EUROPEAN ASSOCIATION OF PROFESSORS EMERITI

The Capital of Knowledge

Proceedings of the First International Congress

May 30 - June 1, 2019, Athens, Greece

Edited by

Dennis V. Cokkinos,
Niki Agnantis, Katerina Gardikas, Constantin R. Soldatos

SOCIETY FOR THE PROPAGATION OF USEFUL BOOKS

ATHENS 2020

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Society for the Propagation of Useful Books
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This book is being published
while humanity is facing a dire ordeal,
the deadly pandemic of Coronavirus COVID-19.

We dedicate our "Capital of Knowledge"
to those who are suffering, those that have sadly perished,
but also to the common strife against the invisible enemy.

We Professors Emeriti express our strong belief
that Humankind will prevail.

CONTENTS

1st INTERNATIONAL CONGRESS
EUROPEAN ASSOCIATION
OF PROFESSORS EMERITI

The Capital of Knowledge

MAY 30 - 31 and JUNE 1, 2019

ATHENS, GREECE

Under the Auspices of H.E. the President of the Hellenic Republic
Mr. Prokopios Pavlopoulos

Dennis V. Cokkinos, (Athens) President of the Congress

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FOREWORD

BY THE PRESIDENT OF THE EUROPEAN ASSOCIATION OF PROFESSORS EMERITI

Dennis V. Cokkinos

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In this book, presentations from the First International Congress of the European Association of Professors Emeriti are included.

The Congress under the main theme **"The Capital of Knowledge"** was a success. It was held in Athens (May 30 - June 1, 2019) under the Auspices of H.E. the President of the Hellenic Republic Mr. Prokopios Pavlopoulos, a distinguished Professor Emeritus of Law, who was named Honorary President of our Association.

Many chapters dwell upon the changes of functions that a retired or Emeritus Professor is called to face when his tenure ends. What the national legislature permits varies greatly in Europe. Thus, in the various countries different laws exist as regards the privileges of retired or Professors Emeriti (PEm). As many of our colleagues have pointed out in many presentations and previous publications, no uniformity exists in Europe and in other continents as well, as to these privileges but also as regards the designation of retiring Professors as PEm[1,2]. Our Association is called to marshall in favor of a united approach in Europe. Another important element is the intradepartmental atmosphere in the retiring Professors' departments. We have the responsibility to impress our Alma Mater Universities that our endeavors point towards a continuing collaboration between active and retiring academic teachers.

An important aspect, elaborated upon mainly by Natale de Santo et al.[3] is the element of age. When a Professor ends his university tenure, health, bodily and intellectual, and numerous additional factors regulate his capacity to further continue his academic activities. Admittedly, many artists, poets, authors and scientists produce some of their most inspired and inspirational works or their most significant scientific findings at a late age. However, body frailty and mental deterioration, even subtle, is a constant threat. There, a clarification is due; it is stated that our population ages. The real situation which should be pointed out is that useful and productive life is extended. Our body mechanisms can enable us to gradually achieve a lifespan of around 115 years. These estimates will surely continue to increase.

The activities of PEm are not necessarily confined within their university Alma

Mater or other universities. A large number of meetings, books and other publications, exhibitions, art demonstrations and festivals, can be the expression of their endeavors. These possibilities create a question: Why is a European Association of Professors Emeriti needed?

I believe that an Association can facilitate the combination of our efforts towards achieving a homogeneity in the stature of retiring academic teachers. This would have a beneficial influence on the services offered to our co - citizens. Assumption of more duties by PEm, always in accord and collaboration with their active colleagues, could afford a greater emphasis to Mentoring, which by definition includes close and personal counseling. Also, PEm could orchestrate their efforts towards education of the general public.This is a very important aspect, because this activity is not always undertaken by expert or completely uninterested or public benefit bodies.

Thus, the European Association of Professors Emeriti (EAPE) was born from the realization that academic teachers after their retirement from administrative duties, still have the possibility and actually the moral obligation to offer their services to our increasingly complex and demanding society. The aims of our Association remain the same since its founding in September 2016:

The creation and preservation of ties among academics and PEm all over Europe.

The collaboration of European PEm in conducting research projects or in producing and publishing meritorious scientific work.

The submission of proposals to the relevant authorities with respect to the study of issues related to graduate and post graduate education or offering courses to the general public with a view to contribute to restructuring curricula or other sections of learning, where such needs exist.

The exchange of knowledge and ideas stemming from various scientific fields, visual and performing arts. The active cooperation among European scientists across various academic fields via the organization of meetings, colloquia or conferences of interdisciplinary and intracultural interests and the creation of a “Think Tank”.

The moral, scientific, legal counseling and material support to colleagues and their families and also to every needy individual.

As many other collective institutions have successfully undertaken, PEm can be instrumental in issuing Recommendations and Guidelines on various aspects affecting our Society. Thus, Advocacy becomes an imperative goal. Here it must be stressed that the number of retired and PEm is quite large, difficult to estimate-but larger than most Associations and Academies. Enrolment of as many colleagues as possible is a necessity and an accessible goal.

To achieve all this, funding is of prime importance, and of course is becoming increasingly difficult, since the number of organizations applying to philanthropy and to the European Union resources is steadily rising.

To respond to the challenges, our young Association has to face many problems successfully:

The first task is to maintain a climate of "confrérie" and collegiality. Our goal is the formation and maintenance of a society of "dignified friends".

The second is growth and expansion. The pattern common to all large and successful organizations is to create as many bodies as possible, Working Groups, Committees, which will be helping the Board of Directors. As a matter of fact the Italian and the Hellenic Committee and a Working Group on Art and Culture and Enrolment and Advocacy have been formed. Also, collaboration with other Associations and Academies is imperative. In the first International Congress of our Association many such august bodies were represented.

Prime among our goals is to maintain our real mission-this of the "Teacher". Teaching is a noble profession. According to J. Wills Hurst, a legendary Professor of Cardiology of the Emory University of Atlanta, U.S.A. the difference between a "Profession"and a regular "job" implies that its servant provides services to the public benefit above and beyond his salary or other financial remuneration. Hurst also commented on the universal definition of the "Teacher". It must be recognized that the function of the Teacher, Mentor, or Educator extends beyond School and University. An enlightened person in all strata of society can advance "Knowledge". In its true essence, knowledge, education, "gnosis" in ancient Greek, implies not a mere accumulation of facts and data, but an introduction to acquiring a new perception of the values of life, and an insight to creative and productive thinking, which alone leads to important advances and discoveries which shape mankind. Communion of knowledge is an act of kindness.

A teacher holds the philosopher's stone, which can convert the raw material of the uninitiated novice to the gold of knowledge. The role of mentoring is very well described by Liv Mjelde in this book and was the subject of a special session.

Henry Brooks Adams in 1907 wrote that: "A teacher affects eternity: He can never tell where his influence stops"[4].

The example of Alexander the Great who stated that: "we are indebted to our parents for living, but to our teachers for living well" «Στους γονείς οφείλομεν το ζην, στους δε διδασκάλους το ευ ζην» still comes to us 24 centuries later.

William Arthur Ward (1921-1994) quoted that: "The mediocre teacher tells. The

good teacher explains. The superior teacher demonstrates. The great teacher inspires".

The communications published in this book present a great diversity. What happily characterizes them is a general approach to the subjects that they dwell upon, thus rendering them comprehensible by scientists in a very wide array of disciplines. We have classified the submitted articles in pertinent entities, taking into account the order of their presentation.

This volume was produced with the generous support of the Society for the Propagation of Useful Books which in 2019 celebrated 120 years since its foundation. We thank the Board of Directors of this eminent society and its President, Professor Emeritus Constantinos Manafis, a member of our Association, for this valuable support which marks another aim of our Association: To collaborate with other meritorious and historic institutions, academies, associations and societies that share common goals of knowledge, enlightenment and culture.

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ADDRESS OF HIS EXCELLENCY THE PRESIDENT OF THE HELLENIC REPUBLIC

THE ROOTS OF LEARNING: THE MENTOR'S ROLE

Professor Emeritus Prokopios Pavlopoulos
on the occasion of the launching of the symposium organised by

The European Association of Professors Emeriti

Athens, May 31, 2019

Foreword

I feel greatly honoured by launching such a high - level Symposium, organised by the European Association of Professors Emeriti here in Athens and in this emblematic Hall of the National and Kapodistrian University of Athens; a University that for me was, remains and will remain, forever, my precious "Alma Mater Studiorum".

My feelings are also justified by the fact - I would say, especially because of the fact - that you have treated me with the honour to include me among your members and, consequently, to give me the possibility to feel the irreplaceable spiritual warmth of our European Academic Community. A spiritual warmth that supports and inspires me, on the one hand to continue, now as a Professor Emeritus, my scholarly research and production and, on the other hand, to take recourse to the ethics of the Academic Community as a safe direction indicator also in the exercise of my duties as President of the Hellenic Republic.

Expecting with particular interest the conclusions of the contributions, which, I am sure, will fully cover the topic of the Symposium, allow me to necessarily limit my opening salutation, on the one hand, to what are the roots of the term "Mentor" and how the meaning of this term has evolved to date; and, on the other hand, whether some form of "Mentor" is conceivable within the field of modern learning and what this can ultimately symbolise under conditions that are specific to the peculiarity of an equally modern learning process.

Mentor: From Myth to History

Back to the roots then, a few millennia ago, in a somewhat blurred era evidence - wise, where the temporal domination of the Myth was ending and the Age of History was rising, led by the Homeric Epics.

Leaving Ithaca in order to participate in the Trojan War, Odysseus leaves his close friend Mentor of Ithaca as his substitute to take care of his "family affairs" and, above all, to act as a kind of "guide" of his son Telemachus. According to Greek Mythology, goddess Athena - her status as the goddess of Wisdom made it quasi - natural - took the form of Mentor and accompanied Telemachus e.g. to Pylos and Sparta, in search of his father, Odysseus; as he also helped Telemachus when he hurried to his father's help, e.g. during the "Slaying of the Suitors [in Greek: *Mnesterophonia*]". It is clear that ever since, with the "transition" from the original Mentor of Ithaca to the goddess Athena, Telemachus' protector and guide until Odysseus' return, we have the first samples of Mentor's symbolic transubstantiation.

Many and multifaceted were the references to the Mentor's role, not only by reference to the Homeric Epics but also by partial correspondences along the trajectory of historical times. However, back to our age, we must rather linger on a critical moment that, in an almost ideal way epitomises both history and literature. This is the period between 1693 and 1694, when François de Salignac de la Mothe Fénelon wrote his famous educational treatise - novel titled "Les aventures de Télémaque" ("The Adventures of Telemachus").

Fénelon, who served as Archbishop in France, was a great theologian and, more generally, a learned man with extremely liberal views on education, which, of course, were not in agreement with the "bossy mood" of the French royal court.

His above - mentioned novel titled ''The Adventures of Telemachus'' was written as a form of guide for the training of the young Duke of Burgundy, depicted by Fénelon as Telemachus and having goddess Athena advising him to complete his education, thus epitomising all the features of a "Mentor" of that time. For historical accuracy, "The Adventures of Telemachus" was sharply critical of France's general education policy, as it was modelled on the highly conservative - and entirely anachronistic, according to Fénelon - standards of Louis XV and his court. Fénelon's work, apart from its enormous influence in France, made an unprecedented international career in Europe of that time through many translations.

It is not, therefore, exaggerated - quite the contrary - to accept that the role and symbolisms of Mentor in our times go back par excellence to Fénelon's "Adventures of Telemachus" and highlight the greatness of the "instructor-advisor", who can inspire, primarily as a model, young persons to complete, through their education and corresponding attitude of life, their whole personality. In other words, a modern "Mentor" ideally expresses the "model" and the "guide" of life.

The Modern Mentor

Can we accept, at least in the context of our common European Academic Community, that it is possible for the role of Mentor in the field of learning process - of course by the dual and, certainly, complementary dimension of research and teaching - to work? And, if so, under what conditions and in the "constellation" of what symbolism? I believe that our answer to this crucial question must be positive, however under the following conditions, which work both ways in this respect: First, that a Mentor represents and expresses an authentic model of an integrated personality in his own field of knowledge - and even beyond this, in the sense that it must represent a minimum of "worldview" with respect to the mission of learning. And, secondly, that a Mentor does not impose his own model on the ones he addresses, however convinced he may be of his completeness. But, what is more, he opens new paths for them in the still unknown "universe" of learning, letting them freely exercise the right of choice and, *a fortiori* the questioning of established perceptions. To put it in somewhat clearer way:

A modern Mentor can claim this role in the context of the learning process - especially in the one concerning our Academic Community - when, first of all, he has reached a sufficiently complete level of education.

Indeed, of an education which certainly extends to the whole of knowledge, within which his specialisation works; but it necessarily exceeds it and provides the guarantee of a solid, more general "worldview" on learning, even more so when modern methodology of Sciences proves that they are not separated by any kind of ''waterproof'' borders; and, on the other hand, the methodology of knowledge transmission - of genuine knowledge transmission - is a component shared by individual methodological channels, which are basically oriented towards a common horizon of scientific search and creation.

I do not hesitate to claim that a modern Mentor must be the "Master" who inspires the student "Telemachus" to resemble him, not only in the sense of reaching the same level of education, but also in the sense of imitating his general way of life and creation; and this adds the following weight on the shoulders of a modern "Mentor": Only then can he inspire the student as a model in the above-mentioned sense when, in addition, by actually practicing his Science - even if he considers it necessary for a living - he does so without any deduction in respecting faithful adherence to commonly accepted scientific ethics. What is more, he does so under conditions that show that also such an exercise of Science has in fact as its primary objective its

confirmation and its necessary promotion according to its mission. To this end, the model of a modern "Mentor" is consistent only with the Master - Servant at the service of Learning, according to its actual meaning and its equally actual destination.

But apart from this, a modern Mentor justifies the respective symbolisms of his entity only when he, as a "Master", remains faithful to the elementary ideas of teaching and learning in the way they both stem from the evidence of General Scientific Methodology.

In this direction his primary concern is to understand that the transmission of learning through teaching does not in any way imply to impose to the student the scientific perceptions embraced by the teacher. Consequently, a modern "Mentor" does not teach according to a "so-spoke-he" model of a "Holy Book". Quite the contrary: he must be against all sorts of "doctrine", hence against all sorts of established perceptions; and this to such an extent that he urges the student to challenge and exceed him under conditions of noble competition in the field of scientific creation.

After all, this easily follows also from the imperatives of modern Science Methodology, given that, as generally acknowledged and confessed, Science is promoted and led to its marginal recognition only by falsification of its eventual evidence.

Epilogue

What I have said explains and justifies, in full, the great importance of the subject to be addressed by the contributions of the Symposium. I conclude by making the following two points:

I wonder, how right are those who conceptualised the topic of the Symposium, giving it the title "At the Roots of Learning: The Mentor's Role!" Because it is absolutely true that, in order to delimit the Mentor's role nowadays, especially in the field of our common European Academic Community - which must always be moving within the context of our common European Civilisation - we must return to the roots of essential Learning; namely the roots that highlight the meaning and mission of Learning and the learning process, as a mission whose main goal is the completion of Personality of Humans according to their destination.

The thoughts I shared with you, especially on the modern "Mentor's" model in the field of Science and scientific process, may somehow give off a scent of romanticism that touches the limits of utopia. Since I know very well who I am addressing, I also know that you do not share such a view. However, not only is the idealisation

of the modern “Mentor’s” model far from utopian but, quite the contrary, it serves what the above model must express and represent, *par excellence* in our complex and troubled times, where the challenges for Humans and Humanity are becoming more and more visible, increasingly painful and, at the same time, dangerous. To this end, for the modern “Mentor” to be honoured, he should move so that he reaches his limits. As for the romantic criticism that I could experience, I completely accept it; in the sense that we should not forget that romanticism in general - even in the field of Learning - has been a truly “revolutionary” movement of the Spirit destined to break the bonds of conservation of “doctrine” and “authority”; and such bonds do not fit, in any way, into real Learning or, in a logical sequence, into the modern “Mentor’s” model, as I have tried to describe it to you.

WELCOME SALUTATION BY THE RECTOR OF THE NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS

Host of the Congress

Professor Meletios Athanasios Demopoulos

Your Excellency, the President of the Hellenic Republic

It is a great honor to welcome You to the National and Kapodistrian University of Athens, of which you are a select and distinguished member, to the Opening Ceremony of the First International Congress of the European Association of Professors Emeriti with the general theme: The Capital of Knowledge.

It is a polythematic congress which concerns important contemporary problems such as education and learning, protection of the environment, matters of public health, the capital of age and economic sustainability. Leading European and Greek Professors, philosophers and thinkers who influence and formulate public opinion participate.

This is the first international Congress, representing a wide initiative undertaken by the European Association of Professors Emeriti. Just a few years ago, in this Great Hall of the oldest and most venerable University of Greece and the broader East Mediterranean this European Association was born. It was a truly remarkable event for education and civilization in Europe.

Professors Emeriti and their Association represent, as we have repeatedly stated, a select part of our University but also of the wider Society in which they are incorporated. They are a valuable repository of knowledge, experience, wisdom and one of the foundation stones of every Higher Educational Institute.

The European Association of Professors Emeriti constitutes in the European level a worthy body of knowledge and experience, especially important in the crucial crossroads which Europe faces. Additionally, this initiative will always represent a bright example of joining of forces in an era of great challenges in which various perturbations shake the European firmament and dangers of dissolution lurk, more than any other time in the recent past. We must stress that EAPE can, among others offer aid to the following subjects:

1. The creation and/or preservation of ties among Professors Emeriti and academics in general all over Europe.

2. The collaboration of European Professors Emeriti and academics in general in conducting research projects or in producing and publishing significant scientific collaborative research work.
3. The submission of proposals to the relevant European authorities with respect to the study of issues related to higher graduate and post graduate education and offering courses to the general public, the expression of opinion and provision of proposals for improvements on the above areas where such need exists.
4. The exchange of knowledge and ideas on various scientific fields.
5. The active cooperation among scientists across various academic fields via the organization of meetings, symposiums or conferences of interdisciplinary and cross-cultural interests and the creation of a "Think Tank".
6. Offering medical, legal or other scientific advice and support to colleagues and their families and possibly to any individual in need.

Your Excellency,
Initiatives such as the International Congress of the European Association of Professors Emeriti constitute a loud message, a strong signal for a United Europe which will be founded on Knowledge, Education and Culture of its Citizens.

For all these reasons, it is a great honor to welcome here today so many distinguished Professors of European Universities.
We thank them most warmly for their deeds and contribution.
Mr. President of the Hellenic Republic, we thank You once more for Your presence.

ADDRESS OF THE PRESIDENT OF THE ACADEMY OF ATHENS

Stephanos D. Imellos
Professor Emeritus, School of Philosophy, University of Athenss

1st International Congress

European Association of Professors Emeriti

The Capital of Knowledge

May 31, 2019, Athens

Your Excellency,

In my capacity as President of the highest intellectual institution of the Country, the Academy of Athens, I address from the depth of my heart a salutation to the 1st International Congress of the European Association of Professors Emeriti.

In this Congress many Greek and foreign prestigious pioneers of Science have been invited to contribute their fund of knowledge. They have distinguished themselves in the field of Research and Science and have thus justified, from the cycle of their interests and achievements each one, the expectations of the experts. The array of subjects to be discussed, a work of toil and effort is always rich, and when presented in Congresses and other similar scientific activities always causes a variety of stimuli, stimuli in essence for fecund and productive discussions.

I wish, now that the Congress is actually commencing, success in its endeavors, although judging from the multitude of the participating distinguished scientists of various disciplines and from the quality of the deeds which they have up to now succeeded in achieving, I am obliged to accept in advance that it will have a resounding success, with the expected result that it will lead from the aspect both of quality and quantity to a rich harvest of scientific knowledge.

And finally permit me to add: Anyone who is acquainted with intellectual manifestations which interest us in this aspect, is cognizant of the fact that for such a congress to be organized and to function and to achieve its purpose, from the conception of the idea of its organization, to finding the proper speakers, to the

regulation of a multitude of details, sometimes very difficult, and until the publication of Proceedings; (without publication of proceedings all that announced in the Congress are "flying words") is a complicated need, which necessitates the succour of many towards a happy conclusion.

To these many, in association with the current Congress, is counted mainly the Organizing Committee on whose shoulders the main burden of the organization of the Congress has fallen.

However, among its members is included one who is primarily responsible and who is alertly following its course and who ultimately represents the main lever for its smooth course and its success. This man, who bears the main responsibility is none other than Professor Emeritus Dennis V. Cokkinos, who is not only a conscientious servant of the Science of Medicine. If one can judge from his contribution in the current congress and his quest for novelty, it becomes evident that his interests turn also to wide scopes of education. For these activities he is deemed worthy of much praise.

Dear Participants of this Congress, «έρρωσθε άπαντες», which in the Hellenic language signifies "enjoy the best of health"; thus you can be assured of the successful continuation of your efforts.

To all of our foreign colleagues I expressly wish both a happy and comfortable sojourn in this Country, already acclaimed for its hospitality since Antiquity, which albeit for a short interval has the privilege of hosting you.

MESSAGE FROM THE PRESIDENT OF THE SOCIETY FOR THE PROPAGATION OF USEFUL BOOKS

Ο ΣΥΛΛΟΓΟΣ ΠΡΟΣ ΔΙΑΔΟΣΙΝ ΩΦΕΛΙΜΩΝ ΒΙΒΛΙΩΝ

Constantinos Manafis

Professor Emeritus, National and Kapodistrian University of Athens

May 30 - June 1, 2019

Our Society was founded in 1899 by Demetrius Vikelas, (Δημήτριος Βικέλας) a great figure of Hellenic literature, Chairman of the Council for the Organization of the first modern Olympic Games held in 1896 in Athens.

With his imposing and international prestige he succeeded in attracting leading persons from Greece and the Greek diaspora in our Society. The purpose of the Society was stated as follows: The propagation of useful knowledge to the people, especially by the publication of small books of low price and easy to comprehend. It succeeded admirably in this quest: In total 800,000 such books have been circulated. They can be classified as follows: The first series were the 100 "red books" with practical subjects. Subsequently, 76 "green books" with literary, religious, historical and humanities subjects were published until 1940.

After World War II, since 1956, altogether 250 books have been produced by the Society, in all aspects of knowledge including books for children. Also the Society has published four journals over the years: "The Diary of Great Greece" (το Ημερολόγιον της Μεγάλης Ελλάδος), "National Culture" (Εθνική Αγωγή),, "New Greece", (Νέα Ελλάς), "Hellenic Letters" (Ελληνικά Γράμματα), and "Study" (Η Μελέτη).

Apart from the aforementioned publications, the Society has accomplished the following activities addressed to the public well being:

School Libraries: Approximately 600 have been founded; to these 50,000 books have been donated.

Paedagogical Libraries: These were created by books designated for public education.

Educational Museum: This consists of educational paintings and charts, instruments,natural history, insect and botanical collections.

The Folk Songs Musical Collection: This was founded in 1935 and contains recordings of more than 650 folk songs.

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.

The Center for Female Education: This was a pioneering Institution, founded in 1937 and contributed greatly to the then non - existent educational activities for women.

The House of the Blind: This was founded in 1906.

School of Marksmanship: This was founded in 1907.

Today our Society is actively pursuing its common weal goals. It comprises 71 members from all fields of sciences, letters and the arts. Professor Emeritus of the University of Athens Constantinos Manafis (Κωνσταντίνος Μανάφης) is the President.

We are happy to be collaborating with the European Association of Professors Emeriti towards producing the book: “The Capital of Knowledge”, originating from the Proceedings of the first International Congress held in Athens on May 30 - June 1, 2019.

ANTIOXIDANT THERAPY

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Abstract

Oxidative stress is a pathological state of our organism due to an excess of radicals generally bringing to different illnesses. In order to contrast it drugs are assumed. Alternatively, so contributing to a decrease of the consumption of pharmaceutics, opportune diets are suggested based on antioxidant foods able due to their composition to scavenge radicals responsible for oxidative stress. In this paper some suggestions for a finalised diet and for experimental tests to evaluate the antioxidant capacity are proposed and discussed.

Keywords: oxidative stress; radical; ROS; antioxidant capacity.

Introduction

Free radicals and other oxidant species are present in the atmosphere both as natural and of anthropic origin components. At the soil level radicals hydroxyl and superoxide are normally trace constituents of air, particularly the former not well known, but very important species. Its concentration is about one hundred million molecules for each air liter, corresponding to a concentration of about 1.7 10 (exp -18) g/cc; it can be formed by photolysis of water and in polluted media it is one of the most diffuse intermediate in the process of oxidation of organic matter. As many other free radicals it is a very reactive species formed within the photochemical smog. Due to its unpaired electron it reacts with many molecules present in air so that it is often named a sweeper species. Because of these reactions three different effects can result:

1) other pollutants are produced so damaging the environment;

2) damages to vegetal world;

3) damages to animal world, including human beings.

Referring to the last case a particular condition corresponding to a high exposure of organism to these damages rises, named oxidative stress.

The effects of oxidative stress

The weakest subjects - ill, oldest, smokers, babies - are particularly suffering this condition. Luckily our organism is equipped with natural defences as sentinels, the

most of which enzymes, able to scavenge radicals. When this endogenous protection doesn't work exogenous helps are needed. The most adopted way was for many years the use of drugs. Among these the most widely adopted were ascorbic acid, ubiquinone (coenzyme Q10) shown to be the first antioxidant to be consumed when human plasma suffers oxidative stress, amidazone and many other ones. Recently the European Union (EU) recommended to reduce the consumption of drugs considered responsible by their abuse of a new generation pollution and of weakening the natural defences of the human organism. Nutraceutics are called the discipline launched in 1989 by Stephen De Felice able to combine pharmaceutics and the wise study of nutrition and feeding. By this way functional foods and feeding integrators have been largely produced and worldwide consumed. The yearly increase of consumption of these substances is exponential, corresponding to a very rich business, in Italy about 4 billion of euros.

Nutrition sciences

In the field of nutrition sciences the evaluation of foods from different points of view becomes so of increasing relevance: not only the feeding properties are considered, but also the capacity of protecting the whole organism in order to allow it to maintain a good health condition. Among these actions to antioxidant activity particular attention was paid. Important targets of free radicals are proteins and DNA. It was shown that antioxidants can protect DNA and that chronical diseases as atherosclerosis, arthritis, dementia of old age, up to cancer, are related to oxidative stress. The consumption of antioxidant foods becomes so fundamental against the appearance of these diseases. Several epidemiological studies have evidenced a narrow correlation between diet and cardiovascular and degenerative diseases and pathologies. Particularly a correlation emerged between Mediterranean diet and a lower frequency and a weaker level of these diseases. It is estimated that the adoption of a feeding style of Mediterranean kind is able to prevent 25% of the cancer cases. The typical foods of Mediterranean diet are particularly vegetables, fruits, extravirgin olive oil, rich in compounds designed as phytochemicals and nutraceuticals, not necessarily nutrients, but able to exert a protective action against the above mentioned pathologies. Especially important is the presence of antioxidant compounds able to directly scavenge free radicals of oxygen, so stopping the lipidic peroxidation in the cellular membranes and also interacting with the enzymes charged for the transformation of precancer substances into mutagenic ones and / or for the detoxification from these ones. These properties are assigned to some vitamin species (ascorbic acid, tocopherols, vitamin A) and minerals such as selenium, copper, zinc, cofactors of the antioxidant enzymes and to

other compounds such as flavonoids, polyphenols, carotenoids contained in fruits, vegetables, red wines.

The French paradox

The French paradox is an interesting international phenomenon well showing the protecting relevance of diet against oxidative stress. French people although being great consumers of red meats don't suffer cardiovascular diseases as expected, being generally related to high levels of consumption of this kind of meats. This discrepancy is explained by the high consumption by French people of red wines, so rich of polyphenols, considered as very active antioxidant protective species against cardiovascular pathologies. It has been shown that the assumption of red wine increases the antioxidant activity of plasma (both within short and long times) and a decrease of the damages to DNA related to a high fat diet. As seen just above we observe that many of the helps against the oxidative stress come from nature able to make available to us many compounds, but also many whole fruits and vegetables acting as precious defences of our organism against oxidative stress. This is a really new emerging line: not synthetic antioxidants additive to food but natural matrices to be directly assumed in our diet. For instance a recent study has shown that to drink green tea is able to recover normal values of antioxidant concentration in human organism when this is lowered due to a prolonged exposure to radicals excess. More recently two compounds attracted attention of people: curcumin and papaya, the former due to many scientific papers appeared dealing with it, the latter exploiting the popularity coming from its prolonged consumption from Wojtila Pope John

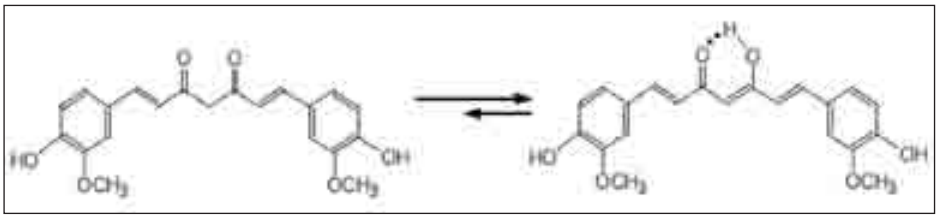

Figure 1. The chemical formula of curcumin.

Paul II, both referring to a new research line, focused on plants as help to mankind. Curcumin is a polyphenol (Fig. 1) contained in curcuma lonfa, papaya is a fruit containing papain enzyme (Fig. 2) considered a powerful antioxidant and immunostimulant. Really papaya is also commonly consumed as its fermented product considered an active principle against Parkinson's disease. We studied both, concluding that curcumin exhibits really quite good antioxidant properties, but lower than that one of ascorbic acid and phenol and that the so called commercial fermented papaya has lost great part of the antioxidant properties of the fruit, so that its recognized

therapeutic properties must be ascribed not solely to antioxidant capacity, but also and above all to some specific active principle present in the product.

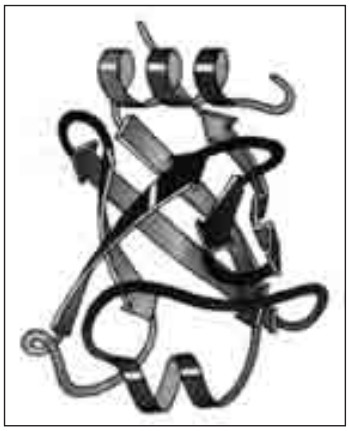

Figure 2. Structure of papaya.

The antioxidant capacity of a matrix or of a component of it needs a scientific method of evaluation. Many of them are really available a short summary of which follows.

Methods of evaluation of antioxidant capacity

Spectrophotometric method by Hatano based on the change of colour of a solution due to the scavenging action of antioxidant to be tested on a coloured radical species. Trolox equivalent antioxidant capacity based on the enzymatic measurement of peroxides. Fricke's method is based on the oxidation by radical species of Fe (II) to Fe (III). Total radical trapping antioxidant parameter based on the slowing effects of antioxidant on the auto oxidation process of linoleic acid. Nishikim's method based on the variation of the colour of a solution containing blue radical nitrotetrazole. Method of Reactive Oxygen Species based on the increase of fluorescence of a compound following its oxidation. EPR Method (electronic paramagnetic resonance) by Rosen and Rauchman based on the production of hydroxide radical by Fenton reactive and the following formation of an adduct presenting an EPR spectrum with a characteristic triplet on its turn strongly affected by the addition of the antioxidant to be tested. Abel method (analysis by emitted light) based on a photoprotein the emission of which is influenced by the presence of radicals and of antioxidants. Photochem method based on photochemiluminescence of a compound such as luminol and on its variations due to the presence of radical traps. OSI Method (oxidative stability instrument) based on the effect of an antioxidant on the accelerated oxidation of a liquid matrix. Spectrophotometric method of DMPD (dimethyl paraphenylendiammine) based on the optical absorption variation of a cationic radical in

presence of antioxidants. Spectrophotometric method of crocin based on the loss of colour suffered from carotenoid crocin. Spectrophotometric method ORAC based on the decrease of fluorescence of the protein beta - phicoerythrine in presence of radicals or of antioxidant species. Spectrohotometric Method by Foulin Ciocalteau to determine the specific antioxidant capacity due tie to polyphenols basing on the production of a blue coloured complex between phenolic OH and Folin Ciocalteau reactive (a mixture of phosphoacids)[1-9].

Conclusions

The oxidative stress produced by an excess of radicalic species in contact with human body in comparison with the enzymatic defences by which we are equipped can be won by a diet approach much better than by drug abuse. Many natural foods especially fruits and vegetable but all so natural products of different origin present antioxidant properties to which ability to degrade radicals to not dangerous compounds corresponds and can be measured.

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PROGRESS IN THE KNOWLEDGE AND THERAPEUTICAL USE OF STEM CELLS IN HUMANS

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Abstract

Hematopoietic multipotent stem cells of the bone marrow differentiate into blood cells. They were used by G. Mathé for the first allogeneic bone marrow grafts, in irradiated subjects in 1958 and in a patient with acute leukemia in 1963. E. Gluckman realized in 1988, the first graft with stem cells of the cord blood. In 1975, J. G. Rheinwald obtained colonies of keratinocytes from epidermal stem cells. Later on, autologous bone marrow cells genetically modified in vitro were transplanted. Mesenchymal stem cells, equally multipotent, are few in the bone marrow and act by paracrine secretions. Pluripotent stem cells that differentiate into all the cells of the body include embryonic stem cells and induced pluripotent stem cells discovered in 2006 by S. Yamanaka. The latter are obtained from adult cells reprogrammed into embryonic stem cells and differentiated into cells from any organ. When allogeneic, they can be produced in a large amount and utilized for therapy.

Keywords: stem cells; graft; history; allogeneic; embryonic; pluripotent; mesenchymal.

