, which will contribute to longer life expectancy and higher quality of life. The objective of ensuring sufficient, high-quality PA must be addressed separately from reducing PI in the most vulnerable subgroups. PA and PI are two separate and weakly-correlated phenotypes; they may include the same or completely different groups of individuals, requiring different types of intervention and tools.

The goal is to achieve less than 4 sitting hours a day, distributed over shorter periods, and at least 1 hour of MVPA. Do we need restrictions to limit sedentary behavior? Do we need to introduce taxes on unnecessary sitting hours for inactive healthy people, on the use of elevators, limit screen time ... (1)? Any of these solutions would probably produce the desired effect sooner than waiting for a general awareness of the positive effects of PA to emerge.

References

1. Pišot, R. "Physical inactivity – The human health's greatest enemy" *Slovenian Journal of Public Health*, vol.61, no.1, 2022, pp.1-5. <https://doi.org/10.2478/sjph-2022-0002>
2. Pišot S, Milovanović I, Šimunič B, Gentile A, Bosnar K, Prot F, et al. Maintaining everyday life praxis in the time of COVID-19 pandemic measures (ELP-COVID-19 survey). *Eur J Public Health* [Internet]. 2020 Dec 11 [cited 2021 Nov 30];30(6):1181–6. Available from: <https://academic.oup.com/eurpub/article/30/6/1181/5880552>
3. Pišot, S., Pišot, R. Decline in motor competences in contemporary society: time for a sociology of sedentarism? *Assur Act Environ Healthy Child Adolesc Book Abstr* [Internet]. 2019 Oct 7; Available from: https://www.zrs-kp.si/wp-content/uploads/2019/11/OVG_ZBORNİK_2019_spletna_izdaja.pdf
4. Monti E, Reggiani C, Franchi MV, Toniolo L, Sandri M, Armani A, et al. Neuromuscular junction instability and altered intracellular calcium handling as early determinants of force loss during unloading in humans. *J Physiol* [Internet]. 2021 Jun [cited 2021 Nov 30];599(12):3037–61. Available from: <https://onlinelibrary.wiley.com/doi/10.1113/JP281365>
5. Pišot R, Marusic U, Biolo G, Mazzucco S, Lazzer S, Grassi B, et al. Greater loss in muscle mass and function but smaller metabolic alterations in older compared with younger men following 2 wk of bed rest and recovery. *J Appl Physiol* [Internet]. 2016 Apr 15 [cited 2021 Nov 30];120(8):922–9.
6. Pratt J, De Vito G, Narici M, Boreham C. Neuromuscular Junction Aging: A Role for Biomarkers and Exercise. *J Gerontol A Biol Sci Med Sci*. 2021 Mar 31;76(4):576–85.
7. Rittweger J, Simunic B, Bilancio G, Gaspare De Santo N, Cirillo M, Biolo G, et al. Bone loss in the lower leg during 35 days of bed rest is predominantly from the cortical compartment. *Bone* [Internet]. 2009 Apr [cited 2021 Nov 30];44(4):612–8. Available from: <https://linkinghub.elsevier.com/retrieve/pii/S8756328209000118>
8. Marušič U, Pišot R, Kavčič V. Higher neural demands on stimulus processing after prolonged hospitalization can be mitigated by a cognitively stimulating environment. *Psihol Obz Horiz Psychol* [Internet]. 2021 May 7 [cited 2021 Nov 30];55–61. Available from: <http://psiholoska-obzorja.si/en/article?id=536>
9. Alosco ML, Spitznagel MB, Cohen R, Raz N, Sweet LH, Josephson R, et al. Decreased physical activity predicts cognitive dysfunction and reduced cerebral blood flow in heart failure. *J Neurol Sci*. 2014 Apr 15;339(1–2):169–75.
10. The Lancet. COVID-19: too little, too late? *The Lancet* [Internet]. 2020 Mar [cited 2021 Nov 30];395(10226):755. Available from: <https://linkinghub.elsevier.com/retrieve/pii/S0140673620305225>
11. Starc, Gregor, Strel, Janko, Kovač, Marjeta, Leskovšek, Bojan, Sorić, Maroje, Jurak, Gregor. *SLOfit 2020 – Poročilo o telesnem in gibalnem razvoju otrok in mladine v šolskem letu 2019/20*. Ljubljana: Fakulteta za šport, Inštitut za kineziologijo; 2020.
12. Sallis R, Young DR, Tartof SY, Sallis JF, Sall J, Li Q, et al. Physical inactivity is associated with a higher risk for severe COVID-19 outcomes: a study in 48 440 adult patients. *Br J Sports Med* [Internet]. 2021 Oct [cited 2021 Nov 30];55(19):1099–105. Available from: <https://bjsm.bmj.com/lookup/doi/10.1136/bjsports-2021-104080>

13. Bull FC, Al-Ansari SS, Biddle S, Borodulin K, Buman MP, Cardon G, et al. World Health Organization 2020 guidelines on physical activity and sedentary behaviour. *Br J Sports Med* [Internet]. 2020 Dec [cited 2021 Nov 30];54(24):1451–62. Available from: <https://bjsm.bmj.com/lookup/doi/10.1136/bjsports-2020-102955>
14. Academy USS. Sitting Time and Physical Activity Comparison between Student Athletes and Non-Athletes: A Pilot Study [Internet]. *The Sport Journal*. 2020 [cited 2021 Nov 30]. Available from: <https://thesportjournal.org/article/sitting-time-and-physical-activity-comparison-between-student-athletes-and-non-athletes-a-pilot-study/>
15. Tassitano RM, Weaver RG, Tenório MCM, Brazendale K, Beets MW. Physical activity and sedentary time of youth in structured settings: a systematic review and meta-analysis. *Int J Behav Nutr Phys Act* [Internet]. 2020 Dec 4 [cited 2021 Nov 30];17(1):160. Available from: <https://doi.org/10.1186/s12966-020-01054-y>

DIAGNOSTIC ERROR AND CLINICAL METHOD IN NEUROLOGY

Vincenzo Bonavita

Professor Emeritus of Neurology University Federico II of Naples
e-mail: bonavita@unina.it

ABSTRACT

A lecture on error is a lecture on the method, but can also be a lecture on the anatomy of an error.

A suggestive anatomy of an error that starts from an assumption about the structure of human cognition and from a general review of the heuristic notion was proposed by D. Kahneman (Nobel laureate 2002).

Following the introductory analysis of such anatomy, which is the subject of part one of my talk, the following themes will be examined: i. teaching (while learning) and learning (while teaching) – crucial elements of scientific rhetoric: a three-party debate (problem, teacher, and learner) pursuing truth as a non-refuted conjecture; ii. the issue of utilitarianism(s) in learning; iii. The relation between the general philosophy of knowledge and the experimental method as a sequence of conjectures and refutations; iv. the relation between intuition and hypothesis in scientific research and, thus, in clinical diagnostics; v. the selection of hypothesis and the diagnostic paradigm; based thereon, the actual operations of a clinician that starts from conjectures originated from the initial story, continues at the onset by refutations via focused questions, and only afterwards with the search for clinical signs, functional disorders, single or multiple anatomical lesions, the aetiology if possible, and, finally, with refutation via non-invasive, before invasive instrumental investigations.

Keywords: Diagnostic error; clinical method; neurology; intuition

INTRODUCTION

While the title of this lecture is intended to arouse the interest of clinicians, its primary goal is to demonstrate that the method can allow even non-clinicians to diagnose. Its second goal is to demonstrate that non-medically trained people should not engage in a procedure that is impossible for non-physicians.

I start from far back in time with a quote of Winston Churchill, one of the three victors in World War II: “Courage is what it takes to stand up and speak; courage

is also what it takes to sit down and listen”. I share Churchill’s words to stress your and my courage, but I also need to acknowledge that, sadly, many stand up and speak because they do not realize that *courage is a measure of intelligence*.

The second introductory quote is a statement of Immanuel Kant, who smartly stressed the fundamental reciprocity between method and knowledge: “insight depends on education, and education on insight.”

Someone wrote that “physicians and patients often reason, judge, and choose other than according to classic rational implications. And since this sets the optimal level of reasoning, judgement, and choice (which is, in fact, rational), the consequences of the gap between an observed behaviour and the optimal behaviour are all but negligible when diagnosing and choosing a treatment. This gap should therefore be acknowledged and appropriate strategies should be designed to correct errors, but such strategies will only turn out effective to the extent that they, in turn, take into account the limits of human cognition and are implemented accordingly. (1).

A lecture on error is a lecture on the method, but can also be a lecture on the anatomy of an error. A suggestive anatomy of an error that starts from an assumption about the structure of human cognition and from a general review of the heuristic notion was proposed by D. Kahneman (Nobel laureate in 2002).

The assumption is that information processing in the human mind is governed by two different cognitive systems, which Kahneman simply identifies as system 1 and system 2. The operations of system 1 are quick, automated, associative, relatively difficult to control or change, and call for minimal mental effort. The operations of system 2 are, instead, slower, deliberate, serial, and rule-based; they can be more easily controlled or changed, but usually call for greater engagement in terms of focus and memory.

System 1 epitomizes “intuitive” processes, whereas the express implementation of formal rules (such as those of the classic rational model) calls for the involvement of system 2. In this perspective, an error occurs when two conditions are in place: (i) a cognitive process triggered to solve a problem generates, in the given conditions, a wrong answer; (ii) system 2, which should carry out a supervisory (rational) action, “gives free way” to the wrong answer.

But is it useful to teach? A clinician, whether a neurologist or not, will find the answer in the relation between teaching and scientific rhetoric.

Teaching (while learning) and learning (while teaching) are crucial elements of scientific rhetoric: a three-party debate (problem, teacher, and learner) pursuing truth as a non-refuted conjecture.

While hemlock was being prepared, Socrates was learning to play an aria with his flute. “What’s the point of learning that?” he was asked: “I’ll know how to play this aria before I die.” Socrates with hemlock and the flute is the exception. Most people learn while acknowledging the usefulness of learning. Utilitarianism or utilitarianisms in learning? A peculiar one is the utilitarianism of someone that learns in order to transfer the learning outcome to his or her community and, particularly, to suffering parties. This is what we refer to as ethical utilitarianism (of the learner). The ethical utilitarianism of someone that learns (while teaching), but inevitably (remember the three-party debate?) the ethical utilitarianism of someone that teaches (while learning). However, utilitarianism does not exclude the joy of doing (learning or teaching, reading or re-reading).

From the general philosophy of knowledge to the experimental method: a sequence of conjectures and refutations.

This is the focal point we were looking for: teaching means conjecturing together (albeit differently) and refuting together (albeit differently).

Clinicians often run into such terms as “intuition” and “assumption,” but an intuition can be an alternative to an assumption.

In philosophy, an intuition is defined as a privileged kind of knowledge, which allows gaining the full and immediate possession of the known object and reintroduces, with reference to man, the definition of Plotinus and Thomas Aquinas: “the total and immediate act through which God gets to know the world”.

But consider Pietro Greco (2) in “Einstein and the cobbler: Asymmetrical dictionary of scientific concepts of philosophical interest”: “An intuition is a creative act, perhaps less immediate and less global than God’s act, which each of us performs when we grasp some truth, usually logical and/or scientific, without having to pass through its formal demonstration.” But not passing through formal demonstration does not exclude demonstration itself.

Consider again Pietro Greco: “An intuition is a tunnel that some manage to dig underneath the procedures of formal logic and/or of physical and mathematical demonstration” (2).

It is now inevitable to ask ourselves what the foundation of an intuition is, and of a clinical intuition in particular. My answer is: the ultra-fast association of seemingly remote understandings, but if this is true an intuition is nothing but an assumption, whose processing is not perceived as a procedural sequence.

If an intuition (and an assumption) derives from the association of more or less remote, more or less hidden understandings, the number of intuitions (and of assumptions) is obviously higher the higher the number of understandings.

This is the reason why you can appreciate the value of two old statements: “a little learning is a dangerous thing” by Alexander Pope, *Essay on Criticism*, 1711, and “neglecting good studies in medicine is not a minor shortcoming, but wicked and ungodly guilt” (Maurizio Bufalini, 1835).

The fact is that clinical diagnostics cannot avoid overt compliance with formal logic. There are scientific anecdotes about German chemist August Kekulè, who grasped the formula of benzene in a dream, and about Alan Turing, who figured out a logical universal machine while sleeping. Such anecdotes cannot be used as analogical models for diagnosing.

An assumption is at the basis of the method that characterizes scientific research and, thus, clinical diagnostics. Plato claimed that all conversations (in our case, the clinical debate) start with an assumption and that the key to good reasoning is the ability to select strong assumptions.

But what is a strong assumption? Philosophers would say a strong assumption is the one that withstands any arguments intended to counter it. On the other hand, clinicians will tend to go for a principle of probability/simplicity of the assumptions that need to be refuted, which they will arrange in decreasing order of epidemiological representation.

With the above methodological approach, clinicians actually agree with Karl Popper (3), who claimed that scientific assumptions should be selected on the basis of the principle of simplicity, i.e., as an attempt to provide the easiest explanation of a phenomenon.

What if the assumptions to be refuted were based on the principle of beauty?

Instead of the principle of simplicity, one physicist, Paul Dirac, went for the aesthetic principle of mathematical beauty. His resounding assumption of the existence of antimatter, made on the basis of the mathematical beauty of certain equations he had created, was then ascertained through observation. But I do not recommend that you imitate Paul Dirac when diagnosing.

Karl Popper’s philosophy of science has no universal value but, unknown to the author, derived from the elimination method of Augusto Murri, which clinicians consider irreplaceable: the best in terms of reliability, efficiency, and cost-effectiveness among all the possible procedures of clinical diagnostics and teaching of the diagnostic method (4).

I think it is useful to reconsider the introduction to a lecture of January 21, 1906 of Augusto Murri, who was a professor of clinical medicine in Bologna between the late 19th and early 20th centuries. On that occasion Murri did not discuss a patient who had died during the night before the lecture, but rather a corpse.

“Before we start discussing today’s case, let me explain what I think. We are not looking at a patient here, but rather at a corpse. Nothing bars us from opening it, have a post-mortem, and make some considerations. But this would not be clinical medicine to me. And I also do not think it is clinical medicine to present a patient, declare what his or her disorders are, and then highlight the symptoms. True clinical medicine is, at least by three quarters, training the mind to explore whatever leads towards a judgement of illness”(4).

I will now continue with more specific information aimed at demonstrating how practical the method is from the operational viewpoint.

Before proposing a therapy, clinical medicine should necessarily diagnose, and diagnostics is a paradigm that starts from a symptom to detect clinical signs, identify functional disorders, define anatomical injuries and, if possible, the aetiology. William Osler suggested: “just listen to your patient, he is telling you the diagnosis.” Why? Because conjectures are first made on the symptom or symptoms. But remember that not all the information contained in a story can be accepted, but it should be either accepted or rejected and, if accepted, possibly prioritized.

The second level of conjectures concerns the development of symptoms in time. If conjectures on one or more symptoms can drive towards the location of an anatomical injury, conjectures on development in time can lead to identify the quality of the injury.

You may wonder what is the number of conjectures that originate from a story. Up to 7 according to Miller (1956); 3 to 5 according to Moran Campbell (1977). The alternative is the “three assumptions plus one” strategy (a, b, c or something else), or the “catch all” strategy (Kozielecki, 1972).

What if the story generated wrong assumptions because a spontaneous story told by a patient is not error free?

I answer with two quotes of Augusto Murri: “Whether you get the medical history from your patient, his family or his physicians, remember that you are searching for a story, and there is no story without lies... If you lack the ability to search and criticize, no theoretical study can develop it, let alone make up for it” (4)

Hence the first refutation should concern the conjectures derived from the spontaneous story told by a patient, his family, or his physician through focused questions asked without suggesting an answer. Only afterwards there will come the time for selectively refuting clinical semeiotics; only afterwards can semeiotic significance be defined even ahead of the diagnostic significance of a symptom; only afterwards there will come the time for the instrumental refutation of the surviving conjectures. Instrumental semeiotics in neurology

developed very quickly in the second half of the 20th century; suffice it to remind that only the following 5 instrumental options were available at the end of the 19th century: i. galvanometer for peripheral nerves (Du Bois Reymond, 1850); ii. ophthalmoscopy (Helmutz, 1851); iii. liquor test (Quincke 1891); iv. x-rays (Roentgen, 1895); v. oscilloscope (Braun, 1897).

In 1995 Eric Hobsbawm published “The Age of Extremes: The Short Twentieth Century, 1914-1991” (5). This was also the century of great advancements in biological and clinical medicine.

CONCLUSION

In conclusion, I repeat my question: is it useful to teach? This time I answer quoting three figures, who are less different than they may appear at first glance: Karl Popper, an Austrian philosopher, Luigi Einaudi, the second President of the Italian Republic, and John Galbraith, an economist of international renown.

“True scientific success is not the one that enjoys all possible confirmations, but rather the one that provides all possible means to demonstrate it is unfounded.” (Karl Popper).

“... that I can no longer be involved in debates, the only source of common will; and that I can no longer feel the joy, among the purest a human heart can experience, to be gradually forced by other people’s arguments to confess to myself that I am, fully or partly wrong, and to access the opinion of wiser men turning it into my own.” (Luigi Einaudi).

“*Faced with the choice* between changing one’s mind and proving that there is no need to do so, almost everyone gets busy on the proof.” (John Galbraith).

But one more reason to teach can be found in the eighth precept of the Dalai Lama: “Share your knowledge. It is a way to achieve immortality”, without arguing on the sixth precept: “When you realize you’ve made a mistake, take immediate steps to correct it.”

References

1. Motterlini M. Crupi V., Decisioni mediche. Milano, Cortina, 2005.
2. Greco P. Einstein e il ciabattino. Roma, Editori Riuniti, 2002.
3. Popper KR. Conjectures and Refutations: The Growth of Scientific Knowledge. New York, Basic Books, 1962.
4. Murri A., Quattro lezioni e una perizia. Bologna, Zanichelli, 1972.
5. Hobsbawm E. The Age of Extremes: The Short Twentieth Century, 1914-1991. London: Abacus. 1995.

ABOUT PARKINSON'S DISEASE

Carmine Vitale, MD, PhD

Associate Professor of Neurology, Department of Motor Sciences and Wellness,
University of Naples, Parthenope.
e-mail: cavit69@hotmail.com

ABSTRACT

2017 marked 200 years since James Parkinson published his 'Essay on the Shaking Palsy'. Parkinson not only comprehensively described the symptoms of the disease, but challenged his peers to better understand the pathophysiology of this condition. Diagnosis of Parkinson's disease (PD) is still based on history and examination. Key observation over the next two centuries, included the recognition of the link between the substantia nigra and PD and the discoveries of dopamine deficiency in patients with PD. PD has multiple disease variants with different prognoses. For all patients with PD, treatment is symptomatic. The development of pharmacological and surgical therapies have changed the natural history of the disease. Despite great progress over the last 200 years, Parkinson's hopes for a 'cure if employed early enough' remain apposite today and we must reflect on the challenges ahead for the next century.

Keywords: Parkinson's disease; neurodegenerative disease; motor symptoms; basal ganglia

INTRODUCTION

PD is a progressive neurodegenerative disease, characterized by the appearance of cardinal motor symptoms (bradykinesia, rigidity, tremor at rest and postural instability) and associated with sensory, autonomic and psychiatric symptoms and signs. From a pathological point of view, PD is characterized by the selective loss of nigrostriatal dopaminergic neurons and other pigmented brainstem nuclei and by the presence of eosinophilic intracytoplasmic inclusions, known as Lewy bodies (1). The first unitary description of the clinical picture of the disease is due to the English doctor James Parkinson in the famous monograph entitled „Essay on shaking palsy“ (2). Dopamine (DA) deficiency in brain homogenates of Parkinsonian patients was first described by Hornykiewicz in

1959, paving the way for symptomatic treatment of the disease (1). The recent discovery of gene mutations at the origin of rare forms of familial Parkinsonism, indistinguishable from the classic form of PD, have further expanded the knowledge on the pathogenesis of the disease (3).

EPIDEMIOLOGY

PD represents one of the most common causes of neurological disability, affecting 1% of the adult population over the age of 55. The average age of onset is between 50 and 60 years with a slight predominance of the male sex (male: female ratio 1.25: 1). Age of onset below 40 years is very rare and suggests a genetic cause of PD. The incidence studies are less numerous than the prevalence ones with rates ranging between 4.9 and 23.8 / 100,000 inhabitants per year (1).

PATHOLOGY

The pathological substrate of PD is represented by the degeneration of the neurons of the pars compacta of the mesencephalic substantia nigra and of the nigrostriatal dopaminergic pathway that originates from it (1,4-6). Dopamine, released at the striatal level, modulates the activity of the basal ganglia (BG) allowing the regulation and learning of motor activities as well as important cognitive functions.

The neurons of the locus coeruleus, of the basal nucleus of Meynert, of the olfactory bulb and of other brainstem nuclei are also involved in the degenerative process according to a caudo-rostral diffusion gradient that extends from the brainstem to affect the cortical areas in the advanced stages of disease (4). The degeneration of these neuronal systems is at the origin of some of the non-motor symptoms observed during PD. The spectrum of the anatomic-pathological alterations of PD is therefore extremely complex, also involving neuronal systems other than the dopaminergic one (7).

PATHOGENESIS

The etiology of PD is still largely unknown. Current knowledge allows us to hypothesize that mutations in single genes are responsible for only a minority of cases (3) and that in the majority of patients, the disease is caused by a complex interaction of genetic and environmental factors that play an important role in the selective neuronal loss observed in the course of the disease. Epidemiological studies conducted in recent decades have made it possible to basically identify

two risk factors (familiarity with PD and occupational exposure to pesticides) and two protective factors (exposure to cigarette smoke and coffee consumption) associated with the onset of the disease (8).

Although the genetic forms of PD are rare, there is a tendency to family aggregation which accounts for about 20-30% of cases of the disease in families that have at least one affected member within them. However, it should be emphasized that a family aggregation is not necessarily synonymous with heredity, since the combined action of environmental factors and genetic susceptibility may be more evident in some families than in the general population. The results of these studies, however, confirm the hypothesis that early-onset PD frequently has a Mendelian basis, while the more common sporadic form of PD, typically onset in the sixth decade of life, recognizes a multifactorial etiology, in which numerous factors contribute to the development of the clinical picture with a possible threshold effect (3).

The discovery in 1983 that MPTP (1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine), a meperidine analog with structural similarity to one of the most popular herbicides, paraquat, was capable of causing akinetic-rigid syndrome in humans and laboratory animals prompted researchers to investigate the role of occupational exposure to pesticides in the pathogenesis of PD (8,9). MPTP, like the herbicide paraquat and the pesticide rotenone, exert their neurotoxic action through the selective inhibition of complex I of the mitochondrial respiratory chain and promote the production of ROS (Reactive Oxygen Species) inducing cell death by apoptosis. Since the 1980s, numerous case-control studies have been conducted to examine the effect of exposure to pesticides and herbicides, as well as the lifestyle habits that potentially favor such exposure (agricultural occupations, life in rural areas, water consumption) on the risk of developing PD (8).

CLINICAL FEATURES

PD is classified on the basis of various parameters, such as age of onset, rapidity of the course, the prevalence of akinesia or tremor, presence of cognitive disorders or mood: all these factors have a decisive influence on the prognosis. The classic picture of PD is characterized by the presence of akinesia / bradykinesia, rigidity, tremor at rest and postural instability. These cardinal symptoms are associated with, and often precede, the onset of motor symptoms, a series of non-motor signs and symptoms including sensory, autonomic and psychiatric aspects (10,11).

Motor Symptoms

- Akinesia / bradykinesia represent the clinical core of PD. Akinesia is the difficulty in starting a movement while bradykinesia or slowness of movements is defined as the reduction in the amplitude and speed of the movement itself.
- Rigidity is characterized by increased resistance to passive mobilization of a body segment and can be highlighted both in the limbs and in the axial muscles of the trunk and neck. Stiffness is largely responsible for the camptocormic posture typical of the Parkinsonian patient characterized by variable flexion of the head, trunk and limbs.
- Tremor is often the earliest sign of PD, present at onset in 70% of patients. It initially manifests itself in one hand with characteristic alternating movements of the thumb on the other fingers (“counting coins”); it generally remains localized to the upper limb for a few years and then extends to the ipsilateral lower limb and subsequently can affect the contralateral limbs.
- Postural instability is the last of the cardinal motor symptoms to be manifest and is the one that contributes most to the worsening of the patient’s degree of disability and with the least chance of effective therapeutic intervention. The appearance of postural instability, expression of a difficulty and subsequently of the inability to make rapid postural adjustments in response to dynamic stresses, considerably reduces the patient’s functional autonomy and exposes him to the risk of frequent falls (10).

Non-Motor Symptoms

Alongside the cardinal symptoms of PD, a series of non-motor signs and symptoms including sensory, autonomic, psychiatric and sleep disturbances appear in the course of the disease and often precede the onset of motor symptoms. Non-motor symptoms negatively affect the patient’s quality of life and decisively influence the prognosis, especially in the advanced stages of the disease (12).

DIAGNOSIS

The diagnosis of PD remains a clinical diagnosis since we do not have specific diagnostic tests and biological markers unequivocally associated with the disease. The diagnosis is currently formulated based on the verification of clinical criteria such as those proposed by the Movement Disorders Society

(10,11) which identify three levels in the diagnostic process:

- a. Recognition of the essential symptoms for the diagnosis of Parkinsonian syndrome
- b. Exclusion criteria for the diagnosis of idiopathic PD
- c. Supportive criteria for the diagnosis of idiopathic PD

These criteria establish that the features necessary to make the diagnosis of PD are bradykinesia, associated with at least one of the other cardinal signs: muscle rigidity, tremor at rest, postural instability. There are also exclusion criteria to exclude the majority of symptomatic Parkinsonian syndromes.

In the absence of specific neuroradiological signs for PD, the use of neuroimaging allows the exclusion of other causes of Parkinsonism, especially in the presence of atypical clinical signs. Magnetic resonance imaging (MRI), if performed at the onset of the disease, aims to exclude the presence of secondary alterations potentially responsible for part or all of the symptoms (13).

The study of the nigro-striatal system with Positron Emission Tomography (PET) and Single Photon Emission Computed Tomography (SPECT) methods allowed for the first time to identify “in vivo” biochemical markers of the degenerative process of PD. The most commonly used are (18F) F- dopa / PET and (123I) - β -CIT / SPECT. Both the radio-tracers are taken up by striatal dopaminergic endings. In PD patients, both (18F) PET and (123I) - β -CIT / SPECT show a reduction in tracer uptake which is more evident in the contralateral striatum on the side of the body most affected (14,15).

CONCLUSION

When James Parkinson described the classical symptoms of the disease he could hardly presage the evolution of our understanding over the next two hundred years. Nowadays, PD is considered a complex multifactorial disease in which genetic factors, unknown environmental factors, and the potential interaction of both could ultimately trigger the pathology.

Two hundred years after the publication of James Parkinson's essay, our understanding of the disease has made notable progress and is still advancing, enriching itself with a precious diagnostic and therapeutic background. At the present, sophisticated tools such as functional genetics, brain neuro-imaging and biomarker detection should guide our research efforts in understanding the pathogenetic mechanisms of the disease. However, despite the progress made, it is still necessary to decipher the pathological cascade of PD, improve its early clinical diagnosis and refine our current therapeutic strategies.

Acknowledgments

Professor Vitale wishes to express his gratitude and acknowledgment to Professor Bonavita for his precious teaching and experience always at the service of patients and students.

References

1. Obeso JA, Stamelou M, Goetz CG, Poewe W, et al. Past, present, and future of Parkinson's disease: A special essay on the 200th Anniversary of the Shaking Palsy. *Mov Disord*. 2017 Sep;32(9):1264-1310. doi: 10.1002/mds.27115. PMID: 28887905; PMCID: PMC5685546.
2. Parkinson J. An essay on the shaking palsy. 1817. *J Neuropsychiatry Clin Neurosci* 2002; 14: 223-36
3. Nussbaum RL. Genetics of synucleinopathies. *Cold Spring Harb Perspect Med* 2017: a024109.
4. Braak H, Tredici KD, R€ub U, de Vos RAI, Jansen Steur ENH, Braak E. Staging of brain pathology related to sporadic Parkinson's disease. *Neurobiol Aging* 2003;24(2):197-211.
5. Parent M, Parent A. Substantia nigra and Parkinson's disease: a brief history of their long and intimate relationship. *Can J Neurol Sci* 2010; 37: 313-9.
6. Goedert M, Spillantini MG, Del Tredici K, Braak H. 100 years of Lewy pathology. *Nat Rev Neurol* 2013; 9: 13-24.
7. Lang AE, Obeso JA. Time to move beyond nigrostriatal dopamine deficiency in Parkinson's disease. *Ann Neurol* 2004;55(6): 761-765.
8. Pezzoli G, Cereda E. Exposure to pesticides or solvents and risk of Parkinson disease. *Neurology* 2013;80(22):2035-2041.
9. Langston J, Ballard P, Tetrud J, Irwin I. Chronic Parkinsonism in humans due to a product of meperidine-analog synthesis. *Science* 1983;219(4587):979-980.
10. Postuma RB, Berg D, Stern M et al. MDS clinical diagnostic criteria for Parkinson's disease. *Mov Disord* 2015; 30: 1591-601.
11. Hughes AJ, Daniel SE, Kilford L, Lees AJ. Accuracy of clinical diagnosis of idiopathic Parkinson's disease: a clinicopathological study of 100 cases. *J Neurol Neurosurg Psychiatry* 1992; 55: 181-4.
12. Chaudhuri RK, Healy DG, Schapira AHV. Non-motor symptoms of Parkinson's disease: diagnosis and management. *Lancet Neurol* 2006; 5:235-245.
13. Peran P, Cherubini A, Assogna F, et al. Magnetic resonance imaging markers of Parkinson's disease nigrostriatal signature. *Brain* 2010;133(11):3423-3433.
14. Kraemmer J, Kovacs GG, Perju-Dumbrava L, Pirker S, Traub-Weidinger T, Pirker W. Correlation of striatal dopamine transporter imaging with post mortem substantia nigra cell counts. *Mov Disord* 2014;29(14):1767-1773.
15. Snow BJ, Tooyama I, McGeer EG, et al. Human positron emission tomographic [18F]Fluorodopa studies correlate with dopamine cell counts and levels. *Ann Neurol* 1993;34(3):324-330.

STROKE MEDICINE FROM ANTIQUITY TO TODAY

Presenting Author: **Rosa Fortunata Musolino,**
Fabrizio Giammello

Stroke Unit, Department of Clinical and Experimental Medicine and Surgery,
University of Messina, Messina, Italy
e-mail: rosa.musolino@unime.it

ABSTRACT

The first description of stroke was in the Book of Psalms in the Bible. Hippocrates described the concept of stroke in about_400_BC, when the symptoms of convulsions and paralysis were referred to as apoplexy. Galen_of_Pergamon (131-201_BC) attributed apoplexy to accumulation within the ventricles. In the middle age, Galen's doctrine remained the core of stroke knowledge. Fernel (1497-1558) demonstrated that apoplexy results from a blood clot obstructing blood flow in the arterial system at the base of brain. Description of blood circulation by Harvey (1578-1657) and cerebral circle anastomoses by Willis (1621-1675) changed the clinical scenario. Virchow (1821-1902) introduced the terms "thrombosis and embolus". Subsequently, the vascular anatomy, the clinical symptoms, and the possible mechanisms of stroke were studied. The 20th_century was a pivotal time for stroke history, due to the introduction of Computer Tomography and Nuclear Magnetic Resonance. In recent years, carotid surgery, clinical trials, thrombolytic and endovascular treatment, organization of stroke units and prevention protocols, proved effective for the reduction of disability and mortality.

Keywords: Stroke/apoplexy; cerebrovascular disorders/history; ischemic stroke; reperfusion therapy

INTRODUCTION

Stroke is a leading cause of disability and the fifth leading cause of mortality, with approximately 800,000 strokes occurring in the US each year (1). The first description of stroke was reported in Psalm 137:5-6 of the Bible, as an invocation of punishment (2). Hippocrates of Kos identified the acute cerebrovascular accident as "apoplexia". Apoplexia was considered "sudden but mostly general

rather than a focal disorder of brain”, due to an imbalance of the four humors (3). Galen of Pergamon (131-201 BC) identified the “rete mirabilis” at the base of the brain in animals: animals’ spirits were stored within the cerebral ventricles and the apoplexia was caused by failure of animals’ spirit due to accumulation within the ventricles. In the middle age Galen’s doctrine remained the core of medical stroke knowledge (3). Galen developed the idea that a vital spirit built into the heart was carried towards the brain via the arteries. Between 500 and 1500, Galen’s brain-centered doctrine of neuropsychiatric symptoms was opposed to a powerful cardiocentric theory, propagated by Aristotle and his followers (3). By the middle of the thirteenth century, new translations and commentaries on the texts of Hippocrates, Galen, and Avicenna, increased the need for synoptic and systematic works, and thus the compendium appeared as new literary.

After the first anatomical dissections of human bodies around 1300, an increasing number of post-mortem examinations were carried out from 1450 onward, allowing a better knowledge of brain anatomy and brain vasculature (3). Fernel (1497-1558) demonstrated that apoplexia was the result of a blood clot obstructing flow in the arterial system at the base of brain (4). Similarly, Vesalius (1514-1564) dispelled the myth of the rete mirabile, not being a structure identifiable at the base of the human brain (4). Brain autopsies and the idea of circulation marked the end of the pre-modern era of stroke. The description of blood circulation by Harvey (1578-1657) and of anastomoses and cerebral circle by Willis (1621-1675) changed the clinical scenario of stroke (4). Harvey first described, in exact detail, the function of the heart and the circulation of blood. Willis explored the relationship between anatomy and clinical effects of vascular disease, providing the first complete description and illustration of the cerebral arterial circle (4). Wepfer (1620-1695) demonstrated that apoplexy was a cerebrovascular disorder caused by an intracranial hemorrhage, and pathological changes were localized in the cerebral substance instead of the ventricles (4). In addition, he hypothesized “pituitous formations” in brain arteries (clots?) with an important role in stroke (3). Morgagni (1682-1771) divided apoplexy systematically into “sanguineous,” in which a collection of blood was identified, and “serous”, in which a collection of fluid with the characteristics of serum was recognized (4). The modern era began in the nineteenth century, thanks to the great development in the field of clinical anatomy, with extension of the neuropathological method. The morphological lesion became the decisive criterion for an operational definition of stroke (3).

DEFINITIONS

The first truly modern definition of stroke is linked to the Paris School of Medicine, as Rochoux claimed in 1812: “Apoplexy is a hemorrhage of the brain, by rupture, with more or less serious alteration of its substance”(3). For the first time, stroke was defined as a result of a lesion. In 1823, Rostan introduced the idea that stroke must be the result of a softening of the brain (“ramollissement du cerveau”), meaning, in modern terms, the ischemic infarction of the brain (3,4). Virchow (1821-1902) introduced the terms “thrombosis” and “embolus”, and focused attention on the physiological mechanisms, considering thrombosis a secondary inflammatory response, as consequence of local arterial changes (4,5). He suggested three principal predisposing factors for venous thrombosis, which are now known as Virchow’s triad (irregularity of the lumen, impaired blood flow, and increased coagulability) (5,6). He also showed that portions of a thrombus could detach and form an “embolus”(5). Virchow recognized the consequences of stopping blood flow to an organ or tissue and coined the term “ischemia” to denote this process. Subsequently, in 1840, Rokitansky demonstrated the close association with heart disease. In 1875, Gowers described emboli originating from clots on the auricular appendages; in 1867, Charcot and Bouchard described microaneurysms on the small cerebral perforating vessels (6). Nevertheless, between 1850 and 1900, the interest of neurologists were tabes and hysteria, and stroke was not a field of critical interest. The interest in stroke among neurologists generally was clearly triggered by the description of specific brainstem syndromes including reports by Millard and Gubler (1856), Foville (1858), Weber (1863), Benedikt (1889), Wallenberg (1901), Babinski and Nageotte (1902), and Claude (1912). The development of clinical-topographic correlation studies, promoted by Déjerine and Marie, and followed by Foix, considered the father of modern clinical stroke research, for his work on the patterns of brain infarction in the middle, anterior, and posterior cerebral arteries and the anterior choroidal arteries further advanced the knowledge of and interest in stroke (7). Although physicians of the 19th century utilized a wide variety of therapies in the treatment of stroke, with particular emphasis on bloodletting, therapeutic nihilism dominated stroke management well into the 20th century (4). Moniz (1874-1955) in 1927 reported the first case of cerebral angiography and in 1937, reported four patients with occlusion of the internal carotid artery detected by arteriography (6). Following the mid-20th century clinicopathological work by Miller-Fisher (1913-2012), with the recognition of

the importance and the therapeutic implication of the carotid artery in stroke, the specialty of stroke medicine came into being. He described the pathology in arteries underlying lacunar infarcts, brain hemorrhages, and carotid artery occlusions, focusing his attention on the importance of this diagnosis as the basis for stroke. His work demonstrated that a thromboembolic mechanism underlies most ischemic strokes and that the source of thrombus might be the heart or a proximal arterial lesion (4). Therefore, the first carotid surgery was performed in Buenos Aires in 1951, while the first successful carotid endarterectomy was performed by DeBakey in 1953, and an innovative carotid reconstruction was performed at St. Mary's Hospital London in 1954 (4). In 1950, the National Institute of Neurological Disorders and Stroke was founded. With the introduction of the journal *Stroke* on 23 February 1968, stroke as a medical specialty had come of age (4,6). In 1972, however, a technological development revolutionized the management, investigation and understanding of patients with stroke. At the Annual Congress of the British Institute of Radiology, Hounsfield (1919-2004), of the Central Research Laboratories of EMI, delivered an account of the technique of computerized tomography (CT scan) (4). For their work, Hounsfield and Cormack were jointly awarded the Nobel Prize in 1979 (6). The 20th century was a pivotal time for stroke, the introduction of CT scans and the Magnetic Resonance Imaging (MRI), changed the history of stroke. Two scientists in the USA carried out the first successful nuclear magnetic resonance experiment in 1946 independently. Bloch (1905–1983), and Purcell (1912–1997), found that when certain nuclei were placed in a magnetic field they absorbed energy in the radiofrequency range of the electromagnetic spectrum and re-emitted this energy when the nuclei transferred to their original state, as earlier demonstrated by Larmor (6). In 1970, Damadian (1936–), developed the first magnetic MRI machine, available commercially in the early 1980s as a tool for medical diagnosis (6). During the 1980s, the era of randomized, controlled, clinical trials was born, thanks to the introduction of CT scanning. In 1988, the Antiplatelet Trialists' Collaboration showed that use of antiplatelet treatment reduced vascular mortality by 15% and non-fatal vascular events (stroke or myocardial infarction) by 30%. In the same years, data from epidemiological studies demonstrated that brain embolism from cardiac diseases was the most powerful precursor of stroke (6). The fivefold increased incidence of stroke in patients with non-valvular atrial fibrillation, found by Framingham, was significantly reduced in a series of randomized clinical trials of warfarin anticoagulation conducted in the early 1990s in primary and

secondary prevention of stroke (6). thrombolytic therapy was first described for stroke in 1958, and the first randomized trial on Thrombolytic treatment in stroke patients was published in 1963, without CT scan. Nevertheless, it was the success of thrombolytic agents for the treatment of coronary artery thrombosis in 1982 that reawakened an interest in stroke thrombolysis (6). Gomez coined a phrase that became the fundamental rule of stroke care: “Time is brain”(8). In 1995 a landmark NINDS tissue-type plasminogen activator (tPA) trial created paradigm shift in the management of acute ischemic stroke (AIS), showing that tPA used within 3 hours, improved functional outcome at 90 days (1). Since then there have been multiple randomized controlled trials including ECASS III which showed efficacy of tPA up to 4.5 hours from symptom onset (1,9). Stroke thrombolysis in a late treatment window (>4.5h from stroke onset) with appropriate patient selection using imaging seems to be safe and efficacious, alone or as bridging (10).The history of endovascular treatment with intra-arterial tPA and later mechanical thrombectomy (MT) is even younger than systemic thrombolysis (1). The watershed change came in early 2015 when a randomized controlled trial out of Netherlands (MR CLEAN) (11) showed positive outcomes from MT in AIS patients with large vessel occlusion (LVO) performed within 6 hours of symptoms onset. HERMES collaboration performed patient-level meta-analysis (12) of above 5 randomized controlled trials showing improved functional outcome at 90 days with MT for patients with LVO stroke in anterior circulation if performed within 6 hours. Another breakthrough came in 2018 with DAWN and DEFUSE 3 trials. The results essentially replaced “timed window” with “tissue perfusion window” in AIS patients (13).Finally, organized in-patient (stroke unit) care is provided by multi-disciplinary teams.

CONCLUSION

Today, stroke patients who receive organized inpatient care are more likely to be alive, independent, and living at home one year after the stroke. The apparent benefits are independent of patient age, sex, initial stroke severity, or stroke type, and are most obvious in units based in a discrete stroke ward (14).

References

1. Damani R. A brief history of acute stroke care. Aging (Albany NY) [Internet]. 2018 Aug 1 [cited 2022 Apr 11];10(8):1797. Available from: [/pmc/articles/PMC6128437/](https://pubmed.ncbi.nlm.nih.gov/30128437/)

2. Resende LADL, Weber SAT, Bertotti MFZ, Agapejev S. Stroke in ancient times: a reinterpretation of Psalms 137:5,6. *Arq Neuropsiquiatr* [Internet]. 2008 [cited 2022 Apr 11];66(3A):581-3. Available from: <https://pubmed.ncbi.nlm.nih.gov/18813729/>
3. Karenberg A. Historic review: select chapters of a history of stroke. *Neurol Res Pract* 2020 21 [Internet]. 2020 Dec 1 [cited 2022 Apr 11];2(1):1-11. Available from: <https://neurolrespract.biomedcentral.com/articles/10.1186/s42466-020-00082-0>
4. Storey CE, Pols H. Chapter 27: a history of cerebrovascular disease. *Handb Clin Neurol* [Internet]. 2010 [cited 2022 Apr 11];95(C):401–15. Available from: <https://pubmed.ncbi.nlm.nih.gov/19892130/>
5. Safavi-Abbasi S, Reis C, Talley MC, Theodore N, Nakaji P, Spetzler RF, et al. Rudolf Ludwig Karl Virchow: pathologist, physician, anthropologist, and politician. Implications of his work for the understanding of cerebrovascular pathology and stroke. *Neurosurg Focus*. 2006;20(6):1-6.
6. Paciaroni M, Bogousslavsky J. Chapter 1 The history of stroke and cerebrovascular disease. *Handb Clin Neurol*. 2008;92:3-28.
7. Paciaroni M, Bogousslavsky J. How did stroke become of interest to neurologists?: a slow 19th century saga. *Neurology* [Internet]. 2009 Sep 1 [cited 2022 Apr 14];73(9):724–8. Available from: <https://pubmed.ncbi.nlm.nih.gov/19720980/>
8. Gomez CR. Editorial: Time is brain! *J Stroke Cerebrovasc Dis* [Internet]. 1993 [cited 2022 Apr 15];3(1):1–2. Available from: <https://pubmed.ncbi.nlm.nih.gov/26487071/>
9. Emberson J, Lees KR, Lyden P, Blackwell L, Albers G, Bluhmki E, et al. Effect of treatment delay, age, and stroke severity on the effects of intravenous thrombolysis with alteplase for acute ischaemic stroke: A meta-analysis of individual patient data from randomised trials. *Lancet*. 2014 Nov 29;384(9958):1929-35.
10. Ma H, Campbell BCV, Parsons MW, Churilov L, Levi CR, Hsu C, et al. Thrombolysis Guided by Perfusion Imaging up to 9 Hours after Onset of Stroke. *N Engl J Med*. 2019;380(19):1795-803.
11. Berkhemer OA, Fransen PSS, Beumer D, van den Berg LA, Lingsma HF, Yoo AJ, et al. A Randomized Trial of Intraarterial Treatment for Acute Ischemic Stroke. *N Engl J Med*. 2015 Jan 1;372(1):11-20.
12. Goyal M, Menon BK, Van Zwam WH, Dippel DWJ, Mitchell PJ, Demchuk AM, et al. Endovascular thrombectomy after large-vessel ischaemic stroke: A meta-analysis of individual patient data from five randomised trials. *Lancet*. 2016;387(10029):1723-31.
13. Fisher M, Seastrong R. The past decade at stroke: Important advances and overcoming challenges. *Stroke*. 2020;1032-5.
14. Langhorne P, Ramachandra S. Organised inpatient (stroke unit) care for stroke: network meta-analysis. *Cochrane database Syst Rev* [Internet]. 2020 May 11 [cited 2022 Apr 15];4(4). Available from: <https://pubmed.ncbi.nlm.nih.gov/32324916/>

NEURO-NEPHROLOGY IN ADVANCED AGE: WILL THE KIDNEY FUNCTION LEAD TO THE ETERNAL YOUTH OF THE MIND?

Davide Viggiano

Dept Translational Medical Sciences, Univ. Campania, Naples, Italy

e-mail: davide.viggiano@unicampania.it

ABSTRACT

Chronic kidney disease (CKD) and hemodialysis might represent a «model» of accelerated aging. They are accompanied by age-dependent cognitive impairment. The mechanisms linking accelerated aging in CKD and cognitive impairment are unclear. Anemia or pharmacological hypouricemia might impair brain functions. Notably, there are positive cognitive changes with aging: more extensive vocabulary and greater knowledge of the depth of meaning of words, accumulated knowledge, and experiences. Research also focuses on so-called “cognitive super-agers”: people aged 80 years and older who have memory performance comparable to people 20-30 years younger. Why some conditions, such as CKD, impair the possibility to become a cognitive super-ager is unclear: maybe some brains are worse at fighting diseases (low cognitive reserve), or they have less extra power to keep working well even in the face of aging and disease (low brain maintenance). We discuss this concept from the point of view of synaptic remodeling.

Keywords: Brain; kidney; cognition; uric acid; synapses

INTRODUCTION

As modern society experiences a longer average life duration, the targets of healthcare move towards an improvement in the quality of life in chronic diseases. Specifically, cardiovascular and organ aging, cancer, and dementia will remain the three main topics of contemporary health sciences. Cardiovascular and cancer treatments received great impulses with entirely new classes of drugs, such as the Sodium-Glucose-Transporter-2 inhibitors (SGLT2i), the aldosterone inhibitor finerenone, the programmed cell death protein 1 (PD1) and programmed death ligand 1 (PDL1) inhibitors, and several monoclonal

antibodies for specific conditions. In contrast, treating dementia and brain aging is clearly disappointing and limited nowadays. The great need for new treatments has recently led to a critical controversy: on June 2021 the US Food and Drug Administration (FDA) approved the first treatment Alzheimer's drug in nearly 20 years, aducanumab, for the first time against the critiques of the experts. The reason for the critiques was that "one-third of people who take aducanumab experience swelling and bleeding in the brain, which can be fatal" (1).

The intense pressure on FDA to speed up the new-drugs approval process follows the growing urgencies of modern society. The accelerated approval procedure by FDA started in the 90s for HIV treatments and, since then, increased in size: of 93 accelerated approvals for cancer treatments, only 19 were useful (2).

It is unclear why it is so hard to find valuable treatments for dementia, as compared to heart diseases and cancer. It is undoubtedly not a funding problem: neuroscience and brain diseases are among the top-ranking themes for funding in public and private agencies. Maybe the problem is the brain itself, with its very limited ability of reparation after damage and its function so dependent on an optimal architecture. After all, repairing a motor in a vehicle (which could be compared to a diseased heart) is much simpler than restoring a damaged computer (comparable, here, to a brain): the substitution of all damaged parts in a motor will allow the car to run again, whereas a damaged computer will never return at its original functions even if we substitute its circuits.

However, part of the problem stems from the models we use to find the cures. Animal models of cardiovascular or organ damage work reasonably well when predicting if a certain drug has potentially beneficial effects. At variance, the animal models of cancer have some limitations, particularly regarding the differences in the immune system between humans and small rodents, and this is rapidly leading to significant improvements in the field (3).

Regarding the brain, animal models come with a significant limitation: the great behavioral difference between rodents and humans. This difference is minimal for simple reactions such as reflexes or relatively simple motor schemes such as pain reaction or walking and is the largest for cognitive processes. To appreciate the difficulty, it is hard to present a convincing rodent model of schizophrenia, a human disease characterized by visual hallucinations, because there is no possibility to say that a mouse has hallucinations.

Similarly, one could assume that some "ancient" brain circuits, such as those linked to emotions, might be reasonably similar in mice and humans, and

therefore mice could be used for testing drugs for anxiety. However, anxiety in humans is probably more complex than in mice and several anxiolytic drugs used in humans cannot be identified using mice (4).

Similarly, dementia is a brain disorder with, at least in part, poor memory and altered executive functions. It is possible to test some form of memory in mice, and some basic phenomenon is likely shared by humans and mice regarding memory. However, if the mechanism to induce memory loss in mice is radically different from that operating in humans, the predictive value of the rodent might be very low. We need to seek a rodent model and a human condition of cognitive impairment that share precisely the same pathogenesis. The remaining manuscript describes such a condition.

THE OPTIMAL CONDITION

Chronic kidney disease (CKD) is a condition characterized by decreased filtration ability of the kidney (decreased glomerular filtration rate) and/or damage of the kidney filter, which appears as loss of proteins in the urine (proteinuria). This condition is quite common in more advanced ages and, if it progresses, can lead to insufficient function of the kidneys and the need for replacement therapy-dialysis or kidney transplant.

CKD and patients on dialysis have modified function in most of their organs: the kidney is necessary to adjust and maintain the composition of the blood, and the blood goes to all organs.

The length of life of subjects with CKD and on dialysis might be shorter than in healthy subjects. This and other considerations lead to the hypothesis that these states represent a “model” of accelerated ageing.

Every study on ageing is very difficult because the experimenters have limited time to collect the data. Therefore, a status of accelerating ageing is important for the understanding and the prevention of the organ dysfunction that might be present in some subjects in advanced age.

For some years our unit has been studying an interesting phenomenon occurring in patients with CKD or on hemodialysis or with a kidney transplant: the presence of a cognitive impairment in about one-third of the subjects. The mechanisms linking accelerated ageing in CKD and cognitive impairment are unclear. Age itself has a role: while children with CKD may also show lower cognitive performance compared to healthy children, the cognitive impairment is more frequent in aged subjects with CKD (5,6)

CKD is often accompanied by anemia. Anemia means less oxygen delivered by the blood. How much this condition might explain cognitive dysfunction in CKD is unclear. Apparently, the use of erythropoietin does not revert this phenotype.

CKD is also very often accompanied by increased levels of uric acid (which, when deposited in joints, is called gout); it is considered a toxic substance. Nephrologists usually treat this condition with drugs (allopurinol, febuxostat), and these very often reduce the plasma uric acid levels to below physiological values. Unfortunately, uric acid is also a major antioxidant in the blood and low uric acid levels are known to be associated with Parkinson's disease. However, whether this may completely explain the cognitive impairment in CKD is quite unclear (7)

Notably, there are positive cognitive changes with aging: more extensive vocabularies and greater knowledge of the depth of meaning of words, an accumulated knowledge, and experiences. Research also focuses on so called "cognitive super agers": people aged 80 years and older who have memory performance comparable to people 20–30 years younger. Why some conditions, such as CKD, impair the possibility of becoming a cognitive super-ager is unclear: maybe some brains are worse at fighting diseases (low cognitive reserve), or they have less extra power to keep working well even in the face of aging and disease (low brain maintenance).

While a naïve idea about the brain would lead to the view that cognitive impairment is due to loss of brain matter, this principle is far from true. First, we are born with a much larger number of synapses than in the adult state: during pubertal and pre-pubertal ages synapses are "pruned", and this process is necessary to shape the behaviour and to form memories. Actually, we improve by losing brain matter! The misunderstanding derives from the observation of a specific form of dementia-Alzheimer's disease: in this condition, when the symptoms of dementia are present, significant brain atrophy is evident on brain imaging. In the case of CKD, no brain loss has been observed; however, cognitive impairment is present (8-13)

One major hope is that by changing blood composition (e.g., by plasmapheresis) one can reverse the cognitive dysfunction. We already know that dialysis treatment is not sufficient to achieve this.

CONCLUSION

In conclusion, (i) CKD and dialysis are models of accelerated ageing, (ii) CKD is accompanied by age-dependent cognitive impairment, (iii) gout accompanies

CKD and low uric acid levels might impair cognition, (iv) cognitive super agers might have better synaptic remodeling and CKD impairs this, (v) all these effects of CKD might also occur in normal aging, (vi) changing blood composition might be a new tool to slow down the negative effects of aging.

References

1. Karlawish J. Fix the process that led to Alzheimer's drug fiasco. *Nature*. 2022; 606(7912):9. doi: 10.1038/d41586-022-01507-3. PMID: 35641673.
2. Gyawali B, Hey SP, Kesselheim AS. Assessment of the Clinical Benefit of Cancer Drugs Receiving Accelerated Approval. *JAMA Intern Med*. 2019; 906-913.
3. Marín-Jiménez JA, Capasso A, Lewis MS et al. Testing Cancer Immunotherapy in a Human Immune System Mouse Model: Correlating Treatment Responses to Human Chimerism, Therapeutic Variables and Immune Cell Phenotypes. *Front Immunol*. 2021 Mar 29;12:607282. doi: 10.3389/fimmu.2021.607282
4. Bourin M. Animal models for screening anxiolytic-like drugs: a perspective. *Dialogues Clin Neurosci*. 2015 Sep;17(3):295-303. doi: 10.31887/DCNS.2015.17.3/mbourin
5. Viggiano D, Capasso G. How much time does it take to get cognitive impairment in kidney disease? *Nephrol Dial Transplant*. 2021;1-2.
6. Viggiano D, Bruchfeld A, Carriazo S et al. Brain dysfunction in tubular and tubulointerstitial kidney diseases. *Nephrol Dial Transplant*. 2021;1-10.
7. Viggiano D, Wagner CA, Martino G, et al. Mechanisms of cognitive dysfunction in CKD. *Nat Rev Nephrol*. 2020a;1–18. Available from: <http://dx.doi.org/10.1038/s41581-020-0266-9>
8. Viggiano D, Wagner CA, Blankestijn PJ, et al. Mild cognitive impairment and kidney disease: clinical aspects. *Nephrol Dial Transplant* [Internet]. 2020b Apr 1 [cited 2020 Jul 28];35(1):10–7. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/31071220>
9. Zoccali C, Ortiz A, Blumby IA, et al. Neuropeptide Y as a risk factor for cardiorenal disease and cognitive dysfunction in CKD: translational opportunities and challenges. *Nephrol Dial Transplant*. 2021; in press
10. Imenez Silva PH, Unwin R, Hoorn EJ, et al. Acidosis, cognitive dysfunction and motor impairments in patients with kidney disease. *Nephrol Dial Transplant*. 2021;1-10.
11. Bikbov B, Soler MJ, Pešić V, et al. Albuminuria as a risk factor for mild cognitive impairment and dementia – what is the evidence? *Nephrol Dial Transplant*. 2021;1-8.
12. Liabeuf S, Pepin M, Franssen CFM, et al. Chronic kidney disease and neurological disorders: are uraemic toxins the missing piece of the puzzle? *Nephrol Dial Transplant*. 2021;1-12.
13. Pépin M, Ferreira AC, Arici M et al. Cognitive disorders in patients with chronic kidney disease: specificities of clinical assessment. *Nephrol Dial Transplant*. 2021 Dec 28;37(Suppl 2): ii23-ii32. doi: 10.1093/ndt/gfab262.

MENTAL HEALTH EFFECTS OF DISASTERS: AVOID, MITIGATE OR JUST TOLERATE?

George N. Christodoulou^{1,2},
Eugenia Triantafyllou^{1,3}, Nikos G. Christodoulou^{1,4}

1. Society of Preventive Psychiatry, Vasilissis Sofias 52, 11528 Athens, Greece

2. Athens University Medical School, Professor Emeritus of Psychiatry, Athens, Greece

3. Eginition Hospital, Department of Psychiatry, Athens, Greece

4. University of Thessaly Medical School, Department of Psychiatry, Larissa, Greece.

e-mail: profgchristodoulou@gmail.com

ABSTRACT

Disasters have been with us since time immemorial and will continue to accompany our lives.

Besides the classical types (natural and human-made disasters) economic and biological ones deserve our attention.

They all have serious mental health consequences on individual and societal bases. These consequences are greatly influenced by the meaning attributed to the traumatic event. This meaning is important as regards the degree and direction of the response (adaptive or dysfunctional).

The role of mental health professionals is highlighted and their response, with reference to human-made disasters, is noted (e.g., the Athens Anti-war Declaration, 2016).

The mental health effects of the recent Covid-19 pandemic are discussed.

In conclusion, disasters have serious mental health effects. We can prevent some of them, mitigate others and tolerate the rest.

The key words in their psychosocial management are resilience (at a personal level) and solidarity (at a social level).

Keywords: Mental health; natural disasters; human-made disasters; economic disasters; Covid-19 pandemic

INTRODUCTION

The classical forms of disasters to which investigators usually refer are: man-made (or human-made) and natural disasters. This differentiation is not

altogether accurate because there is always a human contribution to natural disasters.

In recent years, two more kinds of disasters have acquired prominence: economic and biological disasters

The purpose of this contribution is to briefly deal with these four types of disasters with a mental health perspective.

The mental health effect of a disaster is greatly influenced by the meaning attributed to the traumatic event. This “meaning” to a great degree determines whether individual behaviours will be dysfunctional or adaptive and explains why human-made disasters have greater psychopathological impact than natural disasters (1).

A disaster is by no means a happy event. Yet, in some cases it can open new opportunities and a different, more balanced and more mature vista of the world.

For every individual physically damaged by a disaster there are four who are psychologically damaged. Yet, the psychological effects of a disaster are not given the same attention as the effects on somatic health. An indication of the general lack of concern regarding mental health is the fact that funding for mental health internationally remains at the level of only 2% of the total funding for health, in spite of the fact that funding of mental health is economically beneficial, as suggested by WHO, among others.

MENTAL HEALTH EFFECTS OF DISASTERS

Distress, depression, generalized anxiety disorder, panic disorder, substance abuse, adjustment disorder and deterioration of pre-existing psychiatric conditions have been described as effects of human-made and natural disasters. In addition to these conditions, there are two specific psychopathological conditions, acute stress reaction (ASR) and post-traumatic stress disorder (PTSD). The former can be considered, by and large, as a precursor of the latter. The most characteristic symptoms of PTSD are re-living of the traumatic event, emotional numbness, avoidance of places, people and activities associated with the traumatic event and hyper-arousal symptomatology (like the “startling” effect), difficulty in concentration, irritability and aggression.

Can we predict which subjects will develop PTSD? To a certain extent, yes. Our research has shown that prior exposure to a disaster, development of ASR, accelerated heart rate and feelings of derealization predict the development of PTSD (2,3,4).

Other researchers have identified intrusion, avoidance, dissociation, intensity of fear, prior exposure to a disaster, female gender, young age, and loss of a relative, as predictive factors for the development of PTSD.

It is of interest to note that a meta-analysis of 36 papers has shown strong correlation of PTSD with dementia (5). This finding is worth investigating further.

As noted earlier, human-made disasters have more frequent psychosocial consequences than natural disasters. Death or damage by human hand is surely more emotionally charged than suffering the consequences of, say, an earthquake. The former condition clearly divides people and increases their aggression. In contrast, a natural disaster may act in a unifying way and increase solidarity. This has been shown on various occasions.

It is also worth noting that the consequences of natural disasters are worse and the death toll is greater in developing countries.

ECONOMIC DISASTERS

In recent years it has become clear that adverse financial situations, like the recent economic crisis, justify the addition of yet another category of disasters, the economic one (1).

People respond to economic disasters in adaptive ways (sorrow, but also efforts to remedy the adverse situation) and also in dysfunctional ways (depression, suicide). Economic crises are responsible for increased rates of unemployment, poverty, debt and inequalities, conditions that may lead to depression, suicide, homicide and alcohol abuse.

Particularly worrying are the longitudinal and possibly transgenerational effects of financial crises on children (6).

Additionally, the financial pressure on the health sector has been enormous and, in some countries, it has resulted in serious gaps in the provision of healthcare and mental healthcare (7).

BIOLOGICAL DISASTERS

The recent Covid pandemic has persuaded everybody that a fourth kind of disaster with strong mental health consequences should be at the center of our attention: biological disasters.

We mention here the findings of research work carried out by our team in the Society of Preventive Psychiatry (8). It concerned 602 subjects residing in

the Greater Athens area (Attica). We carried out detailed telephone interviews during the first wave of the pandemic (March to May 2020). Appropriate assessment instruments were used as well as sociodemographic data and a special questionnaire related to the Covid outbreak.

The findings showed increased values for stress, anxiety and depression, contamination obsessions and de-contamination compulsions, greater degree of body vigilance (hypochondriacal symptoms) leading to deterioration of the quality of life of the population studied. The most vulnerable groups were the aged, the unemployed, those who were single, divorced or widowed, those with low social or educational status, those with stressed inter-personal relations and those with somatic or psychiatric illnesses.

We have followed up 130 of the above subjects using the same instruments for their assessment (9). This second study was carried out again with telephone interviews during January - February 2022.

We found a decrease of the negative emotions produced by the pandemic and a decrease of obsessive-compulsive and hypochondriacal symptoms. This, however, was not the case with depression, anxiety and stress nor with quality of life that did not subside. During this second period of the infection, insecurity concerning employment was more intense. However, those who had been vaccinated were more secure and this security was positively correlated with quality of life. Increased vulnerability was noted in people who had been infected with Covid. Negative emotions were recorded in this category as well as worsening of quality of life.

On the basis of these findings, we concluded that the mental health problems related to the Covid pandemic are still alive. In spite of the decrease of negative emotions related to the infection, the negative effect on quality of life and on psychopathology (anxiety, depression, stress) persist, especially in persons who had been infected and in vulnerable people like mentally ill patients.

The findings of our first study are basically in line with meta-analyses e.g., Tsamakidis et. al (10) that have shown high prevalence of depression, anxiety and distress during the pandemic. Family violence, increased use of alcohol, substance abuse and tobacco, online gaming and gambling, were also reported. In older people, depression was prominent as well as social isolation and difficulty concerning practical everyday issues like obtaining medication.

In children, duration of social isolation was associated with subsequent psychopathology and serious problems were noted with the socialization of children with special problems such as autism.

Health professionals suffered a lot for a variety of reasons among which stigma and burn-out were prominent. Nurses were more vulnerable.

Persons with prior mental illness suffered relapses and faced difficulties in approaching health services e.g., day hospitals. Their socialization and rehabilitation were seriously affected.

Those who had been infected, often developed post-intensive care syndromes (characterized by cognitive, neurological and executive dysfunctions) due to the effect of the virus as well as depression.

Health systems suffered a lot and, as estimated by WHO, in 93% of countries the Covid infection disrupted mental health services of critical importance.

In a meta-analysis by Rajkumar (11) anxiety, depression, stress, insomnia, hypochondriacal symptoms and health anxiety were reported to occur frequently in relation to Covid infection.

The most vulnerable sectors of the population were older people, homeless persons, migrants, people suffering from mental illness, pregnant women and Chinese students studying abroad (due to the stigma associated with their country of origin).

For people who have been infected, the story does not end with discharge from hospital. Many of them suffer from the so-called long-Covid situation (or post-Covid syndrome). A great number of symptoms have been described with reference to the above but the most characteristic are five: tiredness, headache, cognitive dysfunction (“brain fog”) hair loss and dyspnoea (12). From the mental health perspective, “brain fog” seems to be particularly disturbing.

ROLE OF MENTAL HEALTH PROFESSIONALS IN DISASTERS

Mental health professionals can provide useful services before, during and following a disaster.

They can offer: advice to government, consultation to health authorities, advice and guidance to the public, consultation and treatment to survivors and mental health promotion.

When, on September 7, 1999, a 5.9 Richter earthquake struck the area close to Mount Parnitha, near Athens, the Psychiatric Department of Athens University (Eginition Hospital) responded in a paradigmatic way with the establishment of two psychosocial support units on site; one unit centrally located at Eginition Hospital and the other, a telephone helpline unit, staffed by psychiatric trainees under supervision (13).

The World Psychiatric Association (WPA) has dealt extensively with the issue of disasters. The Association established a special Institutional Program on Disasters (headed by the first of us and Professor Juan Lopez-Ibor) and produced a Statement. It also produced a special volume entitled “Disasters and Mental Health” (Lopez-Ibor et al. 2005)-created educational programs for mental health professionals and created local task forces for a number of disaster situations.

With reference to human-made disasters, the WPA and the Hellenic Psychiatric Association (HPA) mediated for the production of anti-war statements by the Psychiatric Associations of Lebanon and Israel (with the approval of the Palestinian Psychiatric Association) (February 2007). The chair of the WPA Institutional Program on Disasters along with EC members of the HPA were keynote speakers in special conferences about mass violence in Lebanon and Israel (Dec 2006 and Jan. 2007). Following an invitation by WHO, members of the Board of the HPA conducted a course for Palestinian psychiatrists in Ramallah, West Bank, Palestine.

Lastly, a very important document, initiated by the Society of Preventive Psychiatry, the HPA, the Psychiatric Association for Eastern Europe and the Balkans and the Serbian Psychiatric Association and co-signed by more than 100 Associations worldwide, is the Athens Anti-war Declaration (2016) to be found on the Society of Preventive Psychiatry Website. This Declaration was supported by the then President of the European Commission Jean-Claude Juncker. It calls for a) termination of war conflicts b) psychological and material support to the victims 3) psychological and material, humanitarian support for the citizens of the host countries and d) urgent and coordinated action to achieve these goals.

The above Declaration has been referred to in a recent (2022) Statement of the World Federation for Mental Health concerning the war in Ukraine. Indeed, the Declaration has full application in all wars occurring everywhere in the world and is apolitical in its content.

Other Declarations related to disasters are the “Statement of the WPA on the Mental Health Implications of Disasters” (2002) the “Athens Declaration on the Mental health consequences of crises and disasters” (2013) and the Cairo Declaration of the WFMH “on the mental health of refugees, internally displaced persons and other populations affected by conflict”(2015). All these documents are included in the Book “Disasters: Mental Health Context and Responses” (1).

CONCLUSION

1. Disasters have always been with us and they will continue to accompany our lives
2. Their mental health effects are serious, debilitating and long-term
3. We can prevent some of these effects, mitigate others and tolerate the rest.
4. The key words in the psychosocial management of disasters are: resilience (at a personal level) and solidarity (at a social level).
5. Adequate and consistent funding of mental health services is essential to achieve these goals.

References

1. Christodoulou GN, Mezzich JE, Christodoulou NG, Lecic-Tosevski D. Preface. In: Christodoulou GN, Mezzich JE, Christodoulou NG, Lecic-Tosevski D, editors. *Disasters: Mental Health Context and Responses*, Newcastle, Cambridge Scholars; 2016, ix-xiv.
2. Christodoulou GN, Paparigopoulos TS, Soldatos CR. The experience of the Athens Earthquake. In : Lopez-Ibor JJ, Christodoulou GN, Maj M et al, editors. *Disasters and Mental Health*, Newcastle, Wiley; 2005, 145-151.
3. Christodoulou GN, Paparigopoulos TS, Soldatos CR. Acute stress reaction among victims of the 1999 Athens earthquake: help seekers' profile. Research report, World Psychiatry 2003; 2:1, 50-53.
4. Soldatos CR, Paparigopoulos T, Pappa DA et al. Early post-traumatic stress disorder in relation to acute stress reaction: An ICD-10 study among help-seekers following an earthquake. *Psychiatry Research* 2006; 143, 245-253.
5. Richie K, Cramm H, Aiken A, et al. Post-traumatic stress disorder and dementia in veterans: a scoping literature review. *Int J Ment Health Nurs* 2019; 28 (5), 1017-1031.
6. Anagnostopoulos DK, Soumaki E. The impact of socio-economic crises on mental health of children and adolescents. *Psychiatriki* 2012; 23, 13-16.
7. Christodoulou N. Individual and Systemic mental health effects of economic crises and their associated measures. In: Christodoulou GN, Mezzich JE, Christodoulou NG et al., editors, *Disasters: Mental health context and Responses*, Newcastle, Cambridge Scholars; 2016, pp 365-278.
8. Triantafyllou E, Tsellos P, Theodoropoulou-Mrvoljak I, Christodoulou N, Anagnostopoulou N, Christodoulou GN. The Covid-19 Pandemic: Psychological impact and effect on Quality of life of the General Population in Athens. 28th Panhellenic Psychiatric Congress, Volume of Abstracts, 2020.
9. Triantafyllou E, Tsellos P, Panou M, Christodoulou N, Christodoulou GN. Quality of life and Psychopathology in the current period of the Pandemic COVID-19. Comparison with the previous period. 30th Panhellenic Psychiatric Congress, Volume of Abstracts, 2022.

10. Tsamakidis K, Tsiptsios D, Ouranidis A et al. Covid-19 and its consequences on Mental Health. *Exp Ther Med* 2021, 21, 244. Published on line on Jan. 22, 2021. <https://doi.org/10.3892/etm.2021.9675>. Article number 344.
11. Rajkumar RP. Covid-19 and Mental Health: A review of the existing literature. *Asian J Psychiatry*. 2020.doi: 10.1016/j.ajp.2020.102066.
12. Yan Z, Yang M, Ching-Lung L. Long Covid-19 syndrome: A comprehensive review of its effects on various organ systems and recommendation on rehabilitation plans. *Biomedicines* 2021, 9,966. <https://doi.org/10.3390/biomedicines09080966>
13. Oikonomou E, Paparigopoulos T, Soldatos C. Christodoulou GN. Disaster Psychiatry in Greece: Mental disorders and psychological distress associated with earthquakes. In: Christodoulou GN, Mezzich JE, Christodoulou NG and Lecic-Tosevski D. *Disasters: Mental health context and responses*. Newcastle, Cambridge Scholars; 2016, 3-16.
14. Statement of the World Psychiatric Association on Mental health implications of disasters. In: Lopez-Ibor JJ, Christodoulou GN, Maj M et al. *Disasters and mental health*, Chichester, Wiley 2005, pp 263-264.

NEUROPLASTICITY AND MAIEUTICS OF EMOTIONS: A WORK OF INTEGRATION

Goffredo Sciaudone¹, Rosetta Rossi², Francesca Sciaudone³

¹Dipartimento Medicina Legale, University of Campania “Luigi Vanvitelli” (Naples), President
National Society of Science Letters and Arts in Naples, Naples;

²Past Professor, Italian Institute of Relational Psychotherapy, Naples;

³Children neuro psycho-motor Therapist, Pedagogist, Naples
e-mail: studio.sciaudone@libero.it

ABSTRACT

Neuroplasticity is a very active research area in numerous fields; in the case of psychiatric pathologies, the ability of the central nervous system to remodel itself provides the explanation for the resolution of symptoms. This happens thanks to the use of therapeutic factors, including awareness in the first place. Psychiatric pathologies are based on emotional experiences such as suffering, anger, guilt, and deep pain that can be treated and resolved by emotional maieutics, a therapeutic art that provides the ability to get in touch with unconscious emotions and to regain possession of a previously unknown experience and which is itself a cause of mental illness. The treatment of psychiatric diseases cannot ignore the knowledge of the psychic structure and the close dynamic connections between psychic contents and bodily experience. In the work of restructuring the psychic defenses, meeting the unconscious and its emotions determines the activation of the neurovegetative pathways (such as anger, pain, guilt) recognized and well described by the Canadian school. The emotions are incorporated and the physical structure constitutes the organismic container where the emotions are placed. Awareness, psychic experience and physical experience constitute an inseparable triad in the therapeutic encounter and emotional maieutics is meant to bring out the unconscious contents and make them evident as a contemporary psychic and bodily experience.

Keywords: Neurosciences; neuroplasticity; *vis medicatrix naturae*; interaction; adaptation

INTRODUCTION

In the case of psychiatric pathologies, the central nervous system's ability to remodel provides the explanation for the resolution of symptoms. This happens by

resorting to therapeutic factors including awareness in the first place. Psychiatric pathologies are based on emotional experiences such as suffering, anger, guilt, and deep pain that can be treated and resolved by emotional maieutics, a therapeutic art that provides the ability to get in touch with unconscious emotions and to regain possession of a previously unknown experience that is the cause of mental illness. In the work of restructuring psychic defenses, meeting the unconscious and its emotions determines the activation of the neuro-vegetative pathways (such as anger, pain, guilt) recognized and well described by the Canadian school. Emotions get incorporated and the physical structure is the organismic container where emotions are placed. Awareness, psychic experience and physical experience constitute an inseparable triad in the therapeutic encounter and emotional maieutics is meant to bring out the unconscious contents and make them apparent as a psychic and bodily experience at the same time.

THE CONCEPT OF NEUROPLASTICITY

Neuroplasticity is the ability of the nervous system to respond to physical and mental stimuli by reorganizing its structure and function (Daniel Siegel).

For many centuries, mainstream science has argued that neural circuits were immutable and that, as they are there since birth, they cannot be changed during the course of life: this was Cajal's dogma. Now that dogma has collapsed, all scientific communities recognize the adult brain is able to generate new neurons and change throughout life.

The concept of neuroplasticity was demonstrated experimentally by the neuroscientist Eric Kandel, laureate of the Nobel Prize for Medicine in the year 2000, who discovered that learning can activate the genes that can modify the neural structure, thus defining the biochemical basis of learning.

Neuroplasticity includes a number of processes that determine structural changes in the brain: *neurogenesis* (formation of new neurons), *synaptogenesis* (formation of new synapses), *myelinogenesis* (formation of new myelin) and *astrocytogenesis* (formation of new glial cells, in this case astrocytes). These processes are related to our ability to learn, so our brain can and must change. *Neurogenesis* takes place throughout life and involves the differentiation of neuronal stem cells into mature neurons that will form the brain's network of interconnections, a process that can take two to three months. So far, neurogenesis has been thought to happen in the hippocampus region, but research indicates

that in the future other areas could be found that may be the site of neuronal stem cell differentiation.

Synaptogenesis is linked to the creation, or strengthening, of synapses in which changes occur with greater speed, within minutes or hours, and consolidate over the course of a few days or weeks. *Myelinogenesis* is the process that allows increasing the efficiency and speed of neuronal circuits thanks to the coating of the axons with myelin that acts as an insulating sheath. Another factor of neuroplasticity: *epigenetics* - the process by which experiences influence the regulation of gene expression which, in turn, affects the way in which structural changes occur in the brain. It is important to emphasize that experience does not change the structure of genes but the molecules regulating gene expression and which are also part of the chromosomal architecture.

CLINICAL IMPLICATIONS

Recent studies have shown how, during childhood, severe trauma or a high degree of neglect can modify the expression of the genes responsible for the circuits that control the response to stress. In cases of neglect or abuse there is insufficient development of the brain circuits and the hormonal balance that is at the basis of resilience to stress is compromised due to pre-existing changes in epigenetic regulation. In order to produce changes in the brain structure, vigilant and constant attention and repetitive experience are required.

Habib Davanloo, Professor Emeritus of Psychiatry at McGill University in Montreal (Canada), creator of Intensive Short-Term Dynamic Psychotherapy (ISTDP), has escribed the *neuro-vegetative pathways of emotions* and the activation of neurophysiological pathways during therapy, the type and the quality of the emotions that arise, allowing for restructuring the psychic defenses and the knowledge of what happens in the mind-body unit during the contact with the emotions, hitherto hidden in the unconscious part of the emotional core.

From ISTDP, Dr Osimo derived his model of Intensive Experiential Dynamic Psychotherapy (IEDP) that, among other things, places emphasis on the *therapist-patient relationship* and therefore on the therapist's personality and promotes *emotional maieutics* as a necessary means to restore a good psychophysical balance and for the disappearance of the symptoms of psychic distress.

The possibility of recognizing and consciously appropriating one's own emotional world leads to the solution of the symptoms people present, and provides a great sense of physical and mental relief and a new integration

with the external world. The symptom of psychic distress is like an alarm signal of a system - the human being who carries it - that does not seem to function effectively in that historical moment of his or her life and because of the circumstances of life itself. The human being is a complex living system governed by the laws that organize its functioning and that we have already illustrated in other papers; we only mention here the self-organizing capacity of living systems that is a function the systems develop in their natural evolutionary capacity and that grows spontaneously in people in therapy, in parallel with the gradual disappearance of symptoms, as awareness reaches the optimal levels of knowledge of the Self.

THE ROLE OF THE LIMBIC SYSTEM

In the circuits of the limbic system, the coordination of numerous mental processes, such as emotions, basic functions of the organism and social interactions, takes place. The limbic area is the interface between the more “primitive” brain stem and the higher cortex, and has developed over the course of evolution to allow for more complex functions than those of the brain stem; it includes the hippocampus and amygdala regions, located in the temporal lobe of both cerebral hemispheres. The hypothalamus - the fundamental station of the endocrine system - and the anterior cingulate cortex that intervenes in the regulation of attention, in the registration of body states, in emotional regulation and in social cognition, are part of the limbic system. The limbic area is formed in part in the uterus and is shaped by the experiences that the baby has with his or her caregivers after birth. It is in charge of five important functions:

- i) it allows for the functioning of the attachment system which is believed to be one of the behavioral systems or emotional operating systems that have evolved over millions of years. It is a system on which all mammals depend for their sustenance, even if their lifespan lasts, from a few days to many years. Personality forms via the relationship between an infant and a caregiver, known as *attachment*. Research on attachment began with John Bowlby and Mary Ainsworth who formulated the basic concepts. According to mainstream research, the communication patterns between a caregiver (a parent or any other figure) and an infant, lead to a type of relationship that will give rise to an internal operating model, a model that will be secure if the parent or the caregiver provides sensitive care and nurturing. The term “*attachment figure*” generally refers to the most

authoritative, most experienced and senior figure in a child's life; the term "parent" is used for the sake of simplicity. The *internal operating model*, with its behavioral correlates based on beliefs, emotions, affectivity and ways of thinking, is governed by neuronal networks and circuits that constitute its supporting and incorporated structure. The first interactions with the mother directly shape the architecture of the developing brain and have lifelong effects, and the first experiences children have with caregivers shape the long-term development of several mental processes such as emotional balance, fear control, interpersonal attunement, insight and self-knowledge, empathic understanding of others and adequate development of moral reasoning. Many studies have highlighted a correlation between these aspects and the so-called secure attachment that depends on the nature of the infant-caregiver bond. Four types of attachment, or of an infant's relationship with his/her figure of attachment, and of the mental state of the adult with respect to attachment can be identified: secure/secure-autonomous; avoidance/distance; ambivalent and resistant/worried; disorganized-disoriented;

- ii) the neuronal networks that make up the limbic system allow for the integration of subcortical inputs by the so-called cortical processing, a fundamental function of the medial prefrontal cortex.
- iii) it allows for the evaluation of the meaning of stimuli and events to identify elements that are worth paying attention to. In this way limbic evaluation influences the orientation of attention and the subsequent maintenance of attention itself;
- iv) the limbic region contributes to the creation of emotional states such as anger, fear, sadness and joy. Therefore, it provides an "emotional" subcortical input to the higher areas of the cerebral cortex that are responsible for reasoning and discernment, and indicates how cortical processes are directly influenced by non-rational, albeit fundamental, modalities of knowledge;
- v) together with the brain stem, it contributes to the creation of motivational drives for exploration, monitoring of resources and for reproduction.



Fig. 1. Maslow's Hierarchy of needs.

The state of every being is determined by the inseparable unity of the above factors that, taken together, constitute his/her individuality.

CONCLUSION

Brain plasticity is the ability of the encephalon to change its own structure and functions (according to the activity of its neurons in response, for instance, to stimuli. Neuroplasticity is identified with the ability of the central nervous system to process the intensity of inter-neuronal relations. The nervous system can change its structure and functions establishing new relations or eliminating old ones.

References

1. Stefani R, Bachiocco V. Neuroplasticità e dolori. Bologna, Clueb, 2005.
2. Daniele MT, Pinto M, Manna V. Stress, trauma e neuroplasticità. Roma, Alpes Italia, 2014.
3. Doidge N. The Brain's Way of Healing. Firenze, Adriano Salani Editore, 2015.
4. Doidge N. Le guarigioni del cervello. Ponte alle Grazie, 2018.
5. Ruia G, Fisiosofia – Riabilitazione dell'Io e neuroplasticità coscienziale. Torino, La Caramella Editrice, 2020.

RELATIONAL FIELD AND COMPLEX NETWORKS: THE CONTRIBUTION OF COMPUTATIONAL SCIENCES TO PSYCHOTHERAPY

Raffaele Sperandeo

Università degli Studi della Basilicata, Potenza, Italy

e-mail: raffaele.sperandeo@gmail.com

ABSTRACT

The approach to psychopathology inherent in the current classification systems for psychic disorders is epistemologically unsatisfactory for the development of treatment plans in psychotherapy.

A possible solution may derive from the one of the cornerstones of the study of human behavior: the “Gestalt theory of the relational field”, proposed by K. Lewin in 1935. This theory states that behaviour must be deduced from a set of coexisting facts that have the character of a “dynamic field”, where the state of each part of the field depends on all the other.

This approach, more suitable for psychotherapeutic interventions, presents an intrinsic difficulty in producing replicable and generalizable explanatory or descriptive mathematical models. The theory of complex networks seems to be able to solve this problem.

We will show how the mathematical analysis of the complex networks can allow understanding of the intersubjective processes, in ways appropriate to the needs of psychotherapy.

Keywords: Psychotherapy; Gestalt theory; complex network; complex systems; psychotherapy processes; psychotherapy effectiveness

INTRODUCTION

The problem of psychopathological evaluation in psychotherapy

The traditional approach to psychopathological and clinical measures, based on evaluation scales, is unsuitable for psychotherapy both for the intrinsic limitations of classical psychometric models and for purely epistemological reasons (1).

In fact, the rating scales that evaluate the patient’s subjective experience, on the one hand, having poor longitudinal reliability, are not reliable in measuring

the time variations of symptoms, on the other hand they do not take into account the dynamics of the relational field that are central to psychotherapy (2).

Despite the importance of this fact, neither clinical contexts nor research environments have yet produced adequate tools to solve the problem.

From the point of view of psychotherapy, the maladaptive manifestations of behaviour, thought and affectivity have an organic and a relational root that are closely intertwined and interdependent in producing psychic disorders (3).

This clarifies the importance of introducing effective and reproducible methods of observation of relational dynamics to correctly document the effectiveness and nature of psychotherapeutic processes.

THE INTERSUBJECTIVE NATURE OF THE PSYCHOTHERAPEUTIC RELATIONSHIP

Although the quality of the relationship is the fulcrum on which the effectiveness of psychotherapy treatment rests, the forms of the dynamics that exist between patient and therapist have not yet been clarified. Many authors identify empathy as the main determinant of the therapeutic relationship (4).

The current concept of empathy is based on a “representationalist” vision according to which cognitive processes such as “the theory of mind” make the person capable of “representing to himself” the mental contents of others (5).

Without discussing the limits of representationalist epistemology, it should be clarified that, considering empathy as a representational system internal to the person focuses attention on subjective processes and fails to describe the intersubjective relational dynamics.

There is an alternative phenomenological and enactivist view of the dyadic relationship that describes intersubjective dynamics as intercorporeal processes. It interprets empathy as a pre-verbal and pre-reflective experience of mutual and immediate understanding, emotional involvement and modification of body memories (6).

The concept of body memory describes all forms of procedural memory mediated by the movement of the body and implicitly updated in everyday life. From the first days of life, following the interaction with parental figures, body memories of relationships are deposited in the children’s brains and constitute a practical and preconscious knowledge of how to interact with others in face-to-face meetings (6).

Thus, psychotherapy is configured as a dyadic relationship that can update and correct these implicit and procedural memories that guide us in daily relationships.

WHAT IS IMPORTANT TO OBSERVE IN PSYCHOTHERAPY

Each person has a wealth of relational experiences deposited in body memories which he uses as a basis for daily relationships. On the other hand, every repeated, significant relationship (such as the psychotherapeutic relationship) modifies and enriches this baggage of relational skills.

The more accurate term to describe this particular type of procedural memory is “interbody memory”. We develop, with the people with whom we have close ties, styles of relationships that we express only with that specific person: relational rituals, repertoires of movements, gestures and postures that constitute a wealth of memories, tuned between the two components of the dyad, which re-emerge, immediately, even after years of separation.

Where can we locate the memories of these shared patterns? The relational dyad as a superordinate system to people obviously does not have an organic substratum to keep memories. The memory of the dyadic system is based on the memories of the individuals involved. On the other hand, it is only together that the individual agents can reactivate this specific relational know-how and this allows us to attribute these specific body memories to the dyad itself. (6)

In psychotherapy it is important to observe the development of these relational patterns as a prerequisite for the enrichment of intercorporeal memories. These observations cannot be made with “representationalist” methods that focus introspection but can only be made by observing the dyad engaged in shared actions.

STUDYING EMPATHY IN PSYCHOTHERAPY

The analysis of complex systems based on network

Complex networks or graphs, introduced in mathematics by Euler at the end of the eighteenth century, constitute, at the moment, the best system for describing the interactions between the components of a complex system.

A complex network is made up of nodes which represent the components of the system, and bridges, which represent the interactions between the components. A network consisting of 5 nodes, for example, could have 10 bridges, if each of the nodes interacts with all the others or have no bridges, if there is no interaction between the nodes. Networks usually occupy an intermediate position between these extremes. The number of bridges starting from a knot is called the knot degree. The average number of bridges for each node is called the average degree of the network. Nodes with many bridges are called Hubs.

The study of the interactions between the components of the networks focuses on the quantity and quality of the connections between the nodes and allows us not to concern ourselves with the nature of the nodes. Network analysis studies the interactive process between components rather than the components themselves. When applied to psychotherapy, networks study the relational field and interactions between people rather than the psychological characteristics of people (7).

The evaluation of psychotherapy with complex networks

The empathic experience of a patient / therapist dyad in psychotherapy is considered an active trans-theoretical factor of treatment. It manifests itself through 6 observable and measurable phenomena in therapy sessions: empathic reformulations (RE), empathic questions (DE), empathic mirroring (RiE), postural interactions (IP), synchronic body movements (MC), the contact of the glances (CS). Some rating scales measure the internal experience of the patient and the therapist relating to the empathy perceived in the session; these measures, although related to the outcome of the treatments do not appear satisfactory in the light of what is described in the introductory paragraphs since recording the internal representation of empathy and not the relational dynamics do not describe the processes involved in the psychotherapy sessions (8).

The six phenomena in question can be quantitatively measured by external observers: the therapist's questions and empathic reformulations can be counted during a session; the synchronic movements and gaze contacts and the synchronizations of body positions can be numbered. In this way, the interaction between patient and therapist can be quantified beyond the verbal contents of the sessions and the psychological characteristics of the subjects.

The six phenomena that describe empathy can be imagined as interacting with each other in the sense that an increase in the frequency of one can cause an increase in the frequency of another. For example, it is conceivable that the increase in empathic reformulations increases the number of postural interactions and vice versa. Using a complex network, a dyad that expresses many empathic phenomena could have greater therapeutic efficiency (7).

THE PILOT STUDY

Materials and methods

To evaluate the hypotheses described in the previous paragraph, 5 videos of psychotherapy sessions were selected and carried out as evidence for the final

evaluation, by trainees of a specialization school in Integrated Gestalt therapy. For each video, both the patient and the therapist had been granted permission to use the recording for teaching and research purposes. The 20-minute videos were chosen based on the evaluation obtained in the curricular examination, by expert examiners of the model. The first video got a rating of 5 out of 5 (moderate) the second a rating of 4 out of 5 (good) the third and fourth got ratings of 3 out of 5 (sufficient) the fifth got a rating of 2 out of 5-considered insufficient. These 5 videos were analyzed in relation to the empathic manifestations by 9 evaluators trained to recognize the 6 phenomena described. The evaluators chosen were not psychotherapists to avoid the objective measures being influenced by the technical judgment on the quality of the session.

Furthermore, after numbering the 6 phenomena in question, the evaluators were asked to give a personal judgment on the quality of the empathic interactions analyzed using a 5-point Likert scale from totally poor to very good.

Statistical procedure

The scores averages obtained by the 9 examinees were used to draw, for each video, a Cartesian plane. In the Cartesian plane, each of the six descriptive variables of empathy (RE, DE, RiE, IP, MC, CS) is identified by a value on the x-axis given by the mean number of events recorded for that specific variable and a value on the y-axis given by the mean of the qualitative ratings attributed to that specific variable

A table of calculated Euclidean distances between all 6 variables identified on the plane was constructed for each Cartesian plane. Euclidean distance is a measure of dissimilarity whereby values less than 1.5 indicate variables that are close and therefore similar.

Since similar variables can be considered connected, the Euclidean distance tables were transformed into tables of connectedness between variables where Euclidean distances between 0.1 and 1.5 were assigned a value of 1 indicative of the presence of connectedness between the variables. The other values of Euclidean distances were assigned value 0 indicative of no connection.

Finally, the descriptive complex networks of each therapy session were constructed on these tables. Each of the 6 variables was considered a node, and the 1 values at the intersection of two nodes defined the presence of a link between them.

Results

Figure 1 and Table 1 show, respectively, the descriptive complex networks of each therapy session, the indices calculated for each network, and the mark obtained in the curricular examination. It is worth mentioning that the examination assessment was conducted by expert examiners other than the evaluators who measured the phenomena expressive of empathy.

It is evident that the videos of the sessions that received a high examination score of “moderate” or “good” have more connected networks with a higher number of connections and an average grade greater than 1

Videos that scored “sufficient” have less connected networks but an average grade of 1.

The therapy video, which was deemed inadequate in curricular examination, has a sparse network and an average grade of 0.333.

Discussion

Discussion of the results is not definitive since this is a pilot study conducted on a small number of subjects, however, it allows us to pose hypotheses that may become targets for future studies.

The density of network connections appears at a first assessment to be related to the value judgment of expert examiners. This figure obviously needs to be investigated further because it can be of great importance.