Introduction

Stem cells duplicate in generating two stem cells or a stem cell and a progenitor at the origin of a differentiated cell. Their potential for self - renewal and differentiation aroused considerable interest and led to therapeutic applications in humans. They are of three types; totipotent, capable of giving all the cells of the body including the placenta cells, pluripotent, that differentiate only in the cells of the body, and multipotent at the origin of the cells of a single or a limited number of tissues. Only the latter two are utilized in therapy.

Multipotent stem cells

Multipotent stem cells include hematopoietic (HSC), epidermal and mesenchymatous (MSC) stem cells.

HSC of the bone marrow were the first to be utilized. The pioneer was G. Mathé who grafted with allogeneic bone marrow six sublethally irradiated physicists in 1959[1] and a patient with acute leukemia in 1963[2]. In 1988, E. Gluckman realized the first graft with HSC of the cord blood in a patient with a Fanconi's anemia. These cells produce fewer graft - versus - host reactions than bone marrow cells because of the immaturity of the immune system at birth. Human epidermal stem cells were cultured by J. G. Rheinwald in 1975[4] and used in 1990 to reconstitute epidermis leaves further transplanted into burns or wounds. In 2009, N. Cartier - Lacave transplanted autologous bone marrow cells genetically modified *in vitro* to correct the mutation of a patient with adrenoleukodystrophy[5].

MSC are multipotent cells capable of differentiating into several cell types. Present in many tissues, they can be at the origin of chondrocytes, osteoblasts and adipocytes. They secrete growth factors active on the surrounding cells.Many clinical trials of cell therapy using autologous or allogeneic MSC are underway worldwide, for example in myocardium infarction and skin burn[6,7]. Success was achieved by MSC local application associated with an autologous epidermal graft in the treatment of skin burns following irradiation. Regeneration of myocytes and keratinocytes is attributed to a trophic effect and not to a colonization by multiplication of the grafted cells.

Pluripotent stem cells (PSC)

They are of 2 types: embryonic stem cells (ESC) and induced pluripotent stem cells (iPS).

ESC come from frozen supernumerary embryos obtained during in vitro fertilization. When these embryos are no longer selected for a parental project, they may be used for research. In France, the law prohibits the creation of transgenic or chimeric embryos as well as the in vitro conception of embryos or the cloning of human embryos for research. ESC are not fitted to an industrial development. However, they were used in vitro for the modeling of human diseases, a prerequisite for the screening of new drugs. An example of success is that of Steinert's disease: the use of human ESC carrying the mutation at its origin showed that metformin corrected the phenotypic consequences of this mutation[8]. Differentiated cells from ESC were also used in regenerative therapy. They are weakly immunogenic despite their allogeneic nature and do not require to be reprogrammed before their differentiation. Each cell type is obtained by adding, in the culture medium, specific growth and differentiation factors. As an example, progenitors of cardiac myocytes derived from ECS were used for the treatment of severe heart failure[9].

Induced pluripotent stem cells (iPS)

In 2006 Shinya Yamanaka converted adult mouse somatic cells into cells with all the features of embryonic cells by transferring, in the genome of these cells, viral vectors bearing the genetic sequences of four well - defined factors, OCT4, SOX2, KLF4 and CMYC[10]. By growing them in a favorable environment, these genetically modified cells developed into any cells of the body. A year later, these same researchers reported the generation of iPS from human fibroblasts[11]. The use of iPS is promising in three areas, regenerative medicine, in vitro models of human diseases for the discovery of new drugs, and production of 3 - dimensional organoids. Because of their unlimited production and the absence of ethical questioning, they are used as basic material in industry.

iPS in regenerative medicine

Autologous or allogeneic iPS are used. In the first case, any immunoreaction is avoided. The potential disadvantage is the risk of mutations generating tumors. In addition, the technique is expensive since cells are produced for a single patient. The main indication remains genetic diseases for which they represent an alternative to gene therapy. Non - genetic chronic diseases are also targeted in which cells differentiated into normal cells replace the damaged cells as in the macular degeneration of elderly subjects recently treated with cutaneous fibroblasts transformed into epithelial cells of the retina[12].

The use of iPS in allogeneic regenerative medicine has potential benefits and risks. Its main advantage is obtaining an unlimited source of cells necessary for industry. In addition, their potential use in many patients significantly reduces the cost of treatment. The possibility of mutations generating tumors exists as with autologous iPS. Furthermore, the allogeneic character causes an immune response. To overcome these drawbacks, a quality control of the cells is essential before their administration and the subjects at the origin of the bank must be carriers of the most widespread HLA antigens. Therapeutic trials are in progress.

Modeling of human diseases and search of new drugs

Identification of mechanisms altering the cellular metabolic pathways responsible for human diseases is a prerequisite for the introduction of new therapies. The use of iPS makes it possible to obtain non accessible cells such as cerebral neurons or myocardial cells. It avoids the ethical question of the use of ESC, permits personalized medicine when the cells of a given patient are studied and acquisition of *in vitro* models of genetic diseases. Creation of mutations is facilitated by new

endonuclease targeting techniques at specific locations in the genome (CRISPR - Cas9). The mutated and control iPS are differentiated in specialized cells by incubation in appropriate culture media. After characterization of the phenotypic changes at the origin of the disease, the molecular targets of new treatments are identified as in progeria that is an accelerated aging due to a mutation in the lamin A gene. Compounds in the family of monoaminopyridines, some of which are already used therapeutically, restore a normal phenotype[13]. *In vitro* study of differentiated iPS of healthy subjects is less expensive and dangerous than the *in vivo* study to evaluate the toxicity of a drug.

Organoids in three dimensions

Interactions between different cell types are best modeled by making 3 - dimensional organoids. This was done using human iPS differentiated into the cell types of a given organ. This is facilitated by the property of iPS to reproduce a spatial organization of these mini - organs similar to that of the embryonic development. It is a fascinating modeling approach to understand cell interactions, pathological dysfunctions, and test new therapeutic approaches. Transplantation seems much more remote because of the lack of vascularization of these organoids in vivo.

Conclusions

Developments in stem cell use in humans raise two types of problems, first the passage to an industrial scale that is necessary for an extensive utilization and requires the same controls as for chemical drugs, secondly the impossibility to play the sorcerer's apprentice by using,in humans, techniques such as creation of post - meiotic gametes for reproduction or chimeras for transplantation that have been proven efficient in animals, but the consequences of which on future generations are unpredictable.

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SLEEP DISORDERS MEDICINE: ADVANCES AND CHALLENGES

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Abstract

In the late 1960's neuroscientists in collaboration with psychiatrists found out that brain activity during sleep goes through certain discrete states which are being registered in the polysomnogram (PSG). Then, it was ascertained that dreaming takes place during the stage of rapid eye movements (REM), which occurs periodically every about 90 minutes during the night. In - between REM sleep periods, the stages of light sleep (stages 1 and 2) and those of deep sleep (stages 3 and 4) namely slow wave sleep (SWS) occur. Starting in the late 1960s and mainly from the 1980s on, the PSG has been utilized by neurologists, psychiatrists, pulmonologists, otorhinolarygologists and other clinicians in studying thoroughly a good number of sleep disorders as well as the impact of various physical and psychiatric disorders on sleep architecture. Consequently, Sleep Disorders Medicine (SDM) evolved as a new clinical field. As a result, clinicians specializing in SDM need to acquire broad skills in adequately dealing with this multifaceted clinical field. A major challenge for SDM specialists is to be able to deal with their patients' psychosocial needs; thus, they should closely collaborate with psychiatrists, psychologists and social workers.

Keywords: sleep research; polysomnogram; sleep disorders; diagnosis of insomnia; psychopathology.

Introduction

For millennia sleep and its disorders constituted a fascinating enigma. Spiritual, philosophical and artistic approaches were widely implied in understanding sleep related phenomena, most notably dreaming. Moreover, in ancient Greek sanctuaries, such as that of Epidaurus, patients presumably suffering from psychosomatic diseases had to spend a number of nights sleeping there before the religious healer would exert mystically his beneficial role to them.

It was only in the 1930s, following the discovery of the electroencephalogram (EEG), that neuroscientists understood that the brain remains quite active during

sleep[1]. Yet, it took another three decades for them, in collaboration with psychiatrists, to find out that brain activity during sleep goes through certain discrete states which are being registered in the polysomnogram (PSG)[2]. Based on the PSG, it was discovered that dreaming takes place during the stage of rapid eye movements (REM), which occurs periodically every about 90 minutes during the night and occupies about 20% of the total sleep time. In - between REM sleep periods, the stages of light sleep (stages 1 and 2) and those of deep sleep (stages 3 and 4) occur; the latter are characterized by the preponderance of slow brain waves and therefore they have been together called slow wave sleep (SWS)[2].

Starting in the late 1960s, neurologists, psychiatrists, psychologists, neurophysiologists and psychophysiologists utilized the PSG combined with their astute clinical observations in studying thoroughly sleep disorders as well as the impact of various physical and psychiatric disorders on sleep architecture[3-7]; later on, otorhinolaryngologists, pulmonologists, urologists, pediatricians, endocrinologists and pharmacologists joined the pioneers to form a large multidisciplinary group of specialists in Sleep Disorders Medicine (SDM). Actually, the management of sleep disorders has become a large clinical field encompassing many important diagnostic and therapeutic issues. Due to space restrictions, the present paper will provide a brief account of the SDM nosology and will focus on the diagnosis of insomnia; it will also provide an overview of the nature of psychopathology in various sleep disorders.

Nosology of sleep disorders

With the advent of SDM, several diagnostic classifications have appeared with relatively little differences among them; the most widely accepted is the one incorporated in the 10th revision of the International Classification of Diseases (ICD-10), which was published in 1992 by the World Health Organization (WHO). Based on a draft prepared by the author of the present paper, in ICD - 10 the diagnostic criteria for the following sleep disorders are included: Insomnia, Hypersomnia, Narcolepsy, Parasomnias (Nightmares, Sleep Walking, Sleep Terrors, Nocturnal Myoclonus), Sleep-wake Schedule Disorder, Sleep Apnea and other disordered breathing syndromes during sleep. One more parasomnia has been described after the publication of ICD-10, i.e. the REM Behavior Disorder[8], which completes the current nosology of sleep disorders. For the diagnosis of each sleep disorder, specific criteria are been provided. All of them are based on a categorical approach; thus, the presence or absence of a symptom is only taken into account, without any consideration of the magnitude / intensity of this symptom which would be based on a dimensional approach.

The diagnosis of insomnia

Following are the ICD-10 criteria for the diagnosis of insomnia:

A. Complaints regarding nocturnal sleep:
Difficulty falling asleep.
Difficulty staying asleep (nocturnal awakenings, early final awakening).
Poor quality of sleep.

B. Sleep disturbance occurs at least 3 nights per week for 1 month or longer.

C. Overconcern with the sleep problem and its consequences during the day.

D. The unsatisfactory quantity and/or quality of sleep cause either marked discomfort or have a negative impact on daily activities.

As is the case with all sleep disorders in ICD-10 as well as in other existing nosological classifications, the above diagnostic criteria are purely categorical in nature. In an effort to empower there criteria with strong dimensional qualities, we created the Athens Insomnia Scale (Table 1), which provides for a four point gradation of each of the ICD-10 diagnostic criteria for insomnia[9].

Table 1. The Athens Insomnia Scale

- Instructions: Please, check (by circling the appropriate number) the items below to indicate **your estimate of any difficulty**, provided that it occurred at least **three times per week** during the **last month**.
- **Sleep induction** (time it takes you to fall asleep after turning-off the lights)
  0: No problem **1:** Slightly delayed **2:** Markedly delayed **3:** Very delayed or did not sleep at all
- **Awakenings during the night**
  0: No problem **1:** Minor problem **2:** Considerable problem **3:** Serious problem or did not sleep at all
- **Final awakening earlier than desired**
  0: Not earlier **1:** A little earlier **2:** Markedly earlier **3:** Much earlier or did not sleep at all
- **Total sleep duration**
  0: Sufficient **1:** Slightly insufficient **2:** Markedly insufficient **3:** Very insufficient or did not sleep at all
- **Overall quality of sleep** (no matter how long you slept)
  0: Satisfactory **1:** Slightly unsatisfactory **2:** Markedly unsatisfactory **3:** Very unsatisfactory or did not sleep at all
- **Sense of well-being during the day**
  0: Normal **1:** Slightly decreased **2:** Markedly decreased **3:** Very decreased
- **Functioning (physical and mental) during the day**
  0: Normal **1:** Slightly decreased **2:** Markedly decreased **3:** Very decreased
- **Sleepiness during the day**
  0: None **1:** Mild **2:** Considerable **3:** Intense

Through the Athens Insomnia Scale, the ICD-10 diagnosis of insomnia can be reliably established when the total score is 6 or above[10]. Moreover, by taking into account the degree of intensity of each diagnostic criterion in relation to that of all

other diagnostic criteria, we can create a unique profile of insomnia for each individual insomniac. This dimensional approach allows for the necessary distinction among various sufferers from insomnia based on the differential intensity of their symptoms and, consequently, for tailoring their management in an appropriate individualized manner.

Psychopathology in sleep disorders

There is a relatively high prevalence of psychopathology in sleep disorders. Psychopathology is mainly primary in certain sleep disorders (eg insomnia) and exclusively secondary in some others (eg obstructive sleep apnea); yet, usually both primary and secondary psychopathology is evidenced in most of the sleep disorders (Table 2).

Insomniacs vs normal controls show higher levels of depression, rumination, chronic anxiety and inhibition of emotions[11]; generally, psychiatric diagnoses are quite common among insomniacs. More specifically, however, anxiety is more common among insomniacs (25 - 40%) than in individuals with no sleep complaints (10%)[12]. Also, risk for occurrence of depression is four times higher in insomniacs than in non-insomniacs. Most interesting individuals with insomnia at a given time point have a RR=1.6 for any psychiatric illness; this RR increases to 39.8 when insomnia persists one year later[13]. Thus, psychopathology proves to be a major factor for the occurrence of insomnia, while over time the persistence of insomnia has been shown to be a factor for the appearance of various manifestations of psychopathology and particularly for that of depression.

Table 2. Nature of psychopathology in adults with sleep disorders

	PRIMARY PSYCHOPATHOLOGY (CAUSATIVE FOR THE S.D.)	SECONDARY PSYCHOPATHOLOGY (CONSEQUENCE OF S.D.)
INSOMNIA	+++	++
SLEEPWALKING	+	+
NIGHT TERRORS	++	+
NIGHTMARES	++	+
NARCOLEPSY & CATAPLEXY	-	++
OBSTRUCTIVE SLEEP APNEA	-	+++

Review paper by Soldatos & Kales, Acta Psychiatr. Scand. 65:381 387,1982) and subsequent publications by the Kales group until 1985

An early study[14] showed that the personality patterns of patients with severe Obstructive Sleep Apnea (OSA) were those of a somatic-neurotic type. The high level of psychological distress was clearly a consequence rather than a cause of the disorder. Most patients (76%) showed cognitive impairment: mild to severe deficits of thinking, perception, memory, communication or the ability to learn new information; this resulted in distractibility, irritability and confusion[14]. Subsequent findings in patients with OSA by other investigators were in accordance with the above early findings: OSA was associated with impairment of memory, attention and executive functions[15]; moreover, anxiety and depression were found to be frequent co- morbidities in OSA patients, denoting that this psychopathology is secondary to OSA.

Conclusions

Clinicians specializing in SDM need to acquire broad skills in adequately dealing with a multifaceted medical field clearly different compared to the one they originated from. The best way to deal with this challenge is to complete a special training in SDM as well as to maintain a steady harmonious interdisciplinary collaboration with physicians and other allied health professionals who can be instrumental in the holistic management of patients suffering from sleep disorders. Another major challenge for SDM specialists is to be able to deal with their patients' psychiatric as well as broader psychosocial needs, besides strictly alleviating their sleep related ailments; to meet this important need they should closely collaborate with psychiatrists, psychologists and social workers in effectively approaching the patients as well as their families and employers while advocating on behalf of them.

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A NEW NEED: SELECTING PERSONALIZED TREATMENT FOR FRAIL ELDERLY PATIENTS

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Abstract

The ageing of the population is one of the most pressing policy issues in the 21st century. Life expectancy at birth has increased during the last decades as a consequence of new living standards, better medical assistance, new medical equipment and increased awareness of health issues. In Europe the life expectancy is now 82.4 years for women and 76.4 for men. This trend is expected to continue.

Frailty is one of the most important consequences of population ageing. It induces a decline of many physiological functions and a progressive organ and system involvements with greater comorbidities and a greater mortality.

The state of fragility depends on numerous factors (social, economic, environmental, cultural) that require a strictly personalized assistance.

In this context it is important to develop more efficient methods to detect frailty and measure its severity in routine clinical practice. Investigators have developed new valid models of frailty scores and these models have allowed the association between frailty and different clinical expression requiring appropriate selection of elderly people for selected personalized procedures or drug treatments.

Keywords: frailty; ageing; treatment of frail elderly patients; life expectancy; elderly population.

Introduction

The inappropriate management of frail subjects is recognized as a major issue in modern society, but often is underestimated. The World Health Organization reports

that the world's population over 60 years old will double between 2000 and 2050 and quadruple for seniors older than 80 years, reaching 400 million[1].

The appropriate treatment of frail persons is not just a problem of industrialized countries. In the last 100 years, also populations in developed countries have experienced an unprecedented addition of 30 years to life expectancy, with all the complications related to the treatment of elderly people.

All older subjects are at risk of developing frailty and risk levels are considerably higher among those with comorbidities, low socioeconomic position, poor diet, and sedentary lifestyles[2].

The role of the professional figures of healthcare and of society is to guarantee to elderly population dignity in the cures and humanity in the difficulties of the age - related diseases.

Socioeconomic demographic impact of ageing

In January 2018 it was observed that the EU has 505,701,172 inhabitants, 24 official languages and 28 states. The life expectancy for women was 81 years old, while men's life expectancy was only 74 years old, which gives 7 years' difference. By 2020 a quarter of the population of Europe will be 60 years or older. The European Commission identified the ageing of the population as one of the most pressing policy issues in the 21st century.

(Data from official website of the European Union. Available at:
https://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=de&pcode=tps00001&plugin=1. Accessed: April 2018).

The shift in demographics will drastically change the economic, labor market, health care. By 2050, the number of people over 65 living in the European Union will grow by 70% and the number of people aged over 80 by 170%, with consequent challenges in terms of demand for healthcare. On the other hand, there is a declining birth rate in Europe[5]. During the year 2017, 5.1 million babies were born in the EU, almost 90, 000 less than the previous year.

(Eurostat, the statistical office of the European Union. "People in the EU: who are we and how do we live?", published on 27 November 2015).

Low birth rates will bring about significant changes to the structure of European society, which will impact on economy, social security, health care systems and human capital. In addition, we cannot forget what Terentius in 160 a.c. the comedy "Phormio" wrote one century before Christ, that "senectus ipsa est morbus (old age is itself a disease)". Considering that the survival rate of the population tends to increase more and more, elderly population with age will inevitably risk to suffer much pain, which makes life increasingly difficult[3].

Frail Elderly Patients

The concept of frailty

Linda Fried and colleagues[4] for the first time described frailty as a syndrome and not a synonymous with either comorbidity or disability, but comorbidity is an etiologic risk factor for, and disability is an outcome of, frailty. They defined frailty as "a biologic syndrome of decreased reserve and resistance to stressors, resulting from cumulative declines across multiple physiologic systems, and causing vulnerability to adverse outcomes". It is also true that not all people of a certain age suffer the same degree of pain and respond in the same way to stressors. This variable susceptibility to pain requires the adoption of measures to make improve quality of life of older people, until the last day of their existence. Selfcare and independence are fundamental elements in daily living activities and their maintenance is a challenge in elderly population.

The essential functions of the daily life include: autonomy in walking, in climbing stairs, bending down, lying down, sitting down, getting dressed, washing, bathing, eating, bed resting at home, sensory faculties (hearing, seeing, speaking). Excluding the conditions related to temporary limitations, frail people are those who are unable to perform the usual daily functions, taking into account the possible aid of sanitary appliances, such as prostheses, sticks, glasses etc.

The degree of frailty

The degree of frailty is measured according to indicators such as: asthenia, fatigue, weight loss, reduced physical activity, fast pace, reduced vision. The ones most affected by frailty are the chronically ill people, with rapid deterioration of physical well - being. In addition, over the years the state of physical health deteriorates more decisively than the mental state. To some extent frailty equals to total loss of self - sufficiency.

The loss of self-sufficiency, which involves frailty, requires those caring for the frail elderly persons to assist them in satisfying of primary needs such as: nutrition, hygiene, movement, and in secondary needs, often underestimated, such as the need to speak, converse, enjoying life. In this historical moment, as a physical condition, frailty is also associated with economic frailty; many families, due to the difficulties encountered in managing an invalid relative, are forced to refer him to nursing homes or health homes, with the result that the patients are deprived of the closeness of his relatives[5].

One of the main dilemmas of physicians is about when, how and if it is necessary to intervene on patients with characteristics of frailty, assessed by specific scales taking into account some variables, such as structural data, social, health, epidemiological, territorial, context and, lifestyle variables. The main goal is being able to offer each patient, depending on his/her condition, the solution able to guarantee less pain as possible, a better quality of life (QoL)[6] without falling into therapeutic obstinacy.

The idea of QoL is old. Aristotle in the Nicomachean Ethics used the term eudaimonia, which in Greek means "good spirit or happiness". Recently Shelby Eatenton, a diabetic, pregnant person, affected by chronic renal failure in the movie "Steel Magnolias" (1989) expressed her idea on the QoL: "I would like to have thirty minutes of wonderful life rather than a long life with nothing special". Joanne Bargman in Seminars in Dialysis (2007) reported a reflection on Dialysis Survival " It is more difficult to live than to die"[7] .

UN Convention on the Rights of Persons with Disabilities (CRPD), also states that disability is "An evolving concept". "It results from the interaction between people with disabilities and attitudinal and environmental barriers, that hinders their full and effective participation in society on an equal basis with others". It is a social relationship between the characteristics of people and the response of social context. To overcome this situation, the Convention intervenes to guarantee the progressive social inclusion of people with disabilities.

(Byrnes A, Conte A, Gonnot JP, Larsson L, Schindlmayr T, Sheperd N, Walker S, Zarraluqui A. From Exclusion to Equality Realizing the rights of persons with disabilities Handbook for Parliamentarians on the Convention on the Rights of Persons with Disabilities and its Optional Protocol. Nº 14 - 2007 Available at:https://www.un.org/disabilities/documents/toolaction/ipuhb.pdf).

The assistance of frail individuals

How can fragile individuals be assisted? Always operate or prefer different types of treatment, trying to promote the quality of life of patients by ensuring as less pain as possible?

The first step is classifying the various levels of frailty. The most widely used indexes include Vulnerable Elders Survey (VES 13)[8], Edmonton Frailty scale[9], Prisma-7[10], Geriatric 8[11], Groningen Frailty Index[12].

The second step is promoting the creation of multi - disciplinary teams: geriatricians, cardiologists, nephrologists, endocrinologists, surgeons, anesthesiologists, who can find the most suitable treatment for each patient, identifying, if necessary, preferential routes able to promote faster recoveries and, in case of hospitalization, shorter stays.

The approach must be multidisciplinary. Innovation hypothesizes integrated and customized social, educational and technological solutions, creating the conditions for: a) giving back to people the will of their own choices, when they were deprived of them; b) promoting the social dimension of their life; c) offering the possibility to cultivate relationships, with the use of widely used technological tools, and a shared planning between public and private bodies and services. The multidisciplinary approach provides for three moments: social, clinical and domotics ones.

The social approach identifies the expectations and needs of the person and his / her environmental context; it offers technological support, designed to improve the quality of life; the clinical approach selects appropriate interventions to reduce sarcopenia; program nutritional interventions for the potential beneficial effects on the impaired nutrition and weight loss, suggest vitamin D supplementation[13] to reduce bone fracture, define the set of exercise to improve mobility and functional ability, propose projects suitable to the person for a greater autonomy and / or independent life. The Domotics[14] approach develops new appropriate technologies to the needs of the individual subject; it defines the set of tools chosen depending on the individual requests; it maintains the solutions provided over time in response to their needs. Integrated social and technological intervention involves the person and his/her environment. The person is offered a simplified access to functions which are useful in everyday life. Improving the quality of life, which passes through the strengthening of housing and living : 1) it guarantees a sustainable management for the person with frailty and for his/her family as far as organization and friendship are concerned; 2) it offers “life” answers, the most to the needs of the individual; 3) it provides an idea of careful social places and participates in people’s lives.

Conclusions

It is essential that frail population should maintain a life of the highest quality as possible, investing on welfare, social inclusion and cohesion.

The European Commission in a communication titled ‘The demographic future of Europe, from challenge to opportunity”, reported that in the past decades “Labour force decline and advanced ageing, give rise to concerns about the reduction of human capital at the population level, despite a steady improvement of its qualitative aspects (health, education, skills, cognitive abilities, etc.). Hence, demographic renewal might be considered at the macro level a measure for reducing the imbalances between the young, adults and the elderly, stimulating human capital growth by increasing its quantity”.

(European Commission (2006), communication, 'The demographic future of Europe - from challenge to opportunity', COM(2006) 571 final, Brussels).

The role of the society is to perform a war against indifference, cruelty and apathy and to give back to older people their dignity and importance. An individual treated as a person of value has a higher sense of self-esteem, copes better with health challenges, and is more independent than a patient who feels worthless[15].
The task of humanity is to guarantee to frail elderly patients the right independence and the right assistance when autonomy starts to decrease, because, as the Nobel Prize Pearl S. Buck said in her book " My several worlds" in 1954,"Our society must make it right and possible for old people not to fear the young or be deserted by them, for the test of a civilization is the way that it cares for its helpless members".

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SURGERY IN ADVANCED AGE

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Abstract

The global population is growing in numbers and the proportion of elderly people is increasing. This poses a particular challenge for healthcare systems as a result of the greater needs of the elderly, particularly when independent living is no longer possible.

Surgery is an important element of such a plan; specific medico - legal issues arise in the area of informed consent, intensity and duration of treatment, and ethics.

The challenge is to identify optimal care pathways that are cost - effective and that pay particular attention to quality of life. Indeed, when life expectancy decreases with age, it becomes crucial for surgeons to focus on maintaining quality of life.

Teamwork is increasingly important in all aspects of surgical care, and the geriatric surgical patient is no exception.

We hope a "great pact" of collaboration between physicians, citizens, administrators and politicians, to give an answer to the new and increasing healthcare needs.

Keywords: surgery in the elderly; quality of life; ageing; biological / chronological age.

Introduction

Projections from the World Health Organization, United Nations and the EU commission all point to ageing as a major challenge for society with a directed response to meet the needs of the elderly. The greatest increase in the ageing population is expected in developing countries.

"How much a doctor should do for aged patients?" This question briefly summarizes today's medicine's main problem and it is a topic full of contradictions regarding legal, scientific, ethical and economic issues.

Performing surgery on centenarians could seem risky, almost irrational. Nevertheless, our considerations will show how this choice could be a result of precise clinical and ethic evaluations.

Clinical considerations

How can we define a patient as "aged"? Everyone agrees that biological age is more important than chronological age[1,2], but for a statistical purpose it is better to define a cut - off point: even if a worker could be defined as "old" at age of 65/67 (the usual retirement age) a more reliable cut off should be 70 years old.

The increase of life expectancy brings a greater rate of pathologies in aged patients, especially oncological ones[3,4]. Almost 60% of new cases of cancer are found in people over 65 years old and about 40% in people over 70 years old. Almost 50% of deaths for colorectal cancer are found in people over 75 years old.

However, the evaluation process that brings a patient to surgery is not different between an 80 - year - old patient and a 50 - year - old patient. Indications for surgery should follow these parameters[5]:

clinical conditions (biological/chronological age, Performance Status, ASA score…) ;

chance of successful surgery;

health related quality of life before and after surgery;

elective surgery/emergency surgery;

chance to express a valid informed consent.

Obviously,there is not much to say if we have a conscious patient in good health with rectum cancer or lower limbs gangrene; but if we have an aged patient with several comorbidities and problems related to the social context, the decision making process involves evidence and ethical aspects[6] and is often far from black and white.

All risks of surgery and peri/post - operative complications should be evaluated (e.g. ictus, loss of consciousness) because they could have a catastrophic impact on quality of life (QOL),with loss of autonomy and further need of assistance after hospital discharge.

Some believe that below certain values of QOL[7], life is not worth to be lived. So, if there is no chance to get back a good value of HRQOL, surgery should not be proposed.

The patient's perspective and wishes should be a compass for the surgeon.Survival after cancer surgery is generally shorter in elderly patients compared to their younger counterparts. This merits consideration when assessing the benefits of an intervention.

We recommend using a multidisciplinary approach, sharing responsibility with other professionals such as geriatrist, psychiatrist, gastroenterologist, physiatrist.

The decision should be made from time to time and we are sure that, even in the most complex cases, the experienced surgeon is the most qualified person to make this choice, more than patient family or judges.

Ethical aspects

Could a surgeon refuse to perform surgery on a patient in good health (considering old age) just because life expectation cannot be extended further?[8,9] This question has two different answers.

The first one is that he could not. Patient's "age" is considered a "therapeutic indicator", like a discriminating parameter to decide if we should assist or not[10].

If we start from such assumptions, we could deny the chance of survival of a large number of patients. A doctor does not have the right to exclude the use of surgery - if it is technically possible and can reasonably bring to a success[11] - just because probably the patient will not live any longer, since his old age.

The appearance of this "ethical utilitarianism" in the health - care environment suggests as primary standard the evaluation of results such as capability and productivity in a lifetime, a reductive and anti-personalist vision of the quality of life concept. So, whoever needs more help because of age or disability, such as elderly people, is penalized instead of being supported.

The personalist principle, instead, considers the single person more important than science's and community's interests, and this should be considered the main reference when taking care of patients. In this context, human life is considered as an inviolable value itself; old people are no more reputed as parasites for our society, but as a value, so that they are not excluded.

Physicians' behaviour towards elder, frail and sick patients[5] should be inspired by the same criteria used for every medical practice[12,13]: choosing the most appropriate therapies (evaluating the risk - benefit assessment) and related to the clinical case; requesting the informed consent; humanizing treatments.

Chronological age parameters, as well as a determining index to establish how to use resources for health service, has been debated for a long time[1,5,13].

The supporters of reduced quality treatments for elderly people assert:

elderly people should quit sanitary assistance in order to support young people assistance;

society should use less resources for elderly people, in order to use more for young people;

if medical treatments must be rationed, it is more fair to ration them concerning the chronological age.

Opposing this thesis, another group of people asserts:
Chronological age is an arbitrary parameter; elderly people are a heterogeneous group and many of them could live longer life when treated in a right way.
Need is the best parameter for health service distribution: elderly people need more treatments as they have a higher risk of inability or getting sick; decisions concerning therapies should be adopted exclusively based on physician's evaluation, together with the patient and his family.

Conclusions

Most surgeons now acknowledge that surgery in the elderly is different[14], in terms of type of surgery, associated risks and meaningful outcomes[15].The challenge for the surgical community is to identify optimal care pathways that are cost - effective and that pay particular attention to quality of life.
Guidelines can provide a useful reference point to better act respecting economical parameters, but health care service cannot be administered exclusively based on financial and administrative logics, but also on patient's centrality and humanization of treatments.
Therefore it is indispensable to reaffirm the authentic meaning of medicine, meant not as the mere restoration of human body, but as the whole safeguard of human health.
We retain that the physician cannot and should never be a passive executer, but also he should not be left alone when dealing with high complexity situations.
It's important to create a "great pact" of collaboration between physicians, citizens, administrators and politicians, to give an answer to the new and increasing healthcare needs in a redefined ethical and normative contest.
We conclude remembering the teachings of Immanuel Kant (1724-1804). *"Grounding for the Metaphysic of morals",* he wrote: *"Act in such a way that you treat humanity, whether in your own person or in the person of any other, never merely as a means to an end, but always at the same time as an end"*.

(Translated by Ellington, James W. (3rd ed Hackett 1993, p. 36; 4: 429).

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THE FUTURE OF VASCULAR SURGERY: THE ROLE OF THE MEDITERRANEAN FEDERATION FOR ADVANCING VASCULAR SURGERY

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Abstract

Vascular Surgery (VS) is undergoing a fundamental change especially since the introduction of endovascular techniques. On October 1st, 2018 MeFAVS was founded to create a network of vascular professionals for durable scientific, educational and clinical cooperation among Mediterranean and Middle East countries through conference calls and surveys about pathology, epidemiology, new treatments and materials for VS. The first topic discussed in MeFAVS was diabetic arteriopathy, a serious, multi-level pathology, often burdened with severe prognosis, and significant incidence of lower limb amputations.

We conducted a survey, through an anonymous online questionnaire emailed to MeFAVS members to investigate current management of diabetic ischemic foot.

Response rate was 60%. Regarding the procedure type, 48% of respondents follow an endovascular-first strategy, 52% an open or hybrid approach. DUS and CTA were potentially obtainable in the 100% of the centers. Moreover, 90.9% of respondents claim to know their real amputation rate.

Keywords: vascular surgery; endovascular surgery; training; Mediterranean sea.

Introduction

Vascular Surgery is experiencing a fundamental change, principally since the introduction of endovascular techniques. In the femoro-popliteal segment, minimally invasive interventions may be life - and limb - saving especially in diabetic patients, in which the progression of the disease, chronically impairs wound healing and endothelial function. Driven by an always higher attention from industry, vascular device technologies are tumultuously increasing in number and variety, and the development of new techniques the, training program of residents is of crucial

importance for the advancement of this specialty. One way to obtain those aims is creating a network, and in this perspective MeFAVS, the Mediterranean Federation for Advancing of Vascular Surgery, has been founded on 1st October 2018, with the purpose of connecting University Professors, chiefs of Vascular Departments and consultant surgeons for durable scientific, educational and clinical cooperation amongst Italy, France, Spain, Portugal, Greece, Morocco, Algeria, Tunisia, Egypt, Lebanon, Emirates, Albania, Croatia, Turkey and many other countries. The current achievements are conference calls and surveys based on topics of vascular pathology, epidemiology, new treatments and materials for VS. The first topic ever discussed in MeFAVS was diabetic arteriopathy, a serious, multi - level pathology, often with severe prognosis and a significant incidence of major lower limb amputations due to ulcers and general impairment.