The network’s average degree appears to be another relevant finding since degree 1 appears to be a watershed between sufficiently good and insufficient therapeutic processes. Moreover, the graph literature shows that networks with mean degrees above 1 describe complex autopoietic phenomena (7). It is permissible that, in therapeutic sessions, when the factors of empathy interact in a mutually activating way, they produce a cascading phenomenon and the therapeutic path is channeled toward a positive treatment outcome. Equally interesting is the possibility of identifying cut-off values of this same index that can enable us to quickly identify ineffective therapeutic paths and intervene in time to reshape the process.

The same qualitative analysis of connections between nodes may be useful in supervision because indicating points of mismatch between empathy factors may indicate points of reshaping sessions.

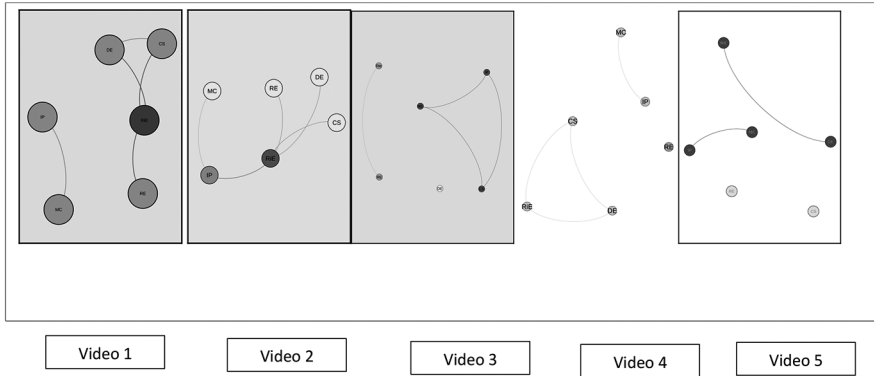


Fig. 1. Complex networks drawn on the therapeutic session videos

Table 1 - Indexes of complex networks

	Total Number of connexions	nodes with 3 connections	nodes with 2 connections	nodes with 1 connections	nodes without connection	medium degree	Mark of curricular examination
video 1	7	0	2	3	1	1,166	moderate
video 2	11	2	2	1	1	1,833	good
video 3	6	0	2	2	2	1	sufficient
video 4	6	0	2	2	2	1	sufficient
video 5	2	0	0	2	4	0,333	insufficient

CONCLUSION

Due to the small sample size from this study, no firm conclusions can be drawn. However, it clearly indicates that the observation of relational dynamics may allow the construction of a network suitable for studying the complexity of processes in psychotherapy with interesting perspectives that are not possible through studies done with ordinary rating scales.

References

1. Möller HJ. Standardized rating scales in psychiatry: methodological basis, their possibilities and limitations and descriptions of important rating scales. *The World Journal of Biological Psychiatry*. 2009; 10(1): 6-26.
2. Krueger RF, Piasecki TM. Toward a dimensional and psychometrically-informed approach to conceptualizing psychopathology. *Behaviour research and therapy*. 2002; 40(5): 485-499
3. Hayes AM, Andrews LA. A complex systems approach to the study of change in psychotherapy. *BMC medicine*. 2020; 18(1): 1-13.
4. Elliott R, Bohart AC, Watson JC, et al. Empathy. In: Norcross J. *Psychotherapy relationships that work*. 2nd ed. New York: Oxford University Press; 2011. p. 132-152
5. Hall JA, Schwartz, R. Empathy present and future. *The Journal of social psychology*. 2019; 159(3): 225-243.
6. Fuchs T, Messas GP, Stanghellini G. More than just description: phenomenology and psychotherapy. *Psychopathology*. 2019; 52(2): 63-66.
7. Strogatz SH. Exploring complex networks. *Nature*. 2001; 410(6825): 268-276.
8. Norcross JC, Lambert MJ. Psychotherapy relationships that work III. Psychotherapy. 2018; 55(4): 303-315

EPIDEMIC and PANDEMIC: PAST, PRESENT and FUTURE

Vincenzo Savica

Accademia Peloritana dei Pericolanti at University of Messina

ABSTRACT

Pandemics and epidemics of our time represent a modernity written in the past. Their study and their history is not only part of the memory of humanity, but also represent indispensable knowledge for the health and safety of people. Epidemics and pandemics appeared in the world from the late bronze age and well-known diseases like the influenza have been documented throughout the world since the Neolithic period. Hippocrates (460-377 AD.) first described some flu symptoms were present among the Greeks and Romans. During Justinian's Byzantine Empire (500 AD) the plague epidemic caused 100 million deaths, and had catastrophic consequences. During the plague epidemic (14th century) the European population decreased from 80 to 30 million people. Smallpox (18th century) decimated the world population until the first vaccine was discovered. Numerous pandemics broke out in the 20th century such as Spanish flu, Asian flu, Hong Kong flu, Swine flu, SARS, HIV, and Ebola. These pandemics have caused the deaths of a total of over 100 million people worldwide. Today the Covid-19 spillover pandemic virus-leap from bat to man, is causing millions of deaths worldwide. Wild animals carry 750,000 viruses that could be spilled over to man, and for this reason the current Covid-19 pandemic will not be the last and will be difficult to eradicate. According to previous evidence a 10-point handbook/catalogue should be produced: it could summarize the needs valid for whole world health.

Keywords: Epidemic; Pandemic; Sars-Cov-2; Spillover; Spillover virus

INTRODUCTION

Pandemics and epidemics are part of the history of humanity and have occurred since the era before Christ (Tab 1). They have always had dramatic consequences, deaths and political and social repercussions; they have also influenced the course of history. One of the earliest examples of these consequences was in the time of the Byzantine Empire which was weakened by the Justinian plague (1). The study of the history of pandemics and epidemics can be of help to our

world, which can use the positive and negative experiences which occurred in the course of human history. The first description of a pandemic was reported in the first book of Homer's *Iliad*, in which "the plague and wrath" describes the pestilence that broke out in the Achaean camp (2).

One of the most disastrous epidemics of all time, was the Justinian plague (541-542 AD). It developed during the time of the Byzantine Empire to the point of obscuring its splendor with catastrophic social, economic and political consequences (Tab 1). This epidemic originated in China and in the Nile delta, causing the deaths of 4 million people throughout the empire. A catastrophic pandemic was the Black Death (1346-1353), which spread rapidly in Europe and caused 50 million deaths out of a total of 80 million people. Another serious viral pandemic was Smallpox, which developed in Europe (1824-1874). It caused a 30% mortality rate in the world population. It was the first disease to be eradicated with the use of the vaccine discovered by Lady Mary Montagu, and developed by Edward Jenner. The last infection was recorded in 1977. During the First World War the first case of Spanish flu was recorded in a hospital in the United States. At the time, Spain was neutral and the media in US was free to report information about the flu, unlike those nations at war where it was censored. For this reason it was nick-named Spanish Flu: it caused between 20-50 million deaths worldwide.

Today, our time is characterized by influenza pandemics that infect millions of victims around the world, partly because vaccination is often refused.

Influenza has been around the world for 2,000,000 years (since the Neolithic period)(Tab.2. It was first described in 412 BC by Hippocrates. The deaths of millions of people (3) have been caused by Asian flu (Influenza A, H2N2 virus), which appeared in China in 1957 and spread to the rest of the world within a year; as well as Hong Kong flu (H3N2 virus), Avian (H5N1), and Swine flu A(H1N1)pdm09; other recent epidemics include Ebola virus, Prioni virus (Mad cow disease), and yellow fever.

Talk of Sars-Covid-2 began, in the 2012 forecasts of David Quammen's book "Spillover" (4) which reported that some authors mention "the next big one" as a great event possibly to be caused by a virus that could arise in rainforests or in a city market in Southern China. This spillover virus, identified as Sars-Cov-2, is a quantum leap of a pathogenic virus from one species to another. In the case of Sars-Covid-2 bats were the carriers, and it is possible that other wild animals could be carriers of viruses that could be transmitted to humans, leading to future epidemics and pandemics.

In order to understand the events related to the current pandemic, its stages must be examined:

- December 31,2019 is the official date on which the Covid-19 pandemic began. It originated in the Wuhan Seafood wholesale market in Wuhan, China and spread through animal products sold in the market .
- January 9,2020, Chinese authorities declared that the virus responsible for ‘a strange pneumonia’ was a new strain of Coronavirus.
- January 12,2020 the virus was sequenced.
- January 21,2020 WHO declared that the virus was being transmitted from human to human.
- January 30,2020 WHO declared a global state of emergency.
- March 11,2020 WHO declared a pandemic.
- March16,2020 the first vaccines were tested.
- End of October 2020 the second Covid-19 wave began in Europe.
- December 14, 2020, approval of the first anti-Covid-19 RNA vaccine
- December 27,2020, beginning of vaccination throughout Europe.

The years 2020 and 2021 were characterized by waves of virus infection and campaigns of vaccinations. Anthony Fauci, the American immunologist, said, “The vaccines against Covid-19 represent the triumph of science and immunology in the fight against this historic pandemic and their importance and effectiveness are incontrovertible as the data of hospitalizations and the number of deaths can clearly demonstrate.” From January 1, 2020 to December 31, 2021, 18,2 million people died globally because of the Covid-19 pandemic (3). The number of deaths reported in the *Lancet* is three times higher than that suggested by the official reported data: this difference is due to an underestimate in official statistics due to delayed, incomplete and undisclosed reports.

Eradication of the Sars-Cov-2 virus appears impossible for a number of reasons: the virus mutates very quickly, there is a reluctance to be vaccinated, and doubts about vaccination in children, there is lack of availability of vaccines in many countries and inadequate health structures in poor countries. We need a bigger ‘umbrella/vaccine’ to protect us from the rain of variants that Sars-Covid-2 virus can produce. An idea could be to produce a universal vaccine using nanoparticles and nasal sprays. To avoid future pandemics a handbook/decatalogue could be made available summarizing the needs appropriate to the whole world; 10 points should be suggested to the world health and political authorities:

CONCLUSION

1) Preventative policies should be improved globally; 2) increased scientific and pharmacological research; 3) a more independent WHO 4) international agreement for the prevention of pandemics; 5) establishment of a global council for health threats; 6) an international platform for the production of vaccines; 7) diagnostic and therapeutic tools; 8) quick access to financial resources; 9) digital health; 10) interest in the development of poorest countries.

References

1. Savica V.: Aspetti sanitari degli Ordini Cavallereschi. 2020 , Il mondo del Cavaliere, Anno XX,n°77,pp17-19.
2. Omero: Iliade , libro primo “ la peste e l’ira” . 1972 Einaudi Torino.
3. Covid-19 Excess Mortality Collaborators. 2022.The Lancet, March 10 2021.
4. Quannen D: Spillover- L’evoluzione delle pandemie,2014,Adelphi Editore,Milano.

Table1: Epidemics and Pandemics in History

– Malaria	Known 50/100.000 years ago, Hippocrates, China, Sumerians, Egypt
– Smallpox	Known 12.000 years ago
– Tuberculosis	Herodotus V century AC.
– Cholera	1835,1837,1849,1854,1865,1867,1884, 1886, 1893.Hippocrates V century BC. Egyptian mummies 3000/2400 BC.
– Anger	2000 BC. Mesopotamia, Aristotle 300 BC.
– Plague	Late bronze age and Egypt 1325 BC.
– Leprosy	460 BC. Greece, China, Egypt. Avicenna XI century
– <i>Other Plagues:</i>	
– Athens	427,429,430 BC.
– Typhus	430 BC. Peloponnesian war; Europe XV, XVIII, XIX centuries
– Antonine	165-168 AD
– Justinian	541,542 AD
– Bubonic	VI century AD
– Black	1347,1353
– Naples	1357,1353
– Florence	1348,1350
– Measles	1529 Cuba, 1531 Honduras 1533 Nicaragua,1850 Hawaii
– Venice	1630 Venice ,Emilia Romagna,Tuscany

– Milan	1630
– Sicily	1647 Sicily and France
– London	1665
– Messina	1743

Table 2: Flu Pandemics in History_

Hippocrates	412 BC (first description)
Greek and Romans	430 A.D.
Carloman's troop	700 A.D.
Antills	1433
Spanish (H1N1)	1918
Asian (H2N2)	1957
Hong Kong (H3N2)	1968
Avian (H5N1)	2003
Sars-Cov-2	2019

PATHOCENOSIS (FROM ANCIENT CONTAGIOUS DISEASES, TO PLAGUES, EPIDEMICS, PANDEMICS AND EPIZOOTIES)

Antonio Pugliese

Department of Veterinary Sciences
Universita' degli Studi di Messina, Italy
e-mail: apugliese@unime.it

ABSTRACT

The aim of this article is to perform a historical journey from plagues examining the various calamitous health events that have affected humans and animals over the centuries. It is an endless story that since the dawn of civilization concerns the origins and changes of communicable diseases,

Public health events, commonly called plagues, are an expression of an altered balance between organic defenses and the potential of some microbial agents, without neglecting unconventional agents, that have altered the ecosystem. These plagues have found space from the anthropocentric vision of humans that are not considered the respect of health and ecosystem; hominids brought with them various family pathogens.

The author analyzes major plagues, occurring over the centuries in relation to the concept of the pathocenosis, to understand how the relationships between the community and infectious agents present at a given time in a given territory are influenced by the dynamics of outbreaks of plagues.

Keywords: Plagues; epidemics; pathocenosis

INTRODUCTION

Scrolling through the infinite space of time, it is possible to understand how man, the last stage of the evolution of the species, has, periodically, found himself facing and fighting major natural catastrophes that particularly related to sanitary matters, such as epidemics, which unstoppably determined huge mortalities of the same species.

It is an endless story about origins and changes of communicable diseases that have affected our ancestors since prehistory and antiquity, as documented by recent palaeontological and molecular researches (1).

These are health events, commonly called plagues, that, are an expression of an altered balance between organic defenses and the potential of some microbial agents, whether bacteria, viruses, fungi, parasites in the broadest sense, without neglecting unconventional agents such as prions, that have altered the ecosystem by endangering the lives of both humans and animals.

INFECTIOUS DISEASES COMMON IN ANCIENT TIMES

According to Hippocrates, the most common and recognized diseases number about 60. They are different but sometimes similar to each other, based on a humoral imbalance.

The main diseases are febrile diseases, septicemic forms and post-partum infections. Others include diseases of the digestive and respiratory systems and poisoning by bad food and intestinal parasites. To these are added the avitaminoses responsible for scurvy, rickets, blindness and dental caries.

Among the ancient Greeks diseases of the urinary system, bones and nervous system were common.

Not negligible were ophthalmic lesions such as trachoma, blepharitis and keratitis resulting from vitamin A deficiency.

Several diseases passed from domestic animals to human populations from about 6000 B.C., onwards. Scabies, measles, ringworm, echinococcus, and roundworm probably passed from the dog, while cattle passed-on smallpox, tuberculosis, and tapeworm; sheep and goats passed-on Maltese fever, and anthrax; pigs passed-on trichinosis, waterfowl-influenza, and rodents-plague. Typhoid fever is spread by the use of manure as fertilizer, human malaria is spread by the movement of people infected by plasmids and by the swamping of land with an increase in vector mosquitoes.

In the determinism of these contagious diseases in ancient populations, an important role was played by climatic variations that lead to the disappearance of various animal species and the settlement of rodents, the main transmitters of plague. Rapid urbanization and the expansion of urban life exerted strong effects on the evolution of infectious diseases. Over a period of about 1500 years, from about 3000 BC to 600 BC, cities saw a tenfold increase in the number of inhabitants (2).

EPIDEMICS IN HISTORY

Epidemics made their appearance with the transition to agriculture: hominids, who at the beginning were only foragers, with time, became hunter-gatherers

and living in small isolated groups and in continuous movement did not allow agents responsible for acute infections to become stable and lasting entities.

It is likely that some infectious diseases have been acquired accidentally from some endemics where the main culprits were wild animals.

The medical historian Mirko Grmek, at the end of the sixties of the last century, proposed the term of pathocenosis, understood as the set of pathological states present within a given population at a given time (3).

The history and evolution of humankind are closely connected with the history of infectious diseases. The development and spread of some infections have even caused the collapse of centuries-old empires.

The earliest records of contagious diseases are found in the Bible, which testifies to the terror and death they caused among the Egyptians in 1320 B.C.

Plague: The first description of the plague is by the Greek historian Thucydides, who in the 5th century B.C. treated with tragic tones the economic and social decline of Athens, which until 430 B.C., the year of the plague, had been the most powerful city in the Mediterranean basin (4).

Plague is an acute infectious disease caused by the bacterium *Yersinia pestis*, and accidentally transmitted to humans through the bite of fleas that infect rats (5).

Once affected, humans are a source of contagion for the entire community. Fortunately, after the discovery of antibiotics, the plague is now a disease that has almost disappeared.

Plague was almost certainly the disease that struck the Emperor Justinian in 542 A.D., described by the Byzantine historian Procopius as “*pestis inguinaria*” (6). But the most widespread and terrifying plague epidemic in Europe occurred in several successive waves in the 14th century; the worst pestilence occurring in Italy in 1348. It is estimated that between 30 and 50% of the entire European population died (7).

Another severe pestilence occurred in Europe between 1629 and 1630 (8).

Infectious Pandemics: Another infectious disease weighed dramatically on the destinies of the world’s population-influenza, with its recurrent epidemics of varying severity.

The first indications of the existence of influenza date back to the 15th and 16th centuries, when Portuguese and Spanish colonizers conquered South America (conquistadors). The indigenous populations had never come into contact with the virus and the spread of the disease gave a fundamental help to the conquerors.

The same happened in the second half of the nineteenth century with the English and French conquest of North America.

A dramatic influenza epidemic was the terrible Spanish flu, which in 1918-19 killed more than 21 million people in Europe alone, a continent already exhausted by World War I. This epidemic owes its name to Spain, which first recognized the health emergency (9).

The most important influenza epidemics, later, occurred after World War II: in 1957 the Asiatic and in 1968 the Hongkong varieties; but these were decidedly less severe forms; in these cases many complications of the disease could be avoided with the administration of chemotherapies and antibiotics.

Avian influenza is another contagious, highly disseminated infectious disease, caused by an influenza virus of the A/H5N1 strain, which affects several species of wild birds that act as a reservoir and can spread the virus through feces. In 1997, it was shown that the virus can also be transmitted to humans, especially when in close contact with the infected birds.

The H5N1 virus outbreak, which began at the end of 2003 in Southeast Asia, has so far affected more than 150 million birds. In addition to Vietnam, Thailand, Cambodia, Laos and Indonesia, the disease has been detected in Korea, Japan, China, Russia, Kazakhstan and Mongolia. Since October 2005 the virus has entered Europe, Turkey, and from there the rest of the continent reported the outbreak especially in wild birds,

Among the epidemic viral diseases not to be neglected we find the Ebola (Ebola virus disease - EVD) better known as Ebola hemorrhagic fever (EHF), which was identified for the first time in 1976 (10). It is transmitted through contact with blood, secretions, organs, or other body fluids of infected animals. Transmission of the infection has been documented following contact with chimpanzees, gorillas, ape bats, antelopes, and porcupines found sick or dead in the rainforest.

Various epidemics or pandemics that have afflicted humanity, including animals, even before the coronavirus, have followed in relatively recent time. These diseases deserve our attention.

AIDS, acquired immune deficiency syndrome caused by the HIV virus, is still a major health problem in many parts of the world, so much so that its spread is considered a pandemic (11).

The main protagonists are prions, unconventional infectious agents that in humans and animals are responsible for neurodegenerative diseases, called transmissible spongiform encephalopathies (TSE) (12).

We can still remember the Middle East Respiratory Syndrome (MERS) caused by a coronavirus- MERS -CoV similar to the SARS (severe acute respiratory syndrome) virus (13).

The coronavirus SarsCoV2 was the second pandemic of the globalized world. It is still unclear exactly when it began to spread: in China, in the province of Hubei. It would have appeared in December 2019, but some experts believe that some cases may have been even earlier. The first cases involved workers at the Wuhan fish market, where live animals are sold, and it was from the slaughter of the animals that the virus made its “jump”, most likely from bats.

The virus, was isolated in a few weeks and traced back to the genetic sequence of Sars-Cov. It was responsible for a severe acute respiratory syndrome at the origin of the 2003 epidemic. To date, studies are underway, at exponential speed, to identify suitable therapies (Remdesivir, a drug effective against Ebola, has also proved effective against Covid-19) and a vaccine. It has been ascertained to have a high rate of contagion through exhalations and contact. It is a devastating and monstrous pandemic that continues today to increase contagions and mow down millions of victims (14).

The epizootics, diseases of infectious nature, which in a short time and in a generally extended territory, affect a large number of animals of the same species or different species, are propagated in relation to the peculiar properties of resistance and virulence of the etiological agent. The latter, which is abundantly eliminated from sick animals, is spread in the environment and favored by the movement of the infected or healed animals, durable carriers of contagion. Even at considerable distance from the focus of onset.

CONCLUSION

After having made an articulate dissertation on the epidemic and pandemic diseases that have afflicted the human race, also involving the animal world- in some cases the starting point of these diseases- it is considered important to evaluate in the future the panzozia.

References

1. Papagrigorakis MJ, Yapijakis C, Synodinos PN, Baziotopoulou-Valavani E. (2006). DNA examination of ancient dental pulp incriminates typhoid fever as a probable cause of the Plague of Athens. *Int J Infect Dis*, 10(3), 206-214.
2. Santucci Francesca (2011) ... Che quanto piace al mondo è breve sogno. La vanità, il tempo, l'amore, la morte. Kimerik, Patti (Me), Italia.

3. Drazen M. (1969). *Les maladies à l'aube de la civilisation occidentale. Recherches sur la réalité pathologique dans le monde grec préhistorique, archaïque, et classique*, Paris, Payot, 1983.
4. Tucidide, *La guerra del Peloponneso* 2.51)
5. Tucidide-I sintomi della peste di Atene (Thuc. II 49-50)
6. Damgaard, PdB, Marchi, N., Rasmussen, S. et al. (2018). 137 antichi genomi umani provenienti da tutte le steppe eurasiatiche. *Natura* 557, 369–374 (2018).
7. Gualtieri Pietro (2016) Marzo 1348: la Peste Nera arriva a Firenze, in “Portale Storia di Firenze”, Marzo 2016.
8. Davis R.C. (2003). *Christian Slaves, Muslim Masters: White Slavery in the Mediterranean, the Barbary Coast and Italy, 1500-1800*, Palgrave Macmillan, London, UK.
9. Taubenberger J.K., Morens D.M. (2006). 1918 Influenza: the Mother of All Pandemics, in *Emerging Infectious Diseases*, 12, 1, 15-22.
10. Batra S., Ochani R.K., Diwan M.N., Yasmin F., Qureshi S.S., Bhimani S., Shaikh S., Tariq M.A., Ahmed Ashraf M., Farooqi H.A., Dodani S.K. (2020). Clinical aspects of Ebola virus disease: a review. *Infez Med.* 2020, 28(2), 212-222.
11. Kallings L.O. (2008). The first postmodern pandemic: 25 years of HIV/AIDS. *J Intern Med*, 263, 3, 218-43.
12. Pugliese A. (2001) BSE. Una sindrome da rivisitare. In *Malattie da prioni : una storia infinita*. Barone & Bella, Ragusa (Italia).
13. Bennet N. (2013). Alarm bells over MERS coronavirus. *The Lancet Infectious Diseases* 13, 7, 573-574. 14) Capua, I.; Cattoli, G. (2018). One Health (r)Evolution: Imparare dal passato per costruire un nuovo futuro. *Virus*, 10, 725.

VACCINATION AGAINST COVID-19: WHICH VACCINE TO SELECT?

Professor Raymond Ardaillou

French Academy of Medicine, Paris, France

e-mail: raymond.ardaillou@academie-medecine.fr

ABSTRACT

Production of vaccines against Sars-Cov-2 virus began as soon as its genetic sequence was known. Obligatory steps followed one another: exploratory studies, pre-clinical and clinical trials, European and national licensing, mass production and distribution. Two types of vaccines were developed in one year. Others are under development. mRNA vaccines are produced in vitro using a DNA sequence encoding virus Spike protein. Being fragile, they are inserted in a lipid nanoparticle. They have been largely distributed. Vaccines with adenovirus are genetically modified adenoviruses in which the DNA sequence encoding protein S is introduced. They have a lower effectiveness than mRNA vaccines. Protein vaccines using protein S as an immunogen are produced by transfecting the sequence encoding this protein in cell cultures. Two vaccines with an inactive virus are available, Sinovac in China and Valneva in Europe. Vaccination stopped the pandemic in several countries. Main challenges persist: new variant emergence, unawareness of immunity length, possible occurrence of new post-vaccination complications, necessity to vaccinate the whole world population to eradicate the virus.

Keywords: Covid-19; vaccine; mRNA

INTRODUCTION: the virus and the vaccine hunt

Covid-19 is a pandemic of an emerging infectious disease caused by the coronavirus SARS-CoV-2. It appeared in November 2019, in Wuhan, China, before spreading around the world and was declared a pandemic in March 2020 by WHO. The disease has initially been transmitted to man by bats from Yunnan province in China (1). The sequence of the virus and its replication cycle were quickly known (2). The virus binds to a receptor, the angiotensin-converting enzyme 2 (ACE2), through the spike protein present on its capsid

(3). Confronted with its high contagiousness and its severity in elderly and people with comorbidities, particularly immunodeficiency, the double problem of how to treat the disease and how to prevent its contamination with a vaccine arose at once (4). Two laboratories, Pfizer in USA associated with BioNTech in Germany (5) and Moderna (6) in USA chose the RNA vaccine technique and succeeded in completing all the steps leading to its launch onto the market within one year whereas 10-15 years had been until then necessary for vaccines already in use. Exploratory studies (in silico, in vitro, in vivo), pre-clinical trials, clinical trials (phases I, II and III) lead to the vaccine being considered as safe and effective. European and national licensing, mass production and mass distribution followed. Astra Zeneca (UK) shared the same prodigy with a vaccine recombining the spike protein and an adenovirus DNA (7). Other laboratories using other techniques (protein vaccine, DNA vaccine, vaccines with an inactive or an attenuated live virus) were affirmed as being successful or are still in a development phase (8). The European authorities did not give a marketing license to all of them. Faced with these multiple offers, how to choose the ideal vaccine among those available knowing that we are only in their first generation?

HOW TO EXPLAIN SUCH RAPIDITY IN FINDING SAFE AND EFFECTIVE VACCINES?

The explanation for such speed is that the usual obstacles encountered were all overcome. Firstly, academic studies in specialized laboratories showed that the project was feasible (proof of concept) (9). At the time when the disease started many laboratories in the world had shown that synthesizing a protein in a cell from a foreign RNA was possible, but they faced many difficulties in moving from the academic to the industrial phase -what is called “crossing over the death valley”, where most of the projects fail (10). The ability to do so means obtaining from private industry a long-term capital investment, the willingness to accept the risk of failure, and a genuine partnership between academic innovation and industrial experience. Finally, when these conditions are fulfilled, one arrives at the end of the road. What remains to be achieved is the manufacture of a vaccine with the following qualities: safety, efficiency, ease of production, low cost. Then there must be organisation of and satisfactory clinical trials, and eventually, implementing mass production and an administration logistic for a large population.

RNA VACCINES

mRNA of the viral Spike protein is produced by transcription of the DNA sequence encoding the protein and multiplication by RNA polymerase. mRNA modifications (5'capping, PolyA tail, modified nucleotides) and its insertion in a lipid nanoparticle increase its stability (11). After injection in man, mRNA enters the cytosol ribosome where it is translated into the Spike protein that behaves as a foreign antigen recognized by T lymphocytes that induce B lymphocytes to produce antibodies (humoral immunity) and cytotoxic T cells activate cell immunity. The two mRNA vaccines on the market have approximatively the same advantages and disadvantages (5, 6). The advantages are that there are many possibilities of genetic engineering making it easy to adapt the vaccine to new variants, their easy production with no necessity of cell culture thus increasing their purity and safety, and a reasonable production cost, the immediate translation of RNA upon cellular uptake and their high immunogenicity. Let us add that they encode several epitopes of the protein, do not enter the nucleus and that no serious side effects have been reported to date, except rare myocarditis with the Moderna vaccine in young people. Their disadvantages are their fragility, the necessity of storage at a low temperature and to continue to improve the lipid nanoparticle that contains them to enhance their stability (12). Moreover, their cost is higher than that of other vaccines and this type of vaccine has never been tested on a whole population for a long period (13).

RECOMBINANT ADENOVIRUS AND SPIKE PROTEIN DNA

These vaccines include genetically modified adenoviruses causing seasonal colds in humans that are made harmless, or other viral vectored viruses (chimpanzee) in which the nucleotide sequence encoding the Spike protein has been introduced (7, 14). The DNA adenovirus is used as a template to produce the Spike protein and generate new adenovirus replica in human cells. Then, the adenovirus is injected into humans. The DNA is released into the cytoplasm and migrates into the cell nucleus without being incorporated into the cell DNA. It is converted into mRNA that migrates into the cytoplasm and interacts with cell ribosome resulting in a translated Spike protein with activation of T cells and production of antibodies. Three are on the European market: Astra Zeneca (chimpanzee adenovirus) in UK, Johnson & Johnson and Sputnik in Russia (human adenovirus) (15). These vaccines make it possible to launch large-scale

production. They induce a marked B and T lymphocyte response. Their main disadvantages are a possible immunity against the adenovirus vector and the necessity of cell-based manufacturing. Exceptional thrombosis of cavernous sinus veins with thrombocytopenia were reported with the Astra Zeneca vaccine and rare occurrences of death for the Johnson & Johnson vaccine.

PROTEIN VACCINES

Protein S or its receptor binding domain are used as an immunogen. These proteins are produced in vitro by transfection of the viral genetic material encoding the protein sequence into several types of cells (insects, mammals, plants, bacteria). This is a mastered technique already developed for other vaccines, for example against hepatitis B virus or measles, that have proven its effectiveness and safety. There is no manipulation of the virus making the technique harmless for staff. We must indicate some disadvantages: the difficulty to purify the spike protein, the glycosylation of the protein that can influence its immunogenicity, the necessity to introduce an adjuvant in the preparation. A vaccine, Novavax, is available in the European Union. Sanofi reported it was in the last phases to obtain such a vaccine soon.

INACTIVATED VIRUS VACCINES

The Sars-Cov-2 is produced in vitro in cells, then inactivated at a high temperature or chemically. The virus is no longer infectious but remains antigenic. Two vaccines are on the market: Valneva that is not yet licensed in Europe, but only in UK, and Sinovac in China licensed by WHO. This is a well-known technique, very frequently used for other viruses or bacteria. Production is easy and one gets a broader immune response than with vaccines including a single antigen like S protein vaccines. The main disadvantages are the obligation to manipulate the virus, which makes it necessary to work in high security laboratories. Cell culture is necessary with the resulting problems of purity to solve. Booster injections and use of adjuvants are required.

OTHER VACCINES

The DNA vaccines are currently under development. DNA sequence of the S protein is cloned into a bacterial plasmid transcribed into mRNA and translated into a protein with the advantage of stability and ease of production, but with

the disadvantage of entering the nucleus, making it difficult to be accepted by public opinion. Let us quote the TMV-083 / V591 vaccine candidate which is a live attenuated virus vaccine, with the measles vaccine (MV) virus as the vehicle and the SARS-CoV-2 Spike protein as the expressed antigen. Its development by Pasteur Institute was quickly abandoned due to disappointing Phase 1 clinical trials.

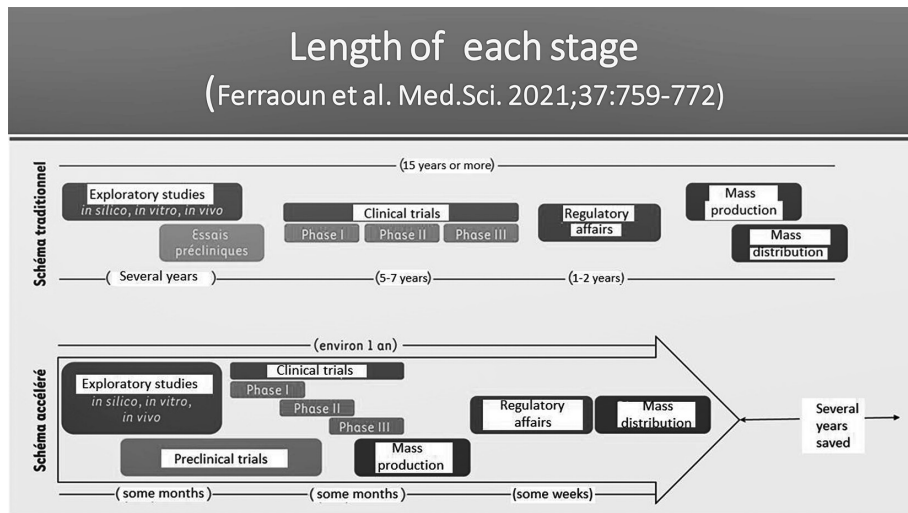


Fig. 1 Comparative lengths of each stage (accelerated and traditional) for the market launch of mRNA vaccines and other types.

Table 1 Different types of anti-Sars-Cov-2 vaccines

Type of vaccine	European licensing	Virus contact	Nucleus transfer	Cell culture	Number of antigens	Fragility	Complications Disadvantages
RNA	2	No	No	No	1 (S prot.)	Yes	Exceptional
Virus-vector DNA	1	No	No	Yes	1 (S prot.)	No	Pre-immunity
Protein	1	Yes	No	Yes	1 (S prot.)	No	Glycosylation Adjuvant
Inactive virus	0	Yes	No	Yes	Several	No	Adjuvant
DNA	0	No	Yes	No	1 (S prot.)	No	Fear DNA entry
Attenuated virus	0	Yes	No	Yes	Several	No	Virus still living

CONCLUSION

The rapid development of vaccines is an unprecedented success that stopped the pandemic in several countries.

A high rate of vaccine hesitancy in some countries is still difficult to overcome.

The length of post-vaccination immunity is unknown and difficult to appreciate (systemic and cell immunities). Therefore, the necessity for several booster injections is no longer a discussion point, particularly in elderly and immunosuppressed people

We are now in phase 6 (Ω) after the end of phase 5 (Δ), the former virus being more contagious and less harmful. A sub-variant, still more contagious, has just appeared (BA2)

The pandemic will not be eradicated as long as the whole world population has not been vaccinated or contaminated, with the fear that new variants will emerge. To limit or avoid this possibility, herd immunity must be obtained as rapidly as possible. Therefore, It is our duty to assist poor countries and to participate in the necessary sharing of vaccine stocks under the international Covax program.

References

1. Zhou P, Yang XL, Wang XG, et al. A pneumonia outbreak associated with a new coronavirus of probable bat origin. *Nature* 2020; 579 : 270-3
2. Lu R, Zhao X, Li J, et al. Genomic characterisation and epidemiology of 2019 novel coronavirus: implications for virus origins and receptor binding. *Lancet* 2020 ; 395 : 565-574.
3. Hoffmann M, Kleine-Weber H, Schroeder S, et al. SARS-CoV-2 cell entry depends on ACE2 and TMPRSS2 and is blocked by a clinically proven protease inhibitor. *Cell* 2020; 181 : 271-80.
4. Huang C, Wang Y, Li X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet* 2020 ; 395; 497-506.
5. Baden LR, El Sahly HM, Essink B, et al.; COVE Study Group. Efficacy and safety of the mRNA-1273 SARS-CoV-2 vaccine. *N Engl J Med* 2021;384:403-16.
6. Polack FP, Thomas SJ, Kitchin N, et al.; C4591001 Clinical Trial Group. Safety and efficacy of the BNT162b2 mRNA Covid-19 vaccine. *N Engl J Med* 2020;383:2603-15.
7. Voysey M, Clemens SAC, Madhi SA et al. Safety and efficacy of the ChAdOx1 nCoV-19 vaccine (AZD1222) against SARS-CoV-2: an interim analysis of four randomised controlled trials in Brazil, South Africa, and the UK. *Lancet*. 2021; 397: 99-111.
<https://valneva.com/press-release/valneva-receives-notice-of-termination-of-covid-19-vaccine-supply-agreement-by-uk-government/?lang=fr>
8. Feraoun Y, Maisonnasse P, Le Grand R, Beignon AS. COVID-19, des vaccins à la vitesse de l'éclair. *Med Sci (Paris)* 2021 ; 37 : 759-77
9. Kariko K, Buckstein M, Ni H, Weissman D. Suppression of RNA recognition by Toll-like receptors. The impact of nucleoside modification and the evolutionary origin of RNA. *Immunity* 2005; 23: 165-175.
10. Pardi, Norbert; Hogan, Michael J.; Porter, Frederick W.; Weissman, Drew. *mRNA vaccines – a new era in vaccinology. Nature Reviews Drug Discovery* 2018. 17): 261-279.
11. Zhu FC, Guan XH, Li YH, et al. Immunogenicity and safety of a recombinant adenovirus type-5-vectored COVID-19 vaccine in healthy adults aged 18 years or older: a randomised, double-blind, placebo-controlled, phase 2 trial. *Lancet* 2020; 396 : 479-88.
12. Abbott A. Researchers highlight questionable data in Russian coronavirus vaccine trial results. *Nature* 2020; 585 : 493
13. Keech C, Albert G, Cho I, et al. Phase 1–2 trial of a SARS-CoV-2 recombinant Spike protein nanoparticle vaccine. *N Engl J Med* 2020; 383: 2320-2332.
14. Jackson LA, Andersen EJ, Roupheal NG. An mRNA vaccine against Covid-19. Preliminary report. *N Engl J Med* 2020; 383: 1920-1931.

Note: Since this article was written, there have been a number of developments, two of them I would like to mention: Sanofi and GSK as well as Valneva have obtained marketing authorization from the European authorities.

THE BALANCE OF THE COVID-19 PANDEMIC IS THE FINAL WARNING TO HUMANITY

Ljubiša R. Mitrović¹, Dragana Mitrović², Dunja Veličković³

¹ University of Niš, Faculty of Philosophy, Serbia

² Center for Balkan Studies, Niš, Serbia

³ Innovation Center, University of Niš, Serbia

e-mail: ljubisa.mitrovic@filfak.ni.ac.rs

ABSTRACT

This paper problematizes the Covid-19 pandemic in the context of the development of modern civilization, and views it through the dominant paradigmatic patterns in social norms (globalization of risk, McDonaldization and dehumanization of society, ecological crisis and the neoliberal casino capitalism, sociology of fluid fear, violence and the culture of death). The object of analysis is the globalizational aspect of the causes and consequences of the Covid-19 pandemic and the (in)efficiency of local responses to this catastrophic challenge. The focus is on different systematic possibilities, as well as on unequal responsibilities and the readiness of social actors to efficiently respond to this challenge. Our civilization is facing a crisis because, in their rush for profit, man and society have come into conflict with nature. Therefore, it is necessary to change the global strategy of development and governance to create an alternative, ecological, humane society of sustainable growth based on solidarity.

Keywords: The Covid-19 pandemic; globalization of risk; neoliberal development; alternative; sustainable growth

INTRODUCTION

A new boogeyman is circulating the world, a boogeyman of globalized death. It does not recognize the borders of countries and continents, race, nation, religion, class, or ideological and political orientations. This global “Todesfuge”-deathfuge (1) is the ugly monster of the Covid-19 pandemic.

The World Health Organization (WHO) alerted the world by declaring Covid-19 as a pandemic on 11th March 2020. Scientists and other public figures

switched on “signal lights” (2) for the public. Mankind has awakened and stirred; it lives in permanent moral and existential panic, anxiety, restlessness and fear.

Scientists around the world are searching for the causes of this vicious disease and the discovery of therapeutic drugs/vaccines. Pseudo-medicine men, protagonists of conspiracy theories, serious researchers and pharmaceutical companies, as well as many death traders from the pharmaceutical mafia, entered the scene simultaneously. For the time being, the medical staff in hospitals (doctors and nurses) and the employees of funeral companies are new labour heroes.

Today, more than ever, the messages of Donne (3), make it clear that *when the bell tolls for any one of us, it actually tolls for all of us*, since we are connected to every person on the planet in this era of globalization. Mankind is at a crossroads today. Its survival is brought into question. It needs a new awakening and new action if it wants to survive, not only as a species, but also as a planet. The alternative world redevelopment project must aim to preserve biodiversity, connect environmental issues and bioethics with sustainable social development, global justice and world peace.

OVERVIEW OF THE DYNAMICS OF THE COVID-19 PANDEMIC OR THE CHRONICLE OF THE GLOBALIZATION OF RISK, FEAR AND DEATH

Since December 2019 to date, 452,201,564 people have fallen ill in the world and 6,029,852 have died (4). There is still controversy among experts concerning the real causes of this mega-disease, while the search for more vaccines continues. The whole process is accompanied by numerous debates and mutual accusations. Unlike the classic pandemics which could be isolated by quarantine measures, this is not possible to achieve today owing to the global networking and population mobility. It turned out that Beck’s (5) paradigm *on the globalization of risk in modern society* is working in practice.

As the pandemic was spreading to new countries and regions, the world was ruled by “moral panic” and fear. The mass media also contributed to the dissemination of information and misinformation, additionally frustrating the public and citizens. In this context, another face of the pandemic is being increasingly revealed, i.e., how we started with the war against the corona virus, only to find ourselves in the war for a vaccine. The race for medical equipment occurred globally.

The pandemic has put societies to test. Unfortunately, a great number of institutions could not cope. Some have suffered from organizational, material or

financial constraints, and some from political ones (inadequate and irresponsible national, regional or international elites). Also, a hypothesis is put forward that the countries which have preserved the primary institutions of general public health (social democratic and former socialist countries) got organized faster in the resistance to the pandemic than did other countries in which the compulsory health insurance of the population was suspended due to the neoliberal doctrine.

We wish to stress certain consequences of the Covid-19 pandemic on the global economy, social relations and the position of individuals and social groups. First of all, the radical spread of the disease has dealt a severe blow to economies. Workplaces have been decimated. Many production and service sectors seem to have been erased from the map. Sokol, Patacini (6) indicate structural changes caused specifically by the pandemic: sector changes in the economy and organization, the rise of the pharmaceutical industry, online trade, telework, and the emergence of new rich people and new losers. They demonstrate the occurrence of deepened inequalities between the classes and between global North and global South, and analyze the growth of debts of the least-developed countries.

Furthermore, an analysis is made of the position held by the countries in transition (Eastern Europe and the Balkans), which are becoming “super periphery” with a dependent market economy and satellite political elites. The uncritical implementation of the neoliberal strategy in Southeast Europe has led to the destruction of the social state and the de-industrialization, growth of inequality, exploitation, precariousness and unemployment. The processes of individualization, disintegration of basic groups (marriage and family), weakening of kinship and intergenerational relationships, growing alienation of personality, as well as the social Darwinization of relations in global society, were built on this foundation. In this context, the position of the elderly in society is particularly marginalized, especially in urban areas. During the pandemic, local communities and the state are increasingly concerned about the position of this group, because the heirs are far from their parents. The phenomenon of loneliness is becoming more and more widespread in the ranks of the elderly generation. Unfortunately, this phenomenon is becoming a contemporary global problem in Europe and the world (7).

The Covid-19 pandemic has additionally affected the further atomization of social relations, now with recommendations on the preventive need to keep distance and wear masks so that physical distance is gradually transformed into a social and psychological one. All this seems to be alienating us from one

another. There are analysts who claim that these measures will strengthen the integration of the family. This is a matter to be studied and debated.

RE-EXAMINATION OF THE STRATEGY OF HUMAN DEVELOPMENT

The tragic balance of the Covid-19 pandemic is the final warning to humanity to reexamine its philosophy of life, development and management strategy, and change the direction and pace of its movement. In the race for profit, we have clashed with nature and other species, with life itself. The capitalism of catastrophe (8) and the globalization of inequality and poverty have produced numerous contradictions and conflicts. The pandemic is just one of the manifestations of these negative consequences of social subdevelopment, degradation of the quality of life, dehumanization of society and the planetary conflict of our species with nature and life itself.

Warnings about where this development is leading have come from numerous scientists and public workers: Bauman (9) warns that fluid fear is another face of our helplessness to control the conditions of life. The crisis of contemporary humanity is caused by the fact that it is not humane enough (10). Attali (11) writes that “anarchic globalization is the last warning to humanity”.

Strange is the phenomenology of this pandemic and human behaviour: from patients, through professionals to the media and political elite, a real theater of panic and fear has emerged, as well as one of alienation and misery of modern man. The stage is populated, not only by sincere fighters concerned about the health of man/mankind, but also by false well-wishers and hypocritical tradesmen (new Tartuffes of death), who would like to milk the negative effects of the pandemic for – money!

We wish to emphasize the responsibility of social sciences and humanities in re-examination of the global production of fear, disease and death. Also we are reminded of Fromm’s (12) warning that there is no healthy personality without a healthy society. In brief, numerous global problems of modernity bear not only the contextual characteristics of the world in which we live, but also the causal social matrices that reproduce them.

CONCLUSION

Mankind has been at a crossroads for several decades now: whether to sacrifice its harmony with nature, a healthy society and a healthy personality in the

name of technological progress and philosophy of profit, or to change the philosophy and practice of development to one in the service of life, humanism, solidarity and survival. Therefore, the reconsideration and radical change of the global strategy of human development is today a precondition for putting the achievements of technology in the service of human development and health, instead of armaments and death. We need a radical change of the system now because, “tomorrow is always too late!” (13).

Regarding science, it must not compete with the actors of the daily political propaganda, or with the instrumentalized corporate complex. The logic that guides science is that the research of truth must never be separated from ethics, i.e., that its results serve the well-being, health and life of man and humanity.

We are of the opinion that it is high time we build the future of humanity as a community of free, equal and solidary citizens and peoples on the platform of the sustainable social and environmental development and new unity between society and nature.

References

1. Celan P. Death fugue. In: Pierre Joris, editor. *Memory rose into threshold speech: the collected earlier poetry*. New York: Farrar, Straus & Giroux – MacMillan Publishers; 2020.
2. Bourideu P. *Counterfire: against the tyranny of the market*. 1st ed. New York: Verso Books; 2003. 112 p.
3. Donne J. For whom the bell tolls. In: *The complete poems*. Kansas City: Digireads Publishing, Neeland Media LLC; 2019.
4. WHO Coronavirus (COVID-19) dashboard. <https://covid19.who.int/> (accessed March 12, 2022).
5. Beck U. *Risk society: towards a new modernity*. 1st ed. New York: SAGE Publications Ltd; 1992. 272 p.
6. Sokol M, Patacini L. Winners and losers in Coronavirus times: financialisation, financial chain and emerging economic geographies of the COVID 19 pandemic. *Tijdschr Econ Soc Geogr*. 2020; 111(3):401-415.doi: 10.1111/tesg.12433.
7. Baarck J, Balahur-Dobrescu A, Cassio LG et al. Loneliness in the EU. Insights from surveys and online media data. Luxembourg: Publications Office of the European Union, 2021. 66p. doi:10.2760/46553.
8. Klein N. *The Shock Doctrine: The Rise of Disaster Capitalism*. 1st ed. Toronto: Knopf Canada. 2007. 672 p.
9. Bauman Z. *Liquid Fear*. 1st ed. Cambridge: Polity Press. 2006. 188 p.
10. Morin E. *Les sept savoirs nécessaires à l'éducation du future*. 1st ed. Paris: Le Seuil. 1999. 67 p.

11. Attali J. La crise, et apres? 1st ed. Paris: Fayard. 2008. 224p.
12. Fromm E. The sane society. 2nd ed. Oxfordshire: Routledge. 2001. 432 p.
12. Mayor F. Tomorrow is always too late. 1st ed. Stamford: Stamford Publishing, 1992.

HOW THE PANDEMIC HAS EXACERBATED EDUCATIONAL INEQUALITY

Address of President Elect EAPE
Professor Sir Les Ebdon CBE DL,
University of Bedfordshire, Luton, LU1 3JU, UK
e-mail: Les.ebdon@beds.ac.uk

The Covid-19 pandemic has not affected us all equally. For example, older people have been more at risk of death. But steps taken to control the pandemic have impacted young people disproportionately. There have been school and university closures, widespread adoption of online learning, significant loss of social life and increased educational inequality.

Educational inequality is a concern because it means the loss of opportunities for individuals, the loss of talent and a lack of fairness which can lead to a loss of social cohesion and is contrary to the principle of education as a human right. The World Bank Group (1) gave some headline figures as to the impact of the Covid-19 pandemic on education. There were tertiary education closures in 175 countries. The education of 220 million post-secondary students was severely disrupted. The impact on institutions can be seen in the rapid move to online learning. 80% of countries surveyed in an International Association of Universities (IAU) Global survey report (2) stated that education had gone online for universities. There was a significant loss of income from catering, accommodation and course fees because of the reduced flows of students in particular from reduced student mobility internationally. There was a reduction in research, with the obvious exception of health focused research, because there was less collaboration.

The impact on students was more severe. Montacute and White (3) give evidence of students suffering from financial hardship because of the loss of jobs or family income or the increased costs of education during the pandemic. Bereavement could be a significant impediment to study. The loss of the breadwinner in the family having perhaps the greatest impact. Another major impact has been 'digital poverty'. While richer students were able to access laptop computers from which to learn, many students had to learn using mobile phone access at best. Access to devices became a dominant issue. Nearly all educational institutions reported a decline in the mental well-being of students and an increase in mental health problems.

Atherton, in a 2016 survey (4) identified that over 90% of countries have inequality in education from differences in social background. A subsequent survey by the National Education Opportunities Network (NEON) found that these inequalities were exacerbated by Covid-19. In 29 different countries surveyed by NEON (of which the author is chair), had changed admission arrangements for university. The 29 different admission systems were all impacted to some extent. Foreexample, following the cancellation of the examinations on which university admissions relied. There were challenges in replacing these with systems that required digital connectivity. Preparation for university entrance was compromised, particularly for disadvantaged students and the integrity of online entrance examinations was questioned.

There were, however, some examples of good student support. In Australia, the State of Victoria Curriculum and Assessment Authority specifically required the consideration of disadvantaged students. Schools were required to give additional information on such students. The Universidade Estadual de Campinas in Brazil took the decision in 2021 to extend the time of the application process, to make it free and to reduce the reading list required. Alumni of the University were encouraged to fund additional access to IT for disadvantaged students.

Some of the issues identified in this research include: the digital divide, both the availability of the internet to students in different geographical or social economic regions and the availability of devices; the quality of these devices; the introduction of physical distancing as a precaution against infection lead to social distancing and the loss of a supportive community for students at risk, virtually all student wellness services reported increased mental health issues and increased demand for counselling services.

Of the 45 countries surveyed by NEON, 60% offered additional financial support to students affected by the pandemic. Out of 21 OECD countries in the survey, only England and Japan were not offering additional financial support and since the survey England has provided a small amount of support for the most disadvantaged students. Some of the examples of financial support are particularly interesting. In the Philippines, students have been offered a tuition subsidy, provided they complete their studies and later serve local government schools. For students in Ireland some €15 million was given to widening access offices to support disadvantaged students, for example to provide computing equipment for low-income students. As a result, 20% of the students at Dublin City University received a free laptop computer (5). In the United States of

America, the University of California launched a ‘Recovery with Equity Program’ (6). This was established by the Governor of California to provide more integrated and equitable support and to make students more resilient than before.

There are ways in which the challenges of Covid-19 and educational inequality can be ameliorated. These include greater financial support for disadvantaged students, particularly support for computing and information technology. There is a need for mental wellness support for all students, particularly those who have additional needs. We should provide opportunities for tutoring to help students regain missed learning opportunities and here there might be a particular role for Professors Emeriti. The pandemic has been an exceptional event for modern university education and we, and those who have benefited from higher education owe a duty to those who have suffered educationally because of it.

Acknowledgement. The author would like to thank Professor Graeme Atherton, Director of the Centre for Inequality and Levelling Up, University of West London, for access to data and useful discussions.

References

1. The World Bank Group (2020). The COVID-19 Crisis Response: Supporting tertiary education for continuity, adaptation and innovation. Available at: <http://documents1.worldbank.org/curated/en/621991586463915490/The-COVID-19-Crisis-Response-Supporting-Tertiary-Education-for-Continuity-Adaptation-and-Innovation.pdf>
2. The Impact of COVID-19 on Higher Education around the world. IAU Global; Survey Report. Available at: https://www.iau-aiu.net/IMG/pdf/iau_covid19_and_the_survey_report_final_may_2020.pdf
3. Montacute, R and Holt-White, E. (2020). COVID-19 and Social Mobility Impact Brief No. 2: University Access & Student Finance. Available at: <https://www.suttontrust.com/our-research/covid-19-impacts-university-access/>
4. Atherton, G. (2016) Charting Equity: Drawing the Global Access Map, London: Pearson
5. Department of Further and Higher Education, Research, Innovation and Science (2020) Minister Harris announces 17,000 laptops ordered to assist students with online and blended learning (9th July 2020). Available at: <https://www.gov.ie/en/press-release/7143d-mimister-harris-announces-17000-laptops-ordered-to-assist-students-with-online-and-blended-learning/>
6. California Higher Education Recovery with Equity Taskforce. Available at: [-first.com/recovery-with-equity-taskforce/](https://first.com/recovery-with-equity-taskforce/) <https://education>

ORGAN DONATION, HOW FAR HAS IT PROGRESSED?

Guido Bellinghieri

Accademia Peloritana dei Pericolanti, Messina, Italy

e-mail: Gbellinghieri@gmail.com

ABSTRACT

The low level of organ donation and consequent organ transplantation in Europe requires important interventions including a multidisciplinary approach and efforts to increase the number of donors. The international response to this consists in the involvement of many important organisations such as the World Health Organization, and some European scientific societies, all focused on transplantation rates. In Europe, Spain has registered excellent results thanks to their national transplant organisation. Many important factors are required to increase organ donation: cultural, religious, ethical and, above all, the innate inclination to donate. All European countries must work together in order to increase the number of organs available for patients requiring transplants by adopting specific programs to give an answer to the increasing number of people who need an organ to continue to live a normal life. An important role must be played by the registries in providing data on organ donation, geographic distribution, transplant activities and outcomes. Organ donation offers the recipient an incredible power to change their life. Transplanted patients become more active, they restart their working activity (90%) and commence a new, more vigorous and intense social life.

Keywords: Organ donation; organ demand; shortage of organs; waiting list

THE HISTORY - INTRODUCTION

The modern history of organ Donation and transplantation started in 1954 when Joseph E. Murray performed the first transplant in identical twins Ronald Lee Herrick and Richard Herrick. For this reason, in 1990 Dr. Murray was awarded the Nobel Prize in Medicine “for the discoveries concerning cell transplants and organs in the treatment of human pathologies.”

THE PROCESS

Organ donation and transplantation means: removing an organ from one person

(donor) and surgically transplanting it into a patient (recipient) in order to acquire a new life.

Organs can be removed from deceased or living donors and commonly include kidneys, heart, lung, liver and pancreas. In addition, there are three different kinds of organ donors: Living (related or unrelated) donors (RLD or URLD), donors after brain death (DBD) in which death has been determined by neurological criteria, also referred to as deceased heart-beating donors and donors after circulatory death (DCD) also referred to as deceased non-heart-beating donors. A single donor can save 8 human lives through donation: 2 kidneys, 1 liver even split between 2 recipients, the heart, 2 lungs, 1 pancreas; tissue donation (arteries, veins, bone marrow, intestines, skin) can save or improve the lives of more than 100 lives. In 2020 USA, Spain, Croatia and Australia had the highest number of organ donors.

NUMBERS AND SOLUTIONS

Before explaining the situation in Europe, it is important to know what the real situation was in some areas of the world representing 50% of the entire world population (USA, China, Russia, Eastern Mediterranean area and Europe): 3,400 million inhabitants in 2020 overall. In the USA the number of organ donors was 27.03 per million population (PMP) per year, and 106,088 patients on the waiting list for a transplant. In China (1,2), with an estimated 1,439,776,000 people, that is 18.47 % of the total world population, the number of organ donors was 4.53 donors PMP. A very low number compared with the total population. The number of patients on the waiting list was also very low; there are currently over 106,000 people on the national transplant waiting list. The list includes people of every age, ethnicity, and gender. Approximately 6.9 thousand patients are on the kidney transplant waiting list in Russia and the number of organ donors is 6.8 PMP in a population of 146,9 million (3). The situation in Eastern Mediterranean was dramatic (4): with an estimated population of 664 million in 21 countries; the number of organ donors was very low, even if currently increasing. “More efforts are needed to overcome current obstacles, supported by religious leaders and governments in the region” as reported by Feras Bader. The Europe Union, a big geographical area with 27 nations, 24 official languages and 746.4 million inhabitants, in 2020. There was an average of 18 donors PMP/year (fig.1). The maximum number of donors registered was in Spain with 38 donors PMP/year and the minimum was in Bulgaria with 2.3 PMP as reported by the global Transplant Registry. From a total number

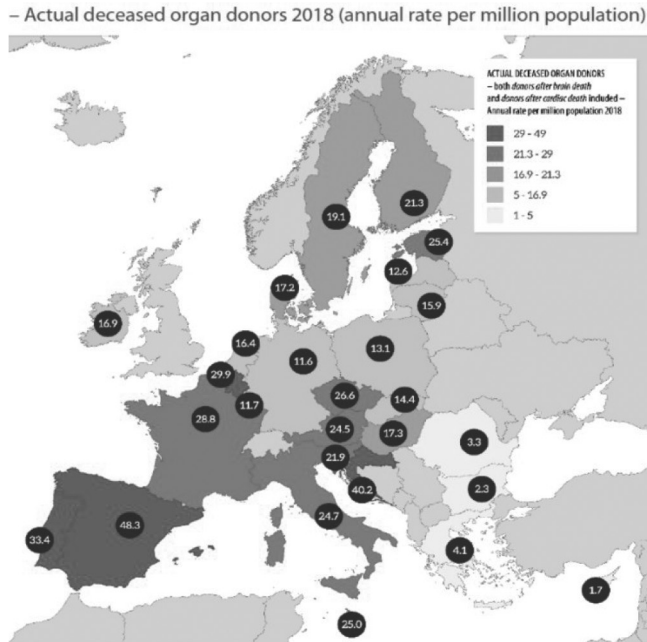


Fig.1. Organ donors in Europe (2018).

of 41,000 transplants, the percentages of organs transplanted were: kidneys 63% , liver 23% , heart 6%; the remaining 8% were lungs and pancreas. Covid 19 had a negative impact on organ donation and transplantation if we compare data of 2019 with 2020. Donation and transplantation among some major European countries (France, Spain, United Kingdom, Italy) registered a mean 20% decrease. Yet the main problem remains the imbalance between the shortage of organs and the high number of patients on waiting lists, considering 41,000 the number of transplants and 48,000 patients on the waiting list.

To overcome this situation, it is important to identify the factors which will increase the deceased (DBD or DCD) or living ((RLD or URLD) organ donors. In this field the European Directorate for the Quality of Medicines (EDQM) actively supports the Steering Committee of Organ Transplantation activities of the Council of Europe (5) to promote some important actions including “collection of international data and monitoring of practices in Europe, the elaboration of reports, surveys and recommendations, the transfer of knowledge and expertise between organisations and experts through training and networking, the development of ethical, quality and safety standards in the

field of organ, tissue and cell transplantation (living donors / religion), the non-commercialisation of organ donation and the fight against organ trafficking”.

An interesting study, published by Amy Lewis and co-workers (6) in Transplantation Reviews summarizes, in four fields of action, the factors capable of overcoming the imbalance between organ demand and organ supply: “ i) increase in the potential donor pool through earlier identification of suitable donors, expanded donor eligibility, incentives for donors and focus on increasing living and minority donors; ii) increase consent rates through public education on the process of organ donation and transplantation and understanding of brain death, training for professionals in communicating about brain death and guidance from religious figures on organ donation; iii) improve fair and more efficient allocation systems and innovate donor-recipient matchmaking; iv) reduce demand through education in treating/preventing disease and improve access to primary care. Among the factors listed by Lewis, the most important are: the national registries, the living related and unrelated donors, religious and cultural factors. The registries are a cornerstone in the process of organ donation and transplantation because they ensure transparency in providing data on this activity. They offer important benefits and involve many different steps such as data collection, analysis and right of access to transplantation. The living related or unrelated transplant donors could be the partial or complete solution to the disparity between available and needed organs, for many reasons, especially to achieve the best histocompatibility between donor and recipient. In addition, there is a faster recovery of function, a lower risk of rejection and a longer survival of the transplanted organ. With reference to living unrelated organ donors, it has been suggested to provide financial incentives. This solution may produce a negative effect: it could result in an organ market, in which the real beneficiary could be the broker, who acts as intermediary between the donor and recipient. The risk is that by obtaining organs from poor people, who could be deprived of one or more organs, they could become poorer. Trafficking in human organs is a global phenomenon The World Health Organization declared in 2007 that organ trafficking was responsible for 10% of the world transplants. The European Union, in accordance with the Istanbul Declaration on Organ Trafficking and Transplant Tourism(2008), disapproved of trade in organs (7). A recognized role is exerted by many religions in contributing to the increase in organ donors. The last Pope expressed his adhesion to the principle of organ donation. John Paul II, speaking at the XXVII International Congress of Organ Transplant in Rome, in 2000, said “...any organ donation is configured as an

authentic act of love.” Also, Benedict XVI said “.... any organ donation is an act of love, of gratuitous affection, of availability”. Recently his Holiness Pope Francis, during the audience granted to the Italian Organ, Tissues and Cell Donors Association (AIDO) in the Sala Clementina, said “Organ donation is an act of love” (fig. 2). Orthodox Jews support organ donation. Because in *Jewish law*, *organ donation* raises such difficult questions, it *has* traditionally *been* met with some *skepticism*. In both Orthodox and non-Orthodox Judaism, organ donation



Fig. 2. His holiness Pope Francis, Bellinghieri and Petrin (AIDO).

is permitted in the case of irreversible cardiac rhythm cessation. Other religions, such as Lutheranism, approves of donating human organs for transplants because it contributes to the well-being of humanity and can be an expression of loving sacrifice for a neighbour in need. Mormonism, Presbyterianism and Quakerism support organ donation and respect the individual’s right to make decisions regarding his or her own body. Although there are variations, according to specific points of view, it is clear that most major religions do in fact permit, allow and support transplantation and donation.

Finally public education may have a great influence on organ donation, a role which can be carried out by teachers at school and by relatives. To increase the number of donors it is important to make people understand the duty of giving as an expression of humanity. The idea of a gift as “something given or received without anything in return’ is an ancient Indo-European root. It takes courage to

give, especially to give what cannot be bought, that takes time, energy, feeling. But, in the instant it happens, the gift becomes a ship of friendship, of loving tribute, it is there that the door of the other opens - just a crack - and makes us understand what the other is and what we are together. The question is: does the gift still exist today? In a society, marked by deep individualism, exaggerated narcissism, selfishness and egoism is the art of giving, as an authentic act of humanization, still possible? The answer is yes, it is! *Giving* is an art which has always been difficult: the human being is capable of it because he is capable of relating with the other, but it remains true that this giving of oneself to someone without condition or expectation requires a deep conviction towards the other”.

CONCLUSION

All European countries must work together in order to increase the number of organs available for patients requiring transplantation, by adopting specific programs to give an answer to the increasing number of people who need an organ in order to live a normal life. Donate is culture. For this reason, we are all involved in increasing organ donation and transplantation in order to reduce human suffering and give patients the possibility to acquire a new life.

My special thanks go to Ms. Maria Amalia Santoro for her linguistic assistance

References

1. Yun Ling, Shui-Bao Xu, Yi-Xiao Lin, Di Tian, Zhao-Qin Zhu, Fa-Hui Dai, Fan Wu, Zhi-Gang Song, Wei Huang, Jun Chen, Bi-Jie Hu, Sheng Wang, En-Qiang Mao, Lei Zhu, Wen-Hong Zhang, and Hong-Zhou Lu: Development of the organ donation and transplantation system in China Chinese Medical Journal 2020;133(7).
2. Zijian Zhang, Zhijia Liu and Bingyi Shi: Global Perspective on Kidney Transplantation: China Kidney 360 3: 364-367, 2022.
3. S.V. Gautier, S.M. Khomyakov: Organ donation and transplantation in the Russian Federation in 2018. 11th Report of the Registry of the Russian Transplant Society, Russian Journal of Transplantology and Artificial Organs Vol. XXI, 3 2019.
4. Feras Bader: Organ donation in the Eastern Mediterranean Region, Transplantation Volume 105 Number 1 January 2021.
5. European Committee on Organ Transplantation Set up by the Committee of Ministers under Article 1, Extract from CM (2021)131 add final
6. Lewis, A. Koukoura, G.-I. Tsianos et al.: Organ donation in the US and Europe: The supply vs demand imbalance, Transplantation Reviews 35 (2021).
7. Steering Committee of the Istanbul Summit. Organ trafficking and transplant tourism and commercialism: the Declaration of Istanbul. The Lancet. 2008 Jul 5;372(9632):5-6.

INNOVATIVE APPROACHES TO PREVENT FRAILTY: OVERCOMING BOTTLENECKS TO VALIDATION AND SCALE-UP

**Maddalena Illario¹,
Giovanni Tramontano², Vincenzo De Luca^{1,2}, Lorenzo Mercurio¹**

¹Federico II University of Naples, Dept. of Public Health, Naples, Italy

²Federico II University Hospital, R&D Unit, Naples, Italy

e-mail: illariomaddalena@gmail.com

ABSTRACT

Public health has been facing a number of challenges that have been exacerbated by the persistence of the Covid-19 pandemic. The need to target specific interventions to specific populations is progressively being addressed by technology advancement in the medical field. Risk assessment through genetic testing, lifestyle interventions for health promotion and disease prevention, early detection of disease, integrated health and social care and service coordination, represent the steps of a multifaceted system where innovative solutions can facilitate improved effectiveness of outcomes for patients by increasing the accuracy and speed of diagnosis, and at the same time contribute to decreasing the burden and cost on health and social care systems.

The availability of healthcare data facilitates the development of personalized services through the collection of outcome data from the real world and clinical trials; however, there are still gaps to integrate digital health solutions into current processes of health service provision.

Keywords: Innovative approaches; frailty; prevention; health promotion; international collaboration

INTRODUCTION

The Covid-19 pandemic has highlighted new challenges for healthcare systems that go beyond the clinical dimension and expand to the social and economic spheres.

A complex mix of interconnected threats to health and well-being range from poverty and inequality to conflict and climate change. Furthermore, people

continue to suffer from infectious diseases, while the burden on health systems of non-communicable conditions is increasing. From an economic perspective, more than half of the world's population is still unable to access health services without experiencing financial hardship. The world is threatened by high-impact health emergencies (epidemics, conflicts, natural and technological disasters) and the emergence of antimicrobial resistance. More than 21 million people are refugees, 3 million are asylum seekers and more than 40 million are estimated to be internally displaced.

To face these global health challenges, healthcare sustainability strategies, based on activities of disease prevention, reduction of inequalities across all social gradients and support to vulnerable groups would be an excellent starting point for a sustainable future provided that increased resources are allocated to disease prevention and health promotion activities. Despite evidence showing the effectiveness of a proactive approach to health and wellbeing, OECD countries spend only 3% of their budget on disease prevention, and often do not implement coherent strategies and plans to reduce health inequalities (1).

In addition to the above-mentioned issues, another complex challenge for health and social systems worldwide is the ageing population. The United Nations has proclaimed 2021-2030 the Decade of Healthy Ageing (2), with WHO leading international action to improve the lives of older people, their families and communities. The Decade brings together a variety of stakeholders galvanizing concerted action to:

- change how we think, feel and act towards age and ageing;
- develop communities in ways that foster the abilities of older people;
- deliver person-centred, integrated care and primary health services that are responsive to older people; and
- provide older people access to long-term care when they need it.

Innovative approaches in health promotion and disease prevention could help older adults to remain independent longer and improve their quality of life. This approach can be implemented through the exchange of innovative solutions developed within the framework of Research and Innovation projects funded by the European Commission. Despite the commitment and efforts of numerous stakeholders in the field of health, there are several challenges and enablers that hinder the transfer and scale up of validated innovative solutions for health from different perspectives (technological, organizational, educational, clinical, social perspectives). The experiences of the European Innovation Partnership on Active and Healthy Ageing from 2013 through 2020 provided the opportunity

to take advantage of several instruments made available at international level, to facilitate the design, testing and adoption of innovative solutions for active and healthy ageing to implement a paradigmatic shift from a concept of disease-centered services to a person-centered approach: health moves out of the hospital, connecting to the community.

An example of Information and Communications Technology (ICT)-driven societal innovation is represented by the PERsonalised ICT Supported Service for Independent Living and Active Ageing (PERSSILAA) project, that resulted in good practice that ignited several international twinnings adapting specific tools to the local context, and feeding into subsequent twinnings and innovative procurements.

PERSSILAA aimed at the development and validation of a new service model to address frailty in community-dwelling older adults. PERSSILAA's main focus was to:

- develop remote service modules for screening, monitoring and training.
- enable a transition of our care services from fragmented reactive disease management to preventive personalized services, that are offered locally, supported by proactive caregivers and health professionals, and integrated into existing healthcare services.
- set up a technical service infrastructure to support these multiple services and users in an efficient, reliable and easy way, entailing gamification, interoperability and clinical decision support.

The validation was carried out in two regions: the Enschede region in the Netherlands and the Campania region in Italy (3) PERSSILAA built on activities within the European Innovation Partnership on Active and Healthy Aging and on the results of earlier European projects. The consortium, with 8 partners from 5 countries, provided a unique mix of social, medical and technological sciences with industry, academia and end user organisations.

The project developed and validated a new service model, to screen for and prevent frailty in community-dwelling older adults, integrating nutrition, physical and cognitive function. PERSSILAA developed remote service modules for screening, monitoring and training. It innovated the way our care services are organized from fragmented, reactive disease management into preventive, personalized services offered through the local community, supported by a proactive team of caregivers and health professionals and integrated into existing healthcare services. PERSSILAA realized a technical service infrastructure to support these multiple services and users in an efficient,

reliable, easy-to-use way and therefore works on gamification, interoperability and clinical decision support. (4).

Another approach to promote the health, wellbeing and social inclusion of older people in communities is the creation of smart healthy and age-friendly environments (SHAFE). Built environments in our cities and communities are critical for supporting and maintaining health in older age (5). This approach was implemented within the SHAFE communities.

SHAFE began as a thematic network, approved by the European Commission, with the ambition to draw policy-makers, organisations and citizens' attention to the need of better alignment between health, social care, built environments and ICT, both in policy and funding. The challenges of different sectors, such as ICT, the building industry and urban planning and the health and social care, as well as those of citizens and their communities are interlinked. Responding to these challenges will foster awareness and support for the creation and implementation of smart, healthy and inclusive environments for present and future generations that enable them to learn, grow, work, socialise and enjoy a healthy life, benefiting from the use of digital innovations, accessibility solutions and adaptable support models in the European context (6).

To promote and implement the Smart Healthy Age Friendly Environment concept, SHAFE evolved to a European Stakeholders Network (ESN), which currently has over 170 partner organisations. In October 2020, it aimed to establish an international and interdisciplinary network of researchers from all sectors to foster awareness, and to support the creation and implementation of smart, healthy, indoor and outdoor environments for present and future generations, the NET4Age Friendly COST Action started. The main approach of NET4Age-Friendly is the establishment of new local or regional ecosystems or by expanding existing ones in each European COST country involved, to work on health and wellbeing in an age-friendly digital world (7).

CONCLUSION

In our past experiences we have seen how participation in international networks can be an enabling factor for sharing and implementing innovative approaches aimed at preventing frailty and improving lifestyles through a life-course approach.

One example is the Reference Site Collaborative Network.

In fact, the main objectives of this network are facilitating members in

developing, sharing and adopting good practices and innovative solutions and technologies at scale, establishing a communication that can influence and provide valuable inputs to bodies such as the EC and WHO, taking advantage of the knowledge and expertise of network members, and setting up thematic working groups involving experts to provide thought leadership (8, 9).

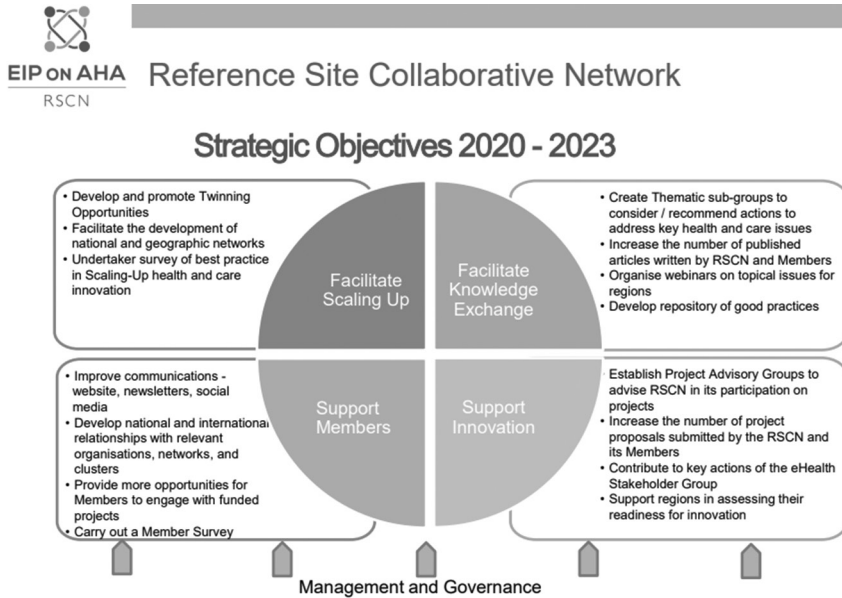


Fig. 1. RSCN Strategic Objectives

The approach used by the RSCN is the quadruple helix of innovation, building synergic ecosystems comprising a variety of stakeholders divided by sectors. The sectors represented in this quadruple helix model are: government, industry, academia & research and civil society. Through the interaction of these stakeholders in the regional context, and implementing the quadruple helix approach there has been an acceleration of the transfer of research and innovation results to current service provision, stimulating sustainable regional growth (10).

References

1. Gmeinder, M., D. Morgan and M. Mueller (2017), “How much do OECD countries spend on prevention?”, OECD Health. Working Papers, No. 101, OECD Publishing, Paris. <http://dx.doi.org/10.1787/f19e803c-en>
2. WHO (2020), Decade of Healthy Ageing: Plan of Action.
3. Cataldi M , De Luca V , Tramontano G et al. “An Approach to Prevent Frailty in Community-Dwelling Older Adults: a pilot study performed in Campania region in the framework of the PERSSILAA project.” *Translational medicine* 2019; 19: 42-48.
4. O’Caoimh, R., Molloy, D., Fitzgerald, C., et al. (2017) Healthcare Recommendations from the Personalised ICT Supported Service for Independent Living and Active Ageing (PERSSILAA) Study. DOI: 10.5220/0006331800910103 In *Proceedings of the 3rd International Conference on Information and Communication Technologies for Ageing Well and e-Health (ICT4AWE 2017)*; pp.91-103 ISBN: 978-989-758-251-6
5. WHO (2018), The Global Network for Age-friendly Cities and Communities.
6. <https://hands-on-shafe.eu/en/what-is-shafe>
7. <https://www.net4age.eu/what-net4age-friendly>
8. Illario, M., De Luca, V., Onorato, G., et al. Interactions Between EIP on AHA Reference Sites and Action Groups to Foster Digital Innovation of Health and Care in European Regions. *Clinical interventions in aging* 2022;17: 343-358.
9. <https://doi.org/10.2147/CIA.S323723>
10. <http://rscn.eu/about/>
11. Bousquet, J., Illario, M., Farrell, J., et al. The Reference Site Collaborative Network of the European Innovation Partnership on Active and Healthy Ageing. *Translational medicine @ UniSa*, 2019; 19: 66-81.

DID THE LEGAL PROTECTION OF ACADEMIC FREEDOM IN EUROPEAN UNIVERSITY HOSPITALS LEAVE MUCH TO BE DESIRED AT THE TURN OF THE MILENNIUM?

Jochen Ehrich

Childrens' Hospital, Hannover Medical School, Germany

e-mail: Ehrich.jochen@mh-hannover.de

Everything that is permitted is not prohibited.

Everything that is forbidden is not permitted.

How is it the other way around?

Is everything that is not allowed, forbidden?

Is everything that is not forbidden allowed?

(Old popular wisdom)

ABSTRACT

A European survey by members of EAPE could provide a solid data base for opening the debate on academic freedom at different faculties of European universities at the turn of the millennium.

Keywords: Rights; academic freedom; university; research; Europe

INTRODUCTION

“In the ethical language of health care, there is great emphasis on rights. A ‘right’ in this context can be defined as an entitlement; something that is due to be rendered to an individual” (1) or a group of people. Modern healthcare systems have become a complex and fragmented business. Rights of one person are often balanced by duties of other persons. Thus, the relationship between right, duty and responsibility plays a key role in medicine. As a matter of fact, academic freedom is one of the essential rights of clinician scientists imposing duties and responsibilities on all people involved in healthcare services.

The Charter of Fundamental Rights of the European Union brings together the most important personal freedoms and rights enjoyed by its citizens into one legally binding document. The Convention is divided into six chapters: dignity, freedoms, equality, solidarity, rights and justice. *Freedom of thought, science, expression, information and choice of health care has to be guaranteed* under the conditions established by national laws.

Academic freedom in university hospitals enables clinicians and scientists to engage in controversial research and critical inquiry concerning complex healthcare. It creates a scientific atmosphere to advance human knowledge in health sciences and to protect the health and well-being of people. Academic freedom is an essential component of the whole medical environment, however, for various structural and historical reasons; *it varies between European regions and countries*. Academic freedom is the right of academic staff members to teach undergraduates and train postgraduates. It also includes the right of scientists to practice research and publish the obtained findings regardless of prevailing opinion, prescribed doctrine, or institutional preferences. Academic freedom includes the freedom of scientists to express their critical opinion about workplace institutions and broad public issues. It also includes the freedom of academic clinicians to participate in national and international academic organisations and governing bodies. Academic freedom also includes mechanisms that regulate the functions of clinicians at their own workplaces. It sustains security of appointment and income of scientists.

Academic freedom has to be integrated into an organizational structure of different European political and healthcare systems which are characterized by structural *power of leadership* in monolithic or departmental systems and in democratic or autocratic political systems. Academic freedom has to be established by *design power* of those who can make strategic decisions for the organization as a whole about what to do (leaders) and how to do it (managers). Freedom includes the *desire of employees for power*, including the entire workforce and their unions and their desire for academic freedom. The *democratic power* includes patients and students who are not as high up on the organizational chart but have to be listened to by caregivers (3).

Our previous article in the EAPE Bulletin (3) opened the debate on academic freedom in pediatrics. The challenges of academic freedom in pediatrics were correlated to nineteen systemic factors such as national laws that forbid therapeutic trials with children, and to nine individual factors such as lack of time for research after routine work. We concluded that we do not know enough about diversity of academic freedom in European pediatrics.

The project “Safeguarding Academic Freedom in Europe” showed that the legal protection of academic freedom in Europe leaves much to be desired (3). Therefore, this article raises the question if there is a need for a retrospective survey on strengths and weaknesses of academic freedom in all types of European universities. Could members of the European Association of Professors Emeriti

play a key role in such a survey? Most of them have worked for more than 50 years in leading positions at universities and the majority has retired from active work at university which renders them professionally independent.

CONCLUSION

I am very well aware of the fact that it will be difficult for reporting Professors Emeriti to determine the incidence of endangered academic freedom at the European level. Due to a lack of publications and other documentation, it is definitely a great challenge to identify and prove causal relationship of failures and risk factors with the degree of violation of academic freedom. However, anonymous reports from Professors Emeriti may demonstrate links between endangered academic freedom and management failures.

Therefore, a survey by members of EAPE could provide a solid data base for opening the debate on academic freedom at different faculties of European universities at the turn of the millennium. I propose to ask retired professors and members of EAPE to anonymously report their general experiences and specific conclusions in a questionnaire to be designed by a committee. Both the proposed draft of questions and the answers in the questionnaire need to be discussed in an EAPE Zoom seminar before being sent out to all members asking for comments and corrections. Thereafter, the reported data will be entered into a data base, analyzed by committee and circulated to reporting colleagues and finally published in the EAPE Bulletin.

References

1. Emson HE (1992) Rights, duties and responsibilities in health care. *J Applied Philosophy* 1992; 9:3-11.
2. Macht und Medizin. Schweizerische Akademie der Geistes- und Sozialwissenschaften & Schweizerische Akademie der Medizinischen Wissenschaften 2021; 16, Nr.10.
3. Ehrich J, Corrad F, De Santo NG. Starting the debate on academic freedom in paediatric healthcare service systems in 2021 in Europe. *Bulletin EAPE* 2021; 2:33-34.

TRENDS IN RENAL REPLACEMENT THERAPY IN BOSNIA AND HERZEGOVINA IN THE LAST DECADE

Halima Resic

Emeritus Professor, University of Sarajevo, Bosnia and Herzegovina
e-mail: halimaresic@hotmail.com

ABSTRACT

The Renal Registry (RR) of Bosnia and Herzegovina (B&H) was established 2002, with the aim to follow the trends of renal replacement therapy (RRT). The prevalence of RRT in B&H is rising steadily. My aim is to present the epidemiology and treatment of all aspects of RRT in B&H in the period 2010-2020. The demographic data, prevalence, incidence, type of RRT, cause of End Stage Renal Disease (ESRD) were obtained from questionnaires sent to 29 dialysis centers. The number of patients treated by RRT increased steadily from 2488 patients in 2010 to 2693 in 2019. Covid-19 started in 2020 and the number of patients decreased to 2543. The prevalence of RRT has increased from 709.2 pmp in 2010 to 720.2 in 2020. The incidence of new patients in 2010 was 130.6 pmp and in 2020 was 115.0 when there were 406 new patients. The mean age for new patients increased from 60 years in 2010 to 63.5 years in 2020 and the population over 75 years rose from 9.79 % to 13.5%. Most ESRD patients in B&H are undergoing intermittent hemodialysis (92%) while 8% of patients were treated by peritoneal dialysis (PD) and transplantation. The most significant cause of ESRD in 2010 was chronic glomerulonephritis (543 patients) followed by pyelonephritis (490 patients) and diabetes mellitus (DM-393). The number of DM patients increased to 546 in 2019 and 479 in 2020. Covid -19 affects ESRD patients and they had a worse outcome.

Transplantation rates decreased; only 4 transplantations were carried out in 2020 and 2021. In B&H in 2020, 387 patients with a functioning graft were being followed; 54 patients (20.3 %) were infected with Covid-19 and 11 patients died (20.37%). From 8 dialysis centers in 2020 we have data for Covid-19. From 622 patients, Covid -19 affected 361 patients (58.04 %) and 75 died (19.38%).

In 2020, 547 patients on RRT died - a high mortality rate of 17.7%. The need for RRT in B&H is increasing in the last decade but Covid-19 has had a significant effect on mortality.

Preventive measures are necessary to prevent ESRD and to decrease the number of patients on dialysis.

Keywords: ESRD; incidence; prevalence; RRT

INTRODUCTION

The number of patients starting RRT for ESRD continues to increase annually in United States, Canada, Australia, Europe till 2019 when Coronavirus disease 2019 (Covid-19) started (1). There is evidence that this was largely due to increased access to RRT for older patients which might not have been available to them earlier. The number of patients on RRT aged 75 years and over doubled though it varied between European countries (2). Epidemiological data of patients on RRT are collected by national, regional and international renal registries (3, 4).

The presence of illnesses such as diabetes mellitus, atherosclerotic cardiac and cerebral disease, and malignancy have long been recognized to increase mortality risk in ESRD population (4, 5).

MATERIALS AND METHODS

Centre and patient questionnaires were sent to all 29 dialysis centres in B&H. Data requested on all RRT patients included number of patients, age, sex, prevalence, incidence, cause of ESRD, modality of treatment, hepatitis B antigen status, Hepatitis C virus (HCV) and HIV status, patient deaths and cause of death, and renal transplantation. Collected data were analyzed using the Statistical Package for Social Sciences (SPSS).

RESULTS

All 29 dialysis centres responded fully in 2020 whereas, in 2002, only 18 centres responded. The Renal Registry of B&H joined the ERA-EDTA Registry in 2003 (European Renal Association-European Dialysis and Transplant Association), and U.S.A. Renal Data. There were 458 incident patients (day 1) B&H, with an incident rate of 130.6 pmp in 2010. compared to the incident rate of 115.0 pmp in 2020 (Table 1.). Of 2543 patients, 1537 were male (60.4 %) and 1006 were female (39.55 %) in 2020. The mean age of patients was 60.0 years in 2020, and females were older (63.0 years) than male. The commonest presenting age was 45-64 (43.2 %) years. Primary renal diseases at day 91 were: glomerulonephritis

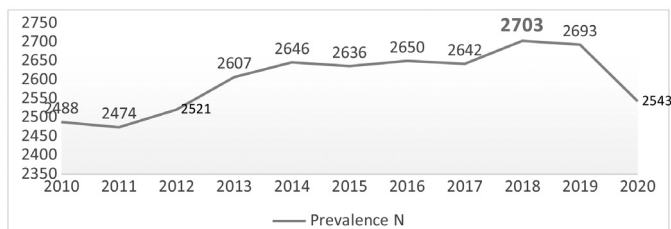


Fig. 1: ESRD prevalence rate from 2010-2020.

(19.6%), pyelonephritis (12,6%), diabetes mellitus (18.84%), hypertension (12.54%), polycystic kidney disease (5.9%), miscellaneous (12.86%), renal vascular disease (16.59 %), unknown (1.02%). The ESRD prevalence rate in 2010 was 709 pmp (2488 pts) increasing to 765 pmp in 2018. Because of Covid-19 in 2020 the prevalence count decreased to 720.19 (Figure 1).

The growth rate of patients on RRT over the last decade can be explained further by the age group >75 years and the higher percentage of diabetics. The mean age of patients was 61.0 years. Distribution of RRT modalities is presented in Figure 2. Most ESRD patients in B&H are undergoing intermittent hemodialysis (92%), while a minority of patients (8%) are treated by peritoneal dialysis and transplantation (Figure 2.). The haemodialysis patients are older and include a

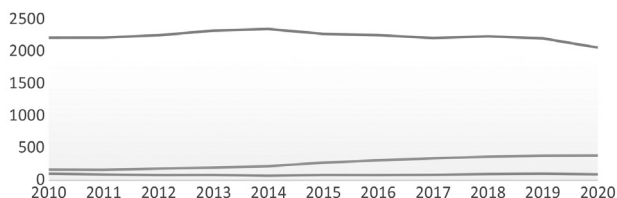


Fig. 2: Treatment modality prevalent patients by year.

higher percentage of diabetics than patients treated with peritoneal dialysis or kidney transplantation. There were 15 patients aged 20 years or younger.

Balkan Endemic Nephropathy (BEN) is specific for North-East Bosnia. Prevalence in 2010 was 85.8 pmp (301 patients) whilst in 2020 it was 35.4 pmp (125 patients). The prevalence of hepatitis C decreased significantly in the last decade. In 2010 the prevalence was 12.5 % (310 patients HCV positive); in 2020 this decreased to 4.2 % (107 patients). In 2020 there were only 49 HbsAg positive (1.9%) patients. There were no HIV- positive patients. In 2010 there

were 393 diabetic patients; the number increased by 2018 to 546; because of Covid-19 the number of diabetics decreased to 479.

The crude death rate for dialysis patients in 2010 was 11.7% (331 pts), and in 2020, 17.7% (547 pts). Covid-19 affected the care and outcomes of patients treated with dialysis worldwide. Patients on dialysis are at extremely high risk should they develop Covid-19, with short-term mortality of 20% or higher (11). Out of 29 centers, 8 responded about the incidence of Covid-19 patients: out of 622 patients on RRT, 92 patients died from Covid- 19 (Table 1).

Total number ESRD patients	3099	3095
Prevalent patients	2694	2557
Total number of deaths	405 (13.1%)	547 (17.7%)
Prevalent HD	2231	2068
Died HD	391 (17.53%)	530 (25.63%)
Prevalent PD	97	97
Died PD	11 (11.34%)	13 (13.40%)
Prevalent Tx	402	402
Died Tx	3 (0.75%)	8 (1.99%)
Infection as cause of death	31 (1.0%)	124 (4.85%)
Died Covid-19 (8 centres)		92

Table 1: RRT and Covid-19 in 8 dialysis centers

DISCUSSION

There has been major increase in the number of patients accepted for RRT in B&H largely due to rising acceptance rates of elderly patients. In addition, there has been an increase in patients with comorbidities, e.g., diabetes.

Similar trends in the most European countries have been recorded (6, 7). Diabetes is one of the most common causes of renal failure in most European countries and US (4, 5). In B&H DM is also one of the leading causes of renal disease (18.6%). Glomerulonephritis and pyelonephritis account for 35% of patients starting RRT. Hypertension is responsible for 12,6 % of cases of ESRD, and is lower that reported in the USA, Japan, Germany (4, 6, 10).

The mean age of patients in our study was 63.5 years. The increasing mean age of ESRD patients in B&H reflects the universal trend of dialysis patients

living longer due to improving healthcare systems. The mean age of ESRD patients in B&H is similar to European countries (7, 8). The incidence rate of ESRD in B&H is similar to other Balkan countries, but lower compared to Western European countries (10).

Balkan nephropathy is endemic in South-East Bosnia. There were 125 patients with this condition at the end of 2020, 48% males, 52% females, - a significant decrease. The high percentage of HCV-positive patients in relation to the low percentage of HbsAg positive patients is due to rigid screening of blood donors for HbsAg for many years whereas HCV screening of blood donors started in 1997 in B&H, and the majority of positive patients were diagnosed prior to that. After strict preventive measurements prevalence of hepatitis C decreased as in other European countries (4,2).

The rate of renal transplantation is low, and is mainly from living-related donors. Only 20 cadaveric kidney transplantations have occurred since 2006. In 2020 387 patients with a functioning graft were being followed.