Methods

We conducted a survey through an anonymous online questionnaire emailed to MeFAVS members, composed by 15 questions about surgical and endovascular approach to revascularization, amputation and recurrence, and diabetic foot (DF) team composition (Fig. 1).

Figure 1a-d. Diabetic Arteriopathies Survey Questionnaire.

Results

Of the 18 centers invited to participate in the Survey, 11 transmitted a filled questionnaire, which has been accepted, with a total response rate of 60%.

Diabetic foot center (Fig. 2). Vascular surgeons resulted to play a special role in the management of DA, being almost always present in the diabetic team (9/11, 81.8%) and often leading it (6/11, 54.5%). Among the other medical specialists, diabetologists were involved in the team, as members (7/11, 63.6%) or as chiefs (5/11, 45.5%). In some cases, more than one figure was indicated as head of the team.

Alongside medical professionals, wound care nurses appear to have a core role in the equip, being present in almost all the centers (10/11, 90.9%) but rarely as team leaders (1/11, 9.0%).

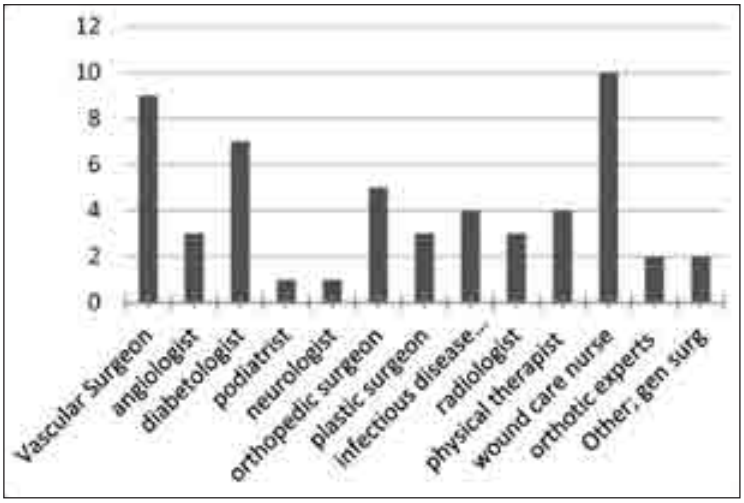

Figure 2. Diabetic Foot Team, healthcare professionals.

Diagnostic methods (Fig. 3). The most used tools to appraise pathology severity, localization and type of the lesions were DUS and CTA (11/11, 100%), followed by ABI (9/11, 81.8%), MRA (7/11, 63.6%) and TcPO2 (6/11, 54.4%).

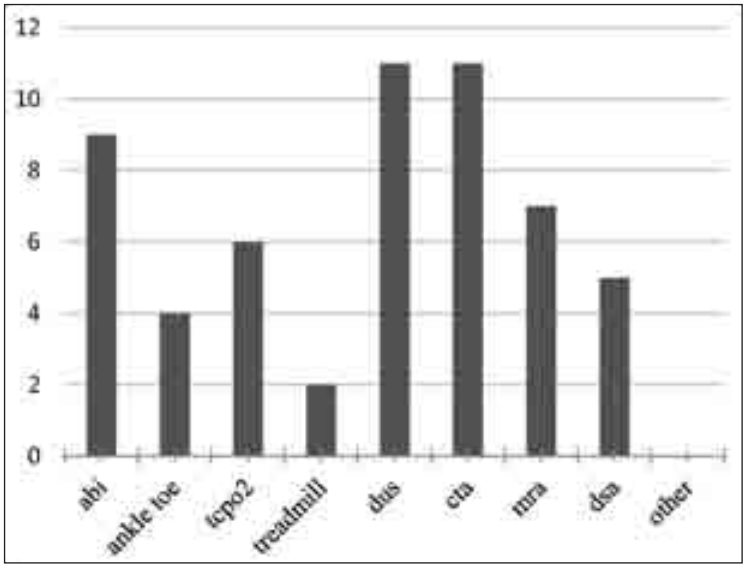

Figure 3. Diagnostic assessment of diabetic arteriopathy.

Diabetic foot ulcer/infection first treatment. A conservative first-line regimen was preferred in 4/11 (36.4%) cases while 8/11 (72.7%) acted with an initial revascularization. In 4 out of 11 cases, both approaches were combined.

Wound care (Fig. 4). Surgical wound care was committed to vascular surgeons in the totality of the cases (11/11, 100%), while non-surgical care only 3 times on 11 (27.3%). Both plastic and orthopedic surgeons were dedicated to surgical wound care in 5/11 cases (45.5%), but were almost never (1/11, 9.1%) or never involved in non-surgical care, respectively.

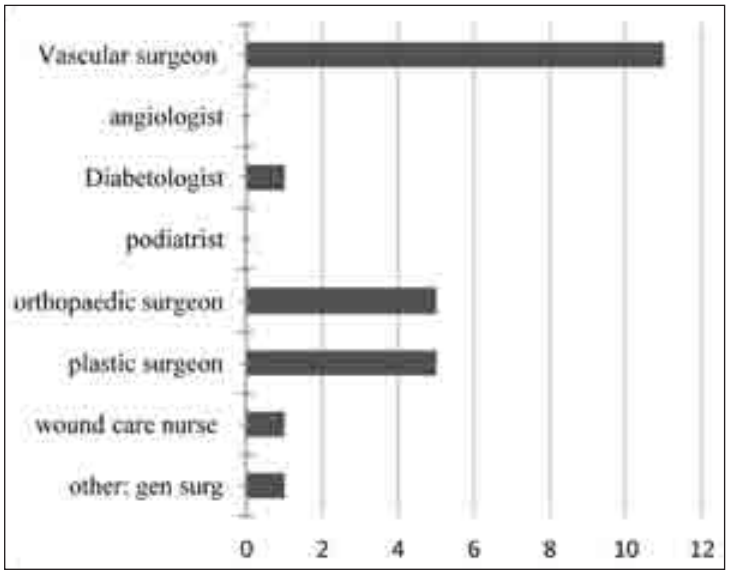

Figure 4. Surgical wound care according to healthcare professional.

Revascularization rate. Every member was asked to specify the rates of frequency of open, endovascular and hybrid interventions on the total of revascularizations performed in their institutions. For open, endovascular and hybrid surgery, rates were respectively between 3-70%, 25-95%, 2-40% among centers with a mean of 48.1, 48 and 18%, respectively.

Endovascular revascularization. Vascular surgeons were the predominant medical professionals performing endovascular revascularizations, in 10/11 cases (90.9%), followed by interventional radiologists (7/11, 63.6%) and angiologists (1/11, 9.1%).

Endovascular revascularization access. Retrograde contralateral access was preferred (11/11, 100%) over ipsilateral antegrade access (10/11, 90.9%). Ipsilateral retrograde popliteal or pedal access and dual access resulted to be the least used (4/11, 36.4% and 2/11, 18.2%, respectively).

Angiosome-oriented revascularization. Any angiosome-oriented revascularization was performed in 8/11 centers (72.2%), none in 3/11 (27.3%).

Amputation (Fig. 5). Vascular surgeons appeared to be the most common performers of amputations, both minor (9/11, 81.8%) and major (10/11, 90.9%). While orthopedic surgeons were sometimes dedicated to both minor (2/11, 18.2%) and major (3/11, 27.3%) amputations, plastic surgeons were called to perform only minor amputations (3/11, 27.3%). In some cases, general surgeons acted as minor (2/11, 18.2%) or major (1/11, 9.1%) amputation operators.

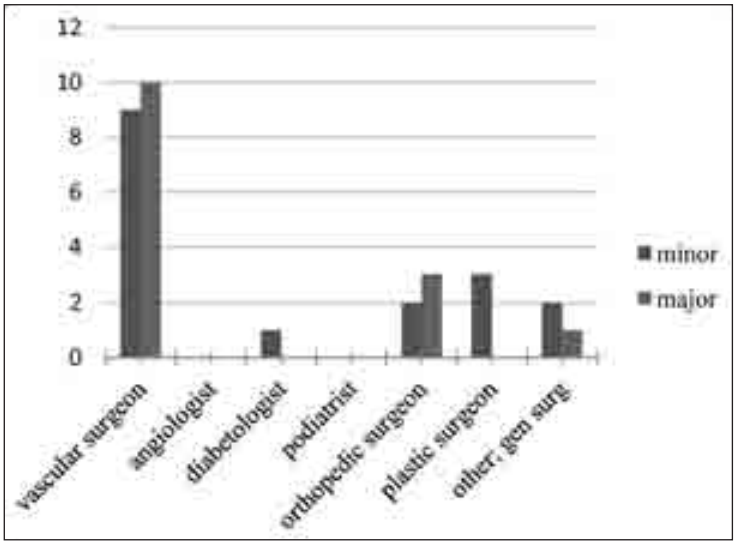

Figure 5. Minor and major amputation-performing medical specialists.

Rate of major amputation. Data about major amputations rates were not available in one case. The mean rate among the remaining centers was 16.55%.

Prosthetic service options available for the diabetic lower limb amputee. Prosthetic services for amputees were predominantly offered by private (7/11, 63.6%) or public (5/11, 45.5%) institutions outside the hospitals participating in the survey, and only in 3 out of 11 centers they were internal to the hospital.

Rehabilitation for post - lower limb amputees. In 9/11 cases (81.8%) public, outside the hospital institutions were offering rehabilitation for amputees; 7/11 (63.6%) had this service inside the hospital instead of 3/11 (27.3%) private, outside the hospital centers.

Relevance of equipment and skills in order to reduce amputation rates (Fig. 6). The most important factor to reduce amputation rates was considered a dedicated diabetic foot clinic (10/11, 90.9%), followed by endovascular (6/11, 54.5%) and

open surgery skills (5/11, 45.5%). The availability of endovascular devices, dedicated amputation clinic or a hybrid room were considered less relevant.

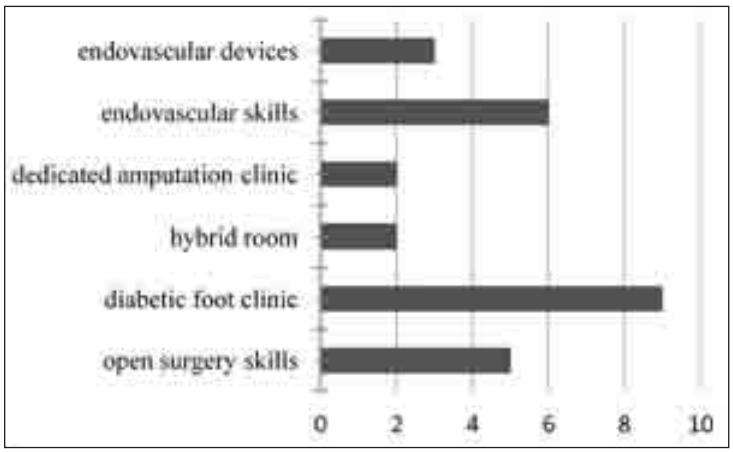

Figure 6. Relevance of equipment and skills in order to reduce amputation rates.

Rate of reintervention. Data from this survey, unavailable for 2/11 responding centers, revealed a mean rate of 25.22% of reinterventions after any sort of revascularization procedure.

Follow - up. From data collected from our analysis, it was not possible to define a shared approach in controls, neither as frequency of appointments nor as type of examination. However, clinical and DUS appeared to be the most common type of examination, usually performed regularly together with higher frequency in the first one year after revascularization.

Discussion

Diabetes mellitus incidence and prevalence show a steady increase over time. According to data released in the IDF Agenda, in the 18-99 years old population in 2017, some 425 million people worldwide have been estimated to have diabetes, and if this trend continues, by 2045 almost 693 million people in the same age range are supposed to have diabetes[1]. DF has a mean global prevalence of 6.4%; it is more frequent in males than in females, and more in type 2 than in type 1 diabetic foot patients; moreover, patients with DF are older, have a lower body mass index, longer diabetic duration, and more hypertension, diabetic retinopathy, and smoking history than patients without DF[2].

In diabetes and DA multi - level diseases involving several organs, it is important to properly assess every comorbidity and complication. This requires the participation of different medical specialists and healthcare professionals in the diagnostic

and therapeutic pathway. In our analysis, vascular surgeons are almost always part of the Diabetic Foot team, and often have a leading position. As stated in ESVS *Diabetic Foot* Guidelines, a vascular surgeon should be a systematically integrated member of a diabetic team, eventually aiming to speed up healing rate and to avoid amputation[3].

There is still lack of evidence, especially from randomized controlled trials (RCTs), whether endovascular-first approach gives a benefit over conservative treatment and / or surgery of DF ulcers in the *above-the-knee* district, while an endovascular-first strategy is confirmed to have a prominent role in case of *below-the-knee* disease. Diabetic arteriopathy has, by the way, typical characteristics if compared to non-diabetic peripheral arterial disease (PAD), as it tends to be bilateral and infrapopliteal, and occlusions are more frequent than stenoses[5]. In diabetic patients, open surgery is often limited by patient's comorbidities, venous saphenous grafts (VGS) graft availability and quality[6], so that endovascular interventions may be the favored approach. A recent meta-analysis states that at 1-year follow-up, open bypass surgery or endovascular techniques are equally valid to produce diabetic foot ulcers healing[7].

The most common complication of diabetic arteriopathy is undoubtedly amputation. Incidence of all forms of lower extremity amputation ranges from 5.8–31 per 10^5 in general population to 46.1 to 9600 per 10^5 in diabetic population[8], in which 85% of amputations are preceded by an ulcer complicated by gangrene and infection[9].

Diabetic arteriopathies costs increase over time also because of prosthetic solutions and rehabilitation, that ask for different professionals to participate in re-mobilizing the amputee. The presence of the diabetic foot clinic, whose resources are focused on getting the best results reducing complications and hospitalization times, appears fundamental.

Endovascular skills are, as well, considered crucial in this perspective: this calls academy and teaching hospitals to concentrate on residents' education. Despite high societal needs of vascular surgery treatments[9], this specialty is reported to have lower appeal than others; endovascular skills may lead to higher recruitment[10], also by integrating vascular surgery and interventional radiology training programs[11]. Simulators, both open and endovascular, play, as well, an increasingly important role in training programs as well as for outreach programs to medical students[12].

Conclusions

Transnational cooperation is an effective strategy in advancing a surgical specialty like Vascular Surgery, in the perspective of giving patients high standards care solu-

tions with efficient healthcare costs, also by training new generations of proficiently skilled professionals.

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DILEMMAS OF SEX ASSIGNMENT / RE - ASSIGNMENT ON THE OCCASION OF A PRISMATIC CASE

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Abstract

Sex assignment or re - assignment constitutes a unique challenge. Current knowledge, related to brain musculinization by prenatal androgens, as well as fluidity and the potential of metamorphosis of an affected individual during adolescence have further complicated pertinent decisions. A unique paradigm, herein described, illustrates these points. A baby was born in a small island and assigned female sex. At the age of one month the mother noticed enlarged clitoris. At the age of 8 years the child was examined at the Pediatric Clinic of Athens Medical School. She looked as a normal girl but there was ambiguity of the external genitalia. The parents denied further investigation. They returned at the age of 15 years when the patient had undergone a real metamorphosis looking as a normal male adolescent. The diagnosis of 17HSD-3 deficiency was made. A decision had to be made concerning sex reassignment. The dilemmas involved and the final outcome will be discussed.

Keywords: sex assignment; gender; disorder of sex development; genital system; reductase defect.

Introduction

Sex and gender are not synonymous. Simply stated "sex is what you see, while gender is what you feel". Under normal circumstances sex and gender are in harmony. Sex/gender are determined by genes, hormones, as well as by environmental factors.

A normal sequence of biological events for normal sexual determination and differentiation will lead to the creation of a normal male or a normal female. However, at any point of this complicated process of sexual evolution, nature might deviate

from the normal path leading to hermaphroditism.The terms hermaphroditism, ambiguous external genitalia or intersex have been abandoned, as conferring a social stigma. The newly proposed terminology for this clinical entity, currently adapted, is "disorder of sex development (DSD)"[1]. Nevertheless, this terminology also includes the term "sex disorder" which is not free of social stigma. Another proposed definition is "defect in the differentiation of the genital system"[2]. In individuals with DSD, dilemmas for management emerge usually in the newborn period but also in adolescence and adulthood. Usually, the sex of an individual as male or female is assigned immediately after birth, based on the appearance of the external genitalia. Nevertheless, in certain newborns the morphology of the external genitalia does not clearly indicate the sex of the individual. In such cases, elaborate testing and thinking is required for a decision to be made regarding the sex of rearing. The decision is based on the following characteristics: 1) Morphology of the external genitalia 2) The hormonal profile 3) Chromosomal constitution 4) Data of DNA analysis and 5) most important, the anticipated function of the genital system later in life[3-10]. It is obvious that in the neonatal period the affected individual cannot take part in this decision, a very important consideration in this process. In reality, we cannot postpone the decision for later in life and raise an individual as one with ambiguous sex. So the doctors and parents, using all data available,have to decide for the best sex assignment and this is where the dilemmas emerge. "Inappropriate" sex assignment in the neonatal period stems from the fact that the decision to raise the individual as male or female is based on the anatomical features of the external genitalia and the hypothetical potential to function as a normal male or female later in life, which is not always correctly perceived. The last few years, it has become evident that brain masculinization from androgens in fetal life[6] may have a greater impact on sexual orientation and function than the anatomy of the external genitalia.

Besides the neonatal period the dilemma of sex assignment (re-assignment) may emerge in an adolescent or young adult. A number of individuals with sexual ambiguity at birth experience in adolescence a metamorphosis, presenting an appearance different from that expected from the type of sex assigned in the neonatal period[4,8]. Despite using all data available, sex assignment in the neonatal period might prove "inappropriate". This must be attributed to the intrinsic difficulty to foresee the fluidity and metamorphosis occurring in adolescents in certain types of sexual ambiguity[4,8]. The entities in which metamorphosis might occur in puberty and in which the question of sex re-assignment might come up are the following: 1) 17bHSD-3 defect 2) XY gonadal dysgenesis 3) inability to synthesize DHT (5a-

reductase defect) and 4) partial androgen insensitivity. In these entities, androgen synthesis or action in fetal life are impaired but becomes normal in adolescence leading to masculinization of body and brain (metamorphosis) in an individual in which female sex had been assigned. In this developmental stage the participation of the affected individual in the decision process is mandatory with a prerequisite that the individual is very well informed and fully understands all data, currently available, regarding the problem.

A unique paradigm

The description of a unique paradigm will illustrate the points discussed above. A baby was born in a rural area of a small Greek island and was assigned female sex and named Catherine. No diagnostic problems were mentioned as far as the appearance of the external genitalia at birth. At the age of one month, the mother noted enlarged clitoris. Evaluation was recommended by the local pediatrician but the parents refused. At the age of 8 yrs the parents accepted evaluation at the Pediatric Clinic of the Athens Medical School. The general appearance of the patient was that of a normal girl. However enlarged clitoris was noted and gonads (testes) were palpable in the inguinal canal. No specific studies were carried out because the parents wanted to return to the island for farm work and promised to come back later, but their promise was not kept. When Catherine entered puberty, the pediatrician noted virilization. One member of our team, accompanied by the local pediatrician, visited the family in their village and had a long discussion with the parents. The mother stated that “since God made her this way we should not intervene”. They, nevertheless agreed to bring the patient to the hospital, as soon as their farm work allowed. They came when Catherine had reached the age of 15 yrs. Catherine, now 15 yrs old, had undergone a real metamorphosis looking as a normal male adolescent. She had a normal height, facial hair, muscle development, but no breast development. The caryotype was 46XY (normal male). The hormonal profile indicated a defect in the enzyme 17b-HSD-3, necessary for the synthesis of testosterone, the male hormone, important for the development of the external genitalia. The defect was confirmed by DNA analysis kindly carried out by Y. Morel (France). Obviously,a decision had to be made regarding sex re-assignment. The factors to consider for this process were the following: 1) Catherine’s wish 2) parental feelings, primarily formulated by social pressure 3) in which sex the patient would function best. A series of psychiatric interviews with Catherine and parents as well as consultations with Pediatric Endocrinologist, Psychiatrist and Surgeon took place. After all these

consultations, the decision was reached not to re - assigned to the male sex. Again the parents left and came back when Catherine was 17 yrs old. The parents expressed again a strong position, namely, that the patient should returned home as Catherine. Catherine herself mentioned that “it is now too late for change”. Obviously, there was no ideal solution. The best possible had to be chosen under the circumstances which seemed to be for Catherine not to change sex. After the decision was reached, appropriate genital surgery was carried out and testes were removed. Hormonal therapy was initiated leading to normal breast development. Subsequently, Catherine was coming to the hospital dressed in a more feminine fashion. She stated that she was for the first time going to the town with her siblings. Previously, she used to remain in the farm caring for the animals. Although her social life had considerably improved, no sexual relations are reported 10 yrs later. In a recent interview at the age of 30 yrs to the question, what she was missing mostly, she replied a husband.

Conclusions

As it became obvious from the description of this unique paradigm, many dilemmas arise in the management of analogous cases. There is no ideal solution.The team handling the case search for the best possible result. Sex assignment or re-assignment is a highly controversial issue and constitutes a unique challenge for physicians, parents and the affected individual, whenever age allows such participation[8]. The position of social activism groups make decisions even more perplexed. The route to the decision and consequent action with respect to sex assignment has considerably changed over the years, based on new knowledge of the underlying molecular defects, as well as follow-up data and information on what determines sexual orientation and function. John Money’s theory (1955)[11] was that “human beings are not born male or female (are born neutral). The sex identity is shaped by environmental determinants, which depend on the way an individual is raised”. Moreover, decisions were influenced by surgical limitations. Current knowledge, however, favors biology rather than environment, namely the manner of raising,and is mainly determined by brain masculinization by androgens during fetal life. These data have currently considerably influenced the decision on sex assignment. It should be emphasized that the decision for sex assignment and the process to be followed must be personalized. The parents and patient’s opinions should be respected[9], making certain that they have adequately understood what exactly the problem is and the limitations and consequences of each decision. In reaching a decision, every effort should be made to consider available data on molecular defects, responsible in each case, data from long term follow - up of affected individuals and the plasticity of

the genital system. One must try to foresee the outcome of the particular underlying molecular defect in order to assure, as much as possible, the least traumatic intervention route, adequate sexual function, fertility, social adjustment and personal satisfaction. Sex must be tailored to suit gender. The Hippocratic saying: do good or (at least) do no harm, should be applied.

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CURRENT CONCEPTS IN DIETARY GUIDELINES: WHAT IS NEW, WHAT HAS CHANGED, WHAT IS STILL DEBATED?

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Abstract

During the latest decades, driven by the globally epidemic proportions of obesity, a considerable amount of effort has been devoted towards developing dietary guidelines that stress the importance of maintaining a balanced energy intake equilibrium. The importance of dietary composition is often overlooked, despite compelling evidence that supports the notion of "quality over quantity". The present short review is an overview of current knowledge regarding individual nutritional components, including unchanged classical beliefs as well as previous "dogmas" that stand in doubt in the light of recent evidence.

Keywords: diet; dietary fat; carbohydrates; dairy; eggs; Mediterranean lifestyle.

Introduction

Undoubtedly, thequantity of food consumption is of crucial importance in the sense that modest reductions in daily caloric intake without malnutrition are associated with decreased morbidity burden and prolonged longevity. This has been speculated by the results of epidemiologic observational studies and further supported by animal studies. It is becoming increasingly clear however, that dietary composition is of equal, if not greater, importance. The present short article is an overview of

steadfast knowledge, as well as modern evidence regarding qualitative components of diet. The reader will ascertain that there is still a bulk of apparent controversy.

The debated case of fatty acids

Nutritious fatty acids are crudely categorized based on the presence and number of double covalence bonds in the carbon chain as either saturated or unsaturated (mono- and polyunsaturated). As early as 1986, the Seven Countries epidemiological study (7C) followed up over 11,000 healthy middle-aged males for 15 years to conclude that cardiovascular and all-cause mortality strongly positively correlates with saturated (animal fat), and negatively to the ratio of monounsaturated (mainly as olive oil) to saturated fat consumption[1]. These results demonized saturated fat consumption, which was since advised to be kept to a minimum. This view was quickly absorbed into popular belief. Concomitantly, it spurred the era of unsaturated fat and it set the ground for further research into the benefits of Mediterranean lifestyle. A body of observational studies followed, aiming to further validate the link between saturated fat and cardiovascular disease yielding equivocal results. Subsequent meta-analyses did not establish a significant connection between daily saturated fat intake and either coronary heart disease or stroke. Although the relevant studies were highly heterogeneous, this showed that the issue was far from resolved.

A recent watershed came from the Prospective Urban Rural Epidemiology (PURE) study. PURE examined the association of macronutrient intake with overall mortality and cardiovascular events among 135,335 individuals. After a median 7.4 years of follow up, participants in the highest quintile of fat consumption had a significantly lower risk of death compared to those in the lowest. That was the case not only for mono - and polyunsaturated, but for saturated fat as well (HR 0.86, p=0.0088). The highest quintile of saturated fat intake had also a lower risk of stroke (HR 0.79, p=0.0498) while no detrimental effects were documented regarding cardiovascular mortality or myocardial infarction risk[2]. These findings have raised skepticism regarding the actual drive behind the results of PURE study in which increased fat is a mere surrogate; these may possibly be a result of increased intake of nutritious - rich animal products such as meat and dairy, or simply of the avoidance of harmful refined carbohydrates.

Monounsaturated fat is an indispensable component of the Mediterranean diet (it constitutes 75% of olive oil mass) and it is responsible for a range of beneficial health effects attributed to it. Evidence, including research results from our center, highlight a range of positive physiological effects associated with its consumption, such as preservation of endothelial function[3] and an improved plasma lipid profile[4].

Furthermore, the majority of available data point towards favorable effects of polyunsaturated fatty acid consumption on the cardiovascular system. A meta-analysis of randomized controlled trials comparing groups of different quantitative polyunsaturated fat intake regarding the occurrence of "hard" cardiovascular end - points concluded that increased consumption is associated with a significant 19% lower occurrence of cardiovascular events[5].

Omega - 3 fatty acids (mainly found in fatty fish) constitute a special case of polyunsaturated fat, with potential beneficial attributes such as anti - inflammatory and antioxidant actions. Eicosapentaenoic and docosahexaenoic acid, derived from marine sources are also important components of the Mediterranean dietary lifestyle. Despite great interest in the potential of their supplementary usage, latest evidence does not seem to support this notion[6,7].

Animal - derived foods: eggs, dairy and red meat

Modern popular belief has occasionally teamed animal-based food consumption to fast food culture and unhealthy eating habits overall. This belief initially arose from the high cholesterol content of these foods. Newer evidence, however, tends to partially counter this traditional view.

Eggs have been at times considered particularly unpopular, given that the average egg yolk contains 150-250 mg of cholesterol. In a 2013 meta - analysis of 8 studies, quantitative egg consumption was not found to significantly correlate with the risk of stroke or myocardial infartion (MI)[8]. Furthermore, in the Finnish Kuopio Ischaemic Heart Disease Risk Factor Study, neither egg nor overall dietary cholesterol consumption was associated to coronary artery disease after a mean follow up of 20.8 years. The same was also the case among the high-risk subset of ApoE4 carriers[8]. In fact, in a recent study conducted among almost half a million individuals, moderate (up to 1 daily) egg intake was significantly and independently associated with a lower risk of cardiovascular events and death[9]. This latest evidence seems to alleviate popular disbelief about egg consumption.

Similarly, excessive moderation has been traditionally advised regarding milk and milk products consumption, with a relative leniency towards low - fat dairy. However, a meta - analysis of 29 trials showed no association between the quantity of consumed dairy and overall mortality or cardiovascular events[10]. A review of the existing literature highlights a gradual shift of the nutritionist community to a "softer" attitude towards the previously condemned dairy intake, irrespectively of fat content.

The case for the health effects of red meat is still far from resolution. This may be partly a consequence of the indiscriminate grouping of a range of meaty foods as "red meat", irrespective of the source, collection, processing and storage. In a meta - analysis of 20 trials, red meat consumption was not found to associate with coronary heart disease (CHD), diabetes or stroke. Conversely, processed meat (salted, cured or smoked) consumption was associated with significantly higher coronary heart disease and diabetes incidence (+42% and +19% per 50 gr daily, respectively). This evidence likely does not acquit red meat of any harmful effects, but it is an excellent reminder of the importance of nutritional moderation and selectivity[11].

Meeting a wise choice of carbohydrates

A striking example of quality over quantity is the case for carbohydrates; a 25 - year follow - up of the ARIC (Atherosclerosis Risk In Communities) study points to an intake of 50 - 55% of energy in the form of carbohydrates as ideal to minimize overall mortality[12] However, this finding does not discriminate between the type of carbohydrate which plays a pivotal role; increasing refined carbohydrate (mainly sugar, and especially in the form of sugar containing drinks)consumption has been shown to significantly correlate with a higher risk of CHD, independently of nutritional and other traditional risk factors[13]. On the contrary, recent meta - analyses report a continuous association between fiber or whole grain intake and reduction of overall and cardiovascular mortality, CHD, stroke, diabetes and certain malignancies.

Incorporating evidence into a nutritional lifestyle: the Mediterranean diet

Most of the above presented evidence arose from prospective studies that derived nutrient information from whole diets. It is therefore questionable whether potential benefits can be attributed to isolated molecules outside the frame of a complete diet. Besides, macronutrient, vitamin and mineral intake in the form of dietary supplements has not previously shown substantial benefits, provided that these are included in an overall balanced nutritional lifestyle.

The Mediterranean dietary plan combines an integrated series of those individual benefits; 50 - 60% of energy is typically provided by complex carbohydrates (the low "plateau" percentage of the ARIC study) and 25% by fat, mostly from fish and olive oil. Protein sources include moderate amounts of poultry, eggs and dairy and only a small allowance of red meat. Moreover, it is associated with restricted salt intake, given the well - established relationship of sodium consumption to significant mor-

bidities. Alcohol is permitted in small quantities which are widely considered beneficial (despite existing data indicating hazard in any alcohol intake above zero).
In practice, numerous studies have established its benefits. Greater adherence to the Mediterranean dietary lifestyle was shown to associate with reduced all - cause and cardiovascular mortality in a cornerstone study by Trichopoulou A. et al[14] while the application of the principles of the Mediterranean diet in the PREDIMED study was shown to be effective in the primary prevention of major cardiovascular events[15].

Conclusions

In conclusion, novel research data shed doubts in previous beliefs regarding certain nutrients, previously considered harmful. Sources rich in saturated fat such as eggs, dairy and even low amounts of red meat may be harmless or even beneficial. Previous view on unsaturated fat are strengthened while a greater disbelief has arisen regarding Omega-3 fatty acids, particularly in supplements. Not all carbohydrates are same, refined sugars are likely dangerous while complex carbohydrates from nuts, legumes, seeds and fruit confer health benefits. Integrated nutritional plans such as the Mediterranean lifestyle are more likely to be beneficial than a mere combination of isolated nutrients.

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NEUROBIOLOGICAL AND ANTHROPOLOGICAL ASPECTS OF NEUROAESTHETICS

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Abstract

Art makes things visible by activating those complex brain mechanisms which interpret and reinterpret the sensory information. But which are the fundamental characteristics of those mechanisms? A. For the brain the only knowledge that is worth acquiring is knowledge about the enduring and characteristic properties of the world; the brain is consequently only interested in the constant, non - changing, permanent and characteristic properties of objects, those characteristics which enable it to categorize objects. B. Human brain has the ability to conceptualize , to abstract, to see something that is not there. Mirror Neuron System is an important mechanism through which the spectator empathizes during art perception.

Keywords: visual cortex; Broca's area; amygdala; homo habilis; empathy.

Introduction

Neuroscientific approaches to art and aesthetics are usually referred to as "neuroaesthetics". This new interdisciplinary field was introduced by the neurobiologist Semir Zeki[1] in early 90s and investigates the neural basis of art creation and aesthetic experience. Following Zeki many neuroscientists started addressing different problems related to aesthetics. However, as Shinner[2] indicates neuroscience in itself is not sufficient to provide a full account of art and artistic images since both are strongly culturally and historically determined. In the present review we shall discuss both neurobiological and anthropological aspects of neuroaesthetics.

Characteristics of brain mechanism

Paul Klee stated: "art does not reproduce what we see. It makes us see". Similarly Constantin Brancusi stated too: " reality is not the external form but the essence of things…. it is impossible for anyone to express anything essentially real by imitating its exterior surface".

The ideas of those two famous artists do not differ significantly with what Ulric Neisser, one of the founders of cognitive psychology, wrote few decades ago: "….we have no direct immediate access to the world, nor to any of his properties…. Whatever we know about reality has been mediated not only by the organs of sense but by complex systems which interpret and reinterpret sensory information".
Taking together the above quotes I suppose that I can suggest that *art makes things visible by activating those complex brain mechanisms which interpret and reinterpret the sensory information*. But which are the fundamental characteristics of those mechanisms?

1. For the brain the only knowledge that is worth acquiring is knowledge about the enduring and characteristic properties of the world; the brain is consequently only interested in the constant, non-changing, permanent and characteristic properties of objects.