The crude death rate for dialysis patients in 2010 was 11.7 %, similar to Eastern Europe, but higher than in US and Northern Europe (9). The Covid pandemic had a substantial effect on mortality in patients on RRT, especially in elderly and male dialysis patients (12). Crude mortality in our patients in 2020 was 17.7 %. We had data from only 8 dialysis centers (622 patients) among whom 92 died with Covid-19. The Registry notes an approximate 20% mortality due to Covid-19 among patients receiving RRT. This rate is dramatically higher than the estimated 4% mortality from Covid in Europe as a whole. Results from the ERA-EDTA Registry indicates a high mortality due to Covid-19 in RRT patients across Europe (11, 12, 13, 14)

Couchoud *et al.*, (6), reporting data from the French Renal Epidemiology and Information Network (REIN) Registry of patients receiving maintenance dialysis, show that, among dialysis facilities with at least 1 patient with Covid-19, the Covid-19 prevalence was 6% during the initial 7-week surge in France.

CONCLUSION

Glomerulonephritis, pyelonephritis and DM are the commonest causes of ESRD in B&H. It is sometimes difficult to classify the cause of CKD in patients with both hypertension and DM. The need for RRT in B&H is increasing. The number of patients had increased prior to the start of the Covid-19 pandemic but then reduced. Hemodialysis remains the commonest treatment modality; the proportion

of PD and transplant patients are slowly increasing. Blood transmission diseases decreased significantly because of implementation of preventive measures. Preventive measures are necessary in relation to ESRD and to decrease the number of patients on dialysis. Kidney transplantation is under-represented in RRT in B&H; a goal is to develop organ transplantation and optimize organ donation.

References

1. Hallan S.I. Coresh I, Astor B.C. et al. International comparison of the relationship of chronic kidney disease prevalence and ESRD risk J Am. Soc Nephrol. 2006, 17: 2275-22841
2. Jaakko Helve et al. Factors associating with differences in the incidence of renal replacement therapy among elderly: data from the ERA-EDTA Registry Nephrol Dial Transplant 2018 1;33(8):1428-1435.
3. Coresh J, Selvin E., Stevens LA, et al. Prevalence of chronic kidney disease in the United States. JAMA 2007; 298: 2038-2047.
4. US Renal Data System. USRDS 2008 Annual Data Report: Atlas of End-Stage Renal Disease in the United States. National Institute of Diabetes and Digestive and Kidney Disease, 2008.
5. Marcelli D. Stannard D. Conte F, et al. ESRD patient mortality with adjustment for comorbid conditions in Lombardy (Italy) versus the United States. Kidney Int. 1996; 50: 1013-1018
6. Youn EW. Goodkin D.A., Mapes D.L., et al. The Dialysis Outcomes and Practice Patterns Study (DOPPS): an International haemodialysis study. Kidney Int. 1999: 57:574-881.
7. Caskey FJ, Kramer A, Elliott RF, et al. Global variation in renal replacement therapy for end-stage renal disease. Nephrol Dial Transplant. 2011;26 (2604-2610)
8. Brown MA, Collett GK, Josland EA, Foote C, Li Q, Brennan FP. CKD in elderly patients managed without dialysis: Survival, symptoms, and quality of life. Clin J Am Soc Nephrol. 2015;10(2):260-268.
9. Hussain JA, Mooney A, Russon L. Comparison of survival analysis and palliative care involvement in patients aged over 70 years choosing conservative management or renal replacement therapy in advanced chronic kidney disease. Palliat Med. 2013;27(9):829-839.
10. Brown EA, Johansson L. Epidemiology and management of end-stage renal disease in the elderly. Nat Rev Nephrol. 2011;7(10):591-598.
11. Jager et al, Results from the ERA-EDTA Registry indicate a high mortality due to COVID-19 in dialysis patients and kidney transplant recipients across Europe, Kidney Int. 2020;98(6):1540-1544
12. Hsu CM and Weiner DE, COVID-19 in dialysis patients: outlasting and outsmarting a pandemic, Kidney Int. 2020 Dec; 98(6): 1402-1404.
13. Couchoud C., Bayer F., Ayav C. Low incidence of SARS-CoV-2, risk factors of mortality and the course of illness in the French national cohort of dialysis patients. Kidney Int. 2020; 98:1519-1529.
14. Klinger A.S., Silberzweig J. Mitigating risk of COVID-19 in dialysis facilities. Clin J Am Soc Nephrol. 2020; 15:707-709.

THE MEDITERRANEAN FEDERATION FOR ADVANCING CARDIOVASCULAR SURGERY

Giancarlo Bracale¹, Umberto Marcello Bracale²

¹Emeritus Professor of Vascular Surgery University Federico II of Naples

²Full Professor of Vascular Surgery University Federico II of Naples

ABSTRACT

The Constitution of the Mediterranean Federation for Advancing Vascular Surgery (MeFAVS) which was created on October 1 2018, aims to compare the experience of various centers in the Mediterranean area, in the treatment of the most frequent and serious vascular diseases, in particular diabetes and its major complications, and to promote cultural, scientific and clinical exchanges between teachers, postgraduate fellows and students from the countries of Southern Europe, North Africa, Middle East, Balkan Area that border the Mediterranean basin.

MeFAVS is also linked with other institutions in European projects on healthy and active aging, Tourism in Health and the Listeo project to improve waiting lists for patients in need of urgent treatment.

Keywords: Mediterranean Federation for Advancing Vascular Surgery; active and healthy ageing; European innovation partnership; major ambulatory surgery; Listeo Plus-App by Andalusian project

INTRODUCTION

This paper aims to introduce to the membership of the European Association of Professors Emeriti the premises, aims, opportunities and actual scientific results of the MeFAVS which was founded with Notarial act and relative by-laws during the first Constitutive Congress held in Naples on 1 October 2018.

In all public sectors, including governments, universities and research centers, there is a strong interest in cooperation between all the countries bordering the Mediterranean, from Southern Europe, North Africa, to the Balkans and the Middle East, initially for trade and economic exchanges, and subsequently, for tourism, cultural, scientific scopes and clinical care pathways.

These principles of the Federation were established during the Paris Summit for the Mediterranean in 2008 to consolidate the goals stated by the

Partenariato Euro-Mediterraneo on 1995 known as the Barcelona Process. The Campania Region has always aspired to have a co-ordinating role between all Mediterranean countries on these issues.

About 25 years ago with 3 Italian, 3 French, 3 Spanish and 3 Portuguese colleagues we founded the Pathology and Vascular Latino-Mediterranean Society (SOPACHIVALAME), which organized 18 international congresses known for the prestige of the participants, and whose principles are very close to those of MEFAVS.

On February 2017, in Aswan, Egypt, during the triple congress of the MLAVS, of the Vascular Society of Egypt and AFROCHAP, under the presidency of Emad Hussein, we decided to found this new Federation with its initial headquarter in Naples.

It is an international network for the progress of vascular surgery, which provides cultural, scientific and educational exchanges and clinical-assistance pathways to standardize the quality of health care among the countries of Southern Europe (Italy, France, Spain, Portugal and Greece), North Africa (Morocco, Algeria, Tunisia, Egypt) from the Balkan area to Turkey and the United Arab Emirates (1).

MEFAVS MAIN AIMS

These are:

- comparison between diagnostic-therapeutic pathways in the most severe and frequent pathologies, and of greatest clinical, economic and social interest;
- up-dating of know-how, new techniques and use of advanced technologies;
- more adequate and uniform training courses for post-graduate fellows, and new generations of vascular surgeons;
- common knowledge of basic and applied research, sharing of scientific programs for publication in journals with a high impact factor.

Methods of communication, collaboration and verification have already been used and will continue to do so for the future (1);

- face-to-face or online scientific meetings;
- exchanges between university professors, chiefs of hospital or high-level private organisations; post-graduate fellows of vascular surgery or PhD students; 5th and 6th year students with an interest in vascular surgery;
- attendance at congresses or webinars

Scientific activity has been intense; the 1st International Constitutive Congress of the Federation was held in October 2018 and the 2nd International Congress, with hands on training, in June 2019. We held the 3rd Congress on 10-11 May 2022. In addition, various teleconferences and 5 international webinars have been held on topics of pathology, vascular surgery, diabetic foot and lower limb ulcers management.

In summary this is the prospectus of the scientific activity:

- 1st Congress of MeFAVS and *hands-on-training* Naples (IT) – October 1-2, 2018
- 2nd Congress of MeFAVS with Joint Forum “*Health Technologies: a challenge to be faced in network*” and *hands-on-training* Naples (IT) – June 19-20, 2019
- 3rd Congress of MeFAVS and *hands-on-training* Naples (IT) – May 10-11, 2022

Teleconferences between Naples, Rome, Paris, Cairo, Beirut, Thessaloniki, Algiers, and 5 international webinars on topics of vascular pathology and surgery: care pathways in diabetic foot and limb ulcers, use of new materials and devices, development of high technologies.

CONCLUSION

We are engaged in joint research with other institutions, especially concerning Active and Healthy Ageing, a multidisciplinary project with the convergence of various specialists, not only medical doctors (geriatricians, cardiologists, orthopedic surgeons etc.), but also sociologists, architects and urban planners to create more livable environments and eliminate architectural barriers (Table 1) (2-6).



Fig. 1.

Another project, health tourism has two aspects: Campania with its beauty and agri-food riches (the so-called Campania Felix , Gaius Plinius Secundus, called “Plinio il Vecchio” who died during the eruption of Mount Vesuvius in 79 AC), spa treatments for psychophysical well-being, Mediterranean diet; the second to create a very effective assistance network so that tourists with known or sudden diseases can be treated in the best way (7).

Finally, it was highlighted that in the Middle East and North African countries diabetes and its complications, such as coronary heart disease, cerebrovascular

disease, nephropathy and peripheral vascular disease, the diabetic foot, have a prevalence 4 times compared to Europe. It has been established that in each congress there will be at least one session dedicated to diabetes (Fig 1) (8-13).

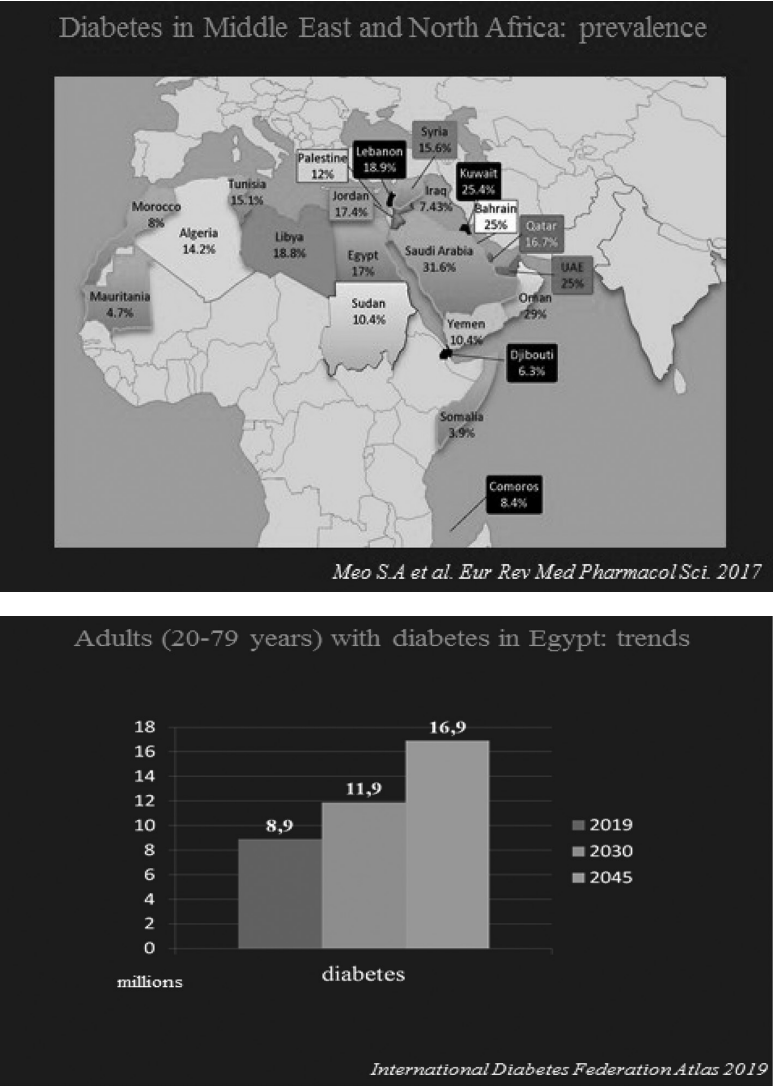


Fig. 2.

A high-level scientific research project was launched, published in a scientific journal with high impact factor.

There has been participation in the Major Ambulatory Surgery (MAS) project using the Listero+ app to improve surgical outpatient care (14).

References

1. Bracale UM, Ammollo RP, Hussein EA, et al. Position Paper on Young Vascular Surgeons Training of the Mediterranean Federation for the Advancing of Vascular Surgery (MeFAVS): State of the Art and Perspectives. *Ann Vasc Surg* 2021;77: e7-e13.
2. Liotta G, Canhao H, Cenko F, et al. Active Ageing in Europe: Adding Healthy Life to Years. *Front Med (Lausanne)* 2018;30;5:123.
3. Bousquet J., Illario M., Farrell, et al. (2019). The Reference Site Collaborative Network of the European Innovation Partnership on Active and Healthy Ageing. *Translational medicine@UniSa* 2019. 19, 66–81.
4. Illario M, De Luca V, Bracale UM, et al. Health Technologies: a challenge to tackle in network. *J Transl Med UniSa* 2020;20;21:1-3.
5. Illario M., De Luca V., Tramontano G., et al. The Italian reference sites of the European innovation partnership on active and healthy ageing: Progetto Mattone Internazionale as an enabling factor. *Annali dell'Istituto superiore di sanita*, 53(1), 60–69. doi.org/10.4415/ANN_17_01_12
6. Tziraki-Segal C., De Luca V., Santana S., et al. Creating a Culture of Health in Planning and Implementing Innovative Strategies Addressing Non-communicable Chronic Diseases. *Frontiers in sociology* 2019; 4, 9. doi.org/10.3389/fsoc.2019.00009
7. Illario M., De Luca V., Leonardini L., et al. Health tourism: an opportunity for sustainable development. *Translational medicine@UniSa* 2019; 19, 109–115.
8. Assaad-Khalil SH, Zaki A, Abdel Rehim A, et al. Prevalence of diabetic foot disorders and related risk factors among Egyptian subjects with diabetes. *Prim Care Diabetes*. 2015;9(4):297-303.
9. Bracale UM, Ammollo RP, Hussein EA, et al. Managing Peripheral Artery Disease in Diabetic Patients. A Questionnaire Survey from Vascular Centers of the Mediterranean Federation for the Advancing of Vascular Surgery (MeFAVS). *Ann Vasc Surg* 2020;64:239-245.
10. Chahrour MA, Homsy M, Wehbe MR, et al. Major lower extremity amputations in a developing country: 10-Year experience at a tertiary medical center *Vascular*. 2021; 29:574-581.
11. Kaafarani HMA, Khalifeh JM, Ramly EP, et al. A Nationwide, Systematic, and Comprehensive Assessment of Surgical Capacity in Lebanon: Results of the Surgical Capacity in Areas with Refugees (SCAR) Study. *Ann Surg* 2019;269:1206-1214.
12. Meo SA, Usmani AM, Qalbani E. Prevalence of type 2 diabetes in the Arab world: impact of GDP and energy consumption. *Eur Rev Med Pharmacol Sci* 2017;21:1303-1312.
13. Spanos K, Lachanas V, Karathanos C, et al. A survey on the status of the management of diabetic foot in the Mediterranean region. *Int Angiol*. 2016;35:192-7.
14. Herrera-Usagre M, Santana-Lopez V, Burgos-Pol R, et al, Project Listero+ A Human-Centred Design Mobile App for Surgical Patients, May 2018. Available at : <https://www.researchgate.net/publications/325148240>.

VOCATIONAL LEARNING THE ART OF REFLECTIVE CURIOSITY

Liv Mjelde

The Senior Centre, Oslo Metropolitan University, Norway
e-mail: mjeldeliv@gmail.com

ABSTRACT

Recent discourse in educational theory on the interface between individualized academic learning versus learning through “hands-on” activity and social cooperation holds promise of change for the education of the future. I will discuss this complexity in the context of the writings of Walter Benjamin about craft knowledge. Central to his understanding of knowledge is the tactility of the hand. I discuss his thinking in light of recent neuroscientific research on the neural bases of art creation and aesthetic experience. And I relate his thinking to my work on workshop learning and mentor traditions. The concept of *Mentor*, rooted in *the Socratic method*, is now in the forefront in discussions about learning and teaching. A master-teacher’s task is to promote a pedagogy of questioning to develop the learners’ curiosity in cooperation with co-learners. This understanding of learning follows an apprenticeship model where praxis and stored knowledge are the basis for learning.

Keywords: Social division of knowledge; tactility; hands-on activity; master-mentor-apprenticeship

INTRODUCTION

My research interest focuses on the social division of knowledge as it has developed under Industrial Capitalism and how it is visible in all educational scenarios. Fifty years ago in Norway, compulsory schooling generally lasted for seven years. Today young people are expected to complete thirteen years of formal schooling before entering institutions of higher education or apprenticeship on the manual labour market. Fifty per cent of each cohort enter academic fields, and fifty percent the technical/vocational fields. This development has been part of a global trend that builds on a belief that expansion of equal access and rights to higher education would solve class contradictions in society. “*Equality through Education*” and lately “*Social Justice*” have been slogans used in this context.

My focal point of departure is research on the division between vocational/apprenticeship and general/academic education as it manifests itself today. I have worked as a councillor and researcher, as well as a professor of vocational pedagogy in Norway since the 1960s, as well in Africa and Latin America. I have worked with networks to build a new understanding in Critical Pedagogy distinct from New Public management and Testing and Evaluation reports. My quest is for a mentoring/teaching environment that will make reflective curiosity one of the foundations of learning for the future (1).

ART AND SCIENCE: PAUL KLEE AND WALTER BENJAMIN

The monoprint by Paul Klee (1879-1940): *Angelus Novus* arose from the spirit of the times in which it was created, and it appeals to our curiosity. It has been used in the texts of the German philosopher Walter Benjamin (1892-1940). While virtually unknown in Paul Klee's lifetime, it has become one of his best-known images because of its connection to Walter Benjamin. He was inspired by this work of art and bought it in 1921.



Fig. 1. *Angelus Novus*

Paul Klee was emerging from the nightmares of the First World War. What I see in the painting is the angel of justice backing away from something. She

is staring, eyes wide open and wings spread. A storm is blowing, catching her wings with such violence that the angel can no longer close them. The angel is facing the past while the storm irresistibly propels her backwards into the future. Her hair is messy, she is imperfect, the wings are limited and despite everything she endures.

The reason for my presentation of Walter Benjamin's beloved Paul Klee work is both simple and complex. Both men came out of the First World War, and their contributions to art and science have laid the groundwork for much scientific work of our times and given rise to interdisciplinary thinking in both the natural and social sciences. Professor emeritus Elias Kouvelas (1) said in Athens in 2019, *"Art makes things visible by activating complex brain mechanisms which interpret and reinterpret the sensory information we get in our everyday lives"*. He was referring to the artists Paul Klee and Constantin Brancusi. Paul Klee said: *"Art does not reproduce what we see. It makes us see"*. Neuroscientific approaches have investigated the neural bases of art creation and aesthetic experience in recent years. Elias Kouvelas puts this into a neurobiological and anthropological perspective referring to the works of the paleoanthropologist Richard Leakey and the development of tools two million years ago and to very old cave-drawings. A recent discovery is the rich images in the Chauvet-Pont D'Arc Cave, a UNESCO World Heritage site (2).

These are complex matters – "Ways of Seeing and Doing" which have challenged scientific work during the past centuries- from the craft knowledge traditions of the 17th Century to the division of knowledge in crafts and industrial production, as it has developed side by side in vocational and academic learning traditions in the education of today.

These complexities appear in the works of Walter Benjamin (3). As Klee's monoprint was a source of inspiration for Benjamin, the work of the latter has inspired me. He uses metaphors from feudal times in his writing. He also aspires to transcend our understanding of seeing and learning, an approach that has enlightened my way of understanding the particularities of vocational learning. In his criticism of mass industrialization, he compared industrial development to its predecessor, the craft milieu and the construction of knowledge in feudal times. One point of departure is the "persons in action", the resident master, the travelling journeymen and apprentices working together in workshops and the art of storytelling as a primary learning tool. The ability to tell stories, Benjamin tells us, is rooted in two factors: expanding consciousness which follows travels to faraway places and knowledge of the past, local lore. The master craftsman

knows the handwork-the activity of the hand-and leads the learners forward. With workshop experience, the masters and the travelling journeymen lay the groundwork for hands-on learning, relating that vocational experience from travels and enriching the craft with storytelling, a mentor/teacher situation we can observe in vocational education today. The wayfarer's imported knowledge is a key to Benjamin's ontology of experience and the hand that touches the world external to itself – a tactile knowledge. True experience is conceived as close and practised knowledge of what is at hand. The hand touches have practical experiences of life. Recurrent in Benjamin's delineations of experience are the words tactile, tactics, the tactical, entering German, as it enters English via the Latin *tangere*, to touch. Benjamin's metaphors allude to former pre-industrial modes of labouring and learning in all societies, including the workshop tradition of European feudal times and hands-on learning traditions of today.

WORKSHOP LEARNING (4)

One of the main findings in my research in the vocational sector over the past decades is that students and apprentices in the vocational trades prosper and learn when they engage in hands-on events, when they are in activity in workshops, in vocational schools or learning as apprentices in workplaces. At the same time, they found no meaning or relevance to the many hours spent in classrooms exposed to the conceptual world of general education. They showed up in the workshops, but often they failed to show up for the academic classes. I have illustrated the different learning arenas in this way:

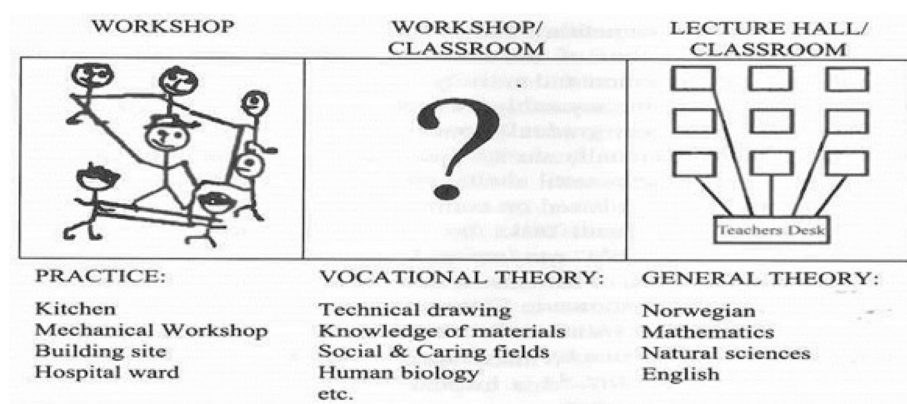


Fig. 2. The relation between Practical and General subjects in Vocational Education

the workshop where the Master and students work together (drawing i) and on the other hand: the lecture hall with students in rows listening to the teacher (drawing iii); vocational theory may be technical drawing, knowledge of materials, applied mathematics and physics in the male-oriented classes, and human biology and psychology in female-oriented classes. These subjects may be taught in both workshops and classrooms (drawing ii); general theory, such as Norwegian language, Mathematics, Physics, and Chemistry takes place in separate classrooms (drawing iii).

The difference between ways of organising learning is highly visible, the workshop, with hands-on activities with its roots in learning in craft workshops and the passive rows in the lecture hall/classrooms as in the cathedral traditions of the Middle Ages. I started to develop this model to describe two educational cultures and the contradictions in educational development: workshop versus academic traditions. In workshops, sharing, cooperation and learning, with body and mind in motion, being in activity, are central features. Students learn from each other. The master teacher is supervisor and mentor. By contrast, tradition in lecture halls and classrooms places students in rows facing the oracle/teacher. They are supposed to absorb learning and compete individually on their way to success. Will the twain meet between these two didactic traditions—workshop/apprentice traditions and cathedral traditions? This is a basic question.

With the growth of education in schools and universities after WW2 we have seen an expansion of conceptual “cathedral learning” and fundamental questions about alternative ways of seeing and learning are seldom posed. As Jarbas Baroto writes from Brazil: *“Traditional didactic methods do not consider workshops as a knowledge-based experience as opposed to knowledge shared in school environment, or classrooms.”* (5) The idea that there is a split between so called theory and practice is predominant. Researchers in education are also the victims of this social division of knowledge, and for the majority, their ways of seeing are part of the scholar traditions.

These questions are basic in the works of Walter Benjamin who argues that technology has stormed the human body, subjecting a human sensorium to a complex training, and provoking a crisis in perception. Soul, hand, and eye are disjointed. He sets himself within a tradition of human anatomical thought, which views the faculty of thinking by touch, or stereognosis; the ability to identify the shape and form of a three-dimensional object, and therefore its identity, with tactile manipulation of that object, even in the absence of visual and auditory stimuli. He looked upon craft knowledge and apprenticeship

traditions for inspiration and inspires thinking in today's social division of knowledge in education (6).

CONCLUSION

These questions also lead us back to Plato, Socrates and Aristotle. Mentoring, a concept rooted in the Socratic method, has come to the forefront in today's discussions about learning and teaching. The master/teacher's work is to promote a pedagogy of questioning: to develop learners' curiosity. The learner develops by interacting in workshops in cooperation with other learners. This leads towards a more holistic thinking on working and knowing in the education of the future, where practice and cooperation are at the centre of learning in general and skills mastery in particular (7). To clarify the contradictions in vocational learning and in science is not to imply that some approaches are superior to others. It is important to put forward all sides of human activity and discuss how vocational learning in workshops and the scholarly general educational route should be enriching one another in the education of the future.

References

1. Kouvelas, E. Neurobiological and anthropological aspects of Neurasthetics. In Cokkinos, D, Agnantis, Gardikas, K, et al. The Capital of Knowledge. Proceedings of the First International Congress. Society for the propagation of useful books. Athens 2020.
2. Brunel, E, Chauvet, J.M., Hillaire, C.: The discovery of the Chauvet-Pont D'Arc Cave. Editions Éditions Équinoxe. La Massane 2014.
3. Leslie, E. Drømmer, leketøy og fortellinger. In Kunsthåndverk nr. 2. Oslo 1998. Salzani, C. Walter Benjamin and the Actuality of Critique: Essays on Violence and Experience. Cambridge Scholars Publishing, Newcastle upon Tyne 2021.
4. Mjelde, L. The Magical Properties of Workshop Learning. Bern: Peter Lang 2006.
5. Barato, J. Oficinas e conhecimento: um desafio para a atuacao e a capacitacao de docents em educacao profissional e tecnologica. UNESCO Office in Brasilia (816), Brazil Ministry of Education (394).
6. Leslie, L. Dreams, Toys and Tales. In Crafts no. 146: (26-31) May/June 1997: p. 26.
7. Mjelde, L. Back to Learning. The Role of Mentorship. In Cokkinos, D, Agnantis, Gardikas, K, et al. The Capital of Knowledge. Proceedings of the First International Congress. Society for the propagation of useful books. Athens 2020

THE RIGHT TO KNOWLEDGE OF EUROPEAN CITIZENS

Luigi Campanella

Dept of Chemistry, Sapienza University of Rome, Italy

e-mail: luigi.campanella@uniroma1.it

ABSTRACT

The General Assembly of the European Council constituted of 47 State members, has discussed and voted on the Report “Freedom of media, political trust and rights to knowledge of citizens” promoted by European radicals. The new technologies help to satisfy the sharing of knowledge. In this direction didactics in vivo, diffuse museums, artificial intelligence, block chain, thematic networks appear precious instruments, but also with a double face by becoming a source of further discrimination if selfishly used. Open science can be considered a preferential way of this process representing the sharing of the results and data of the scientific research, innovation and progress. Unfortunately, to do what seems to be obvious is not due to many different interests involved in the complex activity of diffusion of the products of new knowledge and experimental procedures

Keywords: Knowledge; open science; ethics; European Council

INTRODUCTION

Many rights to information laws do not lead to more informed populations who can call corrupt politicians and officials to account or, on the other hand to vote in a referendum with a responsible choice. That is why transparency requests for transparency put pressure on governments around the world to do better on this key issue. The policy aims to promote access to knowledge and will be particularly focused on intellectual property and open access to models of knowledge creation and diffusion. Open Science is the practice of science in such a way that others can collaborate and contribute where research data, laboratory notes and other research processes are freely available under terms that enable reuse, redistribution and reproduction of the research and its underlying data and methods. The General Assembly of the European Council constituted of 47 Member States has discussed and voted on the report “Freedom of media, political trust and rights to knowledge of citizens” promoted by European radicals and based on four basic pillars: availability

of political power to make accessible and available information and knowledge to citizens, to ensure the reliability of public and private media information through the collection and analysis of data recovered by an independent body, an incentive to the diffusion of science and knowledge sites and the guarantee of freedom of word as an indispensable condition for a democratic country (1).

DISCUSSION

For long years Science and its knowledge were only seen as instruments of economic growth not looking at other virtuous aspects such as protection of health, safety of foods, unpolluted environment. This vision depends on the relativistic and exclusively productive role assigned to science. So knowledge of citizens appeared only as a curiosity: it was not their duty to transform knowledge into money and economy. The reasons for such a position are many, one of the most meaningful being the disarticulation of science into too many sectors with the only wish to take possession of one of them from a restricted scientific community. So many problems were wrongly related and considered to be solved by a single discipline and much data considered as a private heritage, even in the case of possibly saving people from diseases or disasters by these factors plus related knowledge. Open access to Science is a mark of a new vision based on integration of disciplines and diffusion of knowledge: these are requested by civil society to improve quality of life and obtain results by investment of material and immaterial resources.

Open Science is a term that is being used in literature to designate a form of science based on open source models or that utilizes principles of open access, open archiving and open publishing to promote scientific communication, so guaranteeing the right to knowledge. Open Science increasingly also refers to open governance and more democratized engagement and control of science by scientists and other users and stakeholders. Sometimes other terms are used to refer to the same or similar conceptions of science such as wiki science or Science 2.0 which focus on technologies of openness that promote not only more effective forms of scientific communication but also increasingly the deep sharing of large database (linked data) and cloud computing, essential for diffusing knowledge. Openness is also an essential aspect of the ethics of science, putting first the social community rather than personal interests. Scientists by virtue of their professional status and membership of scientific communities and societies are bound by expectations to openly share their work and to make public their methods and procedures as much as the data or results. By voting the above cited Report it is shown that Open Science as an

instrument of knowledge is a policy priority of the European Commission and the standard method of working under its research and innovation funding programmes as it improves the quality, efficiency and responsiveness of research. When researchers share knowledge and data, as early as possible in the research process, with all relevant participants, it helps to diffuse the latest knowledges. And when partners from across academia, industry, public authorities and citizen groups are invited to participate in the research and innovation process, creativity and trust in science increase. That is why the Commission requires beneficiaries of research and innovation funding to make their publications available and openly accessible. This recognizes and rewards the participation of citizens and of end users. To develop its Open Science policy the Commission works closely with 2 expert groups (i) the Open Science Policy Platform advises the Commission on how to further develop and practically implement an open science policy; and (ii) the expert group on Indicators proposes researchers' engagement with Open Science and its impacts, supporting and acknowledging open knowledge practice.

The hope is that by this engagement the resistance sites to a public vision of knowledge due to different interests can be won. The first individuals are editors of books and journals for which open access represents a loss of money. In order to evaluate the amount of this loss it must be recalled that according to recent statistics, editors, such as Springer, Elsevier, Urley, have gains three times higher than BMW and almost double that of Coca Cola.

Scientific societies can profitably contribute to the virtuous process of the transfer of knowledge but if they give up they lose one of their funding principles. For instance EUCHEMS, the network of the European Chemical Societies, in order to respect the different concerns has foreseen three levels of access - gold, hybrid, green - to papers and to books. The American Chemical Society has launched a specific system of publication for primary needs and urgencies. The Royal Society of Chemistry has edited its own journal - Chemical Science. Similar interventions were performed by Dutch and Austrian Chemical Societies. In Italy the Conference of the Rectors has recommended the unification of data banks to be managed by the Ministers of Cultural Heritage and of University and Research. The editors too have made significant steps in the same direction: Elsevier has applied the method of sharing of papers directly from authors; Wiley has published a gold, open access journal, Chemistry Open. The future will bring much more news, largely depending on electronic progress. As said, editors have moved toward, but they and overall scientific societies, have to do more if they do not to have minimal results in the fundamental world process of diffusing knowledge

Other resistances come from the industries for which patents represent a source of funds: this is certainly true but probably can be considered in a vision of selected situation and times of their uses and especially of knowledge about innovative products; a drug is different from a cosmetic in a social return vision

An Association such as EAPE having promotion of society as one of its primary objectives can contribute to dissemination and transfer of knowledge and of education and participation of the citizens at the so called “moments and places of choices”. An association with many members who are excellent professionals, as EAPE, can become a precious instrument to guarantee the right to knowledge of citizens in overcoming the described difficulties and obstacles.

A last comment: I have tried to focus on all the methods we have to guarantee that the right to knowledge of citizens is respected. Each one of the methods needs to be applied with an ethical vision so the interests of the community are put first (.2-4)

CONCLUSION

The General Assembly of the European Council has discussed and voted on the Report “Freedom of media, political trust and rights to knowledge of citizens”. Knowledge can be deductive or inductive both producing enrichments of the mind and of the methods able to protect all species of the ecosystem, human kind included, but not alone. In this way Open Science and Open Access papers and books are basic instruments. As their adoption is complex due to contrasting interests within the stakeholder community scientific societies can play a fundamental role and Associations, such as EAPE having promotion of society as one of their objectives can contribute to the process of dissemination and transfer of knowledge and of education and participation of citizens. But every one of the proposed ways needs an ethical vision of the respective involved behaviours able to put before community to personal interests (5).

References

1. Benkler Y., Nissenbaum H.: Produzione e Virtù tra pari basate sui beni comuni, *Giornale di filosofia politica*, 24, 394-419 (2006).
2. Judson H.: Trasformazioni strutturali delle Scienze e fine della peer review, *Journal of American Medical Association* 272, 92-94 (1994).
3. Nikam K. Rajendra Babu H.: Passare da Script a Science 2.0 per la comunicazione accademica, *Webologia* 6, 1 (abstract) (2009).
4. Hollingworth JR., Mille KH, Hollingworth EJ: Fine dei superpoteri della Scienza?, *Nature* 454, 412-413 (2008).
5. Kesnik D.: *The Ethics of Science An introduction*, Taylor Francis Ed (1998).

INTEGRITY OF SCIENCE, THE INFORMATION INDUSTRY AND THE MYTH OF EXCELLENCE

Alberto Girlando

Molecular Materials Group, Parma, Italy
e-mail: alberto.girlando@momag.it

ABSTRACT

Nowadays integrity of science (openness, reproducibility, no conflict of interest) appears to be in jeopardy. The causes are complex, and bound to the evolution of our society. In this paper I will underline one of the possible causes, namely the application to science of the economic paradigm of efficiency, quantitative (numeric) assessment and continuous growth.

Keywords: Science integrity; open access; information Industry

INTRODUCTION

There is increasing concerns about the integrity of scientific research (1) whose pillars of openness, reproducibility and transparency (lack of conflict of interest) were put forward by Robert Boyle and eighteen century scientists. Indeed, today openness has become a synonym of to pay to publish, reproducibility from other parties has been made increasingly difficult (also due to the presence of voluntary scientific fraud) and lack of conflict of interest is hard to control in a world where economic return is foremost (2). The causes are manifold, and bound to the evolution of our society. In this contribution I will present my personal (and necessarily simplified) perspective as a Senior Professor of Chemical Physics and as a longtime Director of the Chemistry Library in my former University.

FROM “THE ENDLESS FRONTIER” to “THE TAXPAYER MUST KNOW”

At the end of the second world war Vannevar Bush in the U.S.A. launched “*the endless frontier of research*”, with the idea that basic research was the wellspring of knowledge and understanding. Accordingly, scientists were to be “*free to pursue truth wherever it might lead*”, so that there would be a flow of new

scientific knowledge to apply to practical problems in government, industry, or elsewhere. For some thirty years this has been the paradigm of scientific research, with U.S.A. taking the lead in scientific progress in western countries, not only through universities, but also thanks to several private research laboratories, at IBM, General Electric, Xerox Corporation etc. But in the 80s the private sector realized that long-term research was increasingly expensive. Without visible economic return many laboratories closed, and research was demanded of the Government. Approximately at the same time, mainly on the push of the so-called Chicago school, the economic paradigm of efficiency, accountability and continuous growth started to apply to the Government budget.

Following the mantra “*the taxpayer must know that his money is well spent*”, evaluation of research become increasingly invasive, indirectly controlling research endeavor: research was not anymore finalized to knowledge and understanding, and universities were increasingly pushed to set up their research strategies around the requirements of assessments. The assessment and evaluation also shifted money from people doing research to people evaluating it: For instance, in 2014 the UK evaluation process “Research Excellence Framework” cost around 300 million Euros. Even if it costs so much (without counting the burden for the scientists), the adopted performance metric fails to capture what it tries to do, i.e., quality of research, and I wonder whether numerical, i.e., quantitative method can ever do so. Rather than abandoning the numeric research evaluation, the European Union has now launched a program to change the method of assessment, proposing that the criteria should also reward ethics and integrity, in addition to research “quality and impact”, as done so far.

THE MYTH OF EXCELLENCE AND OPEN SCIENCE DONE WRONG

Modern science mainly progresses through the publication of articles in scientific journals. Initially these journals were produced by the scientific societies. The journals, which often struggled to be profitable, were managed by authors, referees and editors, all of which were generally not paid, and the cost of the journals to the libraries was essentially related to the production process (printing and distributing). This business model was rather unusual, and was forged to ease communication between scientists, not to make money. But around the 50s commercial editors entered the game (Pergamon Press, later acquired by Elsevier) (3). In the case of a commercial publisher, quality of the

papers was not so important, rather the quantity: the publication range expanded, so the libraries could not overlook the subscription, with the price that increased in function of the diffusion of the journal. Aggressive commercial practice was commonplace, by which, for instance, a publisher provided a package of journals (e.g. all journals related to Chemistry) containing well-established titles and very sectorial or just-launched ones. The price of the package was far less than the sum of the important part of the subscription, and the price was different for different universities. At the same time commercial editors found a way to assess numerically the impact (taken as a substitution for authority) of a journal. The impact factor (IF) of a journal was established through the number of citations received for publications in that journal by other articles that subsequently appeared (ISI Citation Index). Bibliometrics was born. But the IF, intended as a means to measure the *influence* of a journal, soon came to be understood as a measure of *quality*. Thus, journals tried to increase their IF with several strategies. At the same time, authors started to be judged by the IF of the journals they published in. Generalist magazines, like Nature, rapidly increased their IF, and became very selective with respect to authors, thus gaining credit of excellence. And the choice of which papers should be sent to reviewers and eventually published was more related to the possible increase of the IF than to the intrinsic quality of the paper: extraordinary results and quite difficult experiments received most attention. But according to surveys about a half of respondents were unable to reproduce *their own results*.

Electronic publishing greatly reduced the publication and distribution costs, at the same time allowing detailed control of the access to the published papers. Bibliometrics became easier to implement, and individual authors started to be evaluated not only on the basis of the IF of the journal in which they published the paper, but also by the number of citations: also, assessment of the author production relied on numbers, as the h-index (4). In addition, copyright given by the authors to the publishers became a barrier to communication. Before the web anyone wanting to read a paper could just walk into a library, read it, and make a copy for personal use. Or he/she could write to the author for a printed copy. But with electronics everything could be controlled, including the number of times a given article was downloaded, and access by non-subscribers was made difficult. Piracy of contents was the reaction, and self-archiving was impeded.

The combination of reduction of publication costs, the increased number of scientists including from developing countries like China and India, and the push to publish papers have yielded a worldwide explosion of articles. Bibliometrics

has become the main method to evaluate research and people. Governments push for excellence, and scientists struggle to emerge. The publishers, now self-dubbed the “information industry”, push to increase the number of publications and offer authors promotion of their work outside the traditional channels, like Facebook etc. At the same time, governments push for accountability and excellence: rankings for people, as well as departments and universities, are being put forward every year. The information industry has also developed software, like Scopus or Web of Science, to “automatically” evaluate scientists.

In the effort to emerge into a continuously increasing publication rate and to obtain financial support for the growing costs of research, the myth of “excellence” has emerged, pushed by governments to gain appreciation by the citizens, and of course, by scientist’s individual ambitions. In this climate, fraud, up to the point of false data fabrication, has become more common (5). Besides plagiarism, made very easy with electronic publishing, new ways to increase h-index or IF have been devised, such as scamming: scammers impersonate guest editors of special issues on a particular topic, and obtain publication of sham papers. Big editors, like Elsevier and Springer-Nature have been recently involved, with hundreds of retracted articles, some with nonsense titles like “Sea level height based on big data of Internet of Things and aerobic teaching in coastal areas” (6).

The artificial increase of subscription prices of scientific journals, coupled to the control of copyright, was substantially impeding scientific communication. In order to remove such obstacles, and always on the basis that science funded by the Governments should be accessible to taxpayers, the idea of open access (OA) has been launched: authors, institutions and funders pay for the publication costs, and the resulting electronic papers are freely accessible to everyone. In principle, the idea is nice, but with the information industry always eager for money, it is diverting an important part of research costs from scientists to publishers. Since readers and librarians are no longer involved in establishing the importance and influence of journals, which now only rely on IF, publishing a single OA paper in journals like Nature or Lancet costs about 10,000 Euros. In this way only well-funded, successful scientists and institutions can afford to publish in such journals: OA is compounding more inequities than resolving them. Everyone can read, but not everyone can be read. Is science becoming the preserve of affluent people? Application of the economic paradigm of efficiency, quantitative (numeric) assessment and continuous growth is in my opinion undermining science integrity.

CONCLUSION

Young researchers, with their career and funding bound to this myth of productivity and excellence, are pushed to bypass science integrity. In science, as in other contexts, “to appear” is more important than “to be”, and this is damaging science and people’s trust. Scholarship and mentoring from Emeriti Professors should be recognized and valorized to restore value to science as a cultural, and not just economic, achievement (3).

References

1. Kretser A, Murphy D, Bertuzzi S, et al. Scientific Integrity Principles and Best Practices: Recommendations from a Scientific Integrity Consortium. *Sci Eng Ethics*. 2019; 25:327–355. doi:10.1007/s11948-019-00094-3
2. Greenberg D S. *Science for sale*. Chicago (IL): The Chicago University Press; 2007.
3. Leng G, Leng R I. *The Matter of Facts*. Cambridge (MA): The MIT Press; 2020.
4. Hirsch J E. An index to quantify an individual’s scientific research output. *Proc Natl Acad Sci USA*. 2005; 102: 16569–16572. doi: 10.1073/pnas.0507655102
5. Fanelli D. How Many Scientists Fabricate and Falsify Research? A Systematic Review and Meta-Analysis of Survey Data. *PLOS ONE*. 2009; 4:1-11. doi: 10.1371/journal.pone.000573
6. Else H. Scammers impersonate guest editors to get sham papers published. *Nature*. 2021; 599:361. doi: 10.1038/d41586-021-03035-y

THE EUROPEAN UNION AND ITS CULTURAL HERITAGE

Stella Priovolou

Professor Emerita, Latin and Italian Literature, University of Athens,
President of the Association of Professors Emeriti
of the National and Kapodistrian University of Athens
e-mail: stepri@ill.uoa.gr

ABSTRACT

All political and social systems strive for a better future and Society. We still have to attain an ideal state. Europe is unfortunately no exception.

In 1950 in Paris, Robert Schuman and Jean Monnet declared their vision of the political union of the European countries for the purpose of eliminating all occasions of war in Europe, which had then been deeply wounded by the conflicts of different interests and ideologies. The two politicians wished to bring countries together with the aim of creating a “Europe without borders”, a Europe of moral values, culture and civilization. Unfortunately, today Europe appears to be an exclusively monetary union and not the political and cultural one that its founding fathers had envisioned. The Greco-Roman roots of Europe, which constitute its greatest advantage, its most valuable heritage and the most powerful element of unity, seem to suffocate in the context of globalization. The European Union, which is now experiencing a financial war as well, seems to be indifferent to citizens’ lives.

We undoubtedly need a policy that will build once again a plan, a vision for the future. Mentors from all over Europe are ringing the alarm bells about its course, giving advice and suggesting solutions to the problems that keep arising on a daily basis. It would be a blessing if the European Union leaders listened to their messages, which are pointed out in this presentation, so that the vision of the inspirers of a united Europe is revived again, along with the hope of the youth of today for a human-centered Europe.

Keywords: Utopia; Constitution of Europe; new humanism; Greco-Roman civilization

INTRODUCTION

Utopia is the detailed description of an ideal human society or community, usually found in a specific literary work such as Plato's "Republic". Is the union of European peoples a utopia too? (1)

Today Europe is dominated by money, large enterprises and material interests. However, it ought to be a Europe of principles, education and Greco-Roman civilization. These are its greatest advantages and its most valuable heritage. The cultural values born in Europe, which, despite their multiformity, are the most powerful element of unity, seem to suffocate in the context of globalization.