2. Human brain has the ability to conceptualize, to abstract, to see something that is not there and to create it.

The information reaching the brain from the external world is never constant, it is instead a continuous state of flux. As we move about, or the ambient illumination changes, the size, shape and brightness of images on the retina also change. Yet under most conditions we do not perceive the object itself to be changing. *"Whether it gets dark or shimmer, jasmine remains white"* wrote George Seferis.
The degree to which visual perception is transformational and therefore creative has been fully appreciated only recently thanks to the results of the neurobiological research of 20th and 21st century.
Cubism was inaugurated by George Braque and Pablo Picasso in the first decade of the 20th century. According to Juan Gris, himself a cubist painter, *"the aim of cubism was to choose and represent the elements of the object which remain in the mind through apprehension and are not continually changing".*
Cubism, therefore, Brancusi. Klee, Moore and so many other artists look for the essence and the permanent characteristics of things, as visual brain does as well.
As the research of Zeki et al.[2] demonstrates, this ability of the visual brain is based on the functional specialization of the different visual brain regions that is a consequence of the fact that the individual cells that make up the visual brain are highly selective for the kind of visual signal or stimulus that they respond.
For example, as the research of Zeki[3] demonstrates, a specific cell of V4 region of the visual cortex responded optimally to a blue square against a white background,

but was almost unresponsive to the same square presented in a black background. Its receptive field properties look remarkably similar to Kazimir Malevich painting "Red Square".

Homo habilis and homo erectus

I will start the discussion for the second characteristic of human brain function with a question: Which is the feature that allows us to recognize Homo habilis as our ancestor rather than the Australopithecus, the famous Lucy, who had, like humans, the characteristic to stand upright? It is the ability of Homo habilis to create stone tools. More recent forms of the stone industry made their appearance in Africa about 1.5 million years ago. The time coincides with the appearance of a new human species, the *Homo erectus*, whose brain size was twice that of Homo habilis.

According to palaeoanthrologist Richard Leakey , *"ancestors of ours, living 1.5 to 2 million years ago, were making beautifully shaped stone implements. To make a hand axe out of a piece of stone, you have to be able to pick up a stone that contains the hand axe before you make it. You have to see the finished object in the piece of stone. Now, that ability to conceptualize, to abstract, to see something that is not there seems to be human"*.

These tools are not only objects used in every day's life. I believe them to be the first works of art in the history of human species. According to Richard Leakey they are "beautifully shaped elements". They are the result of the ability of the human mind to conceptualize, to see something that is not there and to create it. This ability of mind allowed the humans to carve a face on a cobble 850,000 years ago, the representation of a woman 200,000 years ago. It allowed the humans of CroMagnon to create, 17,000 years ago, beautiful drawings on the walls of the caves of Lascaux in Southern France, the Minoan, 5,000 years ago, to create the impressive drawings in the walls of the palace of Knossos, Pieter Bruegel, 500 years ago, to create the Tower of Babel, Edward Munch to create his famous painting "The Scream".

Munch wrote of how the painting came to be. "I was walking down the road with two friends when the sun set suddenly, the sky turned as red blood. I stopped and leaned against the fence, feeling unspeakably tired. Tongues of fire and blood stretched over the bluish black fjord. My friends went on walking, while I lagged behind, shivering by fear. Then I heard the enormous infinite scream of nature".

In other words, Munch transferred in his painting the fear that he felt this evening. A fantasy that produced an enormous feeling of fear. "I lagged behind shivering by fear". Neuroscientific research has proven that in such a situation the brain region

that is activated is the amygdala which in turn activates the body reactions of fear that are described by Munch. The amygdala was activated that evening in the brain of the painter and as brain imaging studies indicate it is activated in the brain of the observer viewing the painting. The painter achieved to activate to the viewer of his painting the same brain region that was activated in his brain during that evening.

Let me return to the Homo habilis. The question that lays here, of course, is what was it exactly that gave Homo habilis these skills that his contemporary Australopithecus lacked, even though he was able to walk upright? I think that the difference can be located in the 100 to 150 more grams of brain tissue contained in the skull of Homo habilis, and that this brain, as has been shown by endocasts of the skull, contained the Broca's area. In modern humans this part of the brain is associated with speech, however our ancestors did not speak to each other.

It appears, therefore, that the transition to the first forms of human species coincides with the enlargement of our ancestor's prefrontal regions, the "Mirror Neuron System" included, and the emergence of Broca's area. This new area, due to the new complexity that carries, is in the position to control complex intentional processes such as tool making, the first art works in the history of human civilization, and speech at a later stage.

The "Mirror Neuron System" was discovered by Rizzolatti et al[4] and recent studies by Freedberg and Gallese[5] and Gallese[6] indicated that the mirroring system enables the direct, empathetic, experiential feeling of the emotional contents of art works.

Conclusions

Neurobiological and anthropological studies indicate that: (a) Besides the visual cortex several other brain regions participate in the creation and aesthetic experience of art works. In these regions are included Broca's area, amygdala and other regions of the limbic system and the "mirror neuron system" as well. (b) The transition to the first forms of human species coincides with the emergence of Broca's area. This new brain region was in the position to control complex intentional processes such as tool making, the first art works in the history of human civilization and speech at a later stage.

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THE CONTRIBUTION OF EMERITI PROFESSORS TO RESEARCH ON THE MULTIPLE DETERMINANTS OF HEALTH AND ECONOMIC GROWTH

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Abstract

Medical and economic research can play an important role to investigate the determinants of health, to promote well - being and quality of life and to assess the performance of the health systems. Emeriti Professors from different disciplines can contribute to the investigation of the multiple relation between health and wealth using qualitative and quantitative multidisciplinary research. The purpose of this paper is twofold: Firstly, to provide some qualitative information on two conceptual models developed by: i) Evans & Stoddart and ii) Dahlgren & Whitehead. Secondly, to provide some evidence on investment on health by exploring the relationship between health and wealth.

Keywords: health; wealth; determinants of health; social and community networks.

Introduction

In March of 2000 the Heads of the European Governments joined heads in Lisbon, and decided on an ambitious goal to create a knowledge - based European economy and society, introducing large scale structural reforms aiming at the promotion of competition, innovation, and modernization of the European Socio-economic and health models. Several EU reports have highlighted the need for European Members States to achieve higher rates of economic growth and employment by introducing large scale reforms in the social, economic and medical sectors. Research findings across Europe pointed out at the need to adopt multidisciplinary methodologies in order to investigate the multiple determinants of health related to socio - economic, political, medical, educational, research and cultural factors. As it is stated in the scoping paper of Horizon 2020 for Societal Research, the Member States are invited to focus on *"co - creation initiatives for economic growth and inclusion by engaging citizens, academia, public authorities, businesses and social entrepreneurs"*.

The Emeriti Professors from different disciplines such us medical, economic, social and psychological can bring together comparable research findings conducted at different countries over time and places and would contribute to more transparent, innovative, and efficient health policies.

The multiple determinants of health

In the literature of public health, social epidemiology, and social science a great bulk of social and health research has indicated the close relationship between socio - economic status and health outcomes. Professor Victor Fuchs in his classical thesis published in 1974 under the title: *"Who shall live? Health, Economics, and Social Choices"* attempted a critical analysis on the multiple factors affecting population's health and medical care. (Fuchs V 2011)[1]. In a similar vein, the Canadian Professors Evans and Stoddart (1990)[2] published a widely cited paper analyzing a broad range of factors like: social, physical and genetic and their impact on health and well - being (see Fig. 1).

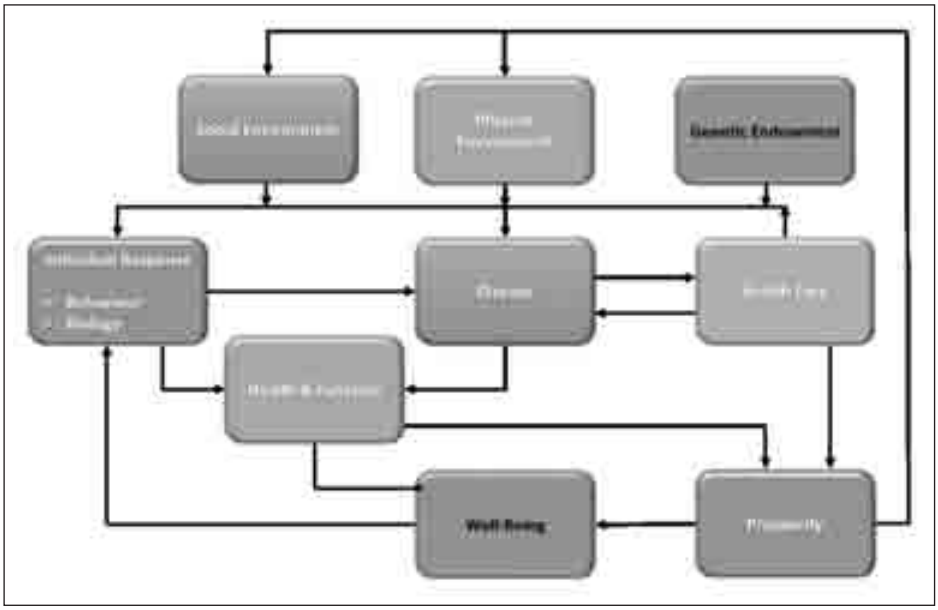

Figure 1. The Conceptual model on Determinants of Health Source: Evans and Stoddart (1990)[2] .

In the 2011 WHO Conference on the Social Determinants of Health, attended by more than 1000 participants, 122 WHO Member States, international and national NGO's and social movement organizations, the urgent need to examine the structural determinants of health was acknowledged. Most of this need lies outside the

conventional health systems per se. The WHO philosophy on social determinants was based on Dahlgren and Whitehead (1991) "rainbow" conceptual model (see Fig. 2) highlighting the interconnection of broader macro-social, economic and cultural factors with more micro factors like education, occupation, income, housing, living conditions, diet, unemployment and unhealthy life style.

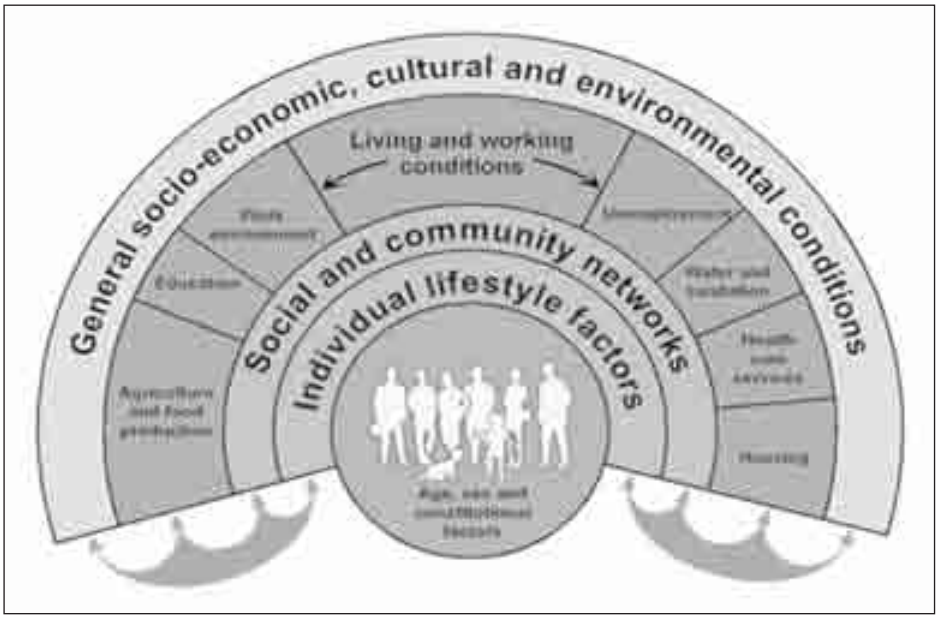

Figure 2. The Dahlgren and Whitehead 'rainbow' model on Multiple Determinants of Health (Dahlgren and Whitehead 1991)[3].

Empirical research has indicated that factors relating to economy and society represent the highest contribution to health 40%, followed by health behavior 30%. Health care contributes only 20% (see Figures 3a and 3b). Research on health inequalities in Europe, has reached the conclusion that a social gradient exists in health status. People with lower education, lower occupational class or lower income tend to die at a younger age and are plagued by a higher prevalence of most types of health problems. During the economic crisis the socio-economic determinants of health became more apparent with greater adverse effects on the health of the European Population. (Yfantopoulos P. and Yfantopoulos J. 2015)[4], (Yfantopoulos et al 2017)[5]. Sir Marmot's WHO Report, (Marmot 2012)[6] acknowledged that "health inequities are politically, socially and economically unacceptable. They are also unfair and the promotion of health equity is essential to sustainable development of our European Health systems.

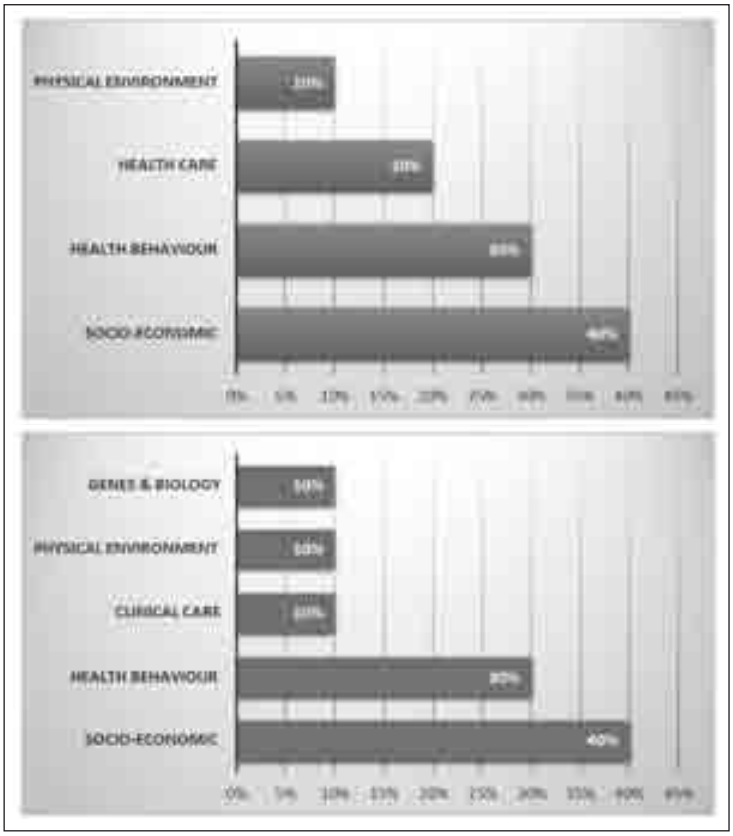

Figure 3. Proportional composition of factors contributing to health.

Investing in health

Investing in health contributes to the European 2020 objective of smart, sustainable and inclusive growth[7]. This implies that we should develop social and health policies aiming at a better and more accessible distribution of health resources ensuring the optimization of effectiveness, quality, accessibility, and efficiency. It also emphasizes the need for more comprehensive and targeted social and health policies.
Health is wealth. A great bulk of literature has indicated that investment in health contributes to economic growth, economic prosperity and welfare. People's health is an important social and economic component because it influences labour supply, increases productivity, and improves the human capital of our societies. In Fig. 4 we portray the double relationship between: 1) health and wealth and 2) health system and the economy[8].

Health and Wealth is defined as : Life expectancy = f (GDP per capita)
(1) Health System and the Economy as: Health Expenditure = F (GDP per capita)

The corresponding results for each relationship (1) and (2) are presented in Fig. 4
The estimated relationship (1) between Life expectancy and GDP per capita is a second order relationship indicating diminishing marginal returns to scale. This implies that countries with less than 10,000 US$ PPP present a life expectancy of around 70 years. An increase of GDP to 20,000 US$ PPP presents an average increase of life expectancy by seven years (i.e 77 years) and a further increase to 40.000 US$ PPP provides only 3 additional years (i.e 80 years of Life expectancy).
The relationship (2) between health expenditure and GDP is widely investigated in the econometric literature. (Deb &. Norton 2018)[8] In our analysis of OECD countries an increase of GDP by 10% would increase health expenditure by 15%. This finding indicates the faster expansion of the health sector in relation to the rest of the economy.
The results of the above analysis indicate that investing in health, particularly during the times of the current economic crisis, is one of the great challenges in Europe. The investigations of multiple determinants of health like: the ageing population, the increase in chronic diseases, the high cost of technology, and the persistent problems of poverty, social exclusion and health inequalities, require new strategies to tackle these issues. The Eurostat[9] and the OECD have jointly developed a system of health statistics to investigate the above factors based on two pillars: 1) The macro-information on health care (economic and health outcomes) and 2) The micro-information based on the European Health Interview Survey (EHIS) and the EU Statistics on Income and Living Conditions (EU-SILC).

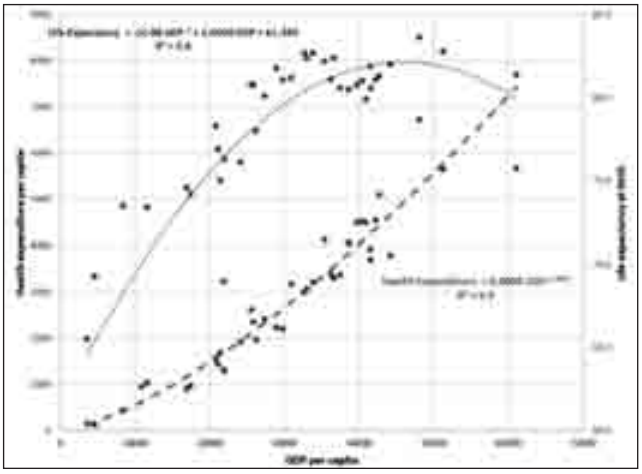

Figure 4. Multiple relationship between Health Expenditure, GDP and Life expectancy[8] Source (J.N. Yfantopoulos 2019)[10].

Conclusions

We should reform our health systems to ensure better access to our citizens, cost effectiveness and long-term sustainability in our health care systems. We should act "together for Health" adopting new strategic approaches. (WHO 2018)[11]. Emeriti professors can play a vital role in increasing awareness around these critical issues. Investing in health contributes to a more just, humane and equitable society with greater social cohesion and greater productivity. Adequate support from the European Funds would help to fulfill these objectives.

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SURGE AND RETREAT IN THE HISTORY OF MALARIA

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Abstract

Malaria predates the evolution of humankind and yet remains one of the most serious health - related threats on the planet, killing hundreds of thousands of its victims each year, primarily in sub-Saharan Africa, and causing severe suffering for hundreds of millions of people. Moreover, contemporary medical historians argue that the period between the mid-nineteenth century and the interwar years marks the most extensive distribution of the disease worldwide. This paper discusses several of the main factors that have contributed to variations in the global, regional and local spread and retreat of malaria incidence. Some of these factors, such the effects of climatological shifts and evolutionary pressures, are long-term and relate to the *longue durée;* others, such as migration, economic development and malaria control programs, affect the medium term; and others, for instance local variations in rainfall, political events and military operations, are more immediate in their impact. In fact, recent scholarship has shown particular interest in studies at the micro-environmental level. Greece, the most heavily malarious country in Europe until the mid - 1970s and the one most seriously affected by the lethal form of the disease, i.e. falciparum malaria, offers a wide range of data for the study of the history of malaria.

Keywords: history; malaria; environment.

Introduction

In his "Epidemiology and control of malaria", published in 1957, British malariologist George Macdonald[1] presented a mathematical model for malaria transmission. Mathematical modeling had been a malariologist's quest since the days of Ronald Ross, the British physician, who had first identified the female *Anopheles* mosquito as the transmission vector sixty years earlier and directed malaria control strategies

against mosquitoes. Macdonald proved that the principal factor behind the amount of malaria incidence was indeed the population and biting frequency of the female *Anopheles*. This finding should therefore inform any historical study on malaria epidemiology.

The risk of making a living

So, what do we seek to learn from studying the history of malaria? For all the genetic, demographic, economic and ecological impact of malaria, for me, the most important experience to take home from such a study is an insight into the intense suffering that was embedded in the daily lives of past populations. In fact, as many historians have shown, such as Margaret Humphreys[2] writing on the southern US, Mary Dobson[3] on England and myself[4] on Greece, the exposure of humans to the risks of malaria by inadvertently sharing their environment with capable species of Anopheles mosquitoes was - and is - related to the daily human activities of merely making a living. Indeed, if choosing such a hostile environment meant increased economic or strategic benefits, humans would invariably take on the risk of malarial fevers. Conversely, humans could avoid falling ill from exploiting malarial environments, if they could force others, whom they held in their power, to do their work for them, for instance use prisoners, conquered men, impoverished women or Gypsies to dig their trenches and canals, to harvest reeds and work in swamps. Historical examples of such behaviour both in times of peace and war are all too common. Greece, in particular, the most heavily malarious country in Europe until the eradication of malaria after World War II and the one most seriously affected by the lethal form of the disease, offers a wide range of data for the study of the history of malaria.

Long term factors

In addressing long - term factors, climate is the first to come to mind. In fact, the early history of malaria, which had originally relied primarily on textual evidence, was revolutionised in scope with the use of palaeoclimatological data. Such data has opened up new paths of enquiry; it has also informed the early history of the disease in Greece. Opinions vary about the time when malaria first took roots in Greece, but there is currently a consensus that vivax malaria must have already been prevalent in Neolithic times although there may have been sporadic outbreaks even earlier.
Taking into account climate conditions and their likely effect on the *Anopheles* population in Greece, Antonia Morgan - Forster[5] postulated that changing climatic

conditions affected shifts over time in the epidemiology of malaria. Specifically, the warmer and humid conditions in the Neolithic physical and social environment and the spread of agriculture and urban centers would have allowed endemic malaria to establish itself in Greece. In the Bronze Age, by contrast, cooler temperatures would be less conducive to endemicity. However, socioeconomic conditions and man-made opportunities for *Anopheles* to breed and travel would have generated an increase of malaria. If the assumptions of Morgan - Forster[5] are valid, then there must have been a surge of endemic malaria in Neolithic times and a rise in unstable, epidemic malaria in the Bronze age.

Medium and short term factors

Malaria moves around when humans move. In the sixteenth century, it arrived in South America from Africa in the bloodstream of African slaves, then made its way to the Caribbean islands, when the slave population was settled there to work on the sugar plantations. Then, in the eighteenth century, it spread further to the southern region of North America, where slaves were needed for the cotton plantations.

Short term migratory movements were - and are - also disseminating factors. For instance, most of the Ionian islands were deficient in grain. Therefore, each year at harvest time peasants would make their way as farm hands to malaria ridden mainland Greece. A few weeks later they would return home with their wages in their baggage and malaria plasmodia in their blood to reignite local infections.

Changing patterns of agriculture also affect malaria prevalence. For instance, malaria began to recede from northern Europe in the eighteenth century with the expansion of cattle breeding, as cattle attracted zoophilic *Anopheles* away from humans[6]. Agriculture could also provide an advantageous or hostile environment to mosquitoes. For instance, consumption of maize pollen has recently been shown to improve the life - expectancy of *Anopheles*, therefore their chances to transmit malaria. Interestingly though, in 1840 the state physician warned the inhabitants of heavily malarious Kalavryta against growing maize.

Among the short term factors that affect the size and feeding habits of *Anopheles* populations malaria control and eradication measures, rainfall and the existence or absence of political stability are among the most prominent. I only have time to discuss political stability very briefly. Reporting on the current dire situation in Venezuela, Gideon Long[7] of the *Financial Times* explains how the collapse of the economy and the health system along with social disruption are burdening the coun-

try with a surge in malaria prevalence that reached one million new cases in 2018. Here in Greece more than seventy-five years ago, one of the worst and most lethal epidemics to hit the country occurred in the summer of 1942. That was the malaria season immediately after the horrendous famine of the winter of 1941, in turn brought on by the Nazi occupation[8].

Conversely, in terms of malaria control, political developments in the aftermath of the Second World War and the Civil war saw a transformation of Greece. Foreign aid, a successful malaria eradication campaign, economic and political stability allowed the country to put in place and sustain institutions of malaria surveillance that are still of vital importance. Thus, the fortunate ending of Greece's history with malaria in the mid - 1970s may be seen to illustrate a joint successful application of politics, economics and science. Nonetheless, on the global scale, it took several more decades of tragic failures and fierce division between two entrenched schools of malariologists, namely, on the one hand the so - called European school, which favoured a social approach to malaria control, and on the other the so-called American school, which promoted a technical approach, before the WHO finally forged a consensus as late as 1992 in Amsterdam. The Amsterdam ministerial conference on malaria adopted a holistic approach to malaria control, that was both scientific and social, broke with past prejudice by acknowledging the value of local experience and established the current malaria control paradigm[9].

Conclusions

Let me conclude by joining the rest of the conference in celebrating mentorship, albeit from a somewhat quirky perspective: I would argue that it is the mentors who benefit from our students, rather than the reverse, because it is our students, who thankfully keep us grounded in the present. Just the other day, sensitive to my interest in malaria and recently released from his military service by river Evros near one of the crossings with Turkey, one of my former students showed me how meticulous and focused malaria surveillance is in this country. As is customary with our young recruits, he visited a local hospital blood bank to give blood in exchange for a two - days leave. Much to his surprise, the personnel literally interrogated him about his precise whereabouts and dates of his movements in the region. As it turned out, they had recently contained a small outbreak of imported malaria among immigrants and refugees crossing the river from Turkey. Apparently, such minor incidents that are kept minor do not make the news and I wouldn't have known were it not for the information network of our mentorship relationships.

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NEUROSCIENCES AND PHILOSOPHY

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Abstract

Philosophy and the neurosciences have a parallel evolution during the ages, since philosophy is an advanced and elaborated product of cognition and high mental faculties, though neurosciences, at the same time, obtain their real meaning, in close connection with philosophy. Philosophy of Neurosciences,on the other hand, concerns foundational philosophical issues within the field of neurosciences involving also neuroscientific interpretation of philosophical doctrines. It is also clear that neurosciences without philosophy have a limited materialistic profile, based on a purely mechanistic conception of mental events, processes, and human behaviour, which are mostly approached by neural network activity and neurotransmitters' interaction conceptualizing that the mental phenomena are identical to neural functional phenomena. However, from the philosophical and neuropsychological point of view the consciousness and all the other high mental activities have a personal character since its interior dimension plays an important role in the interior life, the emotions and the individualized thoughts of the human being.

Keywords: philosophy; neurosciences; consciousness; language; mind and soul.

Introduction

The principal psychological issues, which have preoccupied philosophers throughout the centuries, from Plato to Jaspers and Kierkegaard, such as the processes of consciousness, perception, knowledge, learning and thinking, mood and behavior,as well as the interaction of the mind and soul, might be approached and eventually interpreted only by the deep and proper knowledge and understanding of the brain's function.

The Consciousness possesses always a principal place in philosophy of mind. A theory of consciousness requires an explanation of the brain's processes, which induce consciousness as a fundamental function for the perception of sensorial experience and self-insight. Recent discoveries in the field of neurosciences motivate extensive philosophical debates concerning the real nature of consciousness and the activation

of various neurophysiological and neurochemical mechanisms related to processes and properties of the conscious experience.

Pain experiences have long been used as a model for analysis of conscious experience. However, in spite of the extensive clinical and experimental work emphasizing the importance of connections between thalamic nuclei and the cortex of the brain's hemispheres, there is no conclusive explanation of consciousness at the level of neural mechanism. The sensorial perception and recognition, the processing of the informations, the memory and the sensory coding systems are also crucial topics of the philosophy of neurosciences. However, we don't have any definite neuroscientific explanation of the incorporation of the sensorial informationsin the human mind for building up the knowledge and inducing learning and memory. Nevertheless, mental faculties according to neurobiology, which is supported by molecular biology, neurophysiology and electron microscopymay be reasonably explained on the basis of the mechanisms of habituation, sensitization and classical conditioning in the frame of a mechanistic profile.

It is reasonable that Neurosciences must have a deep philosophical import in order to get a relevance to the problems of mental activities and to harmonious interactions between mind and soul.

The roots of neurophilosophy

The relationship between body and soul and the importance of mental activities on the psychosomatic homeostasis of the human being have been main subjects of inquiry from the Greek antiquity up to our Era[1]. From the Pre - Socratic philosophers soul and mind have been the subject of continuous speculation, study, research and meditation.

According to encephalocentric theory of the human being, introduced by Alcmaeon from Croton and supported by the Pythagoreans, Anaxagoras, Hippon from Samos, Philolaos, Hippocrates, Erasistratus, Herophilus and Galen, the brain is the "hegemonicon", the principal organ which rules and controls all the mental functions and the activities of the human being[2].

The concept of Mind (Νοῦς) possesses a dominant position in Anaxagoras' philosophical system[3]. Everything is set and directed by Mind, which is the causative power of all creation. The Mind (Νοῦς) is unique, original, eternal, authentic, autonomous, unlimited, unmixed with anything else, remaining pure and alone itself by itself, self - powered, self - subsistent, self - sufficient, separated completely from all other elements[4]. Mind dominates upon the matter, activating all its properties and functionalizing it properly. The motion is the most obvious phenomenon

of the changeability of all substances and the way of the transition from matter to energy. The mind, controls and directs properly all the mental faculties and brain processes concerning knowing and perceiving, memory and imagination, emotions and social behavior,speech and writing, symbolic meanings and art, judgment and creativity. The Mind dominates the inner life of the human being, inducing peace, serenity and wisdom[5] .Anaxagoras' doctrine of the Mind, is the most innovatory and amazing theory in ancient philosophy. His revolutionary theory of the relationship between matter and energy, was a real prophecy of the great achievements of the modern science and philosophy[6].

Empedocles may be considered as the most approximate to Neurosciences pre - Socratic philosopher.In his surviving works entitled "On Nature" and "Purifications"it is obvious that during his life Empedocles searched for the pure and genuine knowledge and tried to find the answers of the main issues, which concern cosmogony,cosmology, ontology, anthropology, morality, human behavior and sociology. According to Empedocles there is not birth and death. There is only a connection or mixture and separation of four pure fundamental elements or "roots", which are the earth, the air, the fire and the water. The main forces of universal value which provoke and modulate the mixture and the separations of the four fundamental elements are Love and Strife. All the Creation is based on Love. Any endeavor for development of a harmonious, rational society, characterized by friendship, kindness, respect and perfect collaboration is based on Love. The suffering of the universe, the pain, the anxiety, the agony and the distress of the human soul would never cease due to perpetuous exchange by the antagonism between Love and Strife[7]. Empedocles claims that the ontogenesis under the power of Love results in creationof perfect entities, whereas under the influence of Strife are created men, animals and plants with malformations and congenital defects.

In the field of the biological sciences is Empedocles' theory of the four "roots", which have an equal validity and importance, as the basic elementsof creation, is of existential importance. From the viewpoint of biological sciences, the harmonious-coexistence of all Empedocles' "roots" is found in the cell's mitochondria[7]. Empedocles' philosophy penetrates the depths of the brain's function, concerning emotion and behavior. It inserts in the limbic system,which consists of evolutionarily archaic brainstructures, closely associated with personality, morality,motivations, memory, emotions and social behavior[7]. Amygdala, from the morphological point of view, is global like the Empedocles' "Spheros". Neuronal circuits of amygdala are particularly involved in emerging emotion and behavior with the coordinated activity of

many cortical and subcortical structure of the brain, including the prefrontal area, the cortex and the hippocampus.

Sextus Empiricus is the most eminent physician and philosopher of the Skeptical School of Philosophy[8], which was closely connected with the Empirical Medical School in the Hellenistic Era. According to Sextus' philosophy Logic is based on phenomena and criteria. By the continuous investigation the thinker is prevented from mental or psychological inactivity (ανενεργησία). The only wise way of thinking is to suspend judgment, regarding everything, thus never facing the risk of being wrong.

Sextus considered that science is the main source of pure knowledge, underlying also the relativity of the scientific data. Science, could not provide the authoritative truth and all its issues must be understood from a dialectical perspective. The scientific methodology consists of investigation, equipotence, suspension of judgment and tranquility of mind and imperturbability, which have been emphasized as main values for an investigator many centuries later by Cajal[9]. The human mind has the innate capacity for perception, thinking, analysis of the phenomena, ability to distinguish what is true and what is false and to meditate avoiding dogmatism. Sextus insists that any argument should be precisely proven.

In the field of neurosciences, the recent achievements of the ongoing research, concerning the knowledge of the multi - dimensional potentiality and capacity of the human brain, the amazing synaptic activity, the miraculous neuronal plasticity as well as the numerous ways of the psychosomatic interactions, verify the crucial concept of the skepticism, that the acceptance of any scientific theory requires a 'critical and repeated experimental verification', providing strong evidence that the theory is based on objective data[10].

Sextus' main theory of relativity which was revitalized and experimentally proved, many centuries later[10], was the supreme concept, which opened new immense horizons in physics, biological science, in evidence based Medicine, in neurosciences and neurophilosophy[11]. Sextus' skepticism exerted also a strong influence on the current Psychology and Psychopathology. Jaspers described the "skeptic" personality, which is characterized by uncertainty, criticism, debate and dispute without any conclusion[12]. According to Sextus the skeptic personality of a neuroscientist would be characterized by the serenity of mind,the fever for research and continuous investigation, endeavoring to approach the truth without empathy, in tranquil objectivity and peaceful criticism, avoiding personal ambition and dogmatism[11].

According to Galen, who combined Medicine and Philosophy[13] the physician must

be philosopher, intellectual, with good knowledge of logic, good theoretical background, enough experience and high moral standards, respecting, protecting and healing soul and body[14]. The physician as thinker should avoid dogmatism and much skepticism, since everything is flexible and changeable. However, experience and high medical education may offer the right solution of medical issues. Health is the result of the homeostatic equilibrium of the psychosomatic entity of the human being. In addition, an individual disposition (diathesis, διάθεσις) exists, which may be responsible for the health or the morbidity[15]. Loss of memory and reason and loss of understanding (σύνεσις) appear in dementia, which was called morosis (μώρωσις) by Galen.

Reason must be trained every day for controlling the irrational and erroneous thoughts and establishing the inner peace. Man needs a continuous culture and training, in order to follow the way of the truth and become a perfect man. The efficacious treatment of the passions is their total and complete eradication, which demands continuous fight and persistence.

Galen's psychotherapeutic technique associated harmoniously philosophy and medicine in order to help man to eradicate the passions and obtain his interior peace and psychological stability. However, the psychopathologic analysis of the passions by Galen has many similarities with the approaches of the modern psychopathology.