Jean Monnet and Robert Schuman were the visionaries of the political union of the European countries for the purpose of eliminating all occasions of war in Europe, which had then been deeply wounded by the conflicts of different interests and ideologies. The two politicians wished to bring countries together with the aim of creating a "Europe without borders", a Europe of moral values, culture and civilization. Sadly, the European Union's plans are in crisis today, as the French philosopher Edgar Morin ascertains, because Europe has not progressed in terms of either political or cultural conscience, neither has it progressed in terms of democratic conscience (2). Present-day Europe has been moulded by history since the ancient Greeks gave it the name it still bears today and will keep forever. The future must be based on this heritage, thanks to which Europe became a world of exceptional wealth and creativity in its unity and diversity.

In October 2004, the Heads of State or Government of the 25 member states of the EU and the 3 candidate countries signed the treaty for establishing a Constitution for Europe. The preamble of the Constitution draft began with the following quote from *Thucydides'* famous work *Pericles' Funeral Oration* (II,37.1), the translation of which is worth remembering: "Our form of government does not imitate the laws of other states; we are rather an example to others than imitators ourselves". However, this quote from *Pericles' Funeral Oration* was omitted from the final text of the Treaty. This omission, which could have been deemed accidental at the time, can easily be seen as intentional today.

On the occasion of the celebration of the 150th anniversary of Italy's unification the central event was the performance of Verdi's "Nabucco" conducted by Riccardo Muti at the Opera of Rome. With this performance, Muti showed the way to recovery from the global crisis through civilization. He reminded his audience that "Nabucco" premiered as a patriotic opera that had

to do with Italy's national identity. Based on the famous phrase «Oh, mia patria si bella e perduta», Muti said that the impression prevailing abroad is that his country is truly beautiful, but if its civilization dies, this country will be indeed beautiful but lost, and he called on citizens to join their voices and fight to save civilization.

As European citizens, dear colleagues, we must seek a “new humanism” tolerant of multiculturalism and adapted to the new circumstances in order to create the Europe of citizens, of institutions and of human rights. Professor G. Babinotis (3) in an article with the title “The New Greek Enlightenment”, points out: “We need a spiritual awakening, a modern Enlightenment that will help us get rid of the weights that have dragged us down to the bottom of national discredit.” It is also worth noting what Stantis Apostolidis observes in the Introduction to the Greek edition of “Humanism – Classical Studies in the Renaissance” (4), a book by the Italian thinker Nicola Festa: “The return to the roots, which characterized the 15th century Italian civilization, was a mainly patriotic trend and touches the very core of the era; for after medieval monotropism and narrow-mindedness, when dawn breaks, the first thing that people think of doing is holding on to a glorious past, a descent, some mighty ancestors that will help them build a new world.” In the Introduction to the same book, one can also read a very interesting opinion on today's crisis in Europe: “Humanism has been ‘unifying’ while we have been ‘dividing’. Then our time, despite declarations to the contrary, is conventional, whereas humanism, which is the exact opposite per se, has always detested conventionalities, constantly seeking after what is primary, genuine and essential. When the head of a particularly bigoted and dogmatic Church, Pope Piccolomini, an ardent humanist himself, crossing the limits, declared that ‘the translation of a classical masterpiece is tantamount at least to one soul salvation’, make no mistake, this was not a mere spiritual movement, it was a *revolution*, and it is worth bringing it back!”

A NEW ERA

In the era of multiculturalism and globalization, the peoples that have inherited the Greco-Roman education are mainly those who can contribute their education and knowledge to the large European family at the time of the indescribable and unexpected crisis that is plaguing the peoples. The Greco-Roman world, which the western civilization originates from, offers a critical arsenal that not only remains active but can also help get our thought out of many impasses. Most

notably, the Italian classicist Luciano Canfora (5) ascertains that “Augustine, having realized that the pre-existing order of things was collapsing, wrote *De civitate Dei*, a book looking to the future in the only constructive way possible: going through the past, namely the triumphant course of imperial Rome. A similar exercise would be definitely useful today.”

It is a fact that the Greco-Roman period could be seen as a gigantic experiment of economic and cultural globalization that culminated in the central centuries of the Roman Empire; as to the latter, we have the privilege to know not only the time when it was shaped but also the mechanisms and times of its final collapse. The same comparison between the Roman Empire and the American Empire, which is quite widespread today, especially in the United States, shows how pressing the need is to explore parallel cases mainly in relation to the crisis and the decay of the past and present societies.

The paradigms of Greco-Roman civilization have not merely museum value; they possess a didactic power and a timeless value which should not be ignored or underestimated at a time that seems to have reached its limit.

Moreover, the refugee problem is already intractable and the very existence of Europe is at stake. If Europe truly wishes to continue to be united, it will have to find a way to combine its own forces in building a system of government based on the humanitarian principles and values of its visionaries. Refugees are human beings too; and there wouldn't be any refugees if there weren't such an obsession with war. So, a question reasonably arises: how is it possible that the EU does not realize that, as long as the war goes on, the refugee problem will keep worsening and threatening peace? Let us not forget, of course that, as Plato (Phaedo 66c7-8) said, “all wars are made for the acquisition of money”.

Plato (Republic V,473d), maintains that only when philosophers reign and kings philosophize will peoples be happy, because philosophers know the true world of ideas that is illuminated by the Good.

Let's take a look at the analyses of Professor Jürgen Habermas (6), the famous 92-year-old German philosopher and sociologist. The work of Habermas focuses on the analysis of the developed capitalist societies and democracy, the concept of legitimization in a critical socio-developmental framework, and modern politics, especially German politics, which he does not hesitate to oppose, defending world prosperity. In his speech at the World Congress of Philosophy held in Greece in 2013, at the time of the dire European crisis, Professor Habermas, an ardent adherent of the European vision, asked Berlin and the European Union in general for more unity, closer cooperation among member

states, political solidarity, to promote growth and competitiveness in the Eurozone, more democracy in Europe and changes in its treaties. European politics should have to do with all citizens and not only the elites. Democracy in Europe, as the German philosopher pointed out, is in danger because of the policy imposed by the German government on its partners in order to exit the crisis.

When the philosopher was asked how he sees the relationships between law and politics today, he answered: “Today our democratic institutions are increasingly becoming a mere façade so that the nation complies with the demands of the world market. We do not possess organizations that can combine the abilities of democratic action and democratic control. Today there do not exist even the minimum conditions for the development of broader political regimes more willing to cooperate and able to tame the deregulated financial markets worldwide in order to reduce the extreme social inequalities that can be found within national societies, but mainly between countries and continents... We need to reconsider the incredibly selective application of the supposedly universal criteria of the West, for instance concepts such as human rights and social evolution. These are tough questions that we ought to answer.”

CONCLUSION

We undoubtedly need a policy that will build once again a plan, a vision for the future. Mentors from all over Europe are ringing the alarm bells about its course, giving advice and suggesting solutions to the problems that keep arising on a daily basis. As is well known, Mentor first appears in Homer’s *Odyssey* and the goddess Athena takes his form to accompany Telemachus on his quest for his father. Thus, the word “mentor” has come to mean “advisor” and “spiritual guide” in all languages. It would be a blessing if the leaders of the European Union listened to the messages of the mentors so that the vision of the inspirers of a united Europe is revived again, along with the hope of the youth of today that will motivate them to fight for a human-centered Europe.

Dum spiramus, speramus for a Europe of the peoples.

References

1. Priovolou S., Quo vadis Europa? L’Unione Europea è un’ utopia? *Classici Contro*, n.12, Mimesis, Milano-Udine 2019, 195-203.
2. Priovolou S., “Το Καποδιστριακό” newspaper, 1 April 2007, *Opinions*, Il Giubileo dell’ Europa Unita e la visione di Umberto Campagnolo.

3. Babiniotis G., To BHMA της Κυριακής newspaper, 4 Dec.2011, Essays, A.49.
4. Festa N., Umanesimo. Le lettere classiche nel Rinascimento (a cura di Arkos e Santis R.Apostolidis), Nea Ellinika, Atene, 2000, introd.,iv, x.
5. Canfora L., Critica della retorica democratica (2002), (trad.greca P.Skondra), Atene 2003, 123.
6. Priovolou S., Philosophizing about Europe with German Professor Jurgen Habermas in Greece of the years of the crisis, European Association of Professors Emeriti e-newsletter, issue 07/ January 2020, 6-7.

THE RELEVANCE OF SOCIAL AND PROFESSIONAL MASKS

Dana Baran

Department of Preventive Medicine and Interdisciplinarity
“Grigore T. Popa” University of Medicine and Pharmacy, Iasi, Romania
e-mail: dana_baran@yahoo.com

ABSTRACT

In the Italian *Commedia dell'Arte*, the key-characters reveal trades, social functions and life course transitions confronted with their criticism. Masks, i.e., “personae” in Latin, separated “persons” from “persons”, protecting individuals from getting contaminated by vices. Their perpetual interplay of being, seeming, acting and cheating persuaded people to choose virtues. Old age brings about a dynamic change in humans’ life; it is such a mask potentially associated with a sort of social and professional isolation or marginalisation. Yet the elderly illustrate a valuable, although entropic, capital of wisdom and skills. The Covid-19 pandemic has pointed out the biological, medical and social vulnerability of this age group, often looked at as a financial burden. A sort of compensatory positive discrimination emerged, supposedly for not confusing the Greek terms “γέρος” (old) and “γερός” (healthy). Now the metaverse challenges ‘magnificent doctors’ to reconsider metaphysics, opportunities and perspectives of a transhumanist posthuman society.

Keywords: Mask; personality; elder; knowledge; mentorship

INTRODUCTION: COMMEDIA DELL'ARTE. MASKS AND PERSONALITIES

In the classic Italian *Commedia dell'Arte*, the key-characters reveal reference trades, social functions and life course transitions confronted with their criticism.^(1,2) Mirroring reality, *Commedia dell'Arte* allows humans to act behind specific masks hiding their proper features and moralistically expressing their characters’ caricatures. Masks protect social actors own identity, mediating knowledge, understanding, satirizing habits. Interchangeable in their interplay, they are real individuals as expressed by the Latin term “persona”, i.e. person; mask. Art has constantly played a central part in public debates and community building, in societal resilience and recovery during and after catastrophic situa-

tions. Old age brings about a dynamic, sometimes a dramatic, change in humans' lives. Metaphorically speaking, it is a biological mask potentially associated with a sort of social and professional isolation or marginalisation. Yet the elder illustrate a valuable, even though entropic, capital of continuity, wisdom and skills. They are living-implicitly subjective witnesses of historical events and part of the living treasures of mankind, integrators for dissipative systems.

Linking past and future to present, facing the threats of rigid gerontocracy and the benefits of fruitful, protective and developmental mentorship, professors emeriti have constantly to regain their role, position and vocation under the contemporary world circumstances, balancing high standard technologies and humanistic approaches. The SARS-CoV-2 pandemic has pointed out the medical vulnerability of this age group, often looked at as a social and financial burden. Hence a sort of compensatory positive discrimination arose, supposedly for not confusing the Greek terms “γέρος” (old) and “ὑγιής” (*healthy*). How to overcome shortages that age brings about? Artificial intelligence, virtual presence and lately the metaverse challenge ‘magnificent doctors’, inviting them to reconsider the metaphysics, opportunities and perspectives of a post-Christian, post-Eurocentric, transhumanist and posthuman society. A “cosmodern” human is now envisaged, able to electively mix up science and spirituality from a transdisciplinary perspective.(3,4) A perpetual metamorphosis of the species occurs changing masks, dialogues, perspectives, fates!

THE WORLD AS A THEATER. PLAYING WITH MASKS AND THE COVID PANDEMIC

Theatrical masks embody all sort of human crises: moral and psychological, social and religious, biological and economic. “Give the man a mask and he will tell you the truth”!-Oscar Wilde exclaimed. This happened in Italy in the sixteenth and seventeenth centuries, in the profane world of the *Commedia dell'arte* – a “parody of the craft”, “comedy of the profession”, when this “art comedy” appeared.

Wearing masks is a behaviour that evolved throughout the millennia along an “error and trial” pathway, critically considering man's own behaviour, memories and ideals. Between identity, alterity and multifaceted personalities, a specific crisis of *conscience* ensued during each developmental stage of mankind. (5,6) Human duality or “multiple personality” repeatedly gave birth to different metamorphoses and games with masks, enabling a rather detached confrontation between characters and innate features, dogmas and emancipation, tendencies and

aspirations, failures and achievements, shame and boldness, shininess and audacity. Sublimation mediated by artistically masked dramas helped humans to cathartically get rid of personal torments whereas the society, as a whole, learned from these lessons, lit up its face with joy and made further progress. From prehistoric rituals to traditional folk magic, from passage rituals and popular theater to *commedia dell'arte* patterns and modern aliens' avatars, masks accompanied people, helping them reveal and hide, disguise and adapt the phenomenology of their complex "self-being", their "self-concepts" (Fig.1). Living as on a huge stage, humans survey, imagine, materialize and adapt appropriate environments to various needs. Social actors' and comedians' masks are so different from one another. Yet they have to accept each other within a cohesive and coherent community, exchanging information, intertwining their interests.



Fig. 1. Romanian New Year's Eve folk rituals with masks.

During the recent Covid-19 pandemic, wearing face masks became mandatory in public and enclosed spaces in many countries. Consequently many significant reactions arose particularly in the long run, revealing the psychological role of masks and their impact on social relationships, their cultural meaning in different political, religious and cultural anthropological contexts.(5) People were confined to their homes and their everyday "agoras" were closed down. Real life partially turned into virtual reality. But for contemporary adult generations the memories of an open world, of an open stage, were still vivid, the terms of comparison to "normal" life persisted. A crisis of *self-consciousness* or self-awareness stemmed out, because face masks inhibit the "performance of the face-work". According to the sociologist Erving Goffman, the face itself behaves like a mask. Goffman developed a dramaturgical theory of the self and society he had identified in George Herbert Mead's basic conception of social interaction.(6) Everything aims at a better "impression management" which combines conscious decisions and unconscious, unpredictable reactions, since the acting individuals try to reveal certain aspects of the self, while concealing others.(7) Face-to-face communication is more difficult when mediated by mask-barriers and only empathically smiling

with the eyes is possible. The social relationship interplay greatly influences human personalities, mentalities, attitudes, health and facts.(8)

CULTURAL AND MEDICAL ANTHROPOLOGICAL CHALLENGES

The mask has accompanied doctors since ancient times. The Renaissance plague doctor mask is the best known artifact. (Fig.2) It was a sort of medical uniform



Fig. 2. Venetian Plague Doctor Mask.

meant to protect them from contagious diseases. In modern history prophylactic face-masks were worn during the 1910-1911 Manchurian plague and 1918 Spanish flu outbreaks. In Japan, mask-wearing was considered a courtesy to other people. In other Asian countries, such as China, Taiwan, Hong Kong, South-Korea, mask-wearing has become rather common due to air pollution and previous pandemics like SARS, and the 2009 H1N1 swine flu- outbreak. Increased levels of air pollution in large and crowded cities have also required more people to wear masks in India, Brazil, sub-Saharan Africa and even parts of Europe. Anyway, in most European and other Western countries, mask-wearing has not been common. More than that, masks were perceived as a serious threat to personal freedom and identity.(9) Nowadays,

once again everything happened all of a sudden and compulsory preventive measures were imposed: wearing masks, getting isolated and vaccinated. Although very strict, these rules could neither completely stop new Covid infections from disseminating, nor secondary effects of both vaccines and Covid-19 from occurring.

For the time being human science proved its limits and concurrently unveiled the deep behavioural archetypes and understanding patterns of the human mind and soul, their affective memories. The influence of cultural ideas, unconscious fears and external pressures remains largely inexplicable but it irritates officials. Masks confirmed their ability to make people feel safer and soon they became fashion items suggesting new esthetic coordinates. No more restrictions, but already a choice and disability turned into virtue! Concurrently masks were little by little sublimated into the “iconic image of the global crisis”.(5)

A MEDICAL COMMEDIA DELL'ARTE

The current pandemic has illustrated a “Comedy of the Medical Art” from various perspectives: medical, social, economic, political and epidemiological. Emergency management and feverish decisions of the state associated with hesitations, inconsistency and lack of professionalism. Governmental interventions in the medical process during the pandemic clearly illustrated restrictions of the citizens right to health whereas the very personal doctor-patient relationships were altered. The lack of transparency in communication and infodemia crowned the whole social “disintegration”. Infodemia mixed up contradictory scientific statements, medical recommendations and “guided information”. Consequently “medical and political dictatorship” seemed quite a possible “conspiracy” or a threatening perspective. Ultracrepidarianism was part of this “improvisation show”. It was an incredible live “commedia dell’arte” able to discourage and confuse people. To a certain extent characters reminded physicians and patients under disguise in Molière’s plays or in Goldoni’s comedies.(10) Other times a Kafkaesque atmosphere resulted.

The pandemic clearly showed the shortcomings of the power exercise system. (11) No wonder that many people, even without having suffered from Covid or post-vaccine reactions, were psychologically disturbed more than before. Public health politics and policies often tried to reciprocally hide the risks and anxieties they engendered. As specialists say, “social responses to disease are rarely influenced by scientific evidence alone or evidence of complete effectiveness”. (5) The more-so in a post-democratic era.

Apart from the accuracy of information and the respect for individual and collective liberties, one has to make sure that disease related restrictions remain humane and based on a reliable system of evidence-based medicine, not on “guideline-based medicine”.(12) Natural life and ecology were affected, and sociopathology intensified. The well-known “Pharmageddon” theory was emphasized. (13) Excessive pharmaceuticalization of medicine and a possible world “new medical order” based on epidemic intelligence and globalization were feared. The World Health Organisation’s scientific decision-making authority, its cooperation with medical, pharmaceutical and political institutions were called into question. From now on, setting up transnational cooperation for transmissible disease-prevention and management would require a “united nations” planetary society, a “science-based society” able to “control” individual rights and homogenise the population. (14) The update “One health” concept is another globalist approach. Against this background, relationships between mentors, representing part of the human

live heritage, and disciples, involving transgenerational knowledge transmission, is redimensioned in a virtual or augmented reality, in a digitized, “transhuman” society or a neuralink-based metaverse to come.(15)

CONCLUSION

In the transgression from the sublime to the ridiculous, a metamorphotic “comedy of errors” has to be faced and fought. ‘Magnificent Doctors’, repositories of proficiency in specific domains, can still represent proactive stimuli of the society. They can mediate progress and through their living memories render people wiser, better informed, and aware of their capacities and limitations. Eventually, another problem of mind over matter: “if you don’t mind it doesn’t matter”.

References

1. Marculescu O. *Commedia dell’arte*, Ed. Univers, București, 1984, 563 p.
2. Grigore V. G. [The Art of Commedia dell’Arte], Ed. Proximia, Bucuresti, 2014, 181p.
3. Nicolesco B. [The Cosmodern Human], Ed. Junimea, Iasi, 2022, 676 p.
4. Ruano J.C. *Cosmodern Philosophy: Transdisciplinary Reflections on Nature, Science, and Religion*, [Internet]’Illy. Revista de Ciencias de las Religiones, 2018.
5. McEwan C. The social meaning of masks.RGS-IBG Managing Editor: Academic Publications, [Internet] November, 23, 2020,
6. Mead GH. *Mind, Self and Society*. University of Chicago Press, 1972, 401 p.
7. Goffman E. *The Presentation of Self in Everyday Life*. University of Edinburgh Social Sciences Research Centre, 1956, 162p.
8. Geukes K, Breil SM, Hutteman R, Nestler S, Küfner ACP, Back MD. Explaining the longitudinal interplay of personality and social relationships in the laboratory and in the field: The PILS and the CONNECT study, *PLoS ONE* 2019, 14(1); e0210424.
9. Lynteris C. *Plague Masks: The Visual Emergence of Anti-Epidemic Personal Protection Equipment*, *Medical Anthropology*, 2018, 37; 6: 442-457, [Internet] doi: 10.1080/01459740.2017. 1423072 (accessed 2022, April 15)
10. Brunoro MA. *The comic contest in Molière and Goldoni* (Thesis), University of British Columbia, Vancouver, 1983, 216 p.
11. Ciurea V, Restian A, Artenie T. [Romania without a Mask. False Treatise of Pandemic], Ed. Mediafax, Bucuresti, 2021, 192 p.
12. Bacharaki D, Athanasios Diamandopoulos A. Emperor’s syndrome in the COVID-19 era: Time for patient-centered nephrology? *World J Nephrol*, 2021, 25; 10(1):1-7.
13. Healy D. *Pharmageddon*, Berkeley: University of California Press 2012, 320 p.
14. Rubin E.J., Baden R.L., Brandt A.M, Morrissey S. Audio Interview: What Earlier Epidemics Teach Us about Covid-19, *N Engl J Med* 2021, [Internet] 384: e55 DOI: 10.1056/NEJMe2105030 (accessed 2022, April 10)
15. Lilley S. J. *Transhumanism and Society: The Social Debate over Human Enhancement*, New York: Springer, 2013, 91 p.

MATURITY AND WISDOM OF YOUNG PEOPLE

Hendrik Ehrich, Mara Ehrich, Eric Schiffer and Jochen Ehrich

e-mail: Ehrich.jochen@mh-hannover.de

ABSTRACT

Maturity characterizes attitudes to life and necessary stages of development of young and old people, and only few of them reach wisdom in the hoped-for, expected, necessary and meaningful form and intensity. The term “wisdom” seems to us to be outdated and its complex spectrum should better be subsumed under the term “age-related maturity.”

Keywords: Maturity; wisdom; young people

INTRODUCTION

This review examines the life domains of youth and old age that pose philosophical questions about maturity and wisdom. Our review considers the role of children and the elderly as a socially relevant category at the intersection of the collective sense of life under the aspect of culturally organized value and competence, and of the sense perceptions as individual sensory and perceptual endowments. Within the framework of this distinction, perceptions, feelings and sense-making will become the object of our empirical understanding of the role of the young and old generations in society.

Perceptions, feelings, and sense-making of a society are used by the faculties of seeing, hearing, feeling, and thinking in everyday life in different ways depending on age: 1. both as communication opportunities and burdens, 2. as carriers of information about reality, 3. as mediators between people’s minds and their external world, and 4. as inter-actors between young and old. In this article, the mental development of adolescents and the elderly as members of society is examined and extended to other areas, such as the identification of children and elderly persons as philosophers and bearers of rights and values, and as makers of meaning in human life.

MATURITY AND WISDOM AS LIFE FULFILLMENTS

Maturity characterizes attitudes to life and necessary stages of development of young and old people, and only few of them reach wisdom in the hoped-for, expected, necessary and meaningful form and intensity.

Firstly, maturity and wisdom are about subjective views of life, i.e. inner wish fulfillments of each individual life.

Second, they are about objective views, i.e. fulfillments of external expectations imposed on an individual from the outside, i.e. from the point of view of the surrounding community of people.

Third, they are about the interactive cooperation between individual and community, i.e. the biographical fulfillments of life achievements under the aspects of social successes and failures.

Fourth, they are about systemic views of existential life fulfillments, i.e. taking stock of what has been experienced, needed, and achieved under the aspects of critical insight, reason, and faith.

All four perspectives taken together provide an overall picture of the individual's identity, authenticity, and spirituality and self-realization, which are requirements of a mature or wise person (1) (Table).

MATURITY OF YOUNG PEOPLE

A general stage of maturity is reached by adolescents and young adults after puberty and describes a normative developmental transition that all young people go through. The maturation process is individually shaped by both social and biological processes.

A first stage of educational maturity after schooling refers to the entrance qualifications for adolescents for education and training of young adults in various fields and professions at colleges, universities and other vocational institutions which open the second stage of professional maturity of early adulthood. Continuous learning and maturation are inter-related activities.

Maturation is an ongoing and life long developmental process which is accompanied by aging.

A later stage of maturity is reached in old people when they reflect on the sense of their lives. Elderly people who feel fulfilled by their past and present lives may reach a balance of needs and wants, in which they can face future with peace. By contrast, those older persons who had lived no good life have a risk to fall into despair.

Table. Evaluation of maturity and wisdom in young people

1. Subjective view and inner wish fulfillments.
2. Objective view and fulfillments of external expectations.
3. Interactive view and biographical fulfillments of life achievements.
4. Systemic view and existential life fulfillments.

CONCLUSION

The term “wisdom” seems to us to be outdated and its complex spectrum should better be subsumed under the term “age-related maturity.” If the maturity of older people differs from that of the young population, the question arises as to how polar views and opposing values can be brought together to form a consensus when it comes to young and old. Pairs of opposites are usually related in content and relate to a common cause. They are not always 180-degree opposites. In human philosophy, life usually takes place in the space between the poles of life (birth and death, individualism and collectivism) and man asks himself, “Where do I stand?” Is virtue the right middle between two opposite extremes such as young and old?

References

1. Schulz von Thun F. Erfülltes Leben. Hanser, Berlin 2021.
2. Osbeck LM, Robinson DN. Philosophical theories of wisdom. In: A Handbook of Wisdom Psychological Perspectives. Cambridge University Press 2009, pp;61 - 83
DOI: <https://doi.org/10.1017/CBO9780511610486>

DOGS, VULTURES AND THE VICTIMS OF MASS DESTRUCTION

Athanasios Diamandopoulos

Hon. Professor Medicine, Nephrologist/Archaeologist,
EKPA and Louros Foundation for the History of Medicine, Athens
e-mail: 1453295@gmail.com

ABSTRACT

We discuss the excarnation of the victims of pandemics and wars by dogs and vultures. Homer starts his Iliad with: “*Sing, O goddess, the anger of Achilles son of Peleus...and many a hero did it yield a prey to dogs and vultures.*” John of Ephesus made the same observation during the 6th century AD Alexandrian Plague. In our era, scenes with dogs chewing dead corona victims buried superficially, or even on hospital stretches, are common in India. Although this kind of cannibalism was born via necessity, another reason was the post mortem humiliation of culprits, thus imposing the same practice for the killed enemies, criminals or rebels. It was common for the crucified victims to have their lower limbs eaten by dogs and the upper ones by vultures, while still on the cross. We conclude that dogs and vultures collaborated with humans in clearing those who had succumbed either to pandemics or to State violence.

Keywords: Dogs’ cannibalism; excarnation; Homer’s pandemic; Sophocles “Antigone”; coronavirus

INTRODUCTION

A big problem recurrently arising from pandemics and other great disasters is the handling of the amassed corpses. In this paper we discuss the blasphemous solution given by the preying dogs and vultures

IN EPIDEMICS

Homer, in the Iliad, offers the first example in Western literature:

Rhapsody I, 1. *Sing, O goddess, the anger of Achilles son of Peleus, that brought countless ills upon the Achaeans. Many a brave soul did it send hurrying down to Hades, and many a hero did it yield a prey to dogs and vultures*”.

John of Ephesus (whose text we will refer to later), notes the devouring of the victims of the pandemic by dogs in the 6th century in Alexandria. The scenes of devouring of the dead of the Covid-19 pandemic in India are completely in line with this; some exhumed from shallow graves, but others still on hospital stretchers waiting for evacuation! (1). A macabre observation was made in New York, where its 40,000 coronavirus victims led to vultures circling over Manhattan (2). An indirect reference to the routine devouring of the dead during mass destructions was provided by Thucydides in his famous description of the plague of Athens during the Peloponnesian War. He notes that the dogs and vultures did not eat the victims of the epidemic, obviously because their odour put them off (3). The same observation was made by Procopius of Caesarea during the 6th-century plague in Constantinople: *“Although many remained unburied, the vultures and animals that touch human meat would not approach them or, if they ate of them, they died”* (4). The ability of dogs to sniff out diseases and thus to be used as diagnostic aids has been extensively described (5). During the Covid-19 pandemic, specially trained dogs able to smell the virus in carriers have been recruited. Extensive studies are already under way on the widespread application of this method at entry gates in stadiums and so on (6).

IN WARS

In medieval sagas the man-eating wolf (the dog's ancestor) walks in the battle field. (7). Lord Byron's poem “The Siege of Corinth” referring to the battle between the Venetians and the Ottomans for the occupation of its fortress relates: *“Gorging and growling o'er carcass and limb; they were too busy to bark at him! From a Tartar's skull they had stripped the flesh, as ye peel the fig when its fruit is fresh; and their white tusks crunched o'er the whiter skull, as it slipped through their jaws, when their edge”* (8).

After the Battle of Gettysburg during the American Civil War thousands of vultures were attracted to the horse carcasses left from the battle. In 1971, during the crackdown in East Pakistan, following a bloodbath, the military forces of West Pakistan forced millions of civilians to flee to India as refugees. On the road to the border many lost their lives either to hardship or due to the cholera epidemic that broke out. *In both cases, the bodies became fodder for vultures and dogs* (9). In the civil war in Angola (1975-2002) the dead locals were eaten by vultures. Similarly, in Rwanda (1990-1994), after raping the

captive women, the anti-Tutsi rebels would throw them as food to the dogs (10). Recently it has been reported that during the war in Ukraine both Russian and Ukrainian dead soldiers were cannibalised by dogs.

AS PUNISHMENT

In history, after execution, those convicted of various offences - mainly against a regime - were left exposed so that vultures and dogs could feast on their bodies. Homer in Iliad Rhapsody XXIV, 405, describes. *"Then answered Priam, 'If you are indeed the squire of Achilles son of Peleus, tell me now the whole truth. Is my son still at the ships, or has Achilles hewn him limb from limb, and given him to his hounds?'"* Four centuries later, Sophocles returns to this topic in his tragedy Antigone. To avoid the dishonouring of Polyneices' corpse, ordered because he had campaigned against his homeland, his sister stated: *"But the hapless corpse of Polyneices-as rumour saith, it hath been published to the town, that none shall entomb him or mourn, but leave unwept, unsepulchred, a welcome store for the birds, as they espy him, to feast on at will"*. In the same tragedy, the heroine, despite the orders of the state authorities, buried her brother and thus when the guards searched for the missing body they wondered why: *"And no sign met the eye as though any beast of prey or any dog had come nigh to him, or torn him"* (11). Already Leviticus sets forth a curse for sinners, stating that their corpses will be eaten by dogs: *"Jezebel then informed Ahab that he could successfully seize possession of Naboth's vineyard. Nonetheless, Elijah condemned Ahab for committing theft and murder. As punishment, God decreed Ahab's death and the annihilation of his royal line. Jezebel's death was also decreed, with her corpse to be devoured by dogs"*. And in Jeremiah 15:3 *"I will appoint over them four kinds of doom,"* declares the Lord: *"the sword to slay, the dogs to drag off, and the birds of the sky and the beasts of the earth to devour and destroy."* This was often the case with convicts crucified en masse. Although crucifixion has been linked in the Christian world with Jesus' death, it was nevertheless a common punishment for rebels. Indicatively 3000 rebels were crucified by Darius in 519 BC, Alexander the Great crucified 2,000 rebels of Tyre in 336 BC, and Alexander Jannaeus King of Judea, crucified 800 prisoners in 86 BC. When Spartacus was defeated, 6,000 of his followers were crucified along the Appian Way in 71 BC. Caesar Augustus crucified 6,000 oarsmen of his opponent Pompey in 36 BC, while the Roman general Quintilius Varus ordered the same fate for 2,000 Jews in 4 BC. All hanging bodies ended up being eaten by vultures, their lower limbs bitten

off by dogs (12). The human race did however, seek revenge by crucifying dogs themselves. This happened annually during the *Supplicia Canum* (punishment of the dogs) held in Rome on August 3rd. The dogs were suspended from a 'furca' (wooden fork) or a cross and then paraded. It was based on the supposition that dogs did not bark to raise the alarm for the Romans when the Gauls attacked the Capitoline Hill, whereas geese raised a noisy alarm. Hence geese were also paraded at the same event, dressed in gold and purple. Dogs did not devour only the dead on battlefields. They were widely used from antiquity and for many centuries to hunt down and eat opponents alive. This practice was followed by the Celts, the Druids, the soldiers of Elizabeth I in Ireland, the colonists against the American Indians and, in the 17th century, by the Persians as a form of execution of convicts (13).

PEACEFUL EXCARNATION

Some dead were also subjected to excarnation on special raised structures, the Towers of Silence, or on mountains, leaving them to be devoured by vultures until only their clean skeletal remains were left. This is a kind of biological celestial burial, practised for centuries by the Parsis, the Zoroastrians and some Buddhists in Tibet according to Ahura Mazda's instructions: "*O Maker of the material world, thou Holy One! Whither shall we bring, where shall we lay the bodies of the dead, O holy Ahura Mazda!*" Ahura Mazda answered, "*On the highest summits, where they know there are always corpse-eating dogs and corpse-eating birds, O holy Zarathustra! There shall the worshippers of Mazda fasten the corpse by the feet and by the hair with brass, stones, or clay, lest the corpse-eating dogs and the corpse-eating birds shall go and carry the bones to the water and to the trees.*" (14). The costume has now intensified due to the pandemic (15). This way of having bones stripped by carnivorous vultures has been macabrely used in what is euphemistically called a "*body farm*" of the Forensic Anthropology Center of Texas State University, San Marcos, Texas. There, the naked bodies of dead donors are left in the fields until their flesh is fully devoured and the various phases are recorded for research purposes! There are in fact several willing post-mortem body donors who choose this "for the good of science" of course (16).

CONCLUSION

Although this kind of cannibalism in epidemics and wars was born via necessity, another reason was the post-mortem humiliation of criminals, and the same

practice was mainly imposed on killed enemies or rebels. We conclude that in spite of modern sensitivities, dogs and vultures collaborated with humans in clearing those who succumbed either to pandemics or to State violence.

References

1. Medical Apathy: Dogs Found Chewing on Covid-19 Patient's Corpse in Andhra Pradesh Hospital, <https://www.timesnownews.com>, 12 Aug 2020.
2. Flock of vultures seen circling over Manhattan <https://www.the-sun.com>, 20 April 2020.
3. Cohn S. Pandemics: waves of disease, waves of hate from the Plague of Athens to AIDS, *Hist J.*; 85(230): 535–555, 1 Nov 2012.
4. Procopius of Caesarea, *History of the Wars*, B. Trans.P. Rodakis.
5. Diamandopoulos A., History of the laboratory diagnosis of renal disease, Mini lecture, ERA/EDTA Congress, London, May, 28-31, 2015.
6. Else H, Can dogs smell Covid-19? Here's what the science says, *Nature* 587, 530-531, 23 Nov 2020.
7. The Dog in the Middle Ages - Bard Digital Commons, <https://digitalcommons.bard.edu>.
8. The Siege of Corinth. A Poem in Paris, Printed for John Murray, Albemarle Street, London, 1816.
9. The New York Times, 1971, pp. 40-41.
10. Lamb C., The women who changed history, in: *Our Bodies their Battlefields*, war though the lives of women, Scribner, N.Y., 2020, p.100.
11. Sophocles, *Antigone: Guard's Monologue*, Ed. Bernadotte Perrin. New York: D. Appleton and Company, 1904, <http://www.monologuearchive.com> > sophocles_002.
12. Ancient History & Civilisation, The Spartacus War, Page 12, [erenow.net](http://www.erenow.net) > ancient 7.
13. Blaize's History of the Dog, *Quarterly Review*, Vol. 72-73, American Edition, J. Murray (pub), N.Y., 1843, p. 267, <https://books.google.gr>.
14. To the Dogs and the Birds Lapham's Quarterly, <https://www.laphamsquarterly.org>.
15. Coronavirus Is Changing the Rituals of Death for Many Religions, www.npr.org, 2020/04/07 April 7, 2020.
16. Mar A., Bodies Get Picked Clean by Vultures in The Name of Science, <https://www.wbur.org>; Oct 13, 2014

BIRDS AS ARTISTIC EXPRESSION OF THE ANCIENT POMPEII

Gaetano V. Pelagalli and Giuseppe Paino

Università degli Studi di Napoli Federico II, Facoltà di Medicina Veterinaria
e-mail-pinopaino.slp3@gmail.com

ABSTRACT

This paper is a brief excursion through the decorative painting and mosaic art of ancient Pompeii and other cities near Vesuvius, with particular reference to the most beautiful representations of birds. These have always played a major role in the arts due to their mastery of the heavens through flight, their beautiful appearance exalted by dazzling colors and the sweetness of their song. We were inspired to describe the frequent subject of frescoes in most of the important Pompeian houses, namely garden scenes where birds express all their vitality and beauty.

Keywords: Ancient Pompeii; house of the prince of Naples; house of Venus

INTRODUCTION

Our research passes through the field of decorative painting and mosaics in Pompeii referring, in particular, to the most beautiful representations of birds which have always had great importance in all the arts thanks to their brio, morphological diversity and their many qualities, such as their complete dominion of the air, their external beauty often enhanced by brilliant colors, the sweetness of their song, and their extraordinary intelligence expressed in many ways, such as construction of hidden, hanging nests.

It thus seemed to us very interesting to describe the most significant aspects of the images found in the main Pompeian houses with particular reference to representations of gardens, whose beauty is accentuated by the presence of birds that animate the scenes with great vitality.

It should be emphasized that while there are a limited number of ancient paintings in Rome, in the Vesuvian cities, especially in Pompeii, it is still possible to admire many artistic works preserved and protected for twenty centuries under layers of ash and lapilli.

The most frequently represented forms of ancient painting in the houses of Pompeii are particular types of small-size painting with painted frames, depicting one or two birds pecking at a ripe fruit (Fig. 1). Their singular aspect and number are the expression of an earlier tradition, possibly from the area's Sannitic cultural roots.

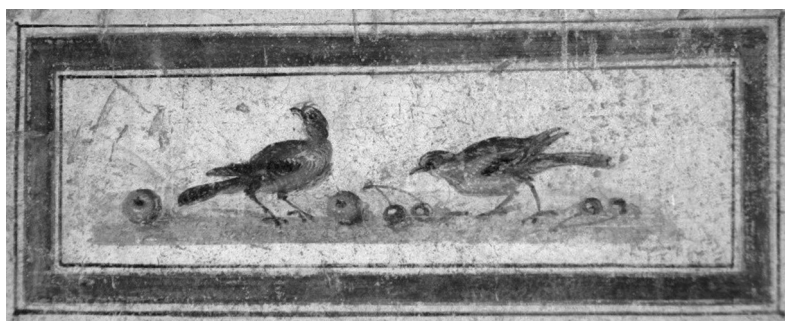


Fig. 1. Pompeii House of the Prince of Naples. Birds pecking at fruit.

In Pompeii mosaic decorations of birds are relatively limited and are derived from Hellenistic art. Some of the most beautiful mosaics, originally in the House of the Faun, have been transferred to the Archaeological Museum of Naples; amongst these is a spectacular scene on riverside Nile with Egyptian ducks.

The interesting frescoes depicting gardens with rich vegetation and birds are particularly pleasing not only for their architectural value, but for the figurative and emotional aspect offered by the diversity and accuracy of the images, the variety of vegetation and the number of birds shown. An attentive examination of these paintings reveals them to be mainly realized in the III and IV style. The most refined forms are related to the new stylistic tendencies expressing the rising cultural level that emerged in the period of Augustus and the creation of a specific Roman identity in the arts.

In Pompeii garden paintings in private houses became almost a requirement, and though mainly carried out in open areas, such as peristyles, were also commissioned for more private interior spaces. These works demonstrated the skill of the artists and of their particular attention to the accurate choice of the various species, both birds and plants, independently of the season, that rendered the precise identification of the subjects possible.

Among the most beautiful outdoor garden paintings are those in the House of Venus in the Shell; Showing great wealth of detail, these paintings are a

demonstration of social status. On the south wall is a composition of three panels in the middle of which Venus lies nude in a shell, flanked by two cherubs, while the side panels show garden scenes with diverse bird species, drinking from a fountain, perched on branches, and standing on the ground amongst vegetation. The doves here are related to the goddess who symbolises love and fertility (Fig 2).



Fig. 2. Pompeii. House of Venus in the Shell.

Antero Tammisto (1), a well-known Finnish researcher and zoologist, noted in a study of the House of Venus in the Shell, that this house contains the greatest number of birds in this kind of framed garden painting.

Very interesting garden paintings in interiors are to be found in the House of the Orchard or the Floral Cubicles. Amedeo Maiuri (2, 3), describes them in detail and points out that, contrary to traditional canon, they were executed in a private area of the house, in two separate, narrow rooms, one giving out onto the atrium and the other onto the portico. The first depicts a variety of birds and flowers against a background of cerulean blue: oleanders, bay and fruit trees with, amongst the birds, blackbirds, swallows, and white and black turtledoves. The second room has a black background from which a rich vegetation of fruit trees stands out with turtledoves, sparrows, thrushes and snipes. Maiuri points out that these paintings of gardens with birds were always carried out by capable artists who were also “acute observers of the lives of these animals”.

The House of the Golden Bracelet also contains some notable Roman garden paintings, executed with exquisite detail, that are found in interior rooms. Grete Stefani (4), in her study, refers to these paintings as reproducing a rich garden with important botanical and zoological details including many different bird species.

CONCLUSION

The Roman garden painting is almost completely lost except in Pompeii where it has been preserved under a thick blanket of ash following the eruption of Vesuvius in 79 AD. This type of frescoes, among the most beautiful ever, are present in some of the domus where, almost always in representative areas, between so much vegetation and flying birds, in some cases it is possible to see Egyptian-inspired motifs.

References

1. Tammisto A, Birds in garden paintings in House of Venus in the Shell. *Rivista di Studi Pompeiani*, XXIII, 2012.
2. Maiuri A, Nuove pitture di giardino a Pompei. *Bollettino d'arte*, Ministero Beni e Attività Culturali. Serie IV, Fasc. XXXVII, 1952.
3. Maiuri A, Pompei. *Itinerari dei Musei e Monumenti d'Italia*. Ministero P.I., 1986.
4. Stefani G, M. Borgoncino. Il giardino dipinto della Casa del Bracciale d'oro. *IL GIARDINO. La realtà e l'immaginario nell'arte antica*. Piano di Sorrento, Villa Fondi, 2005.

ANCIENT CHEMICAL TECHNOLOGY: THE INVENTION OF MINERAL ACIDS AND AQUA REGIA IS AN ARABIC OR A HELLENISTIC ACHIEVEMENT? AN INTERDISCIPLINARY APPROACH

Dimitrios Yfantis

Professor, EAPE Member Dr rer.nat Dept. of Chemical Engineering, National Technical
University of Athens, Athens, Greece
e-mail: dyfantis@mail.ntua.gr

ABSTRACT

The invention of acids is credited to Arab alchemists. In ancient Graeco-Roman literature different names accompanying the word water (*ύδωρ* or *aqua*) means acids. In *Description of Greece of Pausanias* (c.AD 110-c.180) is mentioned the myth of Styx water which corrodes all metals. We considered that is not paradoxography but hides acids and mixtures like Aqua regia (nitric acid / hydrochloric acid 3:1) which dissolves gold. The text is an argument that, during the Hellenistic era, the technology of acids was empirically known. Our hypothesis is strengthened by an alchemical recipe from the book *On the invention of truth* attributed to Geber (721-815 AC) about production of nitric acid (*aqua fortis*) and indirectly Aqua regia. Based mainly on Pausanias and the ingredients of the recipe, we conclude that the Arab Alchemists exploited relevant texts of Theophrastus (372-287 BC) and Dioscorides (c.AD40 -c.90).

Keywords: Ancient; chemical; technology; mineral; acids

INTRODUCTION

The knowledge of the ancients in the area of chemical technology was significant but has not adequately been explored and is therefore underestimated. The relevant references of Greek and Latin literature have mainly been commented upon from a literary and historical perspective. The findings associated with the ancient technology are limited and their evaluation is generally difficult (1). Chemical knowledge appears in the written texts of Theophrastus and is closer to chemical technology and serves practical purposes Theophrastus, successor of Aristotle in the Lyceum, describes technological achievements

of his time in his book *On stones* (2). Some paradigms are given: a) artificial preparation of mercury (Hg) from Cinnabar (HgS, mercuric sulfide) chemically a redox reaction of copper (Cu) with mercuric ions (Hg²⁺) in the presence of acetic acid (b) artificial preparation of *Miltos* (red pigment for painting) *by* roasting yellow natural ochre (chemical modification of FeOOH goethite to Fe₂O₃ hematite). Recent archaeo-metallurgical experiments verified the text of Theophrastus (3). *Miltos*, known in Homeric epics was mentioned incorrectly as minium (Pb₃O₄) in old references. Later worthy authors such as Dioscorides (ca.40-90AD) (4) Vitruvius (circa 100 BC) and Pliny (100 AD-180 AD) (5) used texts of Theophrastus extensively. Although generally in literature (6,7) the invention of mineral acids, hydrochloric (lat. *Acidum muriaticum*), nitric (lat. *aqua fortis*), sulfuric (*vitriol*) is attributed to experimentation of Arabic alchemists, manuscripts and papyri have been found indicating knowledge of acids during the Hellenistic period (circa 300 BC-circa 300 AC).