Conclusions

Modern neurophilosophy is mostly based on neurophilosophical doctrines of Ancient Greek philosophers and physicians. Moreover, the neurobiological theory of mind, and the recent unification of neurosciences with psychology, opens a wide window onto further development of theories of mind, based on evidence and data from the fields of neurophysiology, neurochemistry and electron microscopy supporting a radical neuron doctrine in the context of neuronal plasticity. However, a solely neurobiological explanation of mental and psychological phenomena leads to dissolution and leaves a substantial number of problems unsolved, particularly those which concern the interior life, the thoughts and emotions, the insight and the spiritual life of the human being.

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MUSEUM OF THE SCHOOL OF DENTISTRY, NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS

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Abstract

Established in 2012, the Museum of Dentistry at the Dental School of the University of Athens houses a large collection of instruments, devices, materials and dental units, reflecting not only the history of the Athens School of Dentistry and dentistry in Greece, but also worldwide. The historical archive of Athens Dental School is incorporated and research on it is supported. The archival footage tracks the evolution of the "Οδοντοϊατρικόν Σχολεῖον" (Dental School) from the very early steps in 1916 until the 1980s. A Digital Museum (www.museum.dent.uoa.gr) has been created not only to present the exhibits but also to feature the history of Dental Education and Practice in Greece. The website visitor may study the entire dental legislation since the establishment of the Modern Greek State until our days. The teaching staff is presented also, as a homage to all those who contributed to the upgrading of dental education. The Museum of Dentistry not only supports a remarkable number of research projects, but also educational programs for schoolchildren, either primary or secondary, that have already gained distinction.

Keywords: Museum of Dentistry; Athens dental school; history of dentistry; digital museum.

Introduction

The establishment of a Museum of Dentistry at the Dental School of the National and Kapodistrian University of Athens has been a constant request for many years. The first step was taken in 2012, when the President of the Dental School of Athens (Professor Georgios Vougiouklakis) organized a research team. The aim was to

create an organization that would manage the reception, recording, maintenance, storage, documentation, research, interpretation but most important of all, the exhibition and the promotion of Dentistry and the dental Profession from antiquity until nowadays to the public.

Museum collections and exhibits

The main exhibition area of the Museum is located on the first floor of the new building of the Dental School in Goudi. (Fig.1) The two halls house a remarkable collection, which includes a significant number of exhibits. The Museum's objects are displayed both in the main area of the Museum and in special display cases in order to meet the demands of modern museological exhibition and Museum function spaces.

Figure 1. Collections at the main area of the Museum.
(Photo by M. Sakelliou)

Figure 2. Dental tools and devices.
(Photo by M. Sakelliou)

The collection, on the first floor exhibition area in the new building, consists of scientific dental instruments dating back to the beginning of the previous century. Examples are surgical instruments such as dental forceps and levers. There are also operative dentistry devices like amalgam dispensers, dental drills and various types of dental headpieces. The first air driven contra-angle hand piece unit that was used at the operative dentistry Department is exhibited there. Moreover, tools and devices of prosthetic dentistry are displayed as porcelain teeth, impression trays, a vulcanizing device for the manufacturing of dentures and others (Fig.2). A rare dental unit with an even most rare dental office light is part of the museum collection of dental units.

One of the most striking exhibits is the portable wooden cabinet with materials and tools for exercising the dental art, which inter alia contains a significant number of glass vials with pharmaceutical preparations for dental use, a great collection of hand tools for placing materials, endodontics tools, needles, syringes, intact local anesthetic vials, etc.

We are deeply convinced that a very important part of the history of dentistry is the story of the people who tried to explore, understand and apply the principles of dentistry. A dialectic relationship between yesterday and today can be achieved by Museum exhibition islets where the exhibits are in plain sight for both students and patients on a daily basis. For this purpose, old dental units, dental appliances and tools were selected and are displayed in properly designed areas of the dental school building comple. (Fig. 3).

Figure 3. Old dental unit. (Photo by M. Sakelliou)

The dental school's historical archive

The Dental Department Museum incorporates the historical archive of Athens Dental School (Fig. 3) and supports the research of the archive. The rare archival footage tracks the evolution of the "Οδοντοϊατρικόν Σχολεῖον" (Dental School) from the very early steps of establishment in 1916 until the early 1980s.

The documents illustrate the way in which the first University Dental educational institution was formed, as well as the changes over the years. In that way, the critical historical period, during which the earlier west dentistry constituted in Greece, is revealed. At the same time, unknown aspects of Athens University academic activity are illuminated.

The digital museum

The Dental Department Museum utilizing the advantages of modern Internet and multimedia technology developed a Digital Museum (www.museum.dent.uoa.gr). The purpose was not only to present the exhibits but also to feature the history of dental education and practice in Greece through time.

In the digital crossroads of contemporary technology and dental history personal exploration is allowed based on digital storytelling. Thus, the website visitor can wander around and study the entire dental legislation since the establishment of the Modern Greek State until our days.

One of the most ambitious programs that are running at the moment is the creation of open, freely accessible online library for the specialist, the student, the scholar, everyone. Rich material about the Museum and Dentistry will be offered in electronic form. Already, the Museum has undertaken the digitization of all English dental books, which are copyright free.

The website also presents the teaching staff, wishing to pay homage to all those who contributed to the upgrading of dental education in our area. The presentation is not through a cold, sterile and long list of names, but through the evolution of the overall staff per academic year, as it is recorded in the university yearbooks. Thus, the reader can follow the course of subjects and faculty over time. In addition, a special section is devoted to all doctorates of Dental School of Athens. Currently, an effort is in progress, so that all the graduates will be recorded, from the first one who graduated in 1916 to the present day.

Conclusions

Research education and awards. The Museum of Dentistry, like any university museum, supports a remarkable number of research projects. A monograph on "Dentistry in the Ancient Greek World" is the result of one of these programs. Another study, which concerns the role of "Iatro-synedrion" (medical council) in the support of the dental profession and the promotion of dental education in Greece, is already at the stage of final writing.

At the same time, the Museum contributes to the teaching of the undergraduate course on the history of dentistry through its rich collection. Innovative educational programmes have been designed for schoolchildren, both for primary and secondary education. The programmes designed and realized by the Museum of Dentistry, have begun to bear fruit and also to be well-appraised. The staff of the Museum won the first prize for the best Poster presentation at 40th National Medical Conference held in Athens (14-17 May 2014) by presenting of an educational program designed and implemented for elementary students.

DETERMINATION OF THE CHOLESTEROL COMPOSITION WITH PHYSICOCHEMICAL ANALYSIS

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Abstract

Cholesterol samples from surgical patients were analyzed with XRD, XRF and FTIR for density determination and melting point in the laboratory of Mineralogy - Petrology and Ore deposits at the National Technical University of Athens (NTUA).
The analyzed samples are classified into four major groups depending on their-chemical constituents and their color:

a) Cholesterol stones with more than 80% cholesterol are mostly white in color or light white.
b) Mixed colored stones consist of a varying amount of cholesterol probably lower than 80% and bilirubinate salts.
c) Pigment stones are subdivided into brown or dark brown pigment stones. Both consist of various bilirubinate salts with less than 30% cholesterol.
d) Stones with high content of calcium carbonate.

Keywords: bile acids; classification; surgical samples; cholesterol stones; bilirubin.

Introduction

This paper is part of my not yet published book entitled: “Minerals in the evolution of life and foods”. Life is considered as a part of moving stones, which stones contain specific minerals with a specific structure. They are transformed by fluids and energy into different moving organic compounds which are involved in the different forms of life.
Cholesterol stones develop when there is an imbalance in the bile duct and it therefore cannot function properly.
N. L. Allinger et al[1] in their book with title “Organic Chemistry”(in German)report that cholesterin or cholesterol of the formula C_{27} H_{46} O was isolated from human bones in the early 19th century; 1/6 of the dry substance of the nerves and the casing of the marrow consists of cholesterol. Today it is being acquired in a high percentage of the bone marrow of cows. The human body is capable of producing choles-

terol itself, but it can also get it from food through the bowel and pass it on to the blood. Increased cholesterol content in the blood is partially deposited in the arteries resulting in increased pressure and arteriosclerosis.

The biochemical degradation of cholesterol in the body leads to importantformations of necessary compounds, the most needed of them being: 7,8 - didehydrocholesterol, which is found in relatively high contents in the epidermis and in fish oil. Through solar radiation it can produce a series of complex photochemical reactions. One of the by-products produced through ring breaks is vitamin D3, which regulates calcium metabolism and prevents the development of rachitis. Cholesterol in the liver is subject to a series of reactions, for example production of hydrolysis of the bond C=C, oxidation of ring and some deconstruction of side chains. This results in the formation of different but similar congenes of carbonic acids. Among these, the most important is bile acid. Via a peptide compound linkage with amino acid, for example glycocholic acid, it acts as a solvent like a natural detergent, makes emulsion of the fat in the intestines and facilitates the digestion.

Analysis of the samples

The FTIR cholesterol bands are attributable at 3398, 2933, 2866, 1463, 1376 and 1053 cm^{-1}, various bilirubin were observed in the region 1661, 1626, 1570 cm^{-1}. The characteristic bands of calcium carbonate are in the 1850 and 2920 cm^{-1} region.

Identified elements with XRF are: Ca (1,5-1,9%) and in lower concentration (ppm) K, Fe, Cl, P, S, Si Al and Ti. Other publications, Athanasiadou et al[2], identified the elements Ca, Fe, Mn, Cu, Zn, Ni, Pb and As.

According to the following Table 1, the melting point of the analyzed gallstones varies between 144 - 152,1 Co.

The density varies between 0,37 - 0,48 g/cm^3 and is much lower than the density of chylomicrons (0.94 g/cm^3). That means that the analyzed samples are mixed with human tissues.

Table 1. Density and melting point of analyzed gallstones

density	m.p.C^0	XRF	XRD	color
0,46	151,5	Ca,K,Fe,(P),(Cl),(S),(Ti),	Hol.Cc, Prot.Oxal.	white
0,37	144,2	Ca,K,Fe,Cl,(P),(S),(Ti),	Hol.Cc. Prot.Oxal	white
0,42	152,1	Ca,K,Fe,S,Cl,P,Si,Al,	Hol.bil.	brown
0,48	145	Ca,K,Fe,P,Cl,S,Ti,	Hol.bil.	brownish

Hol=cholesterol, bil=bilirubin, Cc=calcite, Prot=protein,

Oxal=oxal. salts mp=melting point

Densities of various gallstones

Ramesh Kleiner et al[3] mention, that depending on the color, the gallstones can be distinguished into a similar chemism. a) For example, white colored gallstones consist mainly of cholesterol, black colored are rich in bilirubin and brown colored stones are composed of variable bilirubin and cholesterol levels.

According to Figures 1, 2 and 3 of the analyzed samples, the main minerals of human gallstones are big or small crystals of cholesterol and bilirubin in various bilirubinate salts. Other components according to Wentrup - Byrne et al[4] that have been detected with gallstones are calcium carbonate (calcium palmitate), calcium oxalate, calcium phosphate, various bile acids and some proteins.

Figure 1. The white color of this big cholesterol stone contents more than 80% cholesterol, the brown overlay is mostly hemoglobin with lower cholesterol and bilirubin, white colored stones consist of cholesterol.

b) Mixed colored stones consist of a varying amount of cholesterol probably lower than 80% and bilirubinate salts.

Figure 2. Black and white colored stones with lower cholesterol content and bilirubin salts.

c) Pigment stones are subdivided into brown or dark brown pigment stones. Both consist of various bilirubin salts with less than 30% cholesterol.

Figure 3. Brown and dark brown pigment of cholesterol stones from a patient with liver disease.

d) Stones with high content of calcium carbonate.

Human gallstones are of heterogeneous materials that consist of a variety of components, including crystalline cholesterol and assorted mineral phases. The regular composition of cholesterol is cholesterol, phospholipids and bile acids in relation 5:25:70. When the liver synthesizes the bile acids and there is an imbalance between them, cholesterol stones can develop. For example if there is an imbalance between bile acids and lecithin on one side and between calcium carbonate or bilirubin on the other side, then carbonate or bilirubin are formed. An excess of cholesterol and a reduced supply in bile acids result in the formation of cholesterol stones.The results on white stones suggest that the composition of cholesterol and bilirubin varies considerably. Figures 1 and 2 show stones from the same family. Fif. 1 are those of the husband and Fig. 2 those of his wife.

Conclusions

The difference in the size of the crystals is due to a different diet or the variation of genes or environment. Dark brown cholesterol stones contain a greater proportion of polymeric type bilirubinate salts than brown stones. Bilirubin does not have any significant functionality for the organism. It is a rejection of the hemoglobin. A small part of bilirubin is absorbed by the intestine and then is excreted through the kidneys. Increased levels may indicate certain diseases; they are responsible for the yellow color of bruises and the yellow discoloration in jaundice.

Various diseases of the liver like hepatitis develop when obstruction of the bile ducts by stones lead to an abnormal gathering of bile.

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ON GLOBAL INSTABILITY

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Abstract

In the present phase of globalization the main questions are relationships between stability and instability. In the 20th century instability became dominant. The world is affected by ecological, social and economic processes that reinforce political instability, with the result that the very future of mankind is now uncertain. It would seem that the world's ecological, political and social problems (such as demography, poverty, pollution, terrorism, and migration) are not to be solved at the national level. This phenomenon could create definitive and lasting changes in the structure of Europe's situation, too. Present-day mass migration brings also both a quantitative and a qualitative change in European society. We are in an unprecedented planetary emergency by the ecological situation of our planet which is very unfavourable for humanity's survival. We have to change our mentality because a society of growth engenders catastrophes.We can but hope that we shall be able manage the coming challenges.

Keywords: instability; global problems; demography; migration; ecology.

Introduction

In the age of globalization the main questions are relationships between stability and instability, and linkages between the ecological, economic, social, political, cultural, and personal. As Anthony Giddens states[1],we are living in a "runaway world" with many great global challenges. They are for example, economic instability (the periodic collapse of economies and financial markets, bankruptcies on the part of investors, major unemployment, etc.), social crisis symptoms (like uncertainty in family life, disintegration of communities, emigration, "liquid society"), demographic "earthquake" (increasing consumption and pollution), global migration wave (global terrorism, ethnic tensions and no go zones in many European countries).

Problems of globalization

The consequences of these socio - political challenges and crisis symptoms are different. In today's globalized world absolute values and relationships are gradually disappearing. Relativity is penetrating everything, the permanent forms of life are perishing, state borders are becoming porous, and well - being in market economies

is coming into vogue. The result is that we are fearful of a relatively rapid deterioration of existing international relationships threatening to become planet - wide conflicts. One of the major consequences of today's Western economy is the existence of considerable inequality between social strata and growing poverty. Compared with the social situation in the second half of the twentieth century, the last two decades have led to a break in the socio - political network of being[2]. The fracturing of traditional social systems (such as those of education and health) has produced uncertainty[2] and instability everywhere - according to Richard Sennett[3].

This process could indeed lead to a 'democracy deficit'. Moreover finance capital has become one of the major destabilizing factors in politics and economics propagating the importance of unbroken growth. In the present "liquid society" previously stable institutions determining individual choices, once models of acceptable behaviour, were unable to remain coherent, and showed signs of falling apart, as it were 'liquefying,' before being able to reconstitute themselves in new stable forms. Such entities - institutions, structures, and models - are incapable of taking on a new aspect, and thus of being guides to human actions and life strategies.

Demographic growth problems

As regards demography we can see that in the past two hundred years populations have multiplied. However the growth is unequally distributed between the different continents. According to estimates by United Nations agencies, some African nations' populations are projected to increase by the end of the new century to almost unbelievable numbers causing a "demographic collapse", because the world seven billion people have given rise to consumption problems, too, increasing pollution. So, in our present world two "bombs" are poised to explode: a "population bomb" (fewer births in rich countries, more in poor countries) and a "consumption bomb" represented by the growing global population. Demography is connected with migration, too. Demographical indexes point to a significant if gradual decrease in native-born "inhabitants" in the European Union (EU), and an equally significant if gradual increase in the numbers of new settlers. Present - day mass migration brings both a quantitative and a qualitative change in European society. This is why we stated that in 2015 the traditional European history came to an end, and will be succeeded by a totally new age. In my view the current historical period could be called the *New Migration Age* because of the many new phenomena that have appeared. The significance of this new migration wave is that the "Third World" is penetrating the "First World", definitively transforming traditional (mainly European) economic, social, political, cultural, ideological and ethnic networks of being,

causing radical transformation in the meaning of civil rights and civic identity. The problem today is with illegal mass migration, not with refugees fleeing insecurity. Legal migrants may generate risk and danger to the security even of multiethnic host societies. Many of the people seeking immigration in EU are Muslims, sharing a culture that appears increasingly difficult to integrate with Western values.

Global terrorism

Global terrorism is a completely new factor, today, ascribed by some to mass migration from Muslim countries. According to some analysts the new migration wave is responsible for inspiring acts of aggression against Western societies, while others say that Muslims are innocent. Huntington[4] gives a very wide review on the differences of attitudes and outlooks between Islam and the west, underlying the differences of civilization and culture. More details on his views can be found in his book. Yet we must distinguish between ordinary Muslims and radical Islamists. Terrorism today is a serious problem for ordinary persons in the EU and the world at large. I presume we will be living with this phenomenon for a very long time.

Ecological issue

In addition to these great challenges, perhaps the major one is the ecological issue: the climate changes, the degradation of entire ecosystems, the warming of global temperatures, specis extinction, loss of tropical rainforest and woodland, exploitation of the world's marine species, extreme water shortage, floods and - at the same time - desertification and fires, pollution. The increase in carbon - dioxide emissions is the main cause of climate change. But other environmental threats are growing, along with excessive water and energy use and air pollution, due to demographic increase[5]. This is why Stephen Emmott said[6]: "I believe we can rightly call the situation we're in right now an emergency - an unprecedented planetary emergency". So, in general the whole world is exposed to a variety of grave ecological dangers. So, we could state that the ecological situation of our planet is very unfavourable for humanity's survival because the exponential economic growth is incompatible with the finite nature of the world. Moreover we need to change our behaviour: we have to consume "less food, less energy, less stuff, fewer cars...". But Stephen Emmott[6] adds an important advice: "here it is worth pointing out that 'we' refers to the people who live in the west and the north of the globe. There are currently almost three billion people in the world who urgently need to consume more: more water, more food, more energy". But, if everyone consumed at the same rate the US does today, the time horizon would be less than 20 years" for mankind on the Earth - believes Tim Jackson[7].

Is there a solution to these global challenges?

Well, instability is a state of affairs relatively widespread in our world. We are living on a planet that is basically unstable. Nowadays to be knowledgeable about contemporary existence necessitates a degree of planetary consciousness. People are slowly realizing that we are living on an actual planet: earth with its oceans, continents, volcanoes, earthquakes, tornadoes etc. Preservation of the ecological ambiance could help to assure some stability. Sometimes even discrete geographical or planetary changes can influence human history's and society's conditions. Their consequences can produce not only a sense of insecurity but real instability. Serge Latouche is pessimistic regarding our future on the planet, being "not at all sure that we would have another thirty years…" and "how may we survive progress?" Our situation has to be changed and a new type of society instituted that is based on degrowth (décroissance). A degrowth society would be oriented towards new values, first of all the ability to live the good life. It is necessary to limit overconsumption, and the current incredible waste of goods, which have the effect of plundering nature. Human needs have to be satisfied more and more at the local level. To achieve this it will be necessary to create a healthful milieu, providing people with a sense of well - being conducive to the creation of a society living in harmony.

Conclusions

The fundamental dilemma of our time if we need (or not?) radical rethinking about our world system, and new forms of behaviour in order to change direction? Because "if we don't change direction we will probably arrive where we are going" - by an ancient Chinese saying. We can but hope that we shall be able to manage the coming challenge. It is the ineluctable imperative surpassing all others. We can but hope that unstable global space and its network structure will not collapse under the weight of social, political, demographic, ethnic and ecological conflict on a mass scale.

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SCIENCE, RESEARCH, INVENTION, DISCOVERY, HOW TO MANAGE

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Abstract

After defining some essential words used when speaking about scientific research, this paper aims to present some of the major problems to which a research manager is usually faced. Several scientists and statisticians have devoted part of their activity to give general rules about the constitution and management of a research team. If it seems unanimously recognised that interdisciplinarity is a key for the scientific production, many other aspects such as size of the team, relations with the manager, type of manager (focusing more on the economical or the scientific aspect of the results), role of funding agencies, evaluation of research, all this depends on the nature of research carried out: looking more for serendipity or for production of many publications. In any cases it appears that a scientist needs some freedom to work fruitfully.

Keywords: scientific research; research management; serendipity; research team.

Introduction

It is very pretentious to want to explain in few lines or minutes how to manage scientific research when hundreds of papers deal with the subject. For this reason, the main objective of this presentation, after making clear what is covered by the words "sciences, research, invention and discovery", is to report some flash ideas about constitution, management and evaluation of a research team.

Science, research, invention, discovery, what are we speaking about?

Science has a very large and ambitious meaning which is "knowledge", a knowledge which demonstrates causes of what can be encountered in the universe… For centuries science was not the specific domain of scientists, but rather belonged to some genius such as Leonardo da Vinci who was not only an artist but also a scientist, as pointed out by Kennett[1] when considering his drawing notebooks. Unfortunately, for a long period of time, he has rather been ignored as scientist. In fact, according

to Wagner et al[2], it is only in the nineteenth century that the terms “science” and “scientist” came into common use.

Science has always progressed by brutal and major shifts such as the Copernican revolution, or the decoding of DNA, two examples given by Kennett[3], but it is only since the mid of the nineteenth century that there has been a tremendous and continuous increase in scientific production leading to the necessity to consider more and more precise disciplines, or even subfields. Wagner et al[2], referring to different authors, underline the contrast with the seventeenth century, where there was no clear differentiation of the different types of knowledge, just broad precisions were done such as medicine, natural physics, or mathematics.

Kennett[3] defines scientific research as a systematic approach in view of generating new knowledge. Turpin and Deville[4] report that it is traditional to speak about a “dual career path” which confronts curiosity and creativity of the scientists to the economic responsibility of the research manager. Of course, curiosity driven research does not fit with economical aspects of the modern research. Couvreur et al[5] in a report of the Committee for Academic Research Relations of European Federation of Pharmacological Sciences (EUFEPS) insisting on the strong competition in scientific budgets between Europe from the one hand and on the other hand USA, Canada, Japan, China and India, explain that this leads universities and research institutions to perform more applied research with direct utility for the society, even though basic academic research can create necessary conditions for technological breakthroughs and be the basis of innovative processes.

Inventions and discoveries are the results of scientific research, but they should not be confused. Inventions are related to what does not pre - exist, when discoveries are related to what already exists, for example Louis Pasteur invented vaccination and Alexander Fleming discovered penicillin. Whatever they are, inventions or discoveries take their real value only when they spread to other scientists, to users and consumers, and nowadays there is no invention or discovery without publication.

Constitution of a research team

With the exponential growth in the number of scientists during the past century, science has been divided into disciplines or scientific fields. In 1963, Price[6] indicated that a scientific field did not become huge assemblages and did not contain more than a few hundred active scientists, but it could be divided in subfields. Today, we can question if this view is still true, and more specifically how many teams are there in a subfield, what is the average size of a team and how are they organised?

During the last 50 years the number of authors per published scientific article increased significantly demonstrating the importance of interdisciplinary research resulting from the extreme specialisation of scientists as pointed out by Lee et al[7]. In order to facilitate communication, it seems preferable to integrate this interdisciplinarity into research teams themselves, resulting in a possible increase in their size. Lee et al[7] confirmed the results of Heinze et al[8] showing that if research performance rises with an increase in team size and scientific variety, this phenomenon reaches a maximum and may tend to decrease whatever is considered: novelty or impact. Of course, the fact of recruiting outstanding scientists in a team is of predominant importance and concerns directly the manager.

Management of a research team

Heinze et al[8] insist on the crucial role of the manager in the scientific productivity of the team. His role is not limited to recruitment and bureaucratic activities, he is also responsible for internal communication and understanding. Spatial and social arrangements such as laboratory facilities, office space, coffee bars, lunchtime, etc. created (or not) by the manager can foster communication opportunities.

Focusing on the quality of research which cannot be defined by productivity alone, but also by serendipity, Murayama et al[9] indicate that if the managerial activity is played by a leading scientist, this will result in a better quality of the paper, giving the possibility for the researchers to pursue serendipitous findings. On the other hand, if the managerial activity is played by a project manager, this will result in many published papers not considering the serendipity.

Lopez - Vega et al[10] give special attention to research carried out in firms with the following questions: where to search and how to search. Where: local or distant search (in the vicinity, or further away from the firm's current knowledge); how: experiential or cognitive search (with on-line, or off-line evaluation).

In case of collaboration, Wang[11] is especially interested by the tie strength inside the network and shows that there is an inverted U - shaped relationship between network average tie strength and citation index; furthermore, in case of high tie strength, a more skewed network performs better because of balance between exploration and exploitation.

To be active and productive, a research group needs financial support. This can be provided by cooperation with firms (industry) or by public funds (national or supra - national such as European Community). In most cases cooperation with industry will focus on a well defined objective and may not give enough attention

to serendipity. According to Turpin and Deville[4], the background of the manager, more administrator or more scientist, is significantly perceived by the researchers who consider that his / her scientific background is absolutely or usually important (70%), and his / her commercial background not at all or slightly important (75%). Another point to consider when cooperating with industry is: to whom belong the results? with the consequences to that question: are publications allowed? what type of publications (novelty or impact)? to whom belong the patents? will the patents be exploited or will they have been taken to stop other firms to work on a similar topic? etc.

Giving advice to beginning researchers, Kennett[3] indicates that funding by agencies may present difficulties for the researchers. This opinion is developed by Heinze et al[8] who indicate that many funding agencies want that the research proposals set targets, give exact details of the likely results, what is very often contradictory with novelty in research and will not give recognition to serendipity. Most often the renewal of funding is not obtained when the expected results are not achieved. Creativity would be promoted by having more flexibility in the use of grant income and less demands for constant progress reports. Furthermore, important secretarial activities are necessary to organise meetings and write intermediate and final reports.

Evaluation of research

Science does not exist, or at least is not recognised, without publications. This leads to at least two questions: where to publish? how the published papers will be evaluated or considered?

Where to publish? Of course, as mentioned by Kennett[1], in a place (a journal) where it will be encountered by other scientists working in the same domain. But depending on the scientific domain, the journal fitting best with the scientific work has not necessarily a high impact factor, for example pharmacological journals generally have higher impact factors than pharmaceutical technology ones. This can push scientists to publish in some journals where their paper will not be often read but will benefit from the high impact factor of the journal. In order to prevent such behaviour, papers are preferably evaluated by their citation index. However, the citation analysis is difficult because, as pointed out by Wagner et al[1], scientific domains are vastly different in size, if there are few readers there are few citations… Furthermore, for interdisciplinary papers, some collaborators to the publication will be more favoured by the chosen journal than others…

Conclusions

Scientific research has different aspects: invention/discovery, serendipity/production. Nowadays, to be of quality scientific papers need to be multidisciplinary, with consequences on the size of the team, the relationships between its members and its management which is the key point for the scientific success. However, despite a great number of publications and scientific/statistical works carried out to demonstrate what could be the conditions of the success, it appears that no general conclusions can be given, only some orientations overlining the fact that success in scientific research is very often an individual process or at least needs enough freedom.

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FIRE IN A CHANGING WORLD

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Abstract

Wildfire is as old as the terrestrial vegetation (350 - 400 million years) and has contributed to shape global biome distribution. Wildfires and climate are closely related as fire regimes rely on rhythm of wetting and drying, to grow biomass and convert it into combustible fuel. Flammable ecosystems cover about 40% of the Earth's land surface and include ecosystems with high level of biodiversity. Many types of adaptation to resist and recover from fire appear to have arisen in response to wildfire activity. During the past 20,000 years, humans have been a major source of ignition. Economic losses and threat to human health caused by fires gain a wide public attention. In contrast, fire as a natural ecological factor is not equally well recognized. There needs to be the awareness that fire is both a destructive yet important ecological factor to feed into the idea of sustainable fire systems.

Keywords: wildfire and climate; man and fire; adaptation to fire; fire prone ecosystems; fire severity.

Introduction

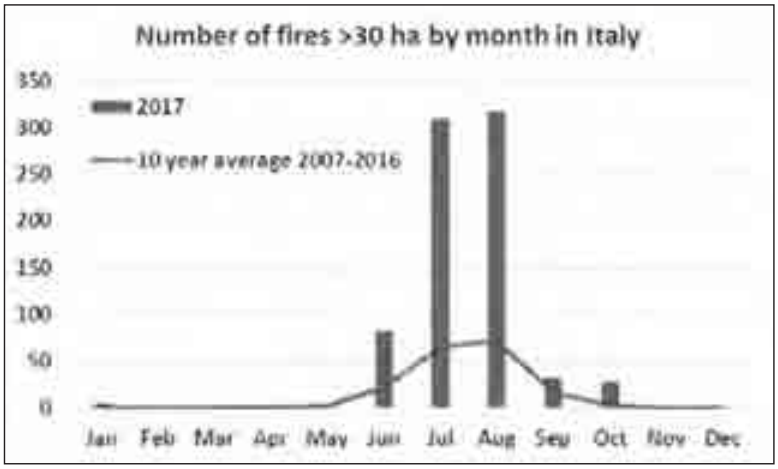
Fire is a natural disturbance and a significant evolutionary force that has influenced plant growth form and species composition in terrestrial ecosystems. Fire - prone ecosystems need fire in order to survive. Hominins evolved in a fire - rich world and developed the ability to use and control fire. Nowadays climate change,the ubiquitous overlay of human impacts on fire regimes, fatalities from fire and economic losses, have led to the demonization of fire.

Fire and climate

Wildfires and climate are closely related. Fire regimes (Fig. 1) rely on rhythms of wetting and drying, as moisture must be high to grow biomass and low to convert biomass into combustible fuel. Regions with even humid / dry climate may experience fires only after exceptional drought / rainy period. Mediterranean regions undergo annual cycles of wet and dry seasons and show regular fire seasons

(Fig.2). In others regions, e.g. those associated with the oscillations of El Niño, fires have multi - year rhythms. Some regions have fire cycles in the order of a century or even longer.

Figure 1. Fire Cause, Type, and Frequency for FAO ecological zones.
N indicates natural fires and H human ignited (accidental and intentional) fires.
Fire frequency: LOW with fire cycle of more than 200 years;
MEDIUM between 20 and 200 years; HIGH less than 20 years.
(Adapted from Lavorel et al., 2007)[14]



(From: European Forest Fire Information System-EFFIS)

Figure 2. Number of fires per month in Italy in 2017 compared with 10-year average. Mediterranean regions undergo annual cycles of wet and dry seasons and manifest regular fire seasons. The year 2017 was characterized by severe fires due to a combination of predisposing weather, fuel conditions, and ignition agents.

The close fire - climate interactions and the increase of wildfire in the last decades have raised the concern for potential impacts of climate change on wildfire. Moreover as reported by Liu et al[1] the increase of wildfire is not simply an outcome of the changing climate, but also a participant in the change by contributing significantly to greenhouse gas and aerosol emissions (Table 1), and modifying earth surface reflectivity.

Table 1. Emissions from wildfires. The mass amount in grams of emission per kilogram of fuel burned. The letter "d" represents particle diameter (Data Source: US National Research Council, 2004).

Emissions	Mass	%
Carbon Dioxide	1564.8	71.44
Carbon Monoxide	120.9	5.52
Organic Carbon	5.2	0.24
Elemental Carbon	0.4	0.02
Particulate Matter d < 2.5μ	10.3	0.47
Particulate Matter 2.5 μ < d < 10μ	1.9	0.09
Particulate Matter d > 10μ	3.8	0.17
Nitric Oxide	8.5	0.39
Methane	5.9	0.27
Non-Methane Hydrocarbon	4.3	0.20
Volatile Organic Compounds	5.2	0.24
Water	459.2	20.97

(From Liu et al., 2013)[1]

Man and fire

Many wildfires are truly natural, some fires such as arsons are started by Man. According to Pyne[2] *"We are, uniquely, a fire creature: We hold a species monopoly over the manipulation of fire. We can start and, within limits, stop fires. We can shape fuels and do so to make them more or less combustible. We can even reach into the geologic past to gather fossil biomass and burn that. Our capacity as fire creatures defines our ecological imprint as no other trait can. Other animals knock over trees, dig holes, eat plants, and hunt, but only human beings apply and withhold fire. The ecology of fire on Earth reflects our own existence; that is, its dynamics embody our knowledge (and ignorance) as well as our will and our capacity to choose"*.

The use of fire as a means for cooking, heating and hunting largely promoted human civilization. Since the Neolithic Age fire was used by human for the management of vegetation. In prehistoric times the landscape of the Mediterranean area, was dominated by primary forests. Liacos[3] reports that in Greece the destruction of the

forests began in the 20th century B.C. with the invasion of the Achaeans and the Dorians who, using fire, converted large forest surfaces to grasslands for livestock feeding or to open passages to alpine rangelands. Homer and other classic writers provide the first historical evidence that fire was part of the natural environment since prehistoric times. In the Iliad, Book 11, 155, Homer sings of the destructive effects of lightning-started the wildfires. Lightning indeed was the cause of wildfire over geologic times and still ignites wildfire, mainly in the boreal forest. During the past 20,000 years humans have been a major source of ignition, accidental or intentional.

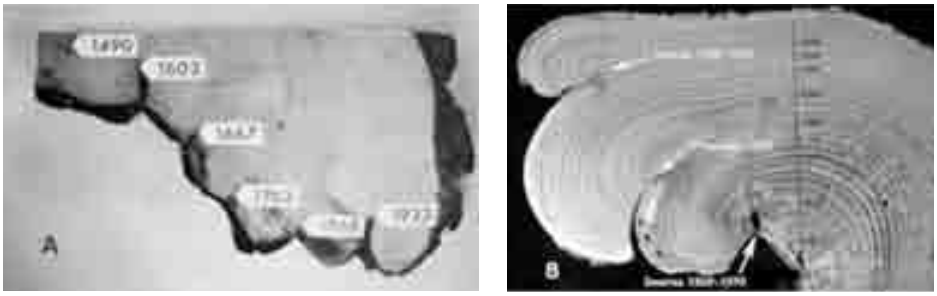


Figure 3.

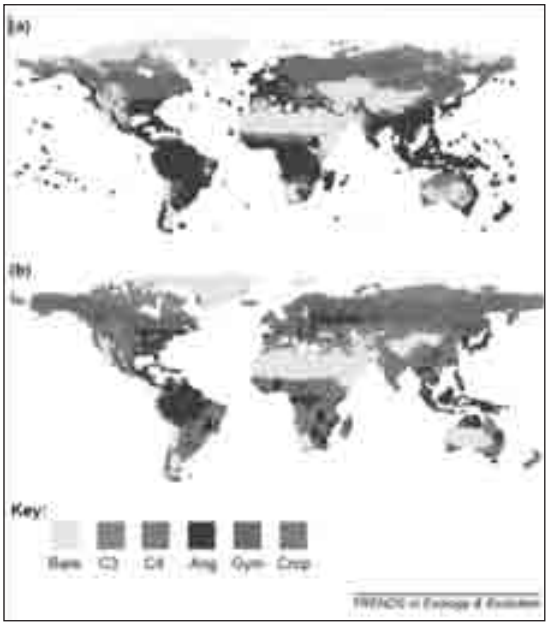
(A) Fire scars of a Scots pine established in 1490, dating 5 forest fires.
(B) Fire scars of a pine about 40 years old, dating 3 high - frequency forest fires.

The abundance of fossil charcoal in different types of soils is a reliable record of wildfire history dating back for thousands of years. Burn scar in tree rings allows dating more recent fires and fire return intervals (Fig.3). The oldest fossil charcoals have been found in Mainland Australia. Mooney et al[4] showed that fires over the last 40,000 years follow cool glacial and warm interglacial periods, with colder periods characterized by less, and warmer intervals by more biomass burning. In contrast, changes in biomass burning during the last 200 years seem to have been exacerbated by humans. Global changes are likely increasing fire frequency and severity, length of the fire season, and forest fire danger.

Fire adaptation

Bond et al[5,6] report that fire - prone flammable ecosystems cover about 40% of the earth's land surface and include some of the most biologically diverse ecosystems on the planet.

According to He et al[7] wildfire is as old as the terrestrial vegetation i.e. approximately 350 - 400 million years and has contributed to shape global biome distribution (Fig. 4).



(From Bond and Keeley, 2005)[6]

Figure 4.

Map of Potential World Vegetation, limited only by Climate (a) versus Actual World Vegetation (b). C3 grasses or shrubs; C4 grasses or shrubs (very flammable); Ang, angiosperm trees; Gym, gymnosperm trees (mainly conifers), indicate the cover of the dominant plant functional type in the diverse Biomes. The numbers indicate sites where fire has been excluded for several decades. All the higher rainfall sites tended to form forest following suppression of fire.

Plants over the eons adapted to fire or died out. Many adaptations, for both gymnosperms and angiosperms, to resist and recover from fire appear to have arisen in the Cretaceous or before in response to wildfire activity.

Among survival strategies, as stated by Fernandes et al[8], thick bark, that provide tissue insulation from lethal temperature, is the most important trait in determining fire resistance in pine. Pausas[9] demonstrated that fire regimes can explain a large proportion of the variability of bark thickness at the global scale. Other survival traits are: a deep root system (soil is a good insulator), a crown structure able to dissipate heat, self - pruning (shedding of lower branches) that deters flames from running up the tree and, large and protected buds that allow re - sprouting. Among oaks, cork oak sprouts from trunk while prickly oak sprouts from roots after fire. Eucalypts and some banksia species have a swelling, known as lignotuber, at the base of the

stem just below the soil. The lignotuber contains dormant buds, which burst into life when the above ground organs are killed by fire and the inhibiting factors they produce can no longer prevent the buds from becoming active.

Pine species adapted to high - severity fire regimes implying stand - replacement events, store a canopy seed bank in serotine cones that are sealed with resin and can only open to release their seeds after the heat of a fire has physically melted the resin. Several pine species from the Mediterranean Basin have serotine cones. In Aleppo pine the amount of serotine cones increases with increasing fire recurrence. Lodgepole pine from western North America and Jack pine from eastern North America are fire-dependent species with serotine cones and require severe wildfires, occurring after years of drought, to maintain healthy populations of diverse ages.

Among Australian plants, many *Eucalyptus* species, and *Banksia* shrubs have serotine fruits. Along their evolutionary history, as the climate became more seasonal, Banksia species started to retain dead leaves indefinitely thus increasing flammability and post-fire fitness due to the ash - fertilized soil. Other plants, such as the Australian grass tree *(Xanthorrea)* and South African aloes retain dense, dead leaves around their stems to serve as insulation against the heat of a wildfire. A number of *Protea* species have moist tissues that provide both thermal insulation and protect against dehydration during a fire.

Keeley and Fotheringham[10] report that several chaparral shrubs and annual plants, as well as species of Australian heath and Mediterranean maquis, require the chemical signals from smoke or from charred plant matter to break seed dormancy otherwise they remain buried in the soil seed bank. Fire-heat induces seed germination by different mechanisms, e.g. Aronne and Mazzoleni[11] demonstrated that in species having water - impermeable seeds as *Cistus*, heat ruptures the seed coat layer.

Many herbaceous plants have fleshy bulbs, rhizomes, or other types of underground stems from which green shoots rapidly develop in the wake of a fire.

Fire impact

Fire evokes images of flame and destruction, however even large severe fires - in the right context - are not ecological catastrophes and do not sterilize the land for long.

Images of flame and destruction catch the public's attention because of catastrophic damages in terms of human casualties, economic losses, or both. Romme et al[12] report that in 1988, under extreme fire weather, mega - fires, ignited by lightning and by humans, burned approximately 570,000 ha in the Yellowstone Park. A huge fire - fighting effort (25,000 fire - fighters and an expenditure of $120 million) was effective in protecting most human life and property, but the fires could not be stopped

until snow came in mid - September. Canopy mortality was total in Lodgepole pine forests; yet about 20 years after fire naturally regenerated Lodgepole pine forests were dense and fixed, by herb and tree, a total of 4.8 Mg C ha^{-1} y^{-1}.
Mediterranean ecosystems are fire-prone and wildfires are a growing problem. As reported by San - Miguel - Ayanz et al[13], in Europe the worst mega - fires, and about 85% of the total burnt area, concentrates in Mediterranean countries i.e. Portugal, Spain, Greece and Italy (Fig. 5).

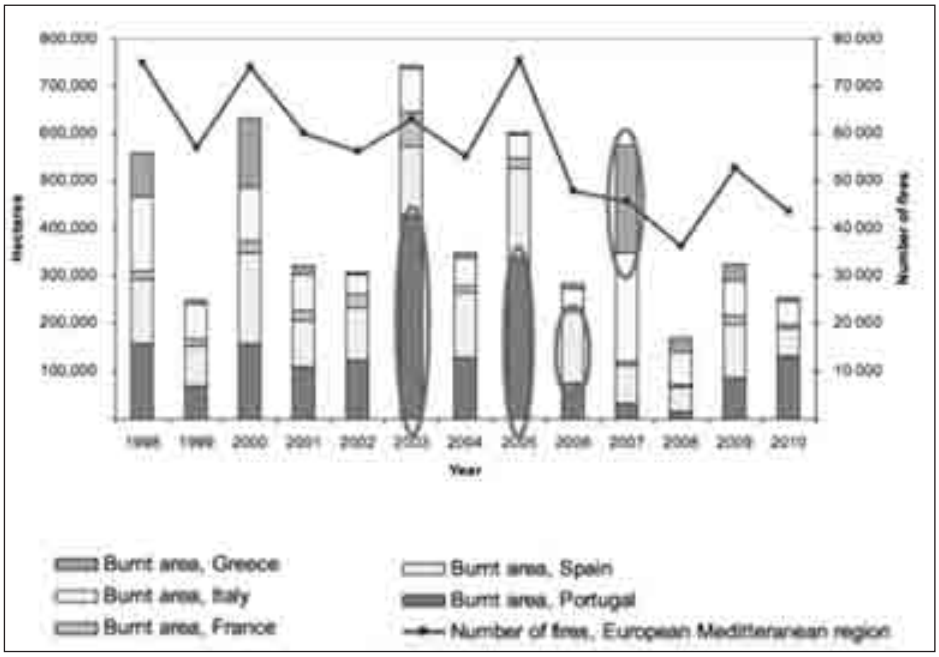


Figure 5. Megafire events in Europe during the period 1998-2010. Megafires are fires that cause catastrophic damages in terms of human casualties, economic losses, or both. The wildfire that raged through a coastal area east of Athens in July 2018 (not present in this figure) killed 91 persons and was the worst fire disaster in Europe since 1900. (From San - Miguel - Ayanz et al., 2013. Adapted)[13]

Lavorel et al[14] highlight that vegetation structure and land use affect fire ignition, propagation and, impacts on local to regional scales. According to Mancini et al[15] fire risk is associated to the socioeconomic context. The significant expansion of the wildland-urban interface, the abandonment of the rural environment and the accumulation of fuel in low - utilized forests increase fire risks for human community.

The plantation of fire-promoting flammable species at the wildland - urban interface is a way to promote fires causing catastrophic damages to humans.

Conclusions

Wildfires are predicted to increase under a warming climate. Understanding wildfires, vulnerability of land systems to fires, and risks they pose to people, is the most effective strategy to better coexist with fire.

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THE THIRD CULTURE AND THE ROLE OF EAPE IN THE ACADEMIA

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Abstract

The concept of culture can be divided in two intellectual aspects: the arts and humanities on one side and the natural sciences on the other. The academia trailed along this division and contributed to fractionalize the culture; this dichotomy should not exist today. The experience showed that scientific and humanistic cultures need to be strictly connected if we want to imagine a complete cultural world. The natural science researchers do not consider the humanistic world and its problems and, at same time, the humanistic researchers do not consider the natural world; creating a big gap for our future society. Third culture expresses a constructive dialogue among the various disciplines , between science and humanism. We must teach our young people that we are living a phase of extraordinary cultures and that we must speak among them to overcome the dualism science-humanism. Culture is one and dualism is between "to do" and "not to do" culture. EAPE could plan an important role in supporting the vision of third culture in academic world . We suggest a "manifesto" about Third Culture.

Keywords: third culture; humanistic culture; scientific culture; manifesto; bioethics.

Introduction

The Third Culture is a scientific proposal at first proposed in 1955 by John Brockman that influences deep and careful scientific reflection supported by numerous philosophers, scientists, humanists, economists, biologists, politicians, physicists, computer scientists, psychologistis[1,2]. It is a project conceived and supported by numerous Nobel Laureates in various fields and John Brockman defining a proposal that could be considered as a "manifesto"[1,2]. The Third Culture, amplified by new scientific achievements, aims to promote new human theories and practices in ev-

ery field. It is to overcome the contrast between humanistic and scientific culture defining a new summary, a new unitary democratic proposal of knowledge[1,2]. The main aim is to support the spread of research among all strata of society. Therefore, according to Brockman[1], we must understand the activity of those scientists who know how to identify new interesting things about the world and about ourselves, and, who know how to collect them and spread knowledge beyond the narrow confines of the academy to a large public. In the past centuries , merging between the different disciplines was an acquired fact. On the temple of the Oracle of Delphi, the prescription of knowing oneself synthesized the Socratic philosophy, and to be accepted in the Platonic academy the study of geometry was required. In the Midle Age the study of Dialectics, Grammar and Rhetoric, named Trivio, and the study of Arithmetics, Astronomy, Geometry and Music, named Quadrivio, were necessary to enter university[3]. The symbol of this interdisciplinary mind was Leonardo da Vinci who is considered one of the greatest men of Genius of humanity. He took an interest in almost all fields of knowledge of his time. Today it is more difficult to study philosophy without taking into account new cosmological ideas such as space and time of the new astrophysics theories[3]. For centuries the most complex questions on the universe, on the origin of man were pertinent to the philosophy and not keeping pace with scientific development. These pieces of evidence were described by Charles Percy Snow, English scientist and writer, 50 years ago when he spoke of a split between humanistic and scientific knowledge. In Italy the evidence of the Congress of the Italian Philosophical Society in 1911 has been introduced when the ideas of science of Benedetto Croce, although reductive and wrong, have defined, the cultural, social, economic and political development of our country[3]. Science was confined to the academic sphere and considered only for its technological implications. We should go back to the common roots of knowledge by making them circulate in institutions, in the education system and in research. Primo Levi, Italian writer, wrote that Empedocles, Dante, Leonardo, Galileo, Descartes, Goethe, Einstein nor Michelangelo, nor the good artisans of today and the physicists did not know the distinction between art, philosophy and science. A solid physical-mathematical, biochemical, biological, engineering training is necessary considering the challenges of well-being and health, creating a link between the technical-scientific training of young researchers with the humanistic culture in its current developments. Universities and institutional places of political discussion of knowledge are lagging behind. Science must not be seen as a danger but as a cultural and social growth. The Third Culture represents the will and the capacity to

create dimensions of cultural exchange. The fruitful relationship between humanism and the sciences was partly stranded around the end of the nineteenth century. Dante in the second Canto del Paradiso discusses the question of lunar spots and in another written the "Questio de aqua et terra". Giacomo Leopardi, Italian poet at the age of fifteen writes the History of Astronomy and publishes poems interested in physics, in chemistry and geology[3].

Today's problems and questions

Today the relationships between human, mathematical, physical and natural sciences follow new paths not because our universities push for this but, perhaps, for social needs. Bioethics is a significant example because medicine, biochemistry, biotechnologies are oriented towards the succession of generations. The jammed research, the devastated university and the scientific news highlighted by the mass media contribute to creating cultural chaos. The same chaos contributes to the confusion of politics and also to our whole social life. Culture increases in quantity of information and becomes impoverished as a critical spirit. We need politicians, teachers, communicators and enlightened minds who can spread the new criteria of culture for a better and complete future. The Third Culture as was defined in 1991 by John Brockman is a group of scientists and thinkers who, by replacing the intellectuals, through work and their writings bring to light the profound meaning of life[1]. The Third Culture expresses a real constructive dialogue between the various disciplines and skills, the will and the need to enhance exchanges on the most advanced research and on the application of the same in the real world, and dialogue between scientific and non-scientific planet between science and humanism. The Third Culture is to be understood as a culture of synthesis of various contents, as communication, as a debate open to scientific communities and not, for which a new knowledge is identified, not an end in itself, but with the aim of rethinking and changing the world. The Third Culture is a project already in progress thanks to some scientists who have learned to communicate to the public and to divulge their great discoveries knowing how to explain to everyone the continuous scientific revolutions. Science must overcome the dualism between humanistic culture and technological scientific culture, working together for peace, human rights and development of humanity.

A synthesis between scientific and humanistic culture is necessary because cultural dualism is equivalent to not doing culture. We must always focus on a constant desire to understand the origin of life and the dream of art, of beauty, which are fundamental parts of human life. The Third Culture does not only appear as a synthesis between the two cultures, humanistic and scientific, but it could represent a

re - proposal of scientific culture understood as a new natural philosophy. It recalls the theses of neo - positivism of the 1920s - 30s[4,5] that only scientific knowledge is considered possible and reliable because it alone offered guarantees of experimental verifiability and denied any claim to truth to other types of knowledge (philosophical, religious, artistic, etc.). The Humanistic Culture is no longer able to answer the questions of the public: Where does the Universe come from? What is the origin of life? How is the mind born? Tanga, and Gelati wrote that the Third Culture is a step forward, which allows to overcome the dualisms such as humanism / science / technique / theory, to open new horizons[2].

The role of the European Association of Professors Emeriti

The Third Culture is a step backwards, because it does not want to unite different realties, mixing and merging them but going back to their common origin, to their original and deeply unified matrix. It is important to keep in mind that what science provides alone cannot be sufficient for all human needs, especially spiritual ones, and that at same time religion that refuses science will hardly survive the 21st century. The dialogue between science and religion (humanism) is now necessary and desired by many parties. Scientific research not only does not create conflicts with faith but, on the contrary, it brings man closer to God[1-5]. The European Association of Professor Emeriti (EAPE) could be the ideal place to sign and spread an appeal "Manifesto" to governments, schools, universities and places of culture, to support the Third Culture for the future of society and to fight a sterile exasperated populism that reduces the capacity of the policy to interpret ethical and social mediation needs. EAPE could be an ideal place to carry out this socio - cultural or social - cultural project. EAPE is an association that brings together multidisciplinary emeritus and active retired professors from numerous European universities and therefore can contribute to deepening and contributing to the project. We think that EAPE, based on active Human capital, could contribute to development of the Third Culture. It is an "epochal handover" from a group of thinkers, the literati, to a new group, the scientists, the architects of the Third Culture. EAPE could contribute to the future of Third Culture, our new cultural future. Moreover it is necessary to re-think our teaching system by inserting scientific elements in the humanistic faculties and humanistic elements in the scientific faculties.

Conclusions

On this point of view we propose an EAPE manifesto for the Third Culture according the following considerations: 1. Culture is a conceptual and material sys-

tem. 2. Culture is not compartmentalizable. 3. Culture connects and is connected . 4. Culture is evolutionary. 5. Culture has no hierarchies. 6. Culture has a continuous structure. 7. Culture is human. 8. Culture is process and product. 9. Culture is formalization.10. Culture must be objectivable. 11. Culture must have a general epistemological framework to harmonize all fields. 12. Culture must be transversal for all disciplines. 13. Culture must be heterogeneous. 14. Culture must be real. 15. Culture must be method. 16. Culture must be homogeneous and correspond between the various disciplines. 17. Culture must not denigrate. 18. Culture must not be a dogma. 19. Culture has an ethical, aesthetic, practical, cognitive, theoretical purpose. 20. Culture is open and does not exclude debate. 21. Culture is not passive and it is becoming and active. 22. Culture is and must be a human product. 23. Culture is a resource.

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SUPPORTING THE ENVIRONMENT, CULTURE AND SUSTAINABLE DEVELOPMENT WITHIN AND BEYOND THE UNIVERSITY

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Abstract

A critical issue for the future of Universities is their interaction with Society at all levels. In addition to high caliber education and research and actual "opening" of the horizons of students to these "new" fields, academic work should lead to Sustainable Development. This concept of high - quality science in the service of society has formulated the vision/driving force of the work of the Laboratory of Environmental Chemistry (LEC) of the University of Athens and the interlinked UNESCO Chair and Network on Sustainable Development Management and Education in the Mediterranean. This system has developed a large number of educational and research activities through wide - ranging partnerships and collaborations that are featured in the present article.

Keywords: university; sustainable development; education; environment; environmental chemistry.

Introduction

A critical issue for the future of Universities is their interaction with Society at all levels. In addition to high caliber education and research and actual "opening" of the horizons of students to these "new" fields, academic work should lead to Sustainable Development (SD) covering many aspects of it: environmental, socioeconomic and cultural, while contributing to environmental and SD governance. This contribution which starts from suggesting policies, may include the monitoring of both the implementation of policies and their impacts (particularly the reduction of pressures, pollution emissions and the state of the environment) and, further on extends, to early warning. This ambitious concept of high - quality science in the service of society keeping, however, clear distance from party politics, has formulated the vision/driving force of the work of the Laboratory of Environmental Chemistry (LEC) of the University of Athens (UoA) at various levels and fora.

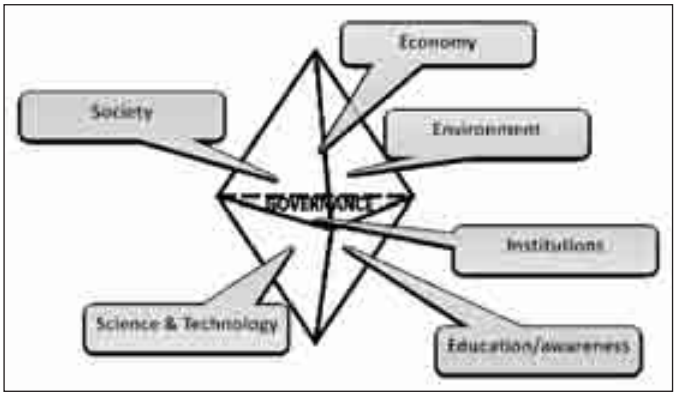

Figure 1. Visualization of sustainable development and tools to obtain it.

The visualization of the relationship among the three dimensions of SD and Governance, as well as the tools used by governance in order to obtain SD, is given in the hexahedron introduced by us and used also by several International bodies (Fig. 1).

The laboratory of environmental chemistry, its educational and research activities and services to the UoA

Although the formal recognition of LEC was done in 2003, its activities were initiated within the Section III of the Department of Chemistry (Inorganic Chemistry and Technology and Environmental Chemistry), already in the early 1970s.

The LEC has developed a large number of educational activities for graduate and post graduate students, among which, the following:

Undergraduate courses - Department of Chemistry

Environmental Chemistry (6th semester - compulsory)
Atmospheric Chemistry (7th semester - selected)
Chemical Oceanography (7th semester - selected)
Ecotoxicology (8th semester - selected)
Environmental Management and Technology (8th semester - selected).

Postgraduate courses

Interdisciplinary Postgraduate Program “Oceanography and Management of the Marine Environment” (since 1975)
Postgraduate Program of Chemistry: “Chemistry, Technology and Environmental Management”
Postgraduate Program on Education for the Environment and Sustainable Development within the framework of the Inter-University Science/Chemistry Education Programme.

E-course of thee-learning Programme

"Mediterranean Food and Diet: A multidisciplinary Historic, Cultural, Environmental and Dietary Overview".

The LEC has carried out a considerable number of studies on many aquatic systems, including the management and depollution of the heavily industrialized Gulf of Elefsis, and many other coastal and protected areas. Fig. 2 presents the main areas studied in Greece. Many more areas, outside Greece, from the Gulf of Lions in the Western Mediterranean to several parts of the Black Sea have been also studied.

Figure 2. Areas studied in Greece.

The basic fields of research of LEC are:

Chemistry of marine and freshwater systems (microenvironments) including surface and groundwater and sediment: circulation, chemical behavior and distribution of metals, nutrients and organic pollutants.

Ecotoxicological studies on aquatic ecosystems and bioaccumulation. Studies in organisms and foodstuffs.

Study of different metal species in natural systems and food, related to their biological activity and impacts.

Atmospheric environment and indoor emissions. Determination of various pollutants in aerosols.

Environmental Management of Aquatic and Marine Ecosystems.

The results of this research are reflected in the large number of PhDs and MScs, as well as many articles published in peer reviewed journals, books, presentations in conferences, etc., presented in Fig.3.

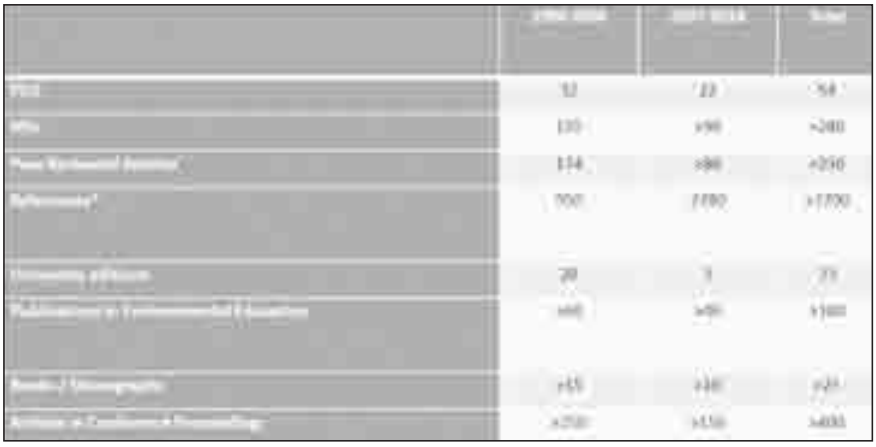

Figure 3. Indicative research statistics for the period from 1980 to 2018 (source: www.scopus.com).

The LEC provides also services to the laboratories of many Departments of the UoA (Biology, Chemistry, Dentistry, Geology and Geoenvironment, Pharmaceuticals), as it concerns the management of hazardous chemical wastes. This includes classifying, collecting and destroying all wastes produced and stored for many years and classification, collection and disposal of newly generated waste.

The LEC, the UNSECO chair and network and the collaborations, partnerships and joint initiatives

The links of the laboratory and significant work in protected areas was facilitated also by the director of LEC, chairing the Hellenic National Committee of the Man and the Biosphere Programme MAB / UNESCO.

Furthermore, the LEC developed a very wide network of collaborations and synergies that allowed it to become the core of the UNESCO Chair and Network on Sustainable Development Management and Education in the Mediterranean (Fig.4).

The contribution to the protection and restoration of natural and cultural heritage (including monuments) of the country was obtained though cooperation and chairing for 19 years of the Hellenic Society of Environment and Culture. The contribution to formulation of European Union, United Nations (UN), Environment/ MAP and UNESCO policies was done directly and through chairing the European Environment Bureau and representing, for 25 years, the European Parliament in the Board of the European Environment Agency, in Copenhagen.

The LEC co - organised the historic conference of UNESCO (Thessaloniki, 1997),

introducing, at global level Education for Sustainable Development (ESD) and has co - drafted the UNECE ESD Strategy, as well as the Mediterranean Strategy on ESD (2014) and its Action Plan (2016), implementing also a large number of ESD projects at local (within schools), national, regional and global level.

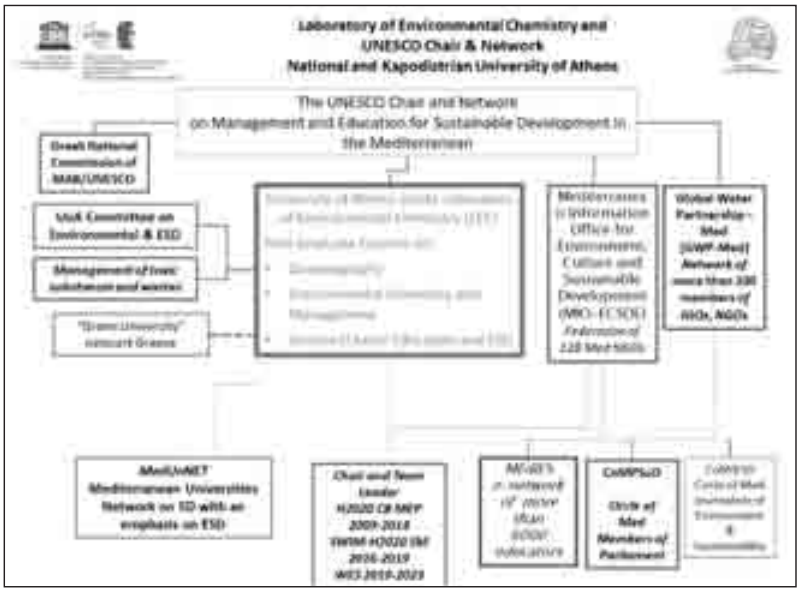

Figure 4. The organigram of the laboratory of environmental chemistry and UNESCO chair & network.

A considerable part of educational activities, are carried out in synergy with the Mediterranean Educational Initiative for Environment and Sustainability (MEdIES) (www.medies.net), which is a Type II Initiative of the UN. It was launched at the Johannesburg Summit for Sustainable Development, in 2002, and it constitutes a Network of 6,000 ESD educators, providing to them opportunities for interaction, regular information on ESD as well as a variety of educational material downloadable free of charge. MEdIES is supported by the Mediterranean Information Office for Environment, Culture and Sustainable Development (MIO - ECSDE) (www.mio-ecsde.org), and Global Water Partnership - Mediterranean (www.gwpmed.org).

MIO - ECSDE, being the major federation of environmental NGOs of the Mediterranean region and the Global Water Partnership-Mediterranean (GWP - Med), is a network of most of the organizations dealing with water issues in the Mediterranean. Both are part of the UNESCO Chair Network, and they are instrumental in promoting public awareness and the active involvement of citizens and their organizations in protecting the environment and efficient water management. The

network includes the Circles of Mediterranean Parliamentarians for SD (COMP-SUD), and for Journalists (COMJESD), and the Network of Mediterranean Universities for SD.

In cooperation with GWP - Med, the Integrated Water Resources Management (IWRM) and Integrated Coastal Zone Management (ICZM), are actively promoted through Integrative Methodological Framework (IMF)[1] while more than 100 pilot projects, concerning rainwater harvesting and gray water reuse, were carried out and transboundary issues (Drin, Orontes) are successfully dealt with[2].

Contributions in Hydrodiplomacy extended in chairing the International Panel of Experts of the World Bank for the Red Sea-Dead Sea Conveyor while through leading the Horizon 2020 CB/MEP, more than 150 environmental trainings and other activities were carried out in the non - EU Mediterranean countries, as described by Scoullos et al[3].

Conclusions

In order for a university unit to reach out in an meaningful way to the society, a clear vision is required as well as hard work and commitment for combining high caliber research and education with openness to and understanding of the needs of the society and its organizations and willingness to contribute in the formulation and implementation of policies at all levels from local to global, for the benefit of the present and future generations.

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THE CONTRIBUTION OF SENIOR INVESTIGATORS TO THE SOLUTION OF "COLD CASES"

The paradigmatic example of the so called "genuine casein kinase"

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Abstract

"Cold cases" are often concealing "hot issues" whose belated solution may hamper both the advancement of knowledge and the attainment of important practical goals. Here the contribution of senior scientists may be critical since they have the opportunity to witness and keep a record of unduly neglected topics which younger investigators may be fully unaware of. A striking example is provided by the unanticipated discovery in 2012 that the enzyme responsible for the phosphorylation of the milk protein casein, the first phospho - protein ever described (in 1883) and which was later instrumental to the discovery of a huge family of enzymes, "protein kinases" (more than 500 in human) governing all aspects of life, does not belong to this family, but to a small family of atypical kinases. Only recently we have realized that this neglected enzyme is responsible for the generation of most secreted phosphoproteins, being implicated in a variety of pathologic situations.

Keywords: biomineralization; Fam 20C; hypophosphatemic rickets; protein phosphorylation; sphingolipid signaling.

Introduction

Advancement of knowledge is an uneven process, not only from a chronological standpoint (due to irregular and serendipitous progress of science and civilization), but also because it reflects variable perceptions of social needs, causing deep and sometimes abrupt changes of what people are expecting from science and technology. Consequently, it happens that even within individual disciplines the investigation of specific topics proceeds with different speed, being either propelled by bursts of general interest or suddenly put aside, according to the mood of the scientific community and, even more, of the public opinion and of the funding agen-

cies. Senior scientists more than their younger colleagues, have the opportunity to witness such a phenomenon and to keep the record of neglected old questions still waiting for an answer.

The scientific career of one of us covers more than half a century, thus providing the opportunity to witness and in part contribute to the solution of a number of intriguing "cold cases". Especially telling, is the belated identification of the enzyme responsible for phosphate incorporation into milk casein and egg yolk phosvitin. A concise recollection of this fascinating story trespassing three centuries (1883 to 2012) is presented below.

The genuine casein kinase: an orphan enzyme for 130 years

Nearly all aspects of life are under the control of protein phosphorylation, a reversible biochemical reaction affecting the majority of eukaryotic proteins, which is catalyzed by a huge family of enzymes (more than 500 in human), termed "protein kinases", responsive to a wide variety of stimuli and whose dysregulation often underlies global diseases, with special reference to neoplasia.

The first protein kinases were discovered in animal tissue homogenates in 1954[1] for their ability to transfer the γ - phosphate of ATP to casein, the milk protein which was firstly reported to contain phosphorus, in 1883[2].

It soon became clear however that these enzymes capable to phosphorylate casein in vitro were different from the genuine "casein kinase" responsible for the phosphorylation of casein in the Golgi apparatus of lactating mammary gland[3,4] whose identity remained a mystery for several decades to come.

Even after the unravelling of the human genome at the very beginning of the present millennium, when all the members of the huge family of eukaryotic protein kinases (the so called "kinome") were identified[5] none of these turned out to be the genuine casein kinase. Only in 2012 independent work performed in three different labs provided the incontrovertible demonstration that the genuine casein kinase is identical to Fam20C, a member a small family of atypical kinases[6,7,8].

Two arguments may account for the generation of such an unmatched "cold case": firstly the logical expectation to identify the genuine casein kinase among the members of the kinome, which in retrospective proved incorrect. Secondly and more critically, the interest for protein kinases was propelled by their implication in cell signalling and their exploitation as druggable targets in many pathologies, so it was hard to believe that a kinase just committed to the phosphorylation of a milk protein could display such exquisitely regulatory features. Consequently,

for decades the literature on this enzyme was extremely "slim" and submitting research projects focused on it to funding agencies was a waste of time.

Nevertheless, in our lab we constantly kept an eye on this elusive enzyme, developing an extremely selective peptide substrate for monitoring its activity and showing that its presence in the Golgi apparatus of tissues other than the mammary gland challenged the dogma that it was a kinase exclusively dedicated to the phosphorylation of casein[9]. In 2005 running MS analysis of proteins co-migrating with in-gel genuine casein kinase activity we identified a protein whose accession number (IPI00363789.1) corresponded to a protein identified as "dentin matrix protein 4" (DMP-4) of unknown function and identical to Fam20C. Although DMP-4/Fam20C was repeatedly detected in our purified genuine casein kinase preparations[10], we dismissed the possibility that it could be responsible for casein kinase activity, based on the misleading expectation that such an activity had to be displayed by a *bona fide* protein kinase, which was not the case of DMP - 4, retrieved at that time as a protein of "unknown function". Several years later, however, clues that DMP - 4 / Fam 20C might display some kind of kinase activity appeared in the literature and prompted us to go deeper into the issue ultimately providing the demonstration that the gel band responsible for casein kinase activity immunoreacted with anti-Fam 20C antibodies[7].