THE MULTIPLE MEANING OF THE WORD WATER IN ANTIQUITY

The importance of water as a basic element of the Mediterranean basin civilizations is well known. The meaning of the word water (*ύδωρ-hydor, aqua*) is multiple e.g., in *Philosophy Thales of Miletus* (624-548 BC) claimed that water is the prime matter (*prima materia-αρχήν των όντων απεφήνατο το ύδωρ*). Empedocles of Acragas/Agrigento (492-432 BC) introduced the concept of four patterns/roots (rizomata, *ριζώματα*) as basic elements from which all beings are composed. Plato and Aristotle (384-322 BC) accepted the theory of four elements (*πυρ, ignis, fire, ύδωρ, aqua, water, αήρ, aer air, γή, terra, earth*) and added ether. Aristotle describes “the water cycle in nature” (8) Hippocrates (460-370 BC) deals with water quality and health, noteworthy: in modern Greek as strange as it may seem νερό is water derived from *νεαρόν ύδωρ* that *means* young or fresh by omission of *ύδωρ* (Byzantine Era). In ancient Graeco-Roman literature different names accompanying the word water (ύδωρ or aqua) mean state of matter, acids or other materials. The names are often doubtful and confusing. Some paradigms are given: a) in mythology *Water of Styx* is discussed in the next heading b) *Water of niter* (*ύδωρ νίτρον aqua fortis*, probably nitric acid) c) Acid of sea water (*Οξος¹ θαλασσίον ύδατος*) hydrochloric acid d) liquid silver, *hydrargyrus υδράργυρος*,

1. The word means not only vinegar or acete in Italian (acetic acid) but also another acid.

Mercury e) Water of sulfur or divine, holy water (θείον ύδωρ, ιερόν ύδωρ, melt of sulfur or probably Mercury).

THE MYTH OF WATER OF STYX AND MINERAL ACIDS

In the book of Pausanias (c.AD 110-c.180) "Description of Greece" (Ελλάδος περιήγησις) (9) a passage of particular interest refers to the myth of Styx water in Arcadia. The topography of the area from where the water comes and its marvelous destructive properties are described: (ύαλος μιν γε και κρύσταλλος και μόρρια και όσα εστίν ανθρώποις άλλα λίθου ποιούμενα και των σκευών τα κεραμέα, τα μιν υπό της Στυγός του ύδατος σήγνυται...), «...κεράτινα δε και οστείνα σίδηρός τε και χαλκός, έτι δε μόλυβδος τε και κασσίτερος και άργυρος και το ήλεκτρον υπό τούτου σήπτται του ύδατος...), «...το δε αυτό [εν]μετάλλοις τοις πάσι και ο χρυσός πέπονθε...). A translation of the text is as follows: "For glass, crystal, murrine vessels, other articles men make of stone and pottery all broken by the water of the Styx..while things of horn or of bone, with iron, bronze, lead, tin, silver and electrum, are all corroded by this water ,Gold too suffers just like the other metals" (10). Three destructive properties are attributed to the water of the Styx: it is deadly for humans and animals, causes a breakage of inorganic materials such as ceramics and corrodes all metals. The ability (corrosiveness) of Styx water to dissolve gold and amber (ήλεκτρον lat. electrum, an alloy of gold and silver) is impressive. In earlier communications we expressed the assumption that mythological text relating to Styx hides the knowledge of production of mineral acids and is not paradoxography (11) A reference of Strabo (12) on the Water of Styx indicates the relation of the Telchines with the acids. Telchines, mythical metallurgists of iron and copper in the island of Rhodes, sprinkled plants and animals with water of Styx mixed with sulfur to destroy them. The above are arguments that acids and their mixtures were known during the Hellenistic era. Our hypothesis is strengthened by an alchemical recipe discussed in the next chapter.

AN ARABIC ALCHEMICAL RECIPE FOR THE PRODUCTION OF NITRIC ACID AND AQUA REGIA

We correlated the corrosiveness of water of Styx with a recipe from the book "On the invention of truth" (lat. De inventione veritatis) which is attributed to the alchemist Geber (721-815 AD) describing the production of nitric acid: "Mix materials Cyprian vitriol (green vitriol, copper sulfate $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$),

salpetre (salt of stones, potassium nitrate KNO_3) and alum (lat. alumen Greek στυπτηρία, aluminum sulfates of potassium and ammonium), then distillate the mixture. A liquid is produced with strong corroding ability (aqua fortis, nitric acid is meant HNO_3). If this acid is mixed with a small quantity of ammoniacal salt (NH_4Cl) then the solution can dissolve gold, silver and sulfur. We observe that this indirectly refers to preparation of aqua regia because when adding ammonium chloride to aqua fortis hydrochloric acid is produced and gold can be dissolved in the solution. About the ingredients of the recipe, we observe that ammonium chloride (lat. sal ammoniacum NH_4Cl) is a crucial material for acids production in Arabic and medieval alchemy. Two chemical properties of this salt justify this viewpoint. It is a compound that sublimates and decays in corrosive gases, hydrochloric acid and ammonia. In Persian and Arabic countries, the mineral is named "Nushantir". It is noteworthy that in vulgar Greek it is called «Νισαντήρι» obviously from Arabic. Ammonium chloride, with its symbol is mentioned in a Greek manuscript of the library of Saint Marc (Venice) printed in page 200 of Berthelot's book (13). In the same manuscript is written στυπτηρία in two types with symbols. Moreover, we find στυπτηρία in a papyrus of Leiden attributed to Dioscorides (14). It is evident that the materials of the recipe of Geber were known during the Hellenistic era.

THE FLOURISHING OF CHEMICAL TECHNOLOGY IN THE HELLENISTIC ERA AND ITS TRANSFER TO ARABS

In Alexandria of Egypt during the Hellenistic era (ca.300 BC-ca.300AC) the arts and sciences flourished (14). Many Alexandrian authors of books on chemical technology are characterized as "Greek alchemists" although the word alchemy with partly Arab origin appears in the Latin West in the 10th century BC (an anachronism). After the conquest of Alexandria by the Arabs (642 AD) the mainly empirical knowledge of chemical technology was transmitted to the West as alchemy. Fragments of the entire knowledge reached our days in the form of later manuscripts (10th to 18th century) in several collections. Many manuscripts contain illustrations of devices for conducting chemical processes like distillation, sublimation and others. Generally, there is lack of information about the operation and the product. An exception to the previous comment is a manuscript in fig 1 showing the production of melt of pure sulfur (water of sulfur ύδωρ του θείου) from mineral sulfur (άπυρρον θείον) with detailed explanations. (14)

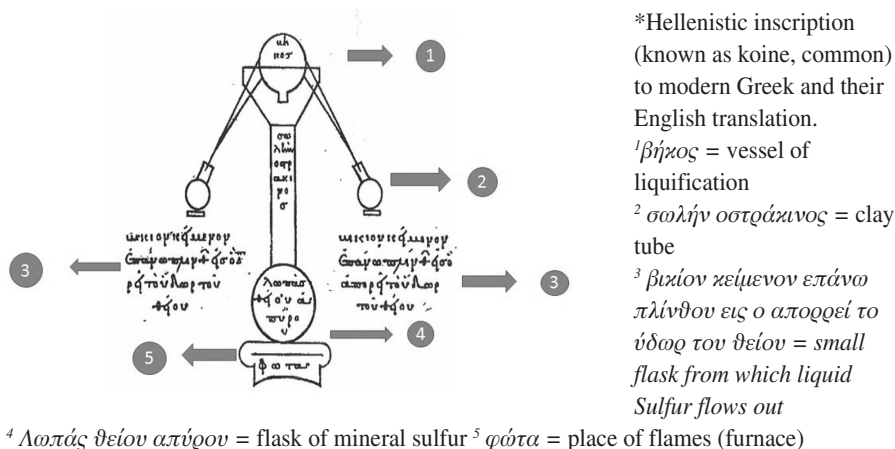


Fig.1. Distillation device (dibikos alambic) (Berthelot CAAG 1887 p. 247).

It is noteworthy that Dioscorides was highly acknowledged by the Arabs and his book “On Medical Material” (περί ύλης ιατρικής) contains important topics of chemical technology(4). It was translated from byzantine manuscripts to Arabic in the 9th century AD. It is evidence of the transfer of Hellenistic chemical technology to the Arabs.

In fig.2 Dioscorides is shown with ancient Greek tunic, halo of saints and Arabic headband. The influence of byzantine iconography is evident (15)

CONCLUSION

Based mainly on many ancient authors (Theophrastus, Pausanias, Strabo, Dioscorides) and the mineral ingredients of the recipe of Geber, we conclude that Arab alchemists successfully exploited relevant texts of the above-mentioned authors and probably improved production methods or used alternative raw materials. We claim therefore that the invention of acids and aqua regia is an achievement of the Hellenistic period transmitted to the Arabs.

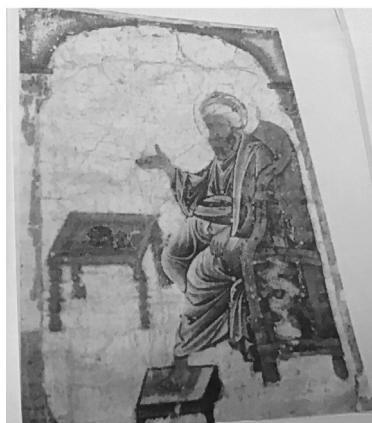


Fig.2 Manuscript in Top Kapi Palace Museum Constantinople (Byzantium) ref. (15)

References

1. Yfantis D. Ancient chemical technology: texts from Greco - Roman literature - an interdisciplinary approach, in Proceedings 10th International Symposium on the Conservation of Monuments in the Mediterranean Basin, 531-537. Springer International Publishing AG, 2018.
2. Caley E R., Richards F.C, Theophratus, On stones, Introduction, Greek Text, English translation and commentary Ohio State University 1956.
3. Mastrotheodoros G, Beltsios KG, Zacharias N, Assessment of the production of antiquity pigments through experimental treatment of Ochres and other iron- based precursors, Mediterranean Archaeology and Archaeometry, Vol 10, pp.37-59, 2010.
4. Dioscorides, De Materia Medica Book V Cactus publications Athens 2004.
5. Pliny, Natural History Books 33-35 translated by Rackam Loeb H Classical Library Harvard University Press, 2003.
6. Karayannis Miltiades I., Magic, mysticism, metaphysics and science during the development of chemistry from the ancient times to the beginning of the 20th century, in The Capital of Knowledge, Proceedings of the First International Congress of the European Association of Professors Emeriti, 175-181 Athens 2020
7. The New Encyclopaedia Britannica (1979), Alchemy, pp 431-436 Macropaedia Knowledge in Depth, vol.1, 15th edition, Chicago.
8. Yfantis D. K., Yfantis A.D. Aristotle and sea-water desalination: a new explanation of an experiment described in Meteorologica and Historia in The Capital of Knowledge, Proceedings of the First International Congress of the European Association of Professors Emeriti pp 167-171, Athens 2020.
9. Pausanias, Description of Greece Arcadia (Παυσανίου Ελλάδος Περιήγησις Αρκαδία), Ancient text, translation and comments in modern Greek by Papachatzis N ekdotiki Athinon, 1974-1981 edition.
10. Following Pausanias: a quest for Greek Antiquity, English translation, Kazazi D Oak Knoll Press Co-published with Kotinos Publications, 2007.
11. Yfantis D. K., Fountoulaki D.K and Yfantis N.D Styx water, myth and reality – an interpretation of its corrosiveness based on Pausanias' text, Proceedings of the 1st International Symposium on Water and Wastewater Technologies in Ancient Civilizations, 155-161 Crete 2006.
12. Strabo, Geographica XIV Cactus editions 1992.
13. Berthelot M, Collection des anciens alchimistes Grecs, Steinheil G, Ed. Paris, 1885.
14. Yfantis D. Reconstructing the Hellenistic heritage: chemical devices and products from illustrated Greek manuscripts; an interdisciplinary approach, in: TMM_CHA 2018, CCIS 962, 385-396. Springer Nature AG, 2019.
15. Anastasios (Yannoulatos) Islam, A general survey- roots -protagonists – basic principles, Historic Course (in Greek) reprint from 1st edition 1975, Athens 2016.

THE DAWN OF CARDIOVASCULAR MEDICINE AT THE UNIVERSITY OF PADUA, LAND OF THE DOGES

Professor Emeritus Gaetano Thiene

Department of Cardiac, Thoracic, Vascular Sciences and Public Health
University of Padua Medical School

ABSTRACT

With the support to the Republic of Venice and its Doges, which guaranteed freedom of teaching and research it was possible, at the University of Padua, to clarify, for the first time in the history of medicine, how our body is made (anatomy), works (functional anatomy = physiology) and becomes sick (pathologic anatomy).

This occurred in the XVIth-XVIIIth centuries, thanks to giants like Andrea Vesalius (anatomist), William Harvey (physiologist) and Giovanni Battista Morgagni (pathologic anatomist).

It is worth stressing that everything started with the availability of bodies from executed criminals and authorization for dissection, which was allowed even by the Church. Thousands of European students moved to Padua, because postmortems were not performed in their countries of origin. Graduation was possible without profession of catholic faith.

We can state that the dawn of Modern Medicine occurred at the University of Padua. In 2022 we are celebrating the 800 years since its foundation.

Keywords: Anatomy; Physiology; Pathology; Cardiovascular Medicine

INTRODUCTION

In the history of Medicine it has always been a challenge to establish how the human body is made, functions, becomes sick and dies. During the Renaissance, anatomists perceived that the heart plays a key role (*primum movens, ultimum moriens* = the first to move, the last to stop). It is not the site of the soul ('*anima*'), it is the motor of life, from where the '*vital spirit*' takes origin, whereas the '*animal spirit*' originates from the brain. The notion of vital and animal spirits came from the medical system elaborated by Galen of Pergamon (c. 129–216 AD), a dogma which persisted to the Middle Ages.

Within a few centuries (XVI–XVIII) a definite answer was given to these questions. It happened at the University of Padua, where the Serenissima Republic of Venice, led by the Doge, guaranteed freedom of research and teaching (*‘libertas docendi et investigandi’*), under the symbol of the winged lion.

We are celebrating the 800th anniversary of the foundation of Padua University in 1222. We briefly overview the cultural and political background, and the protagonists that made possible fundamental achievements in modern cardiovascular medicine.

THE HISTORY OF PADUA UNIVERSITY: MILIEU AND POLITICAL MILESTONES

A new *‘gymnasium omnium disciplinarum’* (school of all disciplines) was founded in Padua in 1222, with the migration of scholars and lecturers from the University of Bologna, in search of freedom. A School of Medicine (*‘universitas artistarum medicinae physicae et naturae’*) was inaugurated in 1399. In 1404 the City of Padua fell under the rule of the Serenissima Republic of Venice, which took over the administration of the university in 1517 by committing three Council members (*‘Reformers’*). They introduced strict regulations to guarantee freedom and tolerance: Venetian patricians and citizens of Padua were barred from major lectureships; vacant chairs were given to the most brilliant external candidates, without ranking from the existing faculty. Only men of demonstrated excellence in their professions were chosen for the education of the young.

Andreas Vesalius (1514–1564) (Figure 1a) in 1543 described the University of Padua as “The most famous gymnasium in the world” (1), thanks to the following facilities:

- i) Strategic northern geographic position, open to Europe;
- ii) Civil and religious freedom and tolerance;
- iii) Value and fame of the teachers;
- iv) Latin as the international language;
- v) Interest in natural philosophy more than in theology.

At the end of the Council of Trento in 1564, a bull of Pope Pius IV (1499–1565) named *‘In Sacrosancta’*, established that every graduate had to swear allegiance to the Catholic faith. An alternative was invented to obtain the degree, giving the authority to the Palatine Counts of Imperial designation in place of the Bishop.

Thanks to this trick the Anglican William Harvey achieved graduation in Medicine by the Palatin Earl Sigismondo Capodilista.

For medicine, the availability of human bodies for dissection, to study anatomy, represented a great facility which the Reformers looked after. On 15 December 1556, they wrote to the Podesta (= mayor) of Padua: “Since Anatomy is very useful to students of Medicine and the present time (winter) is very appropriate, we beg your Magnificence to give some subjects, sentenced to death, to the most excellent Fallopius (Professor of Anatomy and Surgery), who will dissect with great expectations and satisfaction to those scholars”(2).

In 1597, German students wrote a letter to the Rector, claiming the need for dissection: ‘Few or none of us have come here only for the sake of lectures. It is the study of practice that has led us to cross so many mountains and at such great expenses (2).

DAWN OF CARDIOVASCULAR MEDICINE WITH CARDIAC ANATOMY

1543 was a turning point for the history of science with the publication by Copernicus (1473–1543) of ‘De revolutionibus orbium coelestium’ (movements of the sky = macrocosm) and ‘De humani corporis fabrica’ (the building of the human body = microcosm) by Vesalius, the first ever illustrated book of anatomy (1). Vesalius was nominated Professor of Anatomy and Surgery in 1537, the day after he graduated, for his outstanding skill. He introduced a methodological revolution namely, undertaking himself the dissection of the human body, a marked difference from the traditional fashion, according to which, the Professor was seated in a chair, far from the cadaver, lecturing on books of Galen or Avicenna (=Lector), while a ‘barber’ was opening the body (=Sector) and a student was indicating the organs (=Ostensor).

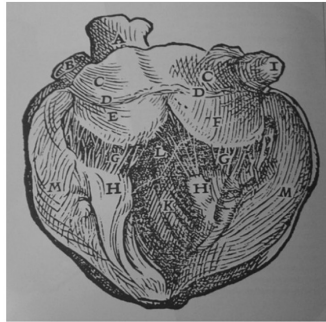
The frontispiece of *De Re Anatomica* by Realdo Colombo (1516-1559), painted by Paolo Veronese (1528-1588), represents an emblematic picture of the novel fashion, showing Colombo surrounded by a crowd of students while dissecting (3).

In the Vesalius book popular is the description of the left atrioventricular valve, named by Vesalius ‘mitral’ because its similarity to a Bishop’s mitre (1). (Figure 1b)

At that time, the most important controversial issue was the origin and movement of blood. According to Claudius Galen, there were two vascular compartments in the human body, venous, and arterial. The veins carry ‘natural spirit’, which originates from the liver, and the arteries carry ‘vital spirit’, which originates from the heart. The nerves take origin from the brain and carry



a



b



Fig. 1a. Andreas Vesalius.

Fig. 1b. Open left ventricle showing the mitral valve, similar to a Bishop's mitre.

'animal spirit' (*anima* = soul). The venous compartment communicated with the arterial compartment through pores in the ventricular septum. They allow the natural spirit, rich with nutrients, to mix with air draining from the lungs and giving origin to vital spirit within the left ventricle. The role of the lungs was to provide air to the pulmonary vein and cool the blood.

At first Vesalius trusted Galen's theory. In the *Tabulae anatomicae sex* ('Six anatomical tables'), published in 1538, Vesalius clearly believed that the blood originated from the liver and the pulmonary vein drains air from the lungs in the left atrium (4).

In the *Fabrica* of 1543, Vesalius started questioning the Galen theory: "In presenting reasons for the construction of the heart and the use of the parts, I have in large degree fitted my discourse to the teachings of Galen, not because I believe them to be in entire agreement with the truth but because I am yet hesitant to present a completely new use and function for those parts" (1). A cross-section view of the heart showed no evidence of septal pores, and in the second edition of 1555, Vesalius clearly states: "However much the pits may be apparent, yet none ... passes through the septum of the heart from the right ventricle into the left. I have not seen even the most obscure passages by which the septum of the ventricles is pervious As a result, I am in no little doubt regarding the function of the heart in this part" (5).

DAWN OF CARDIOVASCULAR FUNCTIONAL ANATOMY (PHYSIOLOGY)

Clearly the puzzle of blood movement and the role of the lungs could not be explained only by dissecting cadavers. Matteo Realdo Colombo, who succeeded Vesalius, started *in vivo* dissections to clarify the role of the pulmonary artery ('vena arteriosa') and pulmonary vein ('arteria venalis'). By cutting the pulmonary vein in dogs, he realized that reddish blood and not air were coming out. In his book *De Re Anatomica* (1559), he wrote: "I believe that the pulmonary vein has been made to carry blood, mixed with air in the lungs, to the left ventricle of the heart ... indeed you will find this vein always full of blood, both by dissecting cadavers and vivisectioning animals" (3). Thus, he established that the air-blood mixing occurs not in the left ventricle, but in the lungs, where the 'natural spirit' travelling through the pulmonary artery is transformed into 'vital spirit', definitively ruling out the role and existence of ventricular septal pores as suggested by Galen.

The idea of blood circulation (centrifugal via the arteries, centripetal via the veins) was guessed by doing autopsies in the Anatomical Theatre, the first Laboratory of Research in the history of medicine, inaugurated by the anatomist Fabrici ab Aquapendente (1537-1619) in 1595, with the support of the Reformer Leonardo Donà (1536-1612), a future Doge. Fabrici had observed valves within the veins; however, he misinterpreted their role. To the contrary, these venous valves enlightened the mind of William Harvey (1578-1657), a young English student coming from Gonville and Caius College, Cambridge.

Robert Boyle (1627-1691), a friend of Harvey, wrote in 1688: "He took notice that the valves in the veins were so placed that they gave free passage to the blood towards the heart, but opposed the passage of the venal blood the contrary way. The blood could not well be sent by the veins to the limbs because of interposing valves; it should be sent through the arteries and return to the veins, whose valves did not oppose its course that way" (6), clearly in keeping with a centripetal blood course in the veins.

However, this was not enough to prove the theory of blood circulation. When Harvey returned to England, by vivisection of dogs at Royal Windsor Castle as personally allowed by King Charles I (Figure 2), and calculating the amount of blood ejected by each systole, he estimated the volume passing through the heart per minute (= cardiac output) and surmised that the liver was unable to produce so much blood in a short period of time. It could be kept constant only in a closed circulatory system. In 1628, he published the theory

of blood circulation in Frankfurt with a book entitled *Exercitatio Anatomica De Motu Cordis et Sanguinis in Animalibus* (*Anatomical Practice on the Movement of the Heart and Blood in Animals*), clearly a physiology title.



Fig. 2. William Harvey with King Charles I and son James.

While dedicating the book to King Charles, he defined the heart “foundation of life, principle of everything, sun of the microcosm from which any force and heat depend” (7).

DAWN OF CARDIOVASCULAR MORBID ANATOMY

The destiny of any animal, humans included, is to die. Our body undergoes a remodelling during its natural history, influenced by diseases which eventually cause death. The diseases are structural and frequently grossly visible (‘organic’). So, as anatomy and vivisection were essential to understand how the body is made and functions, post-mortem dissection became fundamental to understand why the body became sick and perishes.

When Giovanni Battista Morgagni (1682–1771) was called to the University of Padua by the Senate of Venice Serenissima Republic, at the opening lecture entitled ‘About a new idea of Medical Institutions’ (Figure 3), in March 1712, he said: “We will state that it is impossible to pursue the nature and cause of any disease without dissection of the cadavers” (8). He introduced the method of clinico-pathological correlations, by performing autopsies of the deceased whom he had personally looked after during life, thus making possible the interpretation of signs and symptoms by a comparison with gross morphological substrates observed at post-mortem.

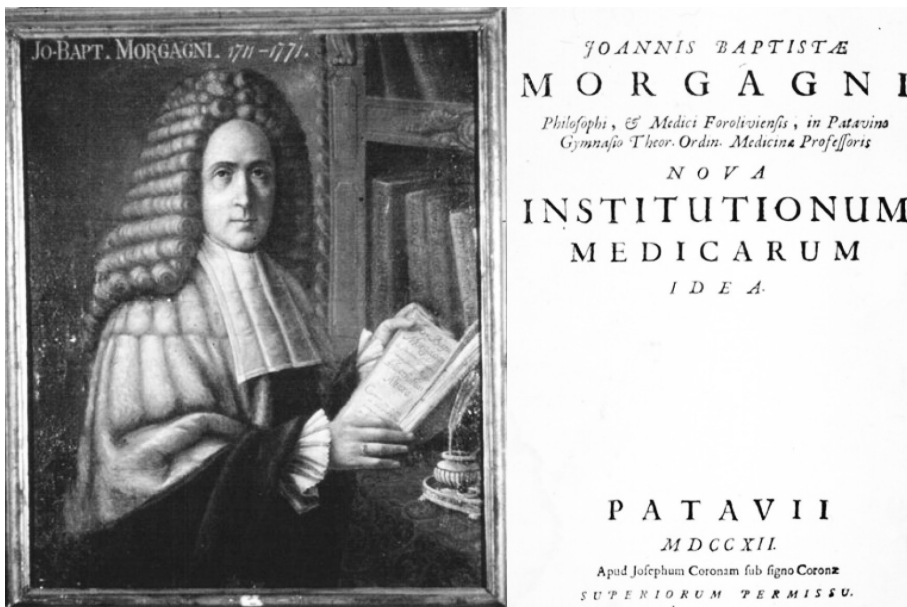


Fig. 3. Giovanni Battista Morgagni.

In 1761, he published the book *De Sedibus et Causis Morborum per Anatomen Indagatis*, reporting the findings from >700 autopsies (9). In relation to cardiovascular pathology, he first described infective endocarditis, aortic incompetence, dissecting aneurysm, heart block, cardiac rupture, and syphilitic aortic aneurysm (10). Morgagni was the founder of pathophysiology. In a 15-year-old girl with pulmonary valve stenosis and patent foramen ovale, cyanosis was interpreted as a right-to-left shunt at the level of the atria, a masterpiece of clinico-pathological correlation (10).

Syphilis at that time was epidemical and an ‘incurable disease’. A spectacular case with syphilitic aneurysm was painted by Diego Rivera (1886–1957) in the Institute of Cardiology of Mexico City, with Morgagni performing a medical examination *in vivo* and later dissecting the same patient. Morgagni appears surrounded by protagonists of the history of Cardiovascular Medicine: the anatomist Vesalius, the functional anatomist Harvey, doing the arm test for venous blood vein circulation, Galen, Hippocrates, Malpighi, and others. Morgagni turns to Harvey how to say, “You are right, the blood circulation does exist!”

CONCLUSION

A description is given of the origins of cardiovascular research in the history of Padua University. Andrea Vesalius first published illustrated anatomy, Matteo Realdo Colombo discovered pulmonary circulation, William Harvey “general” circulation and Giovanni Battista Morgagni was the founder of pathology and pathophysiology. The achievements of these giants are still relevant today.

References

1. Vesalius A. *De humani corporis fabrica libri septem*. Basileae: Ex officina Joannis Oporini, 1543.
2. Klestinec C. *Theaters of Anatomy. Students, Teachers, and Traditions of Dissection in Renaissance Venice*. Baltimore: John Hopkins University Press, 2011.
3. Colombo R. *De re anatomica*. Venetiis: ex typographia Nicolai Bevilacqua, 1559.
4. Vesalius A. *Tabulae anatomicae sex*. Venetiis: Sumptibus Ioannis Stephani Calcarensis, 1538.
5. Vesalius A. *De humani corporis fabrica libri septem*. Second edition. Basileae: Per Ioannem Oporinum, 1555.
6. Pagel W. *New Light on William Harvey*. Basel: Karger Medical and Scientific Publishers, 1976.
7. Harvey W. *Exercitatio anatomica de motu cordis et sanguinis in animalibus*. Francofurti: Sumptibus Guilielmi Fitzeri, 1628.
8. Morgagni GB. *Nova Institutionum Medicarum Idea*. Patavii: apud Josephum Coronam sub signo Coronae, 1712.
9. Morgagni GB. *De sedibus et causis morborum per anatomen indagatis*. Venetiis, Typographia Remondiniana, 1761.
10. Zampieri F, Zanatta A, Basso C, Thiene G. Cardiovascular medicine in Morgagni’s *De sedibus*: dawn of cardiovascular pathology. *Cardiovasc Pathol* 2016; 25:443–452.

GEORGIOS GEMISTOS “PLETHON”: AN EXCEPTIONAL GREEK SCHOLAR AT THE 1438 FLORENCE COUNCIL AND HIS INFLUENCE IN ITALIAN RENAISSANCE

Christos S. Bartsocas

University of Athens, Greece
e-mail: cbartsocas@nurs.uoa.gr

ABSTRACT

The octogenarian Greek scholar's participation in the Ferrara-Florence Council in 1438 for the union of the two Christian Churches was impressive. His theories presented in Florence obviously affected philosophical thinking and contributed to the development of Italian Renaissance.

Keywords: Georgios Gemistos Plethon; Florence Council; Byzantine Empire; Mystras; Renaissance

INTRODUCTION – GEORGIOS GEMISTOS PLETHON (1355/1360-1452)

The difficult situation caused by the fall of Thessaloniki to the Ottomans in 1430 and the subsequent blockade of Constantinople, forced the Byzantines to seek assistance from the West, as an alternative to capitulating to the Turks. Manuel, the oldest son of Emperor John VIII Paleologos, adamantly insisted that support offered by the Western European nations was the only hope for the salvation of the Byzantine Empire. He believed that the Pope represented a powerful stronghold, which could motivate the Western European powers to come to the support of the Empire. This target could be achieved by a union of the Eastern Orthodox and the Roman Catholic Churches. Therefore an Ecumenical Council was scheduled for this purpose and the city of Ferrara was initially selected as a safe venue.

The Byzantine representatives sailed for Italy on Venetian ships in November 1437. The representation consisted of approximately 700 persons, led by Emperor John VIII and Patriarch Joseph II. Dimitrios Paleologos, the Emperor's brother, was also attending, as well as the Patriarch's representatives, the Bishops Bessarion of Nikaia, Isidoros of Kiev, Markos Evgenikos of Ephessos, but, most important among them, the Byzantine scholars, George

Scholarios, George Amiroutsis, Ioannis Argyropoulos and Georgios Gemistos Plethon (Fig. 1).

Georgios Gemistos Plethon (1) was born in Constantinople between 1355 and 1360, the son of a church official. In his early years, he received



Fig. 1. George Gemistos Plethon.

a classical education, through which he was introduced to the platonic and the neoplatonic theories. Around 1380 he visited Adrianople, which was the capital of the Ottoman Sultan Murat I. There he came in contact with polytheism, paganism and various other religious ideas. Having been there as a student of Elissaios, a Jew, who was a follower of Zoroastrianism and paganism, Gemistos developed reservations over the correctness of Byzantium, which he believed was decaying both politically and spiritually. He even discarded Christianity. In fact, he considered the state organization of Byzantium as deeply problematic. It is true, indeed, that another cause of the inefficiency of the Byzantine Empire to resist the Ottomans surrounding

Constantinople in 1397, was its ineffective church administration.

Upon his return to Constantinople, Plethon dared to present his ideas publicly, thereby causing an extreme reaction. He became a target of the Patriarchate for preaching paganism and polytheism. Through the assistance of Emperor Manuel II Paleologos, he fled for safety to Mystras, where he was assigned to a high level administrative post in 1393. While in Mystras he was able to complete his religious concepts, especially after studying, in detail, Plato, Plotinus, Iamvlihos, Porfyrios and Proklos. Several eminent persons of his time attended Plethon's school in Mystras, e.g., Bessarion of Trepizond, Gennadios Scholarios, Isidoros of Kiev, Ioannis Argyropoulos, Laonikos Chalkokondylis and several others. Nevertheless, Plethon was in high esteem by the rulers of the Mystras Despotates Theodore I and II, and Constantine XI Paleologos, who sought his advice frequently (2,3). Plethon advised Emperor Ioannis VIII

Paleologos on the most important problem of that time (1428) i.e., the Union of two Churches in order to cope with Ottoman aggression. Plethon, however, was extremely pessimistic and strongly discouraged the participation of Orthodox Bishops in a Council held in the West.

THE FERRARA-FLORENCE COUNCIL

Although older than 80 years of age, Plethon was convinced to board a ship for the long trip to attend the Council initially in Ferrara and then moved to Florence in the winter of 1437-1438 (Fig. 2). Fortunately, he was accompanied by several of his formal students in Mystras. During his sojourn in Ferrara,

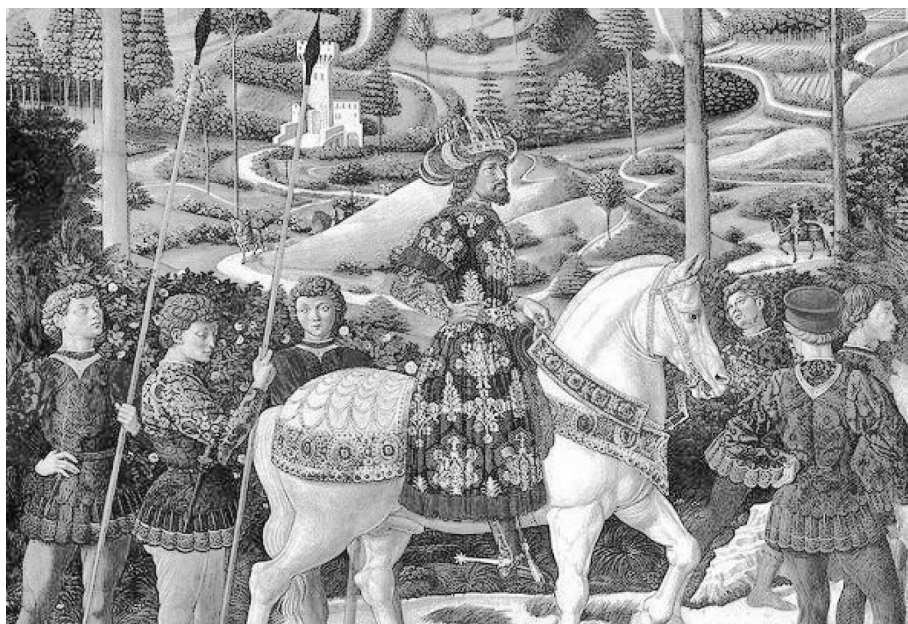


Fig. 2. The Byzantine Emperor entering Ferrara.

Plethon brought into contact the most famous scholars of Western Europe with classic literature and particularly with Plato. Upon their suggestion he authored in Greek "*De Differentis*", differentiating Aristotle's cosmologic theories from Plato's ideas on the creation of the sky and time, as presented in "*Timaeus*". This text, translated into Latin, caused strong debates which lasted for several decades. Plethon's wisdom, knowledge, personality and eloquence impressed

Italian humanists. in particular Cosimo de Medici, ruler of Florence. Cosimo aspired to be the founder of a new Platonic Academy, the *Academia Platonica*.

Cosimo de Medici (1389-1464) attended several of Plethon's lectures. The Florentine humanist Marsilio Ficino (1433-1499), the first director of the Academy, produced a translation of Plato's works into Latin, which were followed by Plotinus' "*Enneads*" and various other Neoplatonic texts. On the invitation of Florentine humanists, Plethon gave a series of lectures on differences between Plato and Aristotle. In fact, he tried to shake the domination of Aristotle's theories, which were evident throughout Western Europe during the later Middle Ages (4,5). To Plethon's ideas, George Scholarios responded with the "Defence of Aristotle", following which Plethon issued his "Reply".

Plethon favored the independence of the Greek Church and was not willing to accept the Papal supremacy. Therefore, he joined the antiunionists led by Markos Evgenikos, the Bishop of Ephessos. In fact, Plethon, rejected most of the arguments of the Catholic Church, such as the *filioque* (the view that the Holy Spirit proceeds from the Father *and the Son*) and, refused to sign the final document. Three weeks before the celebratory Holy Mass for the Union of the Churches in the Santa Maria del Fiore Cathedral on July 6, 1439, he accompanied the Patriarch and Dimitrios Paleologos departing from Florence towards Venice, in order to board the ship to take him back to Mystras.

PLETHON AS AN AUTHOR

Apparently, Plethon never wrote a book before 1437. His former student, the Patriarch George Gennadios, accused him for his denouncing Christianity and for supporting Plato. However, Plethon's religious ideas represented a merging of Zoroastrian mysticism and stoic philosophy. Nonetheless, his ideas caused an extensive debate between Greek scholars of his time.

It is believed that his book, written in Florence in 1438-39, on "Differences between Aristotle and Plato" (*De Differentis*), significantly influenced the Italian scholars and undermined the roots of Scholasticism (6).

His *magnus opus* "*Nomoi*" (Book of the Laws) was written in the last few years of his life. George Scholarios burned it publicly, considering it as a controversial text for suggesting social and political restructuring, based on polytheism. Thanks to available copies, 15 out of 101 chapters of the opus were saved. It is evident, and it should be pointed out, that Zoroastrianism influenced his ideas on the immortality of soul.

PLETHON'S DEATH

It is amazing that following Plethon's death in Mystras in 1452 (or 1454) a group of Italian disciples under Sigismondo Pandolfo Malatesta (1417-1468) dug and removed his remains from Ottoman-held Mystras and interred them in the Tempio Malatestiano in Rimini, so that "*the great teacher is among free men*"!

CONCLUSION

When Bessarion in Venice learned the sad news of Plethon's death he wrote a letter addressed to Plethon's two sons. He stated that "*if we exclude Aristotle, Greece did not give birth to a wisest man after Plato*". The humanist Marcilio Ficino named him "*the second Plato*"!

It should be pointed out that many of his students fleeing from the Ottoman occupation, i.e., Bessarion, Ioannis Argyropoulos, Laonikos Chalkokondylis, eventually settled in Italy thus contributing to the prevailing spiritual current finally named Renaissance (6).

References

1. Woodhouse C M. The Impact of Plethon on the Western Renaissance. Proceedings of the Academy of Athens, 1980, vol. 55, pp. 473-483.
2. Baloglou C P. The Institutions of Ancient Sparta in the Works of Pletho, in *Antike und Abendland*, vol. LI, Berlin, Walter de Gruyter; 2005, pp. 137-149.
3. Benakis A G, Baloglou C P. Proceedings of the International Congress of Plethon and His Time. Athens-Mystras, June 26-29, 2002; 2003, pp. 311-326.
4. Brown A M. Platonism in fifteenth century Florence and its contribution to early modern political thoughts. *J Modern Hist* 1986; 58:383-413.
5. Headky V. The Philosophy of Gemistos Plethon. *Platonism in Late Byzantium, between Hellenism and Orthodoxy*. Ashgate, Farnham-Burlington, 2014.
6. Runciman S. *The Last Byzantine Renaissance*. Cambridge, at the University Press, 1970.

ON THE ADMIRABLE AGING CREATIVITY OF ROMAN PONTIFFS REIGNING IN THE YEARS 1492-2005

Natale Gaspare De Santo¹,
Carmela Bisaccia² Luca Salvatore De Santo³

¹Emeritus Università della Campania Luigi Vanvitelli, ²Istituto Mazzini, ³Division of Heart
Surgery, Università della Campania Luigi Vanvitelli, Naples
e-mail: NataleGaspare.Desanto@unicampania.it

ABSTRACT

Recent studies have shown the potential of the lives of Roman Pontiffs to study the time course of diseases connected with lifestyles. The aim of this work is to investigate the creativity of aging popes, reigning in the years 1492-2005. A total of 51 pontiffs were empowered at a mean age of 63.9 years (the youngest being Leo X at 38 years old, the oldest Clement X at 76 years old. Their average time in service was 10 years, average life-span 73.6 years, the oldest being Leo XIII who died at 92. It must be stressed that life expectancy in the general population at the beginning of the 20th Century reached 50 years in men. Popes were not only responsible for the spiritual needs relating to Christianity, but had to care for the administration of the Vatican State, and were involved in European and World Politics, including participation in wars. They supported innumerable European universities, hospitals and academies. They also promoted poetry, literature and music and enriched Rome with churches and palaces, and continuously refurbished Saint Peter's Basilica with works of art. The number of artists who they called to Rome was huge. In conclusion Roman Pontiffs although enthroned in their aging years, kept their admirable creativity till the end of life.

Keywords: Creativity; Roman pontiffs; universities; hospitals; art; artists

INTRODUCTION

Popes represent a special category of world leaders with temporal and spiritual/religious power. Their lives have been closely monitored and chronicled because of their uniquely important position in the history of their times.

In the period 1492-2005 there have been 51 popes. They started their pontificate at a mean age of 63.9 years, reigned for an average of ten years

and died at a mean age of 73.6 years. Nineteen of them were older than 80 years at death (old-old). Table 1 includes a total of ten pontiffs, from Alexander VI to Paul VI who have been selected because of their peculiar creativity. Of particular interest is the activity of popes Julius II, Sixtus V and Urban VIII who have been defined by Richard Krautheimer (1897-1994) “the great builder popes”. Alexander VI was elected before the arrival of Columbus in America, in 1492, the year the modernity started. Alexander VII, the humanist pope, with experience as diplomat, brought a personal vision in planning to Rome. He has the merit for planning a Rome not only as a great political capital but as the city where antiquity and modernity could coexist, the site of papacy, and also a place attracting learned persons, a place where people of all persuasions and nationalities could meet. His vision guided his successors for the subsequent three centuries (1).

AIM OF THE STUDY

The study was devised to demonstrate that popes, nominated usually at the completion of a long- lasting career, not only actively participated in the making of the history of Europe and beyond but were at the same time capable of realizing extraordinary projects for ports, aqueducts, universities, hospitals, monuments, palaces, streets that embellished and enriched the civil life of Rome and of the cities of State and of the Church.

Table 1. Creative Roman Pontiffs selected for this study.

ALEXANDER VI (1492-1503)
JULIUS II (1503-1513)
LEO X (1513-1521)
PAUL III (1534-1549)
GREGORY XIII (1572-1585)
SIXTUS V (1585-1590)
URBAN VIII (1623-1644)
ALEXANDER VII (1655-1667)
JOHN XXIII (1958-1963)
PAUL VI (1963-1976)

RESULTS

ALEXANDER VI (1492-1503)

Alexander VI, born Rodrigo de Borgia y Borja, on January 1431 at Xàtiva near Valence, in the Kingdom of Aragon, was enthroned on August 11, 1492. He was 61 years old and was Pope for 11 years, he died of Roman fever that complicated his gout. He had 6 sons: Pedro Luis from an unknown mother, Giovanni, Cesare, Lucrezia and Joffre from Vannozza Cattanei, and Laura from Giulia Farnese. His son Cesare headed a circle enrolling more than a hundred great humanists.

Alexander VI supported the Universities of Rome, Valencia and Alcala. He enrolled Pinturicchio for Palazzo Borgia. As a patron of the arts, he erected a Centre for the University of Rome, restored Castel Sant'Angelo in Rome, built the monumental mansion of the Apostolic Chancery, embellished the Vatican palaces, and persuaded Michelangelo to draw-up plans for the rebuilding of St. Peter's Basilica. He proclaimed the year 1500 Jubilee Year and promoted the evangelization of the New World.

JULIUS II (1503-1513)

Julius II was enthroned at 60 years of age. "Great head, high forehead, deep eyes, protruding nose, pursed lips... the greatest patron" (2). A warrior ready for the battle, but also a man capable of enrolling great artists, especially the principal pictorial geniuses of the Renaissance. He enrolled Sansovino, Pinturicchio, Bramante (55 years old), Michelangelo (28 years old), and Raphael (23 years old). Julius II had an original attitude towards artists. He recognized their talents, their work and had an unprecedented way to honor them and their genius; he was generous with them, literally covering Bramante, Michelangelo and Raphael with gold.

Donato Bramante had the great opportunity to become the architect of Julius II at age 55 and worked, not only at the galleries that form the Belvedere Court, but also at other Vatican buildings. Around 1503 the Pope conceived the idea (and nurtured it) of building a new basilica of St. Peter. Bramante created the first model. Its foundation stone was laid on April 18, 1506.

The friendship of Julius II with Michelangelo began in 1505 and was extremely productive and long-lasting. Of Julius' tomb only the "*Moses*" in the church of S. Pietro in Vincoli, was completed at Julius' death. Julius, however, was not interred there but in St. Peter's, along with the remains of Sixtus IV.

By 1509 Raphael had begun his masterpieces for the Pope-the frescoes in three rooms of the Vatican. Rafael painted references to the person of Julius II and to the achievements of his pontificate in the *Stanza della Segnatura*, “where earthly and celestial wisdom are juxtaposed in the *School of Athens*” (2). The pope instructed Raphael “about people to be represented in that supreme masterpiece of Catholic Anthropology. Paolo Giovio, a master of Renaissance, wrote that it was painted “ad prescriptum Julii”,- according to the orders of Julius II (2).

LEO X (1513-1521)

Born Giovanni di Lorenzo de’ Medici-enthroned at the age of 38 years-he embodied the spirit of Renaissance. Having had experience in his youth at the court of Lorenzo de’ Medici, he had adopted the style of brilliant societies of Europe. The construction of *St. Peter’s Basilica*—initiated under Julius II—was accelerated, the holdings of the *Vatican Library* were greatly increased, the *Biblioteca Laurenziana* was restored and in general the arts flourished, supported by his personal money and by that of the Church.

Leo was the patron of Michelangelo, Rafael, Bembo, Badoletto, Sannazzaro, Castiglione, Guicciardini, Erasmus, Giuliano and Antonio Sangallo, Sansovino, Peruzzi, and Romano. Michelangelo was commissioned for the *Façade of San Lorenzo in Florence*, whereas Rafael was commissioned for the *Palazzo Branconio dall’Aquila* and *Palazzo Vidoni-Caffarelli* and, in addition, was offered the supervision of the *Vatican Loggias* (3).

PAUL III (1534-1549)

Born Alessandro Farnese he was nominated pope by acclamation at the first scrutiny. He was 67 years old. As a patron of the arts, he restored the University of Rome after the sack in 1527 and increased the subsidies and importance of the Vatican Library. He cajoled Michelangelo into finishing the fresco “*The Last Judgment*” in the Sistine Chapel, decorating the Pauline Chapel, and completing the plans for the construction of the new St. Peter’s Basilica. He used Antonio da Sangallo the Younger and a host of architects to renew the fortifications of Rome and the Papal States and continued the construction of the *Sala Regia* (Royal Hall) in the Vatican.