In retrospective the expectation that an enzyme must exist committed to the incorporation of phosphorus into casein dates back to 1883 when this milk protein was firstly described as a "phosphoprotein". The molecular identity of such a genuine casein kinase however remained a mystery until 2012, although biochemical evidence for its existence was available already in the sixties of the past century. For decades the genuine casein kinase was believed to be an exquisitely dedicated enzyme, just committed to the phosphorylation of casein before its secretion in the Golgi apparatus of the lactating mammary gland and devoid therefore of any implication in cell signalling and metabolic regulation, at variance with most of the other protein kinases. After its identification with Fam 20C already known to be responsible for the Raine syndrome, it soon became clear that all these inferences were incorrect: the genuine casein kinase is in fact a ubiquitous and very pleiotropic enzyme, responsible alone for the phosphorylation of a plethora of secreted proteins[11]. Many of its targets are implicated in human pathologies, with special reference to bio - mineralization diseases, hypophosphatemic rickets, tumor metastasis and neurodegenerative syndromes. More recently, Fam 20C was identified to be responsible for the phosphorylation of phosvitin in egg - laying animals[12], solving the mystery

of the “genuine phosvitin kinase”, another fascinating, even if less charming, cold case since 1900[13]. In perspective, an in depth investigation of its molecular features and biological roles will pave the road toward innovative therapeutic strategies and shed light on complex biological events, such as sphingolipid signalling and human lipid homeostasis[14,15].

Conclusions

The moral of this paradoxical story is that quite often hot issues are hiding behind cold cases whose solution may be troublesome and time consuming, but ultimately turns out to be very rewarding.

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TEACHING COMPLEXITY: THE CASE OF MEDICINE

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Abstract

In the last quarter of the last century a growing opposition to specialization occurred along a quest for unity of culture. A new method of teaching not based on disciplines, but between disciplines and crossing disciplines was proposed which adopted complexity. The method also flourished thanks to (i) the foundation in 1984 of the Santa Fe Institute in New Mexico, inspired by Murray Gellman and (ii) the publication in 1994 of the *Charter of Transdisciplinarity* inspired, edited and signed by Lima de Freitas, Edgar Morin and Besarab Nicholescu in the Convento da Arrábida in Portugal. Complexity emerged from 3 main streams: cybernetics, general systems theory and dynamical system theory. Now it is seen an indispensable tool to advance science without losing the effects of specialties that are of paramount importance for solving practical problems. The aim of this paper is to demonstrate the need of crossing disciplines for advancing medicine as a science and as a profession at a time characterized by an exponential increase in knowledge.

Keywords: complexity; simplicity; specialists; disciplines; classicism; teaching medicine.

Introduction

Background. Science progresses through the work of specialists, they are at the same time the most indispensable and also the most despised being charged of incapacity to catch the unity of knowledge. They are even described as narcissi who defend their individual originality by secluding themselves in smaller niches as demonstrate by De Santo[1,2] and by Ehrich, Corrad and De Santo[3]. An example of this ambivalence was provided in the Heraclitean Fire: sketches from a Life Before Nature authored by Erwin Chargaff (1905 - 2002). There Chargaff[4] pointed out that "if one or two persons decide to investigate on a rare beetle and find something interesting, their path will soon be followed by ten or more scientists. When the

number of scientists investigating on the rare beetle will be around one hundred they will create a scientific society and publish a journal. A scientific society generates a profession and a profession cannot be extinguished".

The 12th chapter of *The Foucault's pendulum* by Umberto Eco appearing in 1988 opens in a publishing house where Mr. Jacopo Belbo, who cares for university books, and Mr. Diotallevi who cares for long - lasting books, are planning a new university faculty. Their list of possible departments includes comparative irrelevance, the art of subdividing one hair in four parts, *impossibilia*, Gipsy city planning and bizarre disciplines (1. the art of cutting the broth, 2. Antarctic architecture, 3. Crowd psychology in the Sahara desert, 4. Building machines to greet the old aunt). The goal was to reform knowledge aiming to reproduce investigators capable to increase ad infinitum the number of irrelevant disciplines.

The birth of complexity

This points to the need of a complex thinking, so complexity was born by necessity. Complexity emerged from 3 main streams: cybernetics, general systems theory and dynamical system theory which were catalyzed with the advent of the Santa Fe Institute in New Mexico to generate the complexity theory. Recently Bhat and Pally[5] have recognized the work of Moses[6] and have reviewed the topic starting from a definition of complex system which can be seen as "an entity which is made up of several constituents that are interconnected with each other, with complexity being a measure of the number of interconnections between the constituents. An essential criterion proposed for a system to be complex is the acquisition of novel functions or properties that the individual constituents do not perform or possess respectively. Since these functions are immediate and contingent consequences of the interaction of components as pointed out by Murray Gell - Mann[7]. For Bhat and Pally[5] "An implicit assumption of the first description of complex systems is that a minimum set of interacting constituents are necessary and sufficient to give rise to a given emergent function and / or property. The addition of another constituent to this set may result in a new property but is not required for the earlier one. Therefore, a complex system is also relatively autonomous in that the system achieves a new state as a result of the connectivity between its constituents that are in this context relatively insulated from other neighboring potential components".

Murray Gell - Mann[7], coined the word *plectics* (from the Greek stem *plékō* ("twisted" or "braided"). The cognate Latin word, *plexus*, also meaning "braided," gives rise to "complex," originally "braided together". The related Latin verb *plicare*,

meaning “to fold”, is connected with simplex. *Plectics* is the study of simplicity and complexity. It includes the various attempts to define complexity; the study of the roles of simplicity and complexity (effective complexity).

Murray Gell - Mann who founded (1984) the Santa Fe Institute in New Mexico, complained that “unfortunately in our society honors are accumulated only by those who study the general aspects of a fundamental problem”. Thus for him it became necessary “to integrate specialized studies with an approximate overall look”. The ideas of complexity, simplicity, regularity and randomness were thoroughly explained by Gell - Mann in *The quarks and the Jaguar*, published in 1984 the quarks representing simplicity, the jaguar the complexity.

Edgar Morin, who authorized in 1973 *Le paradigme perdu / The lost paradigm* (Paris, Seuil) has been working on complexity for decades. He inspired, edited and signed with Lima de Freitas and Besarab Nicholescu the *Charter of Transdisciplinarity*. Morin in a recent preface to a book of his former fellow Mauro Ceruti[8], declares his aim to bridge together what is dispersed (*sparsacolligo*). He points out “that at the time of globalization, specialization drives the progress of knowledge however it also drives to breaking down knowledge which should be kept as a whole”. The disjunction between disciplines hides the connections and the complexity of the whole human being. It is a paradox that medical progress induces regression of knowledge and causes new ignorance. Understanding our times means to understand globalization which drives the human adventure at a time of planetarization”.

The role of disciplines

For Edgar Morin[9] “Teaching shall be seen as teaching to live as in the original thought of Jean Jacques Rousseau in *L’ Émile*. Although “disciplines” are indispensable in our professional life to solve the general and fundamental problems” we have to unify knowledge which is now dispersed in many disciplines. Thus, it is necessary to develop a more complex method of thinking and a more complex paradigm of knowing. Until we have the various knowledge bound together according to the principles of complex knowledge we will be unable to recognize the common weaving of things. We just see the threads that compose the tapestry. Identifying the individual threads does not allow to understand the overall design of the tapestry. The new system grants rationality, scientificity, complexity, modernity and development. “The real problem” Morin says, “is to substitute the method which drives to know by disjunction and reduction with a new method obliging us to know by distinction and conjunction” (*Introduction to complex thinking*). However, “we

have to be aware that we are not yet landed in the society of knowledge, but rather in the society where knowledge is fragmented, and consists of various *tesserae*, each separated from the others. Such separation does not allow us to bind them in order to understand the fundamental and global problems related to our personal lives as well as to our collective destinies". However according to Morin[10] disciplines have a role since "A discipline is a kind of organizing category since it introduces in the field of knowledge the division as well as specialization and a certain degree of autonomy. Disciplines developed in the XIX and XX century along with scientific research. However disciplines were fertile in history of science. They in fact unveil, extract or build up a non-trivial object. However their remains something which has been extracted from a context or made *de novo*. This shall be changed to give the specialty a general view". "A discipline is a kind of organizing category since it introduces in the field of knowledge the division as well as specialization and a certain degree of autonomy. Disciplines developed in the XIX and XX century along with scientific research. However, disciplines were fertile in history of science. They in fact unveil, extract or build up a non - trivial object.

Mauro Ceruti[8] says, "Specialties have generated new knowledge that however does not allow to solve multidimensional problems. The separation of disciplines makes us unfit to catch complexity. The thought that divides allows to experts and specialists to provide high performances within their compartments and to collaborate into non - complex sectors of knowledge. However, the fragmentation makes us blind towards inter and retro - actions and towards circular causality".

Teaching medicine with the method of complexity

Kelley and Randolph[11] gave an answer to the question "Who is a great professor of medicine?" Their answer was: he is a man who holds three talents: being a good physician, investigator and teacher. However, just a few possess all three talents, many of them just one. In addition, now we need physician-scientists not only teaching with charisma, but with the capability to communicate with the sick person. This is something which cannot be completely taught and requires personal gifts. Therefore we need to attract the best students to become physicians. Once such creative people enter universities and hospitals, they can explore the complexity and the fertility of the boundaries of the disciplines with other disciplines. These boundaries can expand and can open new avenues. In addition, we need to give our own contribution to translational medicine. Many basic discoveries remain in journals housed in the shelves of libraries and are not turned into the cures that patients

need. Our current approach to science failed to achieve this goal. It is not a question of money. It failed notwithstanding the investments. So the priority for De Santo[12] is to turning basic science into cures.

Teaching medicine by adopting the method of complexity would be impossible without integrating it with a reduction/thinning of the things to be taught. A lot can be learned from art in general and from sculpture in particular. We may start from the idea of classicism which, taking out from the block of marble a piece of marble after another, built up great works. For Alberto Savinio (1891 - 1952), born Andrea Francesco Alberto de Chirico, brother of the more famous Giorgio (1888 - 1978), we have to go back to Classicism.

Medicine, notwithstanding the progress in knowledge and advances in technology is still unable to foresee the exact route of the process of cures. According to Mauro Ceruti[9] this is a great opportunity to understand and interpret the complex systemic perspective which may make available a new way of looking to scientific knowledge in biology and medicine.

Conclusions

There are many problems to be solved in medicine that have not been solved by means of disciplinarity / interdisciplinarity (De Santo[12]). In 1999, the Institute of Medicine published a report of Kohn, Corrigan and Donaldson[13] that suggested between 44,000 and 98,000 people per year die of preventable medical error and the data of Leape and Berwick[14] show here has been no progress with time. This indicates the complexity of medical practice and the difficulties in teaching it with the traditional teaching-learning approach as emerges by De Santo's[15] recent research.

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THE CAPITAL OF KNOWLEDGE

Homage to Professor Emeritus Prokopios Pavlopoulos, President of the Hellenic Republic Honorary President of the European Association of Professors Emeriti

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Abstract

Ageing is a crucial time in human life. The list of artists and scientists who have been very productive in their late years includes Michelangelo, Galilei, Rita Levi Montalcini, Rembrandt, Bailly, Okusai, Moore, Picasso, Gaudí, Miró, Niemeyer, Montaigne and Russell. The reigning pope Francis sees old people as memory keepers and defines them memoriosi, utilizing a Latin entry of the XIV century. Professors emeriti have different destinies in Europe and USA where there is no compulsory retirement due to age.

Keywords: professors emeriti; retirement; ageing; scientific productivity.

Introduction

What is age? To try to answer this question we start with three examples. The first is "The prayer of an unknown abbess of the 17th century".

"Lord, thou knowest better than myself that I am growing older and will soon be old. Keep me from becoming too talkative, and especially from the unfortunate habit of thinking that I must say something on every subject and at every opportunity. Release me from the idea that I must straighten out other peoples' affairs. With my immense treasure of experience and wisdom, it seems a pity not to let everybody partake of it. But thou knowest, Lord, that in the end I will need a few friends. Keep me from the recital of endless details; give me wings to get to the point. Grant me the patience to listen to the complaints of others; help me to endure them with char-

ity. But seal my lips on my own aches and pains - they increase with the increasing years and my inclination to recount them is also increasing. I will not ask thee for improved memory, only for a little more humility and less self-assurance when my own memory doesn't agree with that of others. Teach me the glorious lesson that occasionally I may be wrong. Keep me reasonably gentle. I do not have the ambition to become a saint - it is so hard to live with some of them - but a harsh old person is one of the devil's masterpieces. Make me sympathetic without being sentimental, helpful but not bossy. Let me discover merits where I had not expected them, and talents in people whom I had not thought to possess any. And, Lord, give me the grace to tell them so"[1].

The second is a passage from Alfred Tennyson's *Ulysses*[2]. It says more about age. Professor Athanasios Diamandopoulos, suggested to attach it to the logo of the European Association of Professor Emeriti :

"Though much is taken, much abides; and though
We are not now that strength which in old days
Moved earth and heaven, that which we are, we are,
One equal temper of heroic hearts,
Made weak by time and fate, but strong in will
To strive, to seek, to find, and not to yield".

This is also included in the book: "The Capital of Age"[3]

The third example is taken from *Little Science Big Science* a book of Derek J. De Solla Price [4]. "Any scientist looking back at the end of his career will find that 80 to 90% of the scientific work has taken place before his very eyes. Every retired scientist is a walking, living, eye - witnessing historian of most of the science that has moulded his or her discipline".

Late contributions of scientists and artists

Rita Levi Montalcini in *L' assonellamanica a brandelli / The Ace in the tattered sleeve*, wrote about the late years of Michelangelo Buonarroti (1475 - 1564), Galileo Galilei (1564 - 1642), Bertrand Russell (1872 - 1970), David Ben Gurion (1886 - 1973), and Pablo Picasso (1881 - 1973).

We should remember the verses written by William Butler Yeats, in Sailing to Byzantium (The collected poems Mac Millan Publ., New York 1933).

"An aged man is but a paltry thing. A tattered coat upon a stick, unless soul claps its hands and sing, and loader sing for every tatter in its mortal dress".

Many artists and scientists including Michelangelo, Bailly, Rembrandt, Montaigne, Galilei, Moore, Picasso, Gaudí, Miró, Niemeyer have produced masterpieces in

their late days. Katsushika Okusai (1760 - 1849) was convinced that only at old age one can produce significant pieces of art. "If I continue to exercise I will understand them better when I reach the age of 86 years. At the age of 93 I shall be capable to penetrating the essence of the nature. Being hundred years old probably I will reach a divine understanding of the things, and at one hundred thirty, or one hundred forty I shall reach a stage where every point every brush stroke will be lively".

Are Professors Emeriti invisible academics?

Richard M.S. Wilson and Charles Oppenheim, in *Times Higher Education, of November 15, 2015,* reported on *Professors emeriti: the invisible academics - Why are we treated shabbily when we do so much for our universities?*

The paper starts by paraphrasing the saying "old professors don't die", which was turned into professors emeriti don't die, they are invisible. As a group, Professors emeriti are not being treated as legitimate academic citizens. "In many universities it is even not possible to register the papers published in the list of the department. Recognition is scanty or nihil. Not out to pasture but we're well definitely out of sight".

Professor Peter A. Lawrence, in *Nature* 2008; 453: 588 - 90 expressed his concern about retirement of scientists and asked to "Retire retirement":

"In USA, Australia, Canada and partly and slowly in United Kingdom age does not discriminate those asking a work place. Abolishing discrimination for age as well as that more traditional for women "ensures dignity and justice within the enterprise of science… The effects of compulsory retirement are multiple and insidious… it turns able academics into lame ducks: they cannot take on commitments such as graduate students and they lose their negotiating power because they cannot seek new posts. In the United States, older scientists make various contributions. Some are great role models and mentors, some augment the international reputation of their institutes, some teach or administrate, freeing younger scientists. More importantly they can provide a deeper perspective on scientific strategy".

Now we do know that "The highest - impact work in a scientist's career is randomly distributed in his / her body of work. That is, the highest-impact work can be, with same probability, anywhere in the sequence of papers published by a scientist - it could be the first publication, could appear mid-career, or could be a scientist's last publication. This random - impact rule holds far scientists in different disciplines, with different career lengths, working in different decades, and publishing solo or with teams and whether credit is assigned uniformly or unevenly among collaborators". This following a demonstration of Roberta Sinatra et al[5].

The Catholic Church is experiencing for the first time two Popes. The emeritus Pope (Benedict XVI) who prays for his successor and the reigning Pope (Francis) who directs and teaches. It may that in the future there might be 3 - 4 popes in the Vatican. On October 23, 2018, Pope Francis participated in the presentation of his book entitled *Sharing the Wisdom of Time*[6]. He said that "Elders have wisdom. They are entrusted with a great responsibility: to transmit their life experience, their family history, the history of a community, of a people". The Pope asked for a book that would highlight the voices of those who have lived the longest affirming that that "they have valuable, life - changing wisdom to share. Elders as a reservoirs of wisdom and historical memory, their insight will offer the future generations much - needed understanding and direction". On that occasion, Pope Francis concluded by saying "I call us the memory keepers", which is a translation for the Italian *"memoriosi"* (a word derived from XIV century Latin). "So to the Elders I say to be *memoriosi*, to the young to watch the stars".

Martha Nussbaum[7] expressed recently her appreciation and gratitude to the United States of America for having cancelled the compulsory age - dependent retirement from work. "Like all American academics of my generation, I have been rescued from a horrible fate by the sheer accident of time. At sixty - nine, I am still happily teaching and writing, with no plan of retirement because the United States has done away the compulsory retirement. I have been able to anticipate happy productivity in my later years. United States have done well to reject compulsory retirement and to adopt laws against age discrimination".

However, we do know that Vesalius, William Harvey, Antony Leeuwenhoek, Edward Jenner, Crawford Long, Wilhelm Roentgen, Ross Harrison, Nikolai Anichkow, Alexander Fleming, Maurice Wilkins at the time of their great discoveries had a mean age of 32.4 years, Moreover Vesalius, Long and Anichkow were just older than 20 years whereas Maurice Wilkins *floruit* at the age of 38 as demonstrated by Friedman and Friedland[8].

A look into the future

Martin Reees, Astronomer Royal, Master of Trinity College, and Director of the Institute of Astronomy at Cambridge University, recently (*On the The Future: Prospects for Humanity*) wrote that[9]. "It is a conventional wisdom that scientists do not improve with age - that they "burn out". However the physicist Wolfgang Pauli had a famous put - down for scientists past thirty. "Still so young, and already so unknown". For retiring scientists there are three possibilities.

Number one: A diminishing focus on research - sometimes compensated by energetic efforts in other directions, sometimes just a decline into torpor. A second pathway followed by some of the greatest scientists is an unwise and overconfident diversification into other fields. They think that they are doing science - they want to understand the world and the cosmos, but they no longer get satisfaction from researching in the traditional piecemeal way: they over-reach themselves. The third way - the most admirable - 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 plateau rather scaling the heights". There are some "late flowering" exceptions, but whereas there are many composers though influenced in their youth (like scientists) by the then - prevailing culture and style, can thereafter improve and deepen solely through internal development. Scientists in contrast, need continually to absorb new concepts and new techniques if they want to stay at the frontier - and that's what gets harder as we get older. And now is unusual to get the first research grant before the age of forty.

Probably he has not had occasion to hear masterpieces directed by Riccardo Muti and Zubin Metha now and when they were young. He might have appreciated the changes and the tremendous innovation and the spirit of research.

Conclusions

Discrimination of Professors Emeriti in Europe. Being Emeritus Professor is not connected to benefits. Sometimes it just tells the recipients the position in ceremonies organized by the university to which they belong. Europe discriminates for age and age of retirement is fixed. In general Professors Emeriti do not have fixed roles. Teaching and research are possible but not as a rule. Opportunities are different among the various European countries. Participating into European projects is a real possibility, however retired investigators are not supported as the younger investigators and may receive reimbursement for personal expenses but not personal funds for research. European Association of Professors Emeriti aims to promote common rules for nomination and access to research and to public and private funding, granting to the senior active participation in teams made of younger and senior investigators but guided by the younger investigators. The younger provide innovation. However teams of younger and senior investigators, if guide by younger and counselled by elder may generated epochal ideas.

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THE YOUNG AS OLD: THE INNATE QUALITY OF OLD INDEPENDENT OF AGE, WITH SOME HISTORICAL NOTATIONS

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Abstract

We discuss the different ways society is looking upon old age, and classify them in four categories. The first is the unchallenged authority of old people, observed since the dawn of history. Old should be wise because they are old. Hence, institutions of elders were founded and still survive in Academia, Politics and the Church. The second way is to accept senior members of the society to lead and produce because they are still able to do so although they are old. The third way is to accept even young people to be the leaders in many fields because although young they behave as the wise old. The last category includes clever, modern, digital native young people who do not care to pretend as the figures of the wise old. They reject the notion and are confident for their abilities. We discuss the relevant arguments from etymological, historical and modern science perspectives, using many examples from Classical, Greek Medieval, theological and current political and scientific sources.

Keywords: senate; gerontocracy; emeritus; lad - elder; gen xers.

Introduction

As "The investigation of the meaning of words is the beginning of education" [Arrian, Discourses of Epictetus, i. 17 (445 - c. 365 BCE).] we start this article distinguishing between old and elder or senior. The former denotes age, while the latter two denote wisdom and office and not age[1]. We elaborate on the distinction between these two terms using examples mainly from political and religious life, and classifying our arguments in four categories: 1). Old people are wise because they are old. 2) Old people are wise although they are old. 3) Young people are wise because they behave like old. 4) Young people are wise and they do not care to behave like Old. We should however keep in mind that this classification is not a vertical one but a circular composition. The Pythagoreans divided the human ages in four categories (child, adolescent, prime man, old man); according to the four seasons and the four humours, the human person being but a micrograph of the macrocosm[2].

Old people are wise because they are old

The first notion that age and wisdom have a parallel relation can be found in sacred books. Thus, we read in the Proverbs that 'Gray hair is a crown of glory; it is attained along the path of righteousness"[3]. Plutarch in "Moralia" brings forward the same idea when he proposes that "as the law places the diadem and crown, so does Nature the hoariness [white hair] of the head, as an honorable sign of princely dignity", merging wisdom with advanced age[4].

As a pilot case, we follow the evolution of the political bodies Senate in Ancient Rome and beyond to the modern times and its Greek equivalent Γερουσία (Gerousia). Initially in primitive societies, it was the group of elders who decided on crucial matters and later this formally consisted of Pater Familias of some financial status and advanced age. Although gradually this custom changed, it is now abandoned in modern societies we have to remember however, that old people are not only wise but also pure and chaste. The Byzantine Emperor Alexios Comnenos (11th cent)., writing on "ad usum Delphini" poem to his son and successor Ioannes, realistically implies that this desirable purity of old people is based on their bodily decline and the unavoidable loss of lust![5]

Old people are wise although they are old

Senior people are not willing to resign from active life in Academia, political parties, or society in general, ignoring their age. Plutarch had noticed it: "On the contrary, we ought to even amend the saying of Pericles, in his great oration over the Athenians who fell in war, that "The love of honour alone never grows old, and in the useless time of old age the greatest pleasure is not, as some say, in gaining money, but in being honoured" because that the same is even truer of the spirit of service to the community and the State, which persists to the end"[6]. The European Association of Professors Emeriti (EAPE)., founded less than two years ago, exemplifies this tendency. It is a young Association with old members. Some may recall John Climacus, the Greek Abbot of Mount Sinai Monastery in the Arabic Peninsula who wrote in the 7th century: "A snake can shed its old skin [incidentally called "geras" in Greek] only if it crawls into a tight hole, and we can shed our old tendencies, our worn-out soul, and the garment of the old man only if we take the straight and narrow path of fasting and dishonour[7].

Young people are wise because they behave like old

In the first part of this article, we presented the criteria for entering the ruling assembly of a community. The main prerequisite then was maturity of age; thus, the Body was called Senate in Latin or Gerousia in Greek and their members were

called “senators” or Gerousiastai, terms deriving etymologically from the Latin “senax” or “geron” from the Greek “geras” (γήρας) meaning old, as an extended form of the homonymous word geras (γέρας), meaning an honorary gift or prize. Thus “old” has an inherent notion of honourable. However, if a relatively young person acquired these properties he/she was also called senator. With the expansion of the Roman Empire and the concomitant social changes, the age threshold for becoming a senator was reduced by Augustus from perhaps 32 to 25 years. A very young old indeed! The Byzantine authors elaborated on that: “Polia (that is the crown of white hair) does not consist of white hairs but by virtues of the soul. […]”[8] Returning to the anomaly of calling a young person old, we see it still practiced in the American and other western democracies’ Senates. Thus, the crown of old hair is not awarded on the number of years but on the presence of prudence and purity and young people showing the qualifications of the old can also be elected and called senators i.e. as a kind of honorary old.

Apart from politics, the appreciation of young people with old (meaning mature), minds was strong mainly in religion. This article presents examples only for the Judeo - Christian tradition although more may be found in eastern religions, as for example the story that Lao - Tzu was supposedly born with white hair, a symbol of seniority and wisdom and was given this name as Laozi, which in ancient Chinese meant Old Child[9]. An Old Testament reference comes from the Daniel and Suzana circle, we read that the elders told him “[Daniel] come sit down among us, and shew it us, seeing God hath given thee the honour of an elder”[10]. The New Testament presents the first such Christian example, when the 12 year - old boy, Jesus, teaches the wise men at the Temple of Solomon. But the real inclusion of such youngsters in the church came with the flourishing of the ascetism in the desert of Nitria in Egypt and in the Sinai Peninsula. One such theme is that of the monastic Wunderkind, the “elderly child” (pure seen, lad - elder or paedariogeron in Greek, a compound name from the words paedo (child) and geron (old person) who from a very early age displays wisdom, discipline and other characteristics usually found in the lifelong veterans of monastic life. Relevant to that is the exceptional use of the title “abba” by young monks. The title of Abba, deriving from Latin, from Ancient Greek, from Aramaic (“abbā”, “father”). was initially given to elderly superiors of Christian or Buddhist monasteries, hence the English “Abbot”. But we read in the Gerontikon (book on the monastic Elders) that one day a monk called the young Agathon “Abba”. When he was asked why he made Agathon an Abba, he said “He was not made such by me but by his manner of living”[11]. In the other end of Europe and also in the spectrum of the Christian Denominations, the Church of Scotland is

governed by a Body of Elders and it has been repeatedly stated that the term does not necessary signify age but only merit.

Young people are wise and they do not care to behave like old.

The rejection by the bright young men of the supposed superiority of the old had started long ago. Indicatively, Niketas Choniates (12th / 13th cent). in his "Historia" condemns this stance, although he had praised them when he himself was younger[12]. He elaborates on the principle of choosing young bright men for a high office in church against the claims of seniority by older ones because this was also the norm at the Church of Constantinople. In the current management climate, there is an unscrupulous rejection of older people's seniority of age. A succinct comment suffices to highlight this point. "Many managers with 20 years of experience don't have 20 years of experience, they have one year of experience repeated 20 times"[13]. In companies nowadays it is common for bosses to be half their employees' age. These Gen Xers are digital natives, unaccustomed to personal contact[14].

Conclusions

In the pragmatic world of the 21st century, there is fervent research going on to investigate the role of telomeres in the aging process and to avoid their gradual degradation by manipulation, thus continually replacing dying cells with new ones, hence establishing a real Fountain of Life. Then old age would be defeated and a youthful life span would be the prize. Old people will be no more and the young will capture the wisdom attained by seniors in the past, still remaining young[15]. There are a lot of "ifs" in this plan but it promises to offer the "Innate quality of Old independent of Age".

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PREHISTORIC GREECE. ACHIEVEMENTS IN SCIENCE AND TECHNOLOGY

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Abstract

Prehistoric achievements in science and technology were attributed to Hephaestus, the god of metallurgy, arts and craftsand named Hephaestoteucta, i.e. Olympian palaces, silver dog guards, winged chariot, automatically sailing ships and other automata.

Keywords: prehistoric navigation; exploration; artificial intelligence; automata.

Introduction

Ancient Greek literature provides evidence of prehistoric achievements in science and technology. Homer, Hesiod, Apollonius of Rhodes[1], Aeschylus and others refer to events and inventions which remind us of contemporary achievements. Homer tells us about Hephaestus, god of metallurgy, arts and crafts, who fabricated many famous items called Hephaestoteucta: Achiles' and Ajax' armors, Perseus' sickle, Dionysus' crater, Harmonia's necklace, Olympian palaces, silver dogguards, winged chariot, automatically sailing ships, other automata i.e. tripods which rolled about automatically, golden intelligent maidens. Hephaestus captured his mother Hera in invisible chains on a throne he had built and trapped his wife Aphrodite with her lover Ares[2]. Homer also described the automatic navigation of the Phaeacian ships, the construction of the wooden Trojan Horse. Hesiod[3,4] described the construction of the plow, the crafting of Pandora, the first woman. Aeschylus informs about contemporary telecommunication.

Hephaestoteucta

Homer[5] described a plethora of machines in the Iliad and the Odyssey. Most of them were constructed by Hephaestus. Among the Hephaestoteucta were the Olympian palaces, to which the gods retreated in the evening (Homer, Iliad, 1. 605 - 608). These items also included automatically rolling tripods on golden wheels (*Il*. 18, 373 - 377). The development of the relative technology of automotive vehicles by the Alexandrian engineers (Philon, Heron) allows for their hypothetical reconstruc-

tion. (Heron of Alexandria, Automatopoetike). The Iliad also mentions other automata such as golden maidens, intelligent speaking creatures (Il. 18. 410-422)[6].

Navigation

The Homeric Epics mention numerous inventions that remind one of contemporary technological achievements, for instance the Phaeacian ships which had *"no pilots, nor steering oars"* and would never sink (Od. 7. 555 - 663). Twenty-seven centuries later, in December 1993, the U.S. Navy achieved operational capability of the Global Position System (GPS). Contemporary technology, however, does not protect ships from damage or wreck.

Craniotomy

Of special interest is the vase painting from about 540 B.C. of Hephaestus splitting open the skull of Zeus, while Athena springs fully armed from his head. He holds a two - headed axe, two - edged axe, evidently used to perform the craniotomy. Craniotomy was first described by Hesiod in his Theogony.

Wooden Trojan Horse

The Odyssey describes the construction of the Wonders Horse, the so - called "Trojan Horse."(Od. 8. 492 - 514).

Agriculture

In his Works and Days, Hesiod[4] gives instructions how to construct a plow:
So at that time (in late September or early October) be mindful and cut wood, a seasonable work: cut a mortar three feet long, and a pestle three cubits long, and an axle seven feet long: for this way things will fit together very well. If you cut a length eight feet long, you could cut a mallet - head from it too. Cut a three - span broad wheel for a ten-palm sized cart. There are lots of ben timbers: search for one on the mountain or through the fields, and if you find one of holm - oak take it into your house as a plow - tree. For that wood stands up most strongly for plowing with oxen, when Athena's servant has drawn it near and attached it to the yoke-pole after having fastened it with pegs to the plow - stock. (Op.420-447).
So - called Hesiod's plow was being used by peasants in Greece until the late 1950s.

Crafting of Pandora

Hephaestus is credited with the crafting of Pandora, the first woman, at the command of Zeus[5].
So he spoke, and they obeyed Zeus, the lord, Cronus' son. Immediately the

Famous Lame One fabricated out of earth a likeness of a modest maiden, by the plans of Cronus' son; the goddess bright-eyed Athena, gave her a girdle and ornaments; the goddesses Graces and queenly Persuasion placed golden jewelry all around on her body; the beautiful-haired Seasons crowned her all around with spring flowers; and Pallas Athena fitted the whole ornamentation to her body. Then into her breast the intermediary, the killer Argus, set lies and guileful words and a thievish character, by the plans of deep-thundering Zeus; and the messenger of the gods placed a voice in her and named this woman Pandora (All - Gift), since all those
who have their mansions on Olympus had given her a gift - a woe for men who live on bread (Hes. Op. 69 - 82).

Telecommunications

With regard to expeditionary or military purposes, in Aeschylus's "Agamemnon," the King signaled from Mt. Ida using beacons to announce the fall of Troy to his wife, Clytemnestra, in Mycenae.

We can appreciate the application of fire in this tragedy:

Chorus *: And since when is then the City taken?*
Clytemnestra *: I tell you: The night, which has born this light.*
Chorus *: And which messenger would arrive immediately?*
Clytemnestra *: Hephaestus! Sending bright fire from Ida.*
And successive fires recruited farewell the flame here;
and Ida first to cape Hermes of Lemnos, and from there mount
Athos third the glorious fire receives ... and here arrives
the shining to nearby peaks of Arachneum,
until it hits the roofs of the Atreidae, the that has the fire
of Ida as grandfather ...
These are the symbols and the signals, that my husband
has sent me from Troy.

Exploration

Apollonius Rhodius, in his Argonautica, narrates all about the ship Argo and the adventures of the Argonauts to fetch the Golden Fleece. Argo was built for travelling to Colchis, on the north - eastern coast of the Black Sea by sailing and rowing with its fifty oars; twenty - five on each side.

The Argonauts' voyage to Colchis was a long, adventurous navigation and constitutes the archetypal adventure reflecting the millennia - old Greek exploration of

the ancient world and the spread of Greek civilization. Argo contained in her prow a magical piece of timber from the sacred forest of Dodona, inserted by Athena, which could give prophesies. (A.R.1. 524 - 527, 580 - 583).
Nowadays, ARGO is a new system for Oceanography. ARGO takes the pulse of the oceans collecting and distributing temperature and salinity observations from a fleet of 3000 underwater robots.