GREGORY XIII (1572-1585)

Gregory XIII, enthroned at 70 years of age, promulgated the *Gregorian calendar* with the Bulla *Inter gravissimas* on February 24, 1582 by erasing all days between October 4 and October 15, 1582. In Latin the Bulla reads: “praecimus et mandamus ut de mensi octobri anni 1582 decem dies inclusive a tertia nonarum usque ad pridie idus eximantur”, indicating the days of erasure.

He founded the *Accademia Musicale di Santa Cecilia*, supported the universities of Bologna, Perugia, Lyon, Besançon, Würzburg and Rome. He enriched the Vatican Library and started the Gregorian University. Gregory’s building program included the *Quirinal Palace* in Rome (1580), and the *Gregorian Chapel* in St. Peter’s Basilica. He completed *The Church of Jesus* (known as the mother of all Jesuit churches) and commissioned Giorgio Vasari for the frescoes with the *Massacre of Huguenots*.

SIXTUS V (1585-1590)

Sixtus V, enthroned at age 65, opened 6 new and beautiful streets, established the hospital for the poor, worked for the application of the decisions of the Council of Trento and issued 72 *Bullae*.

Sixtus established a state printing house, started the draining of the Pontine marshes-the first attempt to fight malaria, a grandiose project, and started the new aqueduct “Acqua Felice”.

He also completed the Dome of St. Peter’s Basilica, St. John Lateran and Santa Maria Maggiore; he re-wrote the Bible because St. Girolamo’s *Vulgata* was full of mistakes.

“For science and art Sixtus V had generous hands” wrote von Pastor (4). In fact he established debt cancellation of the University of Rome and started the Universities of Fermo, Graz and Quito.

URBAN VIII (1623-1644)

A promoter of the arts, enthroned at 55 years of age, He was the foremost patron of the important Baroque sculptor and architect Gian Lorenzo Bernini, some of whose finest works he commissioned, including the *Loggias of St. Peter’s*, and *Urban’s tomb* in the basilica. Reluctantly, he had his friend Galilei tried and condemned for a short time in 1633.

He promoted the building of the *Library Barberini*, *Barberini Palace* (Carlo Maderno), *Palace of Propaganda Fide* (Bernini, Borromini), *The Fountain of Tritons* (Gian Lorenzo Bernini). He was the patron of Cassiano da Pozzo, Vincenzo Giustiniani, Nicolas Poussin, Claud Lorrain, the musician and virtuoso Giovanni Girolamo Kapsberger, the mathematician and physicist Benedetto Castelli, the French philosopher and theologian Denis Pétiau. In addition, he supported the *Academy of Santa Cecilia*, promoted music publishing, and was able to obtain from Philip IV of Spain the release from prison of Tommaso Campanella (after 27 years imprisonment).

ALEXANDER VII (1655-1667)

Born Fabio Chigi in Siena in 1598, he was 58 years old at enthroning. He protected the University of Rome, added six chairs and established the Rome University Library. Alexander enrolled Gian Lorenzo Bernini both as sculptor and architect. Bernini built the great *Scala Regia*, which leads to the Sistine Chapel, and the immense *Colonnade of St Peter's Square*, his greatest architectural achievement and a masterpiece (5).

THE LOSS OF TEMPORAL POWER IN 1870

The loss of temporal power caused a drastic loss of the commission power of the Vatican since it no longer serving the needs of Rome, but just those of a tiny state of 44 hectares. However, a few monumental churches have since been created and various monuments and palaces built. Two works of art deserved a particular mention.

The first is *The Doors of Death* of Giacomo Manzù in St. Peter's Basilica, created in the years 1952-1964 (1). Manzù-a renowned artists was an atheist and communist but he obtained freedom of inspiration directly from *John XXIII*, both being from the Province of Bergamo. The result was a masterpiece which was inaugurated on June 28, 1964 by Pope Paul VI. The invitation of Manzù served the idea of the needs of the Catholic Church to understand modern art and modern artists (1).

The other great work is *The Pier Luigi Nervi Hall*, now Paul VI Hall (1). In 1964 *Paul VI* asked Nervi to produce a hall for papal audiences. He asked the architect for "a daring effort" taking into consideration "the special location and functions". The result was "a work of suggestive and grandiose simplicity", an auditorium for 7,000 (1).

COMMENTS AND CONCLUSION

The popes of this study were enthroned at a mean age of 62 years, the youngest being Leo X, the oldest John XXIII. In the years between enthroning and death they successfully showed vision, organizing abilities and creativity. Of them speaks the list of artists, scientists, administrators, politicians, diplomats whom they had been able to enroll, put to work and grant them personal support and the money needed to finalize their projects.

Before concluding it is worth mentioning the *Vatican Apostolic Library* that has benefitted from the efforts of many popes. Sixtus IV (1471-1484), instituted it with the bulla *Ad decorum militantis Ecclesiae* (June 15, 1475). The library started its activity three days later, its first *gubernator et custos* was the humanist preceptor Bartolomeo Sacchi, known as Platina because of his origins in Piadena. But all had started with Nicholas V (1447-1455) who got the idea and assembled a total of 1200 antique codices (300 originating from the Collection of Avignon) and located it in *Il Cortile dei Pappagalli* (the Parrots' courtyard). Officially the library started with the books of Sixtus IV (2500 works) that increased up to 3500 six years later. Books were displayed in 4 halls: *Bibliotheca Latina*, *Bibliotheca Graeca*, *Bibliotheca Segreta*, *Bibliotheca Pontificia* (archives). The halls were decorated by Melozzo da Forlì, Antoniazio Romano and Domenico and David Ghirlandaio. Later it was transferred into the *Salone Sistino* (70x15 m) with frescoes of Andrea Lilli.

References

1. Vian G. Andare per la Roma dei papi. Bologna, Il Mulino, 2020.
2. Julius II. Encyclopedia Britannica.
3. Leo X. Encyclopedia Britannica.
4. Von Pastor L. Storia dei Papi dalla Fine del Medio Evo. XVI Vol.(20 Tomes). Desclée & Ci. Editori Pontifici, Roma, 1958.
5. Maxwell-Stuart PG. Chronicles of the Popes. London, Thames and Hudson, 1997.

THE FONIFERO OF GIOVANNI PALADINO (1876) FIRST HEARING AID

Giuseppe Paino¹,

Presenting Author: **Gaetano V. Pelagalli¹, Italo Cantore²**

¹ Università degli Studi di Napoli Federico II

² Dirigente Medico UOC di Otorinolaringoiatria, ASL Roma 1, Ospedale S. Filippo Neri, Roma

ABSTRACT

Some modern, surgically implantable devices allow the reacquisition of hearing by means of directly sending sound vibrations to the inner ear through the bones of the cranium. The first device utilising this principle in patients with serious pathologies of the hearing system was invented in 1876 by Giovanni Paladino. This quite rudimentary instrument was useful not only for removing the obstacle of deafness but also for diagnostic purposes.

Keywords: Voice conductor; fonifero

INTRODUCTION

It was in 1876 when Giovanni Paladino (Potenza 1842-Naples 1917), veterinarian and Professor of Anatomy, Histology and Physiology at the Royal School of Veterinary Medicine and Surgery of Naples, published, in the journal “Movimento medico-chirurgico” an article entitled “On the physiological transmission of the voice through cranial bone with a Fonifero and its use in otiatric medicine” (1). A brief abstract of this study, which had a wide international echo, was published in the following year by Professor A. Lucae of Berlin in the journal “Jahresbericht über die Leistungen und Fortschritte in Deresam. Med.” where the use and applications of this device were described. Here I quote a short passage from Paladino: “If it is true that the voice is the best means to explore the state of the quality and grade of hearing strength, it was necessary to find a way to reach the labyrinth, not by normal means but through the cranial bones”. This function was carried out by a particular instrument he would call Fonifero, able to transfer the vibrations from words and sounds from a subject who produced them to another who received them.

The idea came to Paladino because he had frequently observed a curious peaceful game of children he met in the alleys on his way home from Veterinary

School. The game was carried-out by two children several metres apart, trying to communicate by means of two rolls of cardboard in the shape of tambourines or pots that were connected by a piece of string to the base of two boxes (2). One of the children, even with a low voice, spoke into the pot, and the other child, holding his pot close to his ear could hear perfectly what his friend at the other end of the string was whispering. If these two friends only had one pot and a piece of string, they could still communicate; in this case, the receiver held the end of the string tightly in his teeth. In both cases, it was necessary to keep the string taught in order for the vibrations of the voice to be transmitted (3) In the absence of these conditions, or if the string was touched by a third person, the transmission did not take place.

What really struck Paladino were the materials used and the way in which the transfer of the sound vibration from the emitting subject reached the auditory apparatus of the recipient subject, without difficulty. Referring to this in his study on the Fonifero and its use, he pointed out concepts of physics, already known at that time, with particular reference to the principles of transmission of sounds through different media: "I don't have to bother to prove that the solids transmit sounds better than liquids or aeriforms; and that sound waves originating primitively in solid bodies reach the ear with greater intensity when solid bodies transmit them". Indeed, the propagation of sounds in air and water travels respectively at a speed of 330 and 1435 metres per second, while the media in solid bodies can be up to 15 times greater than in air. Not taking into consideration temperature variations, acacia wood propagates sounds along its fibers at 4714 m/s, pine wood at 3322 m/s, iron at 5127 m/s, steel at 4956 m/s, copper at 3556 m/s, silver at 2707 m/s and gold at 1743 m/s.

On the basis of his observations he decided to build an instrument-"Voice conductor" which he originally wanted to call Lessifero or Logoforo, but which, in the end, he named Fonifero, as being more generic and comprehensive. The device Paladino invented (Fig. 1) consisted in a bar of maple wood (A) which led at one end to a semi-circular metal plaque (B), and at the other end to a slightly concave disk. The semi-circular plaque (fork) had to be applied to the front part of the neck in correspondence to the larynx of the subject who had to transmit their voice; the opposite end was intended for the hearing-impaired subject who had to place the plaque at the entrance to the mouth in front of the incisor teeth, or adhering to the mastoid process of the temporal bone (Fig 2).

It was well known that solids transmit sounds better than liquids and aeriforms. Indeed, Giovanni Filippo Ingrassia, a doctor from Palermo and pupil

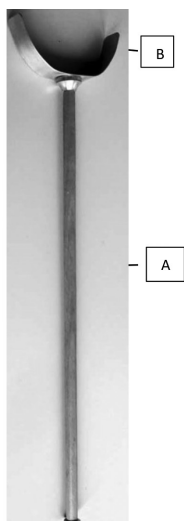


Fig. 1.



A

B

Fig. 2. Application mode of the Fonifero: A=Terminal on mastoid apophysis. B= Terminal between the teeth. The older man subject with deafness.

of Andrea Vesalio, who had discovered the stapes, had already, in the 16th century, focused his attention on sound conduction through bone and teeth (4). In this way Beethoven, who suffered from severe otosclerosis, would listen to his compositions, holding a rod, probably wooden, between his teeth, with the free end touching the piano.

The Fonifero had the feature of directly taking the vocal sound of the person speaking and offered the easiest means of applying the bone transmission of word for the first time to diagnostic, prognostic and curative purposes by direct transmission of sound vibration through a solid, leaving out the aerial pathway. It is important that Paladino attributed an essential role in the topodiagnosis of deafness to his device, which also allowed the evaluation of the inner ear's integrity in cases of middle and external ear pathologies, or the severity of inner ear involvement when an etiological agent had attacked the labyrinth.

Indeed, the Fonifero ascertained the integrity of the internal ear with broken transmission. The importance of his "Fork" in diagnosis and prognosis emerged where the tools of the diapason and a clock's 'tick-tock' were not reliable.

Today, Paladino's Fonifero has evolved into the titanium screw-connected

piezoelectric transducer implanted in the temporal region, forming a prosthesis that could be defined as a “Modern Fonifero” (B.A.H.A - Bone Anchored Hearing Aid). This is based upon the same principle of sound vibrations transmission through the cranial bone, which reach the inner ear and consequent afferent nervous impulses of the spiral organ of the Corti. These systems allow the correction of moderate-to-severe unilateral or bilateral conductive hearing losses and also complete unilateral sensorineural hearing losses, by stimulation of the cochlea on the opposite side to the defective one.

CONCLUSION

Giovanni Paladino was a deep scientist of cellular biology and functional anatomy. Infact, his research of 1876 laid the foundation for future studies on the cardiac conduction system and designed a device in hearing impaired people useful for establishing the sector of auditory apparatus responsi-ble for deafness. That was a fruitful period of ideas that allowed Paladino to receive an honorary degree from Rush University of Chicago.

References

1. Paladino G. Della trasmissione fisiologica della voce a traverse le ossa del cranio mercè il Fonifero e del valore di questo nella clinica otojatria. Movimento medico-chirurgico. 1876. Napoli.
2. Cantore I, Cantore R. Forche, trombette e tromboni, ovvero l'altra scoperta di Giovanni Paladino. La Lucania Medica, 4/2010.
3. Cantore I. Una potenza di otobionica. La Lucania Medica, 14/2015.
4. Ingrassia G.F. In Galeni librum de ossibus doctissima et expertissima commentaria. Panormi (Palermo): Joannem Maringum; 1604.

LIGHT FOR DIABETIC PATIENTS THANKS TO EVA MARIA KOHNER (1929-2021), A JEWISH BARONESS FROM BUDAPEST

Presenting Author: **Oliver Rácz**^{1,2},
József Fövényi³

¹Medical Faculty, Šafárik University, Košice, Slovakia

²Faculty of Healthcare, Miskolc University, Hungary

³Diabetes Outpatient Clinic, Péterfy Sándor Street Hospital, Budapest, Hungary
e-mail: olliracz@gmail.com

ABSTRACT

Baroness Eva Maria Kohner was born in 1929 as a 6th generation member of a Hungarian-Jewish entrepreneurial dynasty. She survived the holocaust and during the communist regime fled to London. After graduation in medicine, she joined the team of Professor Colin Dollery, who was studying retinal circulation with fluorescein angiography. Her first paper was published in 1964, followed by more than 300. Her contribution to the understanding of diabetic retinopathy was outstanding. At the Airlie House Symposium in 1968 she participated in development of a retinopathy grading system and coordinated the British Multicentre Trial of Photocoagulation. In 1990 Professor Kohner co-founded the Eye Complications Study Group of the European Association for the Study of Diabetes (EASD) and was its first president. With Massimo Porta she published “Screening for Diabetic Retinopathy in Europe”. In 2002 she received the Order of the British Empire from Her Majesty the Queen. Professor Eva Maria Kohner passed away on 24th September 2021.

Keywords: History of medicine; Shoa; diabetic retinopathy

INTRODUCTION: THE FAMILY OF BARONESS MARIA EVA KOHNER

Baroness Eva Maria Kohner was born on 23rd February 1929 in Budapest as a 6th generation member of a successful Jewish entrepreneurial dynasty. The founder of the dynasty was Nathan Kohner, a crop dealer, who, in the early period of the 19th Century moved from Leipzig to Neumark (now Všeruby, Czech Republic). His sons and their descendants lived and worked in Budapest

(Tab. 1). Their business activities were manifold, among them, as members of Kassa – Oldenburg (now Kosice – Bohumín) railway consortium. According to the opinion of the Hungarian Industrial Chamber they were “citizens of impeccable character and good behaviour” They became wealthy and supported the arts and the Jewish community. Their manner of living was to a large extent similar to the life of the Hungarian upper class. In 1913, Emperor Franz Joseph I of Austria (1848-1916) bestowed the family with the baronial title. The best-known member of the dynasty was Dr. Adolf Kohner (1866-1937), the uncle of Maria Eva. He was a banker, owner of the Hungarian Jacquard Textile Mill and an ardent art collector. He used the earnings from his banking and other businesses to buy an estate of 28.000 acres in Szászberek, near Szolnok, with the goal of transforming it into a model farm and university study centre. Professors and students from the Agrarian University of Budapest used this land as an experimental laboratory and it ultimately became one of the most avant-garde farming systems of the time. The work and production of the model farm improved considerably the living conditions of local people, too. Adolf Kohner was also a talented musician and had a collection of Stradivarius and Guarneri violins. Among his closest friends were many famous musicians including Franz Liszt, Giacomo Puccini and Béla Bartók. Typical of his high position in the society was that in 1919, he attended the Jewish welcome delegation of Miklós Horthy (Hungarian admiral and statesman, regent of the Kingdom of Hungary between the two World Wars and throughout most of World War II). The contact of Kohners with the Horthy family later helped them against the gradually tightened anti-Semitic restrictions and laws up to the German occupation (March 1944) and the following takeover of power by the Arrowsmith Movement in October 1944 (1).

LIFE DURING THE SHOA AND THE COMMUNIST REGIME

Maria Eva (second daughter of Miklós György Kohner and Katalin Böszörményi) was already officially baptized as a member of the Calvinist (Reformed) Church. She spent her cloudless happy child years (1933-1941) in the Szászberek castle and farm with her famous uncle Adolf. From 1941, she attended the Baár-Madas Reformed Girl's Grammar School located in Pasarét, district of Budapest led by pastor Sándor Joó and received confirmation in 1943.

In 2021, she narrated the following to her biographer, Carol Peaker: (2) “Sándor Joó won my admiration the first time I heard him. He was a tall, dark-

haired, handsome man, an excellent speaker, already well known in Budapest.... His speeches were passionate. He opened a new world for me... He had an even deeper impact on me. Thanks to him, Calvinism, which had been my religion in name only, became an essential part of my identity. I developed a strong, abiding faith in Jesus, which remained with me throughout the war... We Jewish girls were comfortable in a community of believers. We knew that Sándor Joó felt for us in our difficult situation, but after service everything was clear and perfectly normal.” Eva was particularly traumatised by the growing anti-Jewish sentiment from which her family could not escape, even though they were, at the time, already fully integrated into the Hungarian society. As Eva further explained, “At church, the congregation already knew I was Jewish, so the yellow star didn’t matter there. In the courtyard after service, everybody shook my hand, pretending not to notice the badge that now separated us.... On one occasion, when the sirens sounded, we fled to the air raid shelter in the basement of the modern house across the street. A young man dressed in an air force uniform appeared and approached me. “You are coming with me,” he said in a stern, formal tone. “You cannot stay here with these nice Christians. You’ll only spoil the air here.” I followed him, but at the door I met Sándor Joó who asked me where I was going. “I have to leave...”, I said, pointing to the guard. Joó suddenly interrupted: “This young lady belongs to my flock. If she goes out, I must go with her.” For a moment, the young guard did not know how to react. Then he shrugged and said, “Well, take off your coat, then no one can complain about the bad air.” ...

In November 1943, her father was transported to the ghetto – she never saw him again. Eva and her mother fled to Szászberek as even Sándor Joó could not help them to find shelter in the capital and survived the end of the war in Orczy Castle with the help of Illés Kiss, a judge from Besenyeszög. The fate of the surviving members of the family did not change for the better after liberation. During the Rákosi communist era, they were stripped of all their possessions, the reopened weaving mill was nationalised, and they were branded as „class enemies” instead of yellow stars. Eva left the country in 1948 with some of the surviving members of her family and emigrated to England via Austria and began a new life on the other side of iron curtain.

THE PROFESSIONAL CURRICULUM OF PROFESSOR KOHNER EVA MARIA

After arriving to London, she enrolled first in nursing and later in medical studies at the Royal Free Hospital. After graduation Eva moved to the Hammersmith Hospital and joined the team of Professor Dollery, who was beginning to study retinal

circulation with fluorescein angiography. Her first papers were published between 1964 and 1968 (3,4). At that time the only possible treatment of advanced diabetic retinopathy was surgical or irradiation hypophysectomy, rarely successful and not suitable for everyday practice. In 1968 she already actively engaged herself in the classification of diabetic retinopathy at the Airlie House Symposium (5). In the seventies she pioneered first the argon and later the laser photocoagulation methods, recognized the basic factors of the diabetic retinopathy pathogenesis including the importance of good glycaemic control in it. The results of her studies were published in scientific journals and presented at international congresses regularly (6,7). In 1977 Maria Eva Kohner was appointed as university professor, and at the same time her activities were increasing significantly. These activities included all possible scientific, diagnostic, and therapeutic aspect of diabetic retinopathy. She also led a broad group of other researchers working in the same topic. One of her best-known collaborators was Professor Massimo Porta (now professor of internal medicine at Università degli Studi di Torino), her first doctoral student in the late seventies. Many years later they worked out the protocol of the diabetic retinopathy screening (8-10). The zenith of her scientific and managing activities was in the 90's. She wrote two chapters to the Pickup and Garreth diabetic textbook summarizing everything on diabetic retinopathy (11,12). Eva Maria Kohner's contribution to the understanding of pathophysiology of diabetic retinopathy was outstanding. She coordinated the British Multicentre Trial of Photocoagulation, and in 1990 co-founded the Eye Complications Study Group of the EASD and was its first president. With Massimo Porta published „Screening for Diabetic Retinopathy in Europe” (1992), the foundation of retinopathy screening programmes. In 2002 she received the Order of the British Empire from Her Majesty, the Queen.

BACK TO HUNGARY AFTER ALMOST 40 YEARS

Eva Maria Kohner's first visit to Hungary was in 1986, almost 40 years of her exile. She had been an invited lecture at the 8th Congress of Hungarian Diabetes Society in Székesfehérvár and was elected to honorary membership of the society (13). Eight years later she led a workshop of EASD Postgraduate Subcommittee (organized by one of the authors, Joseph Fövényi, together with late Prof. Michael Berger from Düsseldorf and Pesach Segal from Tel Aviv) in Eger for 80 diabetologists and diabetes nurses (14). As a bonus in addition to official lectures and seminars she also carried out ophthalmologic examination with thorough fundus analysis. After the official programme the participants

attended a common lunch in the „Szépasszony Völgy” wine cellar (the Valley of Beautiful Ladies, home of the famous wines of Eger) and the baroness sang old gypsy and Hungarian songs together with the others. Everybody was fascinated and charmed with her kindness, informality, and high level of knowledge.

After the change of the political situation in Eastern Europe the contacts between the diabetologists from Hungary and prof. Eva Maria Kohner were already frequent, e.g., at the EASD Annual Meeting held in Budapest, 2002.

CONCLUSION

One of the authors of this paper (JF) met her also during the 48th EASD Annual Meeting in Berlin. “During a coffee break she stand lonely, and when I greeted her, she confessed that due to macula degeneration she almost lost her vision and told me, that probably this was the last occasion she attends a scientific meeting”. Despite it, in 2017 she attended an ophthalmological congress in Budapest and visited also Szászberek. At the spot of her happy childhood, she acknowledged with pleasure, that the renovated Orczy castle is functioning as a school and promised to support it financially. She was also delighted to see the bust of his famous and beloved uncle, Baron Adolf Kohner in the main square of the settlement. She visited Hungary the last time on her 90th Birthday in 2019. Baroness Professor Eva Maria Kohner, Honorary Member of the EASD, passed away on 24th September 2021 (15).

References

1. Hlbocsány N. A szászbereki Baroness Kohner család. Zounok. Jász-Nagykun-Szolnok Megyei Levéltár Évkönyve. 2015, 29, 139-172.
2. Carol Peaker, personal communication.
3. Kohner EM et al. Arterial fluorescein studies in diabetic retinopathy. *Diabetes*. 1967; 16, 1-10.
4. Oakley NW, Hill DW, Joplin GF et al. Diabetic retinopathy I: The assessment of severity and progress by comparison with a set of standard fundus photographs. *Diabetologia*. 1968; 3:403-405.
5. Goldberg MF, Fine SL. Airlie Symposium on the Treatment of Diabetic Retinopathy Airlie House, Warrenton, Virginia, September 29 to October 1, 1968. U.S. Dep. of Health, Education, and Welfare, Public Health Service, Neurological and Sensory Disease Control Program, Diabetes and Arthritis Control Program 1969 914 p.
6. Cheng H, Kohner EM, Keen H., et al. Photocoagulation in diabetic maculopathy *Lancet* 1975; 2:1110-1113.
7. Multicentre Study Group: Cheng H, Kohner EM, et al. Proliferative diabetic retinopathy: treatment with xenon arc photocoagulation Interim report of multicentre randomised controlled trial. *Brit Med J*. 1977; 1:739-742.

8. Hugh D, Herbert L, Kohner EM. Laser treatment in proliferative retinopathies In: Current techniques in laser surgery pp.49-60. Ed. Benson WE, Coscas G, Katz LJ. Pub. Current Medicine Philadelphia 1994.
9. Kohner EM, Maneschi F, Cessar J, Lowy C. Diabetic control, HbA1 and development of microangiopathy in non-insulin dependent diabetes Diabetologia. 1964; 19:291.
10. Kohner EM, Porta M. Screening for diabetic retinopathy in Europe: A field handbook Boehringer Mannheim Italy 1992.
11. Kohner EM. The pathogenesis of diabetic retinopathy. In Pickup J, Williams G (Eds) Textbook of diabetes mellitus. Blackwell Scietific Publications 1991, Vol 2, Section 13, Chapter 57, p.564-574 ISBN 0-632-02598-1.
12. Kohner EM. The lesions and natural history of diabetic retinopathy. In Pickup J, Williams G (Eds) Textbook of diabetes mellitus. Blackwell Scietific Publications 1991, Vol 2, Section 13, Chapter 58 p. 575-588. ISBN 0-632-02598-1.
13. Békefi D, Hidvégi T, Várkonyi T. Az MDT tiszteletbeli tagjai [Honorary members of MDT]. In: Kempler P, Winkler G (Eds). A Magyar Diabetes Társaság története [The history of Hungarian Diabetes Association] Tudomány kiadó 2020, 656-657. ISBN 978-963-8194-87-9.
14. Kempler P. EASD Postgraduate Course “Clinical Diabetology” In: Kempler P, Winkler G (Eds). A Magyar Diabetes Társaság története [The history of Hungarian Diabetes Association] Tudomány kiadó 2020, 444-446 ISBN 978-963-8194-87-9.
15. Porta M, Hammes HP. Eva Maria Kohner, 23 February 1929-24 September 2021. Diabetologia. 2022; 65, 261-262. doi.org/10.1007/s00125-021-05626-w

Table 1. A short overview of the Kohner family genealogy

GENERATION, NAME, DATE OF BIRTH AND DEATH	OCCUPATION	RESIDENCE
1. Nathan Moses Kohner 1775-1845	Crop dealer	Neumark (now Všeruby, CZ)
2. Henrik & Abrahan Adolf 1805-1874; 1815-1860	Merchants	Budapest
3. Sigmund & Agost 1840-1908; 1847-1907	Industrials, bankers	Budapest
4. Baron Dr. Adolf Kohner 1866-1937	Banker, landlord	Budpest & Szászberek
5. Baron Nicolaus George Kohner 1903-1945	Industrial	Budapest (death in concentration camp)
6. Prof. Eva Maria Kohner, MD 1929-2021	Ophtalmologist, scientist	Budapest, Szászberek & London

Note: In the excellent genealogical book of Hlbocsany (1) altogether 58 members of the

family are mentioned. Some collateral descendants of the family are now living in Hungary, in Italy (Charlie Farkas, sculptor, 1926, grandson of Adolf Kohner), and direct descendants in England: Stephen & Nicholas Kohner, Church of England parsons, 1962 & 1964, sons of Eugen Kohner (1931-2009), uncle of Eva Maria.

Table 2. A list of most important functions and awards of Baroness Professor Eva Maria Kohner

Royal College of Physicians, Royal College of Ophthalmologists, Royal Society of Medicine
 British Medical Association, British Diabetic Association
 European Association for the Study of Diabetes (EASD)
 American Diabetic Association (ADA)
 Hungarian Diabetes Association, Honorary member, 1986
 Diabetic Complications, Editorial Board, 1986-1990
 Kellion Lecturer, Australian Diabetes Society 1987
 Visiting Lecturer, Broadhurst Foundation Eye Research Institute Boston, 1988
 Founder member & 1st President, EASD Eye Complications Study Group, 1990-1994
 Diabetologia, Editorial Board, 1992-1994
 Castelli Pedrolì Prize & Golgi Lecture, EASD Prague, 1992
 Banting Lecture, British Diabetic Association, 1993
 Honorary Fellow EASD, 1998
 Arnall Patz Medal, Macula Society, 2002
 Officer of the British Empire (OBE), 2002
 Member of the Athenaeum Club (one of first 30 female members), 2002
 Honorary Doctorate, Torino University, 2004

ROBERT SCHRIER – A WORLD LEADER IN NEPHROLOGY (1936-2021)

Malcolm Phillips¹, Natale Gaspare De Santo²

¹Charing Cross Hospital, London, United Kingdom,

²University of Campania Luigi Vanvitelli, Naples, Italy

e-mail: malcolm.phillips101@gmail.com

ABSTRACT

Bob Schrier was brought up in Indianapolis. He studied Medicine at Indianapolis University Medical School, graduating in 1962. In 1965 his lifelong interest in salt and water balance started. In 1976 he became Chairman of Medicine at the University of Colorado.

Whilst Chairman the faculty membership and research funding increased massively. He devoted much time to mentoring Fellows and juniors. His own research covered many body systems and diseases that featured fluid retention e.g., cirrhosis. In his lifetime he published >1000 papers and >50 books. He was, at various times, President of the Association of American Professors, the American Society of Nephrology and the International Society of Nephrology (ISN). Within the ISN he expanded its influence globally.

“Post-retirement” he continued research in many fields, often related to salt/water balance. He wrote 177 papers, maintained his mentoring role and became Professor Emeritus University of Colorado in 2012. He died in January 2021.

Keywords: Schrier; nephrologist; Colorado; fluid retention; mentor

INTRODUCTION

In this brief paper I am writing about Professor Robert Schrier, a world leader in renal medicine who died in 2021. I hope, at the conclusion, that you will agree that Bob Schrier was a scientist whose academic life matched, very well, many of the aims and wishes of EAPE.

THE EARLY YEARS

Bob was born in 1936 in Indianapolis, where he also schooled. His first college was De Pauw University where he gained his Bachelors degree. Here, he met his wife-to-be, Barbara, a marriage that lasted nearly 62 years. The marriage resulted

in 5 children, 13 grandchildren and two great-grandchildren. During his school and college years he was recognised as a highly-talented basketball and baseball player, attracting the interest of a major baseball team. Such was his interest that, he admits in his Memoirs (1) that he managed to fit in a game of baseball before his wedding ceremony. He made his vows on time-but it was a very close call!

Happily, for Medicine he decided on that field rather than sport and went to Indiana University Medical School where he graduated MD with honours in 1962. After qualifying he undertook junior medical posts and then obtained a Harvard Fellowship working at the Peter Bent Brigham Hospital (1965). His research was in Endocrinology and Metabolism and it was at this time that he became interested in salt and water balance and its regulation. This was to be his lifelong interest. In 1966 he met Hugh de Wardener, Nephrologist and Professor of Medicine at Charing Cross Hospital Medical School, London, who invited him to work with him in the field of salt and water regulation. He went to Charing Cross in 1967. That year M P also started to work clinically for de Wardener and so met Bob for the first time.

ACADEMIA

In 1969 he was appointed Assistant and then Associate Professor of Nephrology at the University of California. In 1972 he moved to the University of Colorado as Head of the Division of Renal Diseases and Hypertension and in 1976 became Chairman of Medicine. He spent almost 30 years at Colorado and massively developed the Faculty of Medicine. Membership increased from about 75 to over 500; research funding increased from around \$3 million to almost \$100 million per year. Bob attracted funds to create 30 endowed chairs in various branches of Medicine, attracting highly qualified and successful medical heads.

As well as administrative achievements he promoted the training of Fellows in renal medicine and research and was enthusiastically involved in mentoring these Fellows as well as junior medical staff. Ultimately over 200 Fellows passed through his department. His home and the kitchen table, at weekends, were regularly the site of mentoring and advising fellows and junior staff.

His own research continued actively and extended beyond nephrology into cardiology, liver disease and pregnancy. A Spanish hepatologist described Schrier as “one of the greatest nephrologists of all time” and “one of hepatology’s most influential observers” (2). This was in recognition of Bob’s findings that

in cirrhosis, fluid retention related to an under-filling of the arterial circulation secondary to increases in vasodilators-especially nitric oxide (3).

In his lifetime Bob Schrier published over 1000 scientific papers and authored or edited over 50 books, some of which are the most-referred to in the field of nephrology worldwide, especially his giant reference book “Diseases of the Kidney and Urinary Tract” (4)

Given his medical and academic status it is not surprising that Bob was a member of multiple societies. At varying times, he was President of the Association of American Physicians, the American Society of Nephrology, the National Kidney Foundation and, especially, the International Society of Nephrology (ISN). Over many years with the ISN he directed the Society towards a global development of nephrology. He launched the Society’s Fellowship Programme whereby clinicians from under-developed countries were sponsored to work and train in nephrology and hypertension for 2 years at an established renal centre. Most returned to their own countries to care for renal patients and to train others in that field. He also developed the Sister Renal Centers Programme which links developing kidney units with established units. The most productive pairing receives the Robert Schrier Award during ISN World Congresses.

His multiple honours and awards are too numerous to list. Of note are his election to the US National Academy of Medicine, his honorary Fellowship of the Royal College of Physicians of the UK and his shared Jean Hamburger Award-the ISN’s highest honour. Of interest to this Association was that, in 2012-ten years “post-retirement”- his role in *mentorship* was recognised by the cardiology profession with the “Eugene Braunwald Mentorship Award”- normally awarded internally.

Bob left his position at Colorado in 2002. But he continued active research in the fields of autosomal polycystic kidney disease-a common, inherited disorder accounting for about 10% of patients worldwide on long-term dialysis. He also continued his interests in salt and water retention in heart failure, liver disease, pregnancy and renal disease. He wrote considerably on diabetes, another common cause of renal failure. Between 2003 and 2018 he published 177 papers.

In 2012, at the age of 76, Bob was made Professor Emeritus of the University of Colorado School of Medicine.

Outside of medicine, between 2011 and 2014 he wrote other books. He had a great interest in American political history and wrote on the political and medical events in the lives of 20th century American Presidents from Roosevelt to Clinton (5), and separately on the lives of famous world leaders- Abraham

Lincoln, Mahatma Gandhi, Nelson Mandela and Martin Luther King Jr. (6). A later book was his Memoirs, entitled “Life’s Lessons Learned” (1).

CONCLUSION

We end this article with a few quotes:

Bob Schrier-one of his favourite quotes was originally by George Bernard Shaw; ‘Some men see things as they are and ask ‘Why?’ Others dream of things that never were and ask ‘Why not?’

Thomas Berl- Bob’s successor at Colorado: ‘His most enduring memory may be his commitment to mentor the large number of Fellows and scientists who spent from weeks to years in his research programme’.

Bob, on his wife, Barbara: ‘Her legacy, as the leader of our family, dwarfs anything that I have ever done’.

Barbara on Bob- written after his passing: ‘Bob sought the best in others and gave the best he had’.

Bob Schrier: sportsman, nephrologist, scientist, author, innovator, mentor and leader. But above all, husband, father, grandfather, great grandfather and friend. His roles in many fields into old age, perhaps especially in passing on his knowledge and wisdom to younger colleagues and his family, is a major tenet of EAPE in relation to work, careers and life in general.

References

1. Schrier RW. Life’s Lessons Learned. Create Space Independent Publishing Platform USA; 2014. p.41.
2. Gines P. Robert W. Schrier: an influential observer from outside Hepatology (Obit). J. Hepatology 2021;74,1281-1282.
3. Gines P, Schrier RW. Renal Failure in Cirrhosis. N Engl J Med. 2008; 361 (13): 1279-1290.
4. Schrier RW. Diseases of the Kidney and Urinary Tract. 8th ed. Lippincott Williams & Wilkins; 2007. 3776 p
5. Schrier RW. Profiles of American Presidents in the Twentieth Century: Merits and Maladies. Create Space Independent Publishing Platform USA,2011. 204p.
6. Schrier RW. Moral Courage. Abraham Lincoln, Mahatma Gandhi, Nelson Mandela, Martin Luther King Jr. Create Space Independent Publishing Platform USA, 2012. 172p



Fig. 1. Professor Robert Schrier

INDEX
OF
KEY
WORDS

INDEX OF KEY WORDS

21st Century 125

1822 85

A

academic freedom 301

academies 81

accelerated aging 187

acids 359

active ageing 37

active and healthy ageing 311

adaptation 245

AEROMET Projects 173

aerosols 173

ageing 193

ageing population 37

aging 181

agriculture 113

AIDS 119

air quality 173

Alfonso of Aragon 81

algorithms 165

alternative 279

anatomy 365

ancient 359

ancient Pompeii 355

anthropogenic impact 135

APEF 57

art 75, 379

artificial intelligence 125

artists 379

B

basal ganglia 219

biomedical person 181

brain 231

Byzantine Empire 373

C

carbon neutrality 113

cardiology 125

Cardiovascular Medicine 365

cerebrovascular disorders/history 225

CFD 165

chemical 359

chronic diseases 119

chronic kidney disease 187

climate 147

climate action summit 93

climate change 93, 113

clinical method 213

CO₂ 147

cognition 231

Colorado 399

common good 49

complexity 141

complex network 251

complex systems 251

contemporary society 205

Constitution of Europe 333

coronavirus 349

Covid-19 119, 271

Covid-19 pandemic 69, 237, 279

creativity 379

cultural identity 69

D

decarbonization 159

diabetic retinopathy 391

diagnostic error 213

disease 181

dogs' cannibalism 349

dynamic modeling 165

E

ecological modernization 49
 economic disasters 237
 elder 339
 emeriti professors 43
 energy storage 159
 environment 141, 153
 environmental engineering 165
 epidemic 259
 epidemics 265
 ESRD 305
 ethics 141, 323
 Europe 301
 European continent 135
 European Council 323
 European innovation partnership 311
 excarnation 349

F

feminist standpoint of knowing 33
 Florence Council 373
 fluid retention 399
 forest ecosystems 141
 fonifero 387
 forests 147
 frailty 295
 FSGS 199

G

gas exchange 147
 Georgios Gemistos Plethon 373
 Geroscience 187
 Gestalt theory 251
 globalization of risk 279
 glomerulus 199
 Greco-Roman civilization 333
 greenhouse gases 113
 green hydrogen 159

H

hallmarks 193
 hands-on activity 317
 health 205
 health promotion 295
 healthy aging 181
 history 75
 history of medicine 391
 Homeopathy and the role of Naples 85
 Homer's pandemic 349
 Homo Sapiens 153
 hospitals 379
 house of the prince of Naples 355
 house of Venus 355
 human-made disasters 237
 hydrogen economy 159
 hydrogen for mobility 159

I

incidence 305
 inclusive society 37
 industrial revolution 125
 in field real time analysis 173
 information industry 327
 innovative approaches 295
 interaction 245
 interethnic-interreligious city 27
 international collaboration 295
 intuition 213
 ischemic stroke 225
 IT services 43

K

kidney 231
 knowledge 323, 339
 Knowledge Economy 49

L

landscape 153
 life and academic activities 63
 Listeo Plus-App by Andalusian project 311
 longevity 75

M

major ambulatory surgery 311
 mask 339
 master-mentor-apprenticeship 317
 maturity 345
 Mediterranean Federation for Advancing Vascular Surgery 311
 memory 69, 153
 mental health 237
 mentor 399
 mentorship 339
 mineral 359
 model organism 193
 motor symptoms 219
 mRNA 271
 miRNAs 199
 music 75
 Mystras 373

N

Naples, crossroad of Homeopathy 85
 natural disasters 237
 natural heritage 93
 neoliberal development 279
 nephrologist 399
 neurodegenerative disease 219
 neurology 213
 neuroplasticity 245
 neurosciences 245
 new humanism 333

O

open access 327
 open science 323

P

pandemic 119, 259
 paradigms of complexity 33
 Parkinson's disease 219
 pathocenosis 265
 Pathology 365
 personality 339
 photosynthesis 147
 physical inactivity 205
 Physiology 365
 pioneers 135
 plagues 265
 PM₁₀/PM_{2.5} 173
 podocytes injury 199
 Pontaniana 81
 prevalence 305
 prevention 181, 295
 professors emeriti 27, 57, 63
 protection of nature 135
 psychology 75
 psychotherapy 251
 psychotherapy effectiveness 251
 psychotherapy processes 251

R

Regulation of Homeopathy in Italy 85
 renaissance 373
 reperfusion therapy 225
 research 43, 301
 retired academics 37
 retired professors 43
 retirement 63
 rights 301

risk assessment 165
 Roman pontiffs 379
 Royal Academy of Sciences and Homeopathy 85
 RRT 305

S

SARS-CoV-2 119, 259
 Schrier 399
 Science integrity 327
 sedentary behavior 205
 senolytic agents 187
 Shoa 391
 silver tsunami 37
 social division of knowledge 317
 social treasure 69
 socio-economic factors 119
 Sophocles “Antigone” 349
 Spillover 259
 Spillover virus 259
 stroke/apoplexy 225
 subsidiarity 57
 sustainable growth 279
 synapses 231
 syndemic 119

T

tactility 317
 teaching 43
 technology 359
 the beyond 27
 The University of Naples and Homeopathy 85

Third Mission 49
 Trans-generational pact 69
 tuberculosis 119
 turbulence 165

U

UNESCO monument 93
 universities 379
 university 301
 University third mission 57
 uremic toxins 187
 uric acid 231
 Utopia 333

V

vaccine 271
 vertebrates 193
 Vesalius, Andreas 365
 Vincenzo Cuoco 81
 vis medicatrix naturae 245
 vocational/academic education 33
 voice conductor 387

W

wisdom 27, 345

Y

young people 345

Z

Zebrafish 199

AUTHORS
INDEX

AUTHORS INDEX

A

Ardailou Raymond 271

B

Baran Dana 339
 Bartsocas Christos S. 373
 Beckhoff Burkhard 173
 Bellinghieri Guido 289
 Berche Patrick 119
 Bisaccia Carmela 379
 Bonavita Vincenzo 17, 213
 Borriello Margherita 187
 Bracale Giancarlo 311
 Bracale Umberto Marcello 311

C

Campanella Luigi 17, 43, 323
 Cantore Italo 387
 Capasso Giovambattista 199
 Caruso Francesca Pia 199
 Ceccarelli Michele 199
 Christodoulou George N. 43, 237
 Christodoulou Nikos G. 237
 Ciamarra Massimo Pica 153
 Ciambelli Paolo 159
 Ciano Orazio 141
 Cokkinos Dennis V. 17, 125
 Čok Lucija 43
 Corona Piermaria 141

D

D'Angelo Livia 193
 Diamandopoulos Athanasios 349

E

Ebdon Les Sir 285
 Ehrich Hendrik 345

Ehrich Jochen 301, 345
 Ehrich Mara 345
 Endlich Karlhans 199
 Endlich Nicole 199

F

Fövényi József 391

G

Gargano Antonio 101
 Giammello Fabrizio 225
 Girard Luigi Fusco 49
 Girlando Alberto 327
 Gričar Jože 43
 Guerriero Olimpio 69

I

Iervolino Anna 199
 Illario Maddalena 295

L

Lange Tim 199
 Lauro Carlo 57
 Luca Vincenzo De 295
 Lymperopoulou Theopisti 173

M

Markatos Nikos C. 165
 Marrucci Giuseppe 81
 Martínez Yuselys García 187
 Mayr Heinrich C. 43
 Melodia Carlo 85
 Mercurio Lorenzo 295
 Mičetić-Turk Dušica 63
 Mitrović Dragana 279
 Mitrović Ljubiša R. 279
 Mjelde Liv 33, 317
 Musolino Rosa Fortunata 225

N

Navenec Carole-Lynne Le 43
Nocentini Susanna 141

O

Ochsenkühn Klaus-Michael 173
Ochsenkühn-Petropoulou Maria 173

P

Paino Giuseppe 355, 387
Papalexandris Nancy 37
Pedrotti Franco 135
Pelagalli Gaetano V. 355, 387
Perna Alessandra F. 187
Phillips Malcolm 17, 399
Pišot Rado 205
Priovolou Stella 333
Pugliese Antonio 265
Pupillo Paolo 147

R

Rácz Oliver 391
Resic Halima 305
Rossi Rosetta 245
Russo Adolfo 27

S

Sadlek Gregory 43
Salvatore Francesco 181
Santini Luigi 69
Santo Luca Salvatore De 379
Santo Natale Gaspare De 17, 23, 379, 399

Savica Vincenzo 259
Schiffer Eric 345
Sciaudone Francesca 245
Sciaudone Goffredo 85, 245
Sepe Stefano 69
Siccardi Sabrina 199
Siegerist Florian 199
Šikić Pogačar Maja 63
Smith Adrian Sir 109
Sperandeo Raffaele 251

T

Thiene Gaetano 365
Tramontano Giovanni 295
Triantafyllou Eugenia 237
Tsakanika Lamprini-Areti 173
Tsopelas Fotios 173
Turk Zmago 63

V

Valentini Riccardo 113
Van de Voorde Marcel 159
Veličković Dunja 279
Viccaro Vincenzo 75
Viggiano Davide 231
Vitale Carmine 219

Y

Yfantis Dimitrios 359

Z

Zecchino Ortensio 105
Zerefos Christos 93

This book
was printed
in 300 copies,
in chamois 100g paper
by Papadakis Bros Ltd