Minoan civilization

Until the 1950s, 5000 - year - old advanced Minoan technology was a 'lost art.'. The Minoan civilization was a Bronze Age Aegean civilization on Crete and other Aegean islands, which flourished from c. 2700 to c. 1450 BC; it subsequently declined and ended around 1100 BC and was absorbed by the Mycenaean civilization.
"Minos (the King) was the first Greek to create a powerful naval force and to become master of the sea." (Diodorus of Sicily, IV. 60. 3)[2].
According to Hughey, the most likely origin of the Minoans is the Neolithic population that migrated to Europe about 9,000 YBP. We propose that the Minoan civilization most likely was developed by the autochthonous population of Bronze - Age Crete. (Hughey JR2013)[7].

Talos, Crete's guardian

The bronze robot *Talos,*
"the man of bronze, by breaking off boulders from the rocky cliff,
prevented them from fastening their cables on land when they reached
Dicte's' heaven for mooring. Being the last of the bronze race of men
born from ash trees still living in the time of the demigods, he had been
given to Europa by Cronus' son to be the island's guardian,
and he made three tours of Crete on his bronze feet. Although
all the rest of his body and limbs were of bronze and invulnerable,
beneath the tendon by his ankle was a vein carrying blood,
and the thin membrane that covered that determined the outcome
of life or death" (A.R. 4. 1638-1648).

Conclusions

These amazing achievements have yet to be interpreted. It would appear therefore that "each generation needs" not only "a new translation of Homer" (Fagles, 1996)[8], but also a reinterpretation under contemporary technological knowledge, a necessary corollary to proof. Sequel of the development of science and technology is,

what the Nobel laureate (1979) Odysseus Elytis[9] refers to in a poem: the Greek myths "broke the gates of their silent palaces, clamoring a new truth."

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THE OVERSEAS TRAVEL OF THE PREHISTORIC GREEKS (CRONUS AND HERCULES) BASED ON THE DESCRIPTION OF PLUTARCH

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Abstract

Towards the end of the first century AD, Plutarch described the voyage of Hercules to the exile place of Cronus, during the Mycenaean era. The description starts from Britain towards the West, to Ogygia island and from there to three other islands located west of Ogygia. Hercules's men travelled further to the west, to a great continental land.

Based on the detailed descriptions of Plutarch's text "De facie", Ogygia coincides with Iceland. The three islands westwards should be Greenland, Baffin Island and New Foundland. The great mainland westwards should be the east coast of Canada.

Keywords: Ogygia; Hyperboreans; Cronus; Hercules; geomythology.

Introduction

Plutarch[1] was one of the most prolific ancient writers. In two of his works, *De facie quae in orbe lunae apparet (De facie) and De defectu oraculorum (De def. or.),* he includes numerous geographical information that allow the modern geographer to realize that the geographical knowledge of the Minoans and the Mycenaeans extended as far as the North Atlantic.

Plutarch's text[1]

A Step by Step Analysis

The following analysis is based on the English translation of Plutarch's text, paragraph 26.1:

1) "An isle, Ogygia, lies far out at sea, a run of five days off from Britain as you sail westward…"

   Based on the first words of Sulla, the distance between Britain and the island Ogygia, on a ship of the Mycenaean era could travel with a velocity of 4 to 5 miles per hour under favorable conditions. Consequently, the distance es-

timation for a 5 days travel is between 800 and 1000 km. According to these calculations, there is only one island atthis distance, Iceland. Consequently, the Isle Ogygia of Plutarch should be Iceland.

2) "Three other islands equally distant from it and from one another lie out from it in the general direction of the summer sunset".

If Ogygia is Iceland, then the threeislands located to the west, must be: Greenland, New Foundland and Baffin Island. The distance is equal to that between Britain and Ogygia (Iceland) only between Iceland and Greenland, but not between Iceland and Baffin Island.

3) "In one of these, according to the tale told by the natives, Cronus is confined by Zeus…"

According to this passage, Cronus's confinement place should be Greenland, Baffin Island or New Foundland.

4) "The great mainland, by which the great ocean is encircled, while not so far from the other islands, is about five thousand stades from Ogygia, the voyage being made by oar, for the main is slow to traverse and muddy as a result of the multitude of streams".

From the above it is clear:

a) That not far from the aforementioned islands a great continent - exists,
b) That this continent encircles a great ocean, in this case the Northwestern Atlantic.

Figure 1. Relative position of St. Laurence Gulf and Maeotis Lake (Azov Sea).

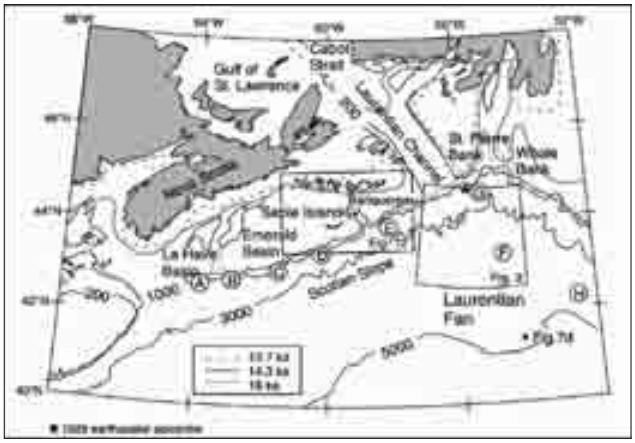


Figure 2. Palaeo - geomorphology of the sea floor between the St. Lawrence Gulf and the Atlantic Ocean with the shorelines during the periods 18,000, 14,300 and 13,700 Before Present (Piper et al.[2]).

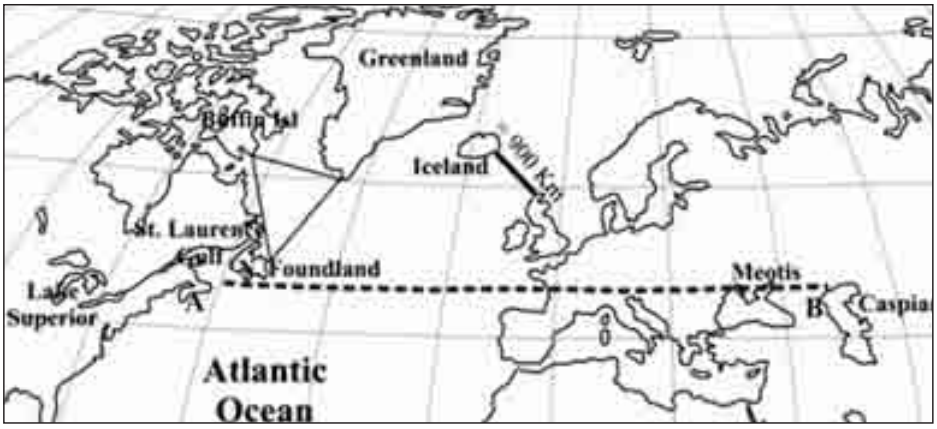
5) The streams are discharged by the great landmass and produce alluvial deposits, thus giving density and earthiness to the sea, which has been thought actually to be congealed.

In Fig. 2 the present and the palaeo-shorelines (before 13.7, 14.3 and 18 ka) of the area between the St. Lawrence Gulf and the Atlantic are depicted.

In Fig. 3, small ice pieces transporting clastic sediments in the estuary area of St. Lawrence during the springtime of 2007. It is worth noticing that the shorelines of St. Lawrence Gulf should have changed since the 6th millennium Before Present, because of the glacial - isostatic vertical movements only, and not because of the glacial eustatic movements.

Figure 3. Small ice pieces transporting clastic sediments in the estuary area of St. Lawrence ("Marais de la Pointe - aux - Épinettes, Parc national du Bic") during the springtime of 2007.
(Photo from Urs Neumeier, University of Quebec at Rimouski, 2009).

6) "On the coast of the mainland Greeks dwell about a gulf which is not smaller than the Maeotis and lies on the same line as the mouth of the Caspian Sea". In this passage, Plutarch clearly states that Greeks dwelled on the coasts of a Gulf, the size of which was about the same with that of the Maeotis Sea (present day Azov Sea). In Fig. 1 if we draw a line A-B parallel to the latitude of the mouth of the Caspian Sea, towards the west, we see that the Gulf of



the great mainland where the prehistoric Greeks dwelled, is present - day St. Lawrence Gulf.

7) "and they believe that with the peoples of Cronus there mingled at a later time those who arrived in the train of Heracles and were left behind by him and that these latter so to speak rekindled again to a strong, high flame the Hellenic spark there which was already being quenched and overcome by the tongue, the laws, and the manners of the barbarians".

From this passage, the following is clear:

a) That Cronus did not go there alone, but with "people".

b) That, a long time after Cronus, the Mycenaean Hercules with his people arrived at the same place.

8) "…but those who survive the voyage first put in at the outlying islands, which are inhabited by Greeks, and see the sun pass out of sight for less than an hour over a period of thirty days…"

These places are the northern parts of Iceland, Greenland, Baffin Island, the Island Southampton at the entrance of the Hudson Bay and others. It is worth noting that New Foundland must be excluded, as it is located further to the south.

When Did All This Happen?

Two main persons are mentioned in the passage (26.1) of Plutarch's text. The

first is the Titan Cronus, the second is Hercules. These two were followed by many other persons of Greek origin.

The question is when did all this happen. Concerning the Mycenean Hercules, we know that he lived during the 13th century BC.

As far as the arrival time of Cronus to his exile placeis concerned, archaeological findings of the Mycenaean and Mesohelladic period from SE Sweden presented by Mörner and Lind[3], suggest that it could be - at least - around the first half of the second millennium BC, perhaps a little earlier.

The Criticism of Plutarch's Text

Since the 16th century AD, this geographical introduction has aroused the wildest speculation. Apparently, Christopher Columbus (15th century AD) did not know anything about the Great Continent, when he discovered his Indies.

The first who tried to identify the islands mentioned by Plutarch was the famous astronomer Johannes Kepler. As he writes in his "Opera Omnia", he was convinced that the trans - Atlantic continent, mentioned by Plutarch, was America.[4]

Approximately 200 years after J. Kepler, Alexander von Humboldt came to the conclusion that the geographical frame of the Sulla's narration in Plutarch's text "de facie in orbe lunae" *had nothing to do with the geographic truth*[5].

Around 60 years after A. v. Humboldt[5], W. Christ[6] could assert that Plutarch's continent was "obviously America" According to W. Christ, the sailors who arrived on the North American coast were not the prehistoric Greeks, but some others who lived the first century AD.

G. Mair (1909)[7], although he accepted the existence of the transatlantic continent, argued:

i. That the source of Plutarch's knowledge was reports of some Carthaginian seafarers,

ii. That the seafarers had penetrated the Gulf of Mexico and not the St. Lawrence Gulf,

iii. That the island of Cronus was Scandinavia and

iv. That the whole description of the geography derived from the voyages of Pytheas of Marsillia.

In our opinion, all his arguments are in total disagreement with the text of Plutarch, as:

i. The Gulf of Mexico is not located on the same line, i.e. the same latitude, as the entrance of the Caspian Sea.

ii. The size of the Gulf of Mexico, which is around 1.6 million km^2, is not the same as that of the Maeotis Sea.

iii. The island of Cronus could not have been located in Scandinavia as
   a. Scandinavia is not an island and
   b. It is found east of Ogygia (Iceland) and not to the west, as mentioned in Plutarch's text.

Furthermore, many other famous scholars have criticized the paragraphs 941a - 942c of Plutarch's script of *"De facie in orbe lunae"*.

Among them the following are the most famous:

H. v. Arnim[8] (1921) writes that the content of the chapter 26 is a fantastic travel romance, whereas. W. Hamilton[9] (1934) believed that Plutarch described a myth similar to those of other writers e.g. Hecateus of Miletus (circa 550 - 476 BC) or Theopompus (circa 380 - 315 BC).

Other writers believe that Plutarch's text in chapter 26 is a direct imitation of Plato's story of Atlantis. It is reasonable that this travel around 4,500 years ago, is difficult to understand and accept. But before we rejectit, we have to take into account the archeological findings in SE Sweden.

Archeological findings in SE Sweden

According to N. - A. Mörner and B. Lind[3], at about 1750 BC, the onset of the Bronze Age in Scandinavia, three things happened at the same time: i) Bronze from the Mediterranean appeared in Scandinavia. ii) Amber from the Baltic started to appear in masses in Mycenaean graves and iii) pictures of huge ships started to be cut into the bedrock and bronze objects in Scandinavia. Based on the above - mentioned, they concluded that Minoan and Mycenaean people arrived in the Vitemölla - Kivik area (SE Sweden) in big ships trading amber for bronze.

Clearly, long distance traveling and trading started before the Mycenaean period.

Conclusions

If we take into account the previous data, comments etc., there is no doubt that all geographic data described by Plutarch in De facie are correct.

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ARCHAEOASTRONOMY

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Abstract

Since the last century Science and Technology contribute significantly to a better understanding of the ancient world. Among other disciplines and techniques Astronomy also offers its aid for this purpose. For example, the observation of various astronomical phenomena and their recording in texts is significant for their date. Consequently, the search for such astronomical information in texts may result in exact dating of an event. Moreover, measurements of the orientation of the main longitudinal) axis of temples, churches, tombs and other buildings give significant information regarding the deities (or saints) to whom they are dedicated, as well as the dates of festivals linked to their worship.

Keywords: astronomical; phenomena; temples; churches; theodolite.

Introduction

History. In the last two decades of the 19th century N. Lockyer, Francis C. Penrose, and H. Nissen measured and studied the orientation of some Greek temples on the Greek mainland, the islands, the Ionian coast, and South Italy. In 1890 Lockyer visited Greece and observed the difference in orientation between the old and the new Parthenon as well as the change in direction of the axes of other temples. He then went to Egypt and in the months ending March 1891, he measured the orientation of Egyptian temples. Knowing that some churches were orientated towards sunrise on the feast day of their patron saint, he thought the same might be true for ancient temples.

Older research techniques

The instrument they used for their measurements was the theodolite. They measured very accurately (up to first and even second minutes of arc) the orientation of the main axis of the temple as well as the profile of the local horizon in the direction of this axis[1].

In the case of a solar temple, given the geographical latitude of the site, the present obliquity of the ecliptic (23°30′), and the correction for refraction, they calculated first the true horizon sunrise amplitude, and second the declination, which should also be the value of the obliquity of the ecliptic in the year of the foundation of the temple, the day of the month is that on which the amplitude of the long axis of the temple was the same as that of the sunrise.

In the case of a stellar temple, they should calculate the effect of the precession of the equinoxes (50.2″ of arc per year) on the declination of the stars. Thus in the course of about 13,000 years the amplitude of the rising (or setting) places of a star may in an extreme case vary by the order of 47° (twice the amount of the obliquity of the ecliptic) along the (local) horizon north or south. This change of the amplitude of the rising and setting places of the stars offers the means of determining the date of foundation of the temples. The angle of orientation depended primarily on the day of the principal festival, but it would be liable to a "slight modification" for the sake of combining a heliacal star with the sunrise, so that both the rising Sun and the star were observed through the two central columns of the front colonnade in the adytum of the temple.

Moreover, the angular distance between the Sun and the star when the star first becomes visible heliacally depends on the brightness of the star. Lockyer used the value of 11° for the depression of the Sun in his calculations for Egyptian temples. But Penrose based on his own observations calculated that a first magnitude star in fair average weather in Greece or Italy could be seen, when rising heliacally, at an altitude of 3°, the Sun being 10° below the horizon; that a second magnitude star should require an altitude of 3°30′ with the Sun 11° depressed; but that of a third magnitude star the Sun's depression should not be less than 13°.

Nissen studied the orientation of 113 Greek temples on the Greek mainland and the islands, as well as on the Ionian coast and in South Italy, based on Penrose's measurements of the bearing of the main axis of these temples but also on the available related philological evidence regarding festivals celebrated in honor of the deities to whom these temples were sacred. Nissen's results, as published in his "Orientation" (1907), showed such a great difference in the classification of the temples (solar or stellar) as well as in their dating as compared to those of Penrose, that in 1939 William Bell Dinsmoor stated in his article "Astronomy and Archaeology" that:

"The astronomical calculations based on these data led in most cases to such fantastic dates for the temples that more recent opinion has tended to discredit or ignore the theory. But the fragments of literary evidence and the accumulated measure-

ments of the actual orientations, taken together, furnish sufficient proof of the existence of the general principle. The following article endeavors to show that the error lay, not in the theory itself, but in the deduction of results from incomplete data. In the absence of detailed knowledge of the archaeological conditions, of the religious festivals, and of the various local lunar calendars, investigators felt obliged to check the observed orientations with reference to assumed astronomical factors such as the heliacal risings of stars - factors which could never have been employed by peoples observing lunar calendars - with results inevitably grotesque."

According to Dinsmoor - the solution of the date problem requires the necessary archaeological evidence (date), the religious evidence (cult), the artificial astronomy (local calendar), and the natural astronomical observations; if more than one or two of the above elements are unknown, there is little hope of finding a solution.

Recent research

In the last decades of the 20th century, the interest in archaeoastronomy revived and many scientists work in this field all over the world. Their search includes not only ancient and modern temples of various cults, as well as Christian churches, but also single tombs and cemeteries. The study of their orientation gives important information regarding burial customs and their relation to astronomical phenomena and the local cult. Consequently, the results of archaeoastronomical research contribute greatly to the enrichment of our knowledge and understanding regarding other civilizations and cultures. Modern technology provides researchers with very exact instruments for accurate observations and measurements. A special astrogeodetic method for the investigation of the orientation of monuments offers greater accuracy in the related calculations. Mathematical and astronomical software for the elaboration of the data is of great help[2].

In Greece, many academic colleagues and their collaborators in our Universities focused their scientific interest also on archaeoastronomical research. I give a few examples:

Crete[3]

In 1991 - 92 M. Papathanassiou (NKUA) and M. Hoskin (Cambridge University) measured the orientation of 224 excavated tombs (until 1994) of the Late Minoan II-IIIB (1450-1190 BC) cemetery at Armenoi (Rethymnon, Crete). The tombs face generally easterly, between north-east and south - east. No fewer than 207 tombs faced the rising sun at some time during the year. It is noteworthy that the earliest

of the tombs so far excavated (No. 200) faces directly towards the ruins of the very important Middle Minoan (early second millennium BC) peak sanctuary on the summit of the mount Vrysinas, some 3 km to the east of the cemetery.

Delos[4]

In 2009 G. Pantazis, E. Lambrou, K. Nikolitsas, M. Papathanassiou, and A. Iliodromitis, published their joint paper regarding their research on the orientation of Delos' monuments. According to astrogeodetic observations and measurements of their orientation combined with a special method to approach the problem and the use of special software, the calculated the following dates of the foundation for the monuments:

Monument	Dates	Uncertainty
Apollo's Great temple	14/04/500 BC or 11/09/475 BC	±21 years
Apollo's Poros temple	15/04/510 BC or 11/09/510 BC	±38 years
Apollo's temple of the Athenians	15/04/420 BC or 09/09/420 BC	±20 years
Dodekatheon	09/10/600 BC or 17/03/600 BC	±17 years
Artemision	25/02/700 BC or 30/10/700 BC	±72 years
Oikos of the Naxians	29/08/600 BC or 29/04/600 BC	±13 years
Cave of Cynthos mountain	26/10/575 BC or 28/02/575 BC	±22 years
Kynthion (South-East wall)	05/10/550 BC or 23/03/550 BC	±47 years

Parthenon and Hephaisteion at Athens[5]

In 2014 G. Pantazis measured very accurately and studied the orientation of two temples at Athens: Parthenon sacred to goddess Athena and Hephaisteion sacred to god Hephaestus. He concluded that they have a very remarkable symmetric placing facing east. The day that the sun rises at Parthenon's main axis astronomical azimuth, sets at Hephaisteion's main axis astronomical azimuth towards West and vice versa. It takes about 50 days for the sun to travel from Parthenon's main axis to Hephaisteion main axis. The festival celebrated in Parthenon was "Panathenaia" and that in Hephaisteion was "Chalkeia." During the festival of Chalkeia the virgins started to weave the "peplos" (veil) to be offered to Athena in the festival of Panathenaia.

Delphi[6]

In 2013 I. Liritzis and B. Castro using modern technology measured and studied the orientation of Apollo temple at Delphi. They give rich information on the geomorphology of the site and the function of the oracle in specific dates in the year with the appearance/disappearance of the constellations of Lyra and Cygnus.

The Church of the Great Meteoro Monastery (Thessaly)[7]

Pantazis R. et al studied the orientation of the Church of this Monastery,with the following results: The azimuth of the main axis of the two churches and the line of the perceptible horizon coincides with the point of sunrise on January 7, 1368±18 years, in agreement with the year of construction (1360 AD). The intersection of the azimuth of the line inscribed on a flat marble stone (different from all other flagstones and embedded on the floor in the middle of the church) and the line of the perceptible horizon agrees well with the point of sunrise on August 6, 1388 AD, when the church was extended. The conclusion is that the first building that contains today the Altar of the "Transfiguration of our Lord," was originally dedicated to Saint John the Baptist. In 1388 the church was enlarged and dedicated to the "Transfiguration of our Lord." The founders not being able to change the orientation of the building, placed this marble plate with the inscribed line to indicate the point of sunrise on the new celebration day.

The Daphni Monastery[8]

The monastery lies to the west of Athens, almost half-way along the ancient Sacred Way to Eleusis. In 2005 G. Pantazis and M. Papathanassiou studied the orientation of the Katholikon of Daphni Monastery. According to their calculations, the Katholikon is sacred to the Virgin Mary and was very likely founded on the date of the celebration of her Dormition (August 15) in 1153 AD (±8 years).

Central Greece[9]

In 2006 G. Pantazis and E. Lambrou measured and studied the orientation of nine early Christian basilicas in central Greece: two in the Larissa fortress, three in the area of Elassona and four in the area of Nea Anghialos. According to their results, seven churches are orientated to the point of sunrise on the day of celebration of their patron saint and the dating agrees with the archaeological evidence.

Mystras (Peloponnese)[10]

In 2019-2010 G. Pantazis, E. Lambrou, and their research team measured the orientation of 24 Byzantine churches and chapels at the archaeological site of the fortified town of Mystras and determined the date of foundation and identified the original patron saint of the monuments.

Rhodes[11]

In a series of papers (2006) I. Liritzis and H. Vassiliou published the results regarding the orientation of the Christian churches in Rhodes. In the last paper, they

studied the orientation of 15 Churches in Rhodes and six churches in other parts of Greece.

Muslim temeni at Ioannina (Epirus)[12]

As well known the Muslim temeni should have a special orientation. In 2007 D. Balodimos, et al using astrogeodetic method measured and studied the orientation of four Muslim temeni at Ioannina.

Conclusions

Astronomical methods are a powerful tool for the study and dating not only of architectural monuments but also of instruments and texts containing information forcelestial phenomena. The pioneering theses of C. Chassapis (1967)[13] and M. Papathanassiou (1978) regarding the astronomical and cosmogonical/cosmological knowledge contained in the Orphic hymns and other saved Orphic texts, as well as their date, paved the way. In 1996 M. Papathanassiou (Papathanassiou, M. Stephanus of Alexandria: On the structure and date of his alchemical work. Medicina nei Secoli Arte e Scienza, 1996; 247 - 266 VIII/2) calculated the exact date of the alchemical work of Stephanus of Alexandria (26 May – 3 June 617); she studied the planetary order and visibility as seen in the very rare phenomenon of a great assembly (or conjunction) of the planets. Recently (2012), St. Papamarinopoulos, et al[14] studied the astronomical information contained in Homer's Odyssey and that refers to a solar eclipse. According to the researchers, this eclipse was the annular solar eclipse of 30 October 1207 BC. Finally, a multidisciplinary team of researchers[15] using modern scientific methods (Astronomy, Mathematics, Computing Science, Chemistry and other), and Advanced Technology studied the Antikythera Mechanism. The results of their study enriched our knowledge regarding the high level of ancient Greek technology and its relation to Greek science, especially astronomy, and its application to everyday life.

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ARISTOTLE AND SEAWATER DESALINATION: A NEW EXPLANATION OF AN EXPERIMENT DESCRIBED IN *METEOROLOGICA AND HISTORIA ANIMALIUM*

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Abstract
In this communication we analyze texts from Aristotle's *Meteorologica, Historia animalium and De generatione animalium.* Graeco - Roman technology is underestimated, especially chemistry, due to lack of reliable texts on processes and equipment. Based on Aristotle's experiments repeated by Roman and Byzantine authors, we discuss the hypothesis that a type of reverse osmosis seawater desalination was known in antiquity, albeit without practical application; pro and contra arguments are given in relation to the current method of reverse osmosis.

Keywords: seawater; desalination; reverse osmosis; ancient technology.

Introduction
Thales of Miletus claimed that water is the source of all life *«αρχήν των όντων απεφήνατο το ύδωρ»*. Aristotle described «the water cycle in nature» amazingly. Hippocrates recognized the crucial role of water for human health and the environment. From the Collection of Hippocratic works, the book on airs, waters and places written around 400 BC *(περί αέρων, υδάτων, τόπων)* includes useful knowledge on water quality (potable, hard, soft and sea water).[1]
Aristotle, as philosopher, is of worldwide renown[2], but his influence on the sciences and chemical technology, particularly in Hellenistic Alexandria, is less known[3,4].
It is noteworthy that Aristotle's Peripatetic School in Athens (Lyceum) was the

model for the Museum and Library in Alexandria[3]. His reputation in medieval Europe is illustrated in Fig.1 showing Aristotle teaching Philosophy at the University of Paris[5].

Figure 1. Medieval manuscript 14th century AD - among students. Alexander the Great with crown[5].

Aristotle and water desalination by evaporation

Aristotle deals with seawater in his Meteorologica book B[6] and has a clear perception of the desalination of seawater by evaporation... *ότι δε γίγνεται ατμίζουσα πότιμος και ουκ εις θάλατταν συγκρίνεται το ατμίζον, όταν συνιστήται πάλιν πεπειραμένοι λέγωμεν*.... "Seawater when it turns into vapor becomes sweet and the saltwater does not form saltwater again when it condenses."As mentioned by Alexander of Aphrodisias, Greek navigators in the 4th century BC first used desalination by evaporation. They boiled seawater and condensed the vapors on sponges to produce fresh water (Fig.2)[7].

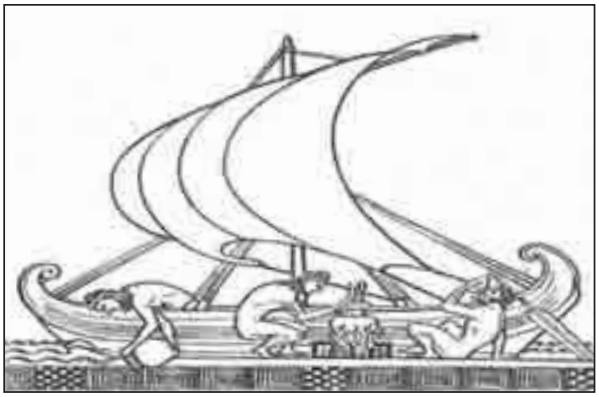

Figure 2. Modern depiction of distillation with sponges.

The same method was used later by Julius Caesar in his invasion of Egypt to secure potable water for his soldiers. Later, the Aristotelian approach of evaporation led to a distillation device (ambyx) in Hellenistic Alexandria (Fig.3)[8]. The same type of device, the alembic, was used for water purification by the Arab Alchemist Geber[9].

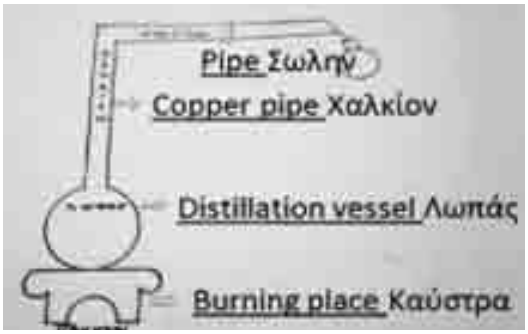

Figure 3. Distillation device[3].

An experiment of desalination in Meteorologica

In our 2017 publication,[8] we dedicated a short text to the following experiment from Aristotle's Meteorologica, book B.[6]

> There is more evidence to prove that saltness is due to the admixture of some substance, besides that we have adducted. *Make a vessel of wax and put it in the sea fastening its mouth in such a way as to prevent any water getting in. Then the water that percolates through the wax sides of the vessel is sweet,* the earthy stuff, the admixture of which makes the water salt,being separated off as it were by a filter.[10]

The text describes an experiment in which seawater turns into drinking water. As Webster noted: "Facts do not bear out this statement. According to other scholars like Lee, who commented on the text, the experiment is not verified". The experiment is repeated in Aristotle's *Historia animalium*.[11]

"If one plunges a watertight vessel of wax into the sea, it will hold after 24 hours, a certain quantity of water and this water will be found to be potable."[12]

Some technical details are mentioned in *Historia animalium*: the vessel is empty and a certain quantity of drinking water is produced in one day.

Before the experiment, Aristotle argues that drinking water feeds shellfish and that they filtrated the seawater. In contrast to *Meteorologica*, salinity of seawater is explained according to Aristotle's theory.

The experiment in Meteorologica appears to have had a diachonic impact. It is mentioned by Pliny and, duringthe Byzantine period, almost verbatim, by Gennadios Scholarios.

Aristotle's experiment as a type of reverse osmosis

We argue that the experiment refers to a type of seawater desalination by *reverse osmosis* because: a) the vessel consists of porous clay *coated by wax* and a *semi - permeable membrane* is created. b) the required *pressure is the hydrostatic* which increases as a function of sea depth.

The knowledge that unglazed clay is porous is mentioned in Aristotle's *De generatione animalium.*

...Δια μεν ούν των φλεβών και των εν εκάστοις πόρων διαπιδύουσα η τροφή ..καθάπερ εν τοις ωμοίς κεραμίοις.[13] In this text the porous ceramic is correlated with the biological phenomenon of diffusion in human organisms.

The Pfeffer cell for demonstration of osmosis - reverse osmosis

To understand osmosis and reverse osmosis,the description of a cell according to Pfeffer is helpful.[14]

The cell is attributed to the German botanist Wilhelm Pfeffer (1845-1920), who studied the phenomenon of osmosis with quantitative measurements (Fig.4).

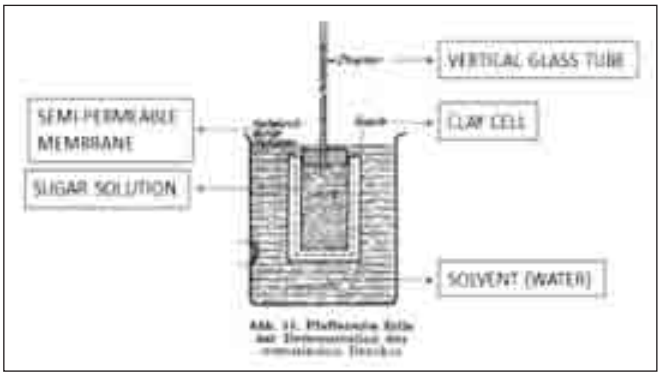

Figure 4. The Pfeffer cell for the demonstration of osmotic pressure.

French physicist Jean - Antoine Nollet (1700 - 1770) also described osmotic pressure. The Pfeffer cell is manufactured as follows: a porous clay cylinder is filled with a solution of copper sulfate (CuSO4) and sunk in a solution of yellow ferro - cyanide iron III ($Fe_4[Fe\ (CN)_6]_3$).

In the pores of clay, copper - ferro (II) - cyanide is precipitated that acts as a semi - permeable membrane.Instead of the chemically-produced semi - permeable wall, a pig's bladder or parchment can be used. By analogy, wax or a wax-based mixture could coat the clay.

After this treatment, the cylinder is closed with a lid with a small glass tube and filled with a *sugar solution.* The cylinder is placed in a vessel *with water.* Water molecules and not those of sugar diffuse through the semi - permeable membrane into the cell. Pfeffer's experiment proves that water is pushed into the cell. Because the cell is closed, the solution, which is diluted with water, is forced to climb into the pipe until the hydrostatic pressure in the tube balances the osmotic pressure of the solution.

Reverse osmosis forces artificially a reversal of the spontaneous osmosis *by imposing pressure on the side of a dense solution.* Thus, from seawater or brackish water passing through a suitable membrane water without salts is collected.

Aristotle's experiment and modern reverse osmosis

The comparison of the modern process of reverse osmosis with the Aristotle's experiment creates the following questions: The R/O mode of installation requires pressure through a pump from 30 to 70 bar (depending on seawater salinity) corresponding to a hydrostatic pressure in sea depths from 300 to 700m. Was there such a technical ability in Aristotle's time? Another issue is the type of material for creating a semi - permeable membrane; was bee's wax used or an unknown mixture of materials?

In order to verify and elucidate Aristotle's experiment, a project supported by Sychem SA is in progress.

Nowadays, Reverse Osmosis (R/O) is a commercially available membrane technology. Since 1970 it is being used extensively for desalination worldwide with continuous development in research and innovation.[14]

In Israel 70% of potable and industrial water is produced by this method; in Greece due to tourism in the Aegean Islands R/O is a viable method to tackle water scarcity (Fig.5).

Figure 5. Seawater R/O installation, Paros, Cyclades, capacity 2500 m3/day, May 2019.

Conclusions

The principle of reverse osmosis, a modern process of desalination, is described in Aristotle's experiment 2,300 years ago.

The interest of scholars in the Works of Aristotle remains undiminished[15], thanks to the interdisciplinary approach toancient technical texts,such as the *Meteorologica*.

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MAGIC, MYSTICISM, METAPHYSICS AND SCIENCE DURING THE DEVELOPMENT OF CHEMISTRY FROM THE ANCIENT TIMES TO THE BEGINNING OF THE 20th CENTURY

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Abstract

The history of chemistry and its significant steps of development will be highlighted. In chronological time spans, covering the ancient world, the Hellenistic and Roman Empire ages, the middle Ages to the beginning of the 20th century, the progress of chemistry will be presented.

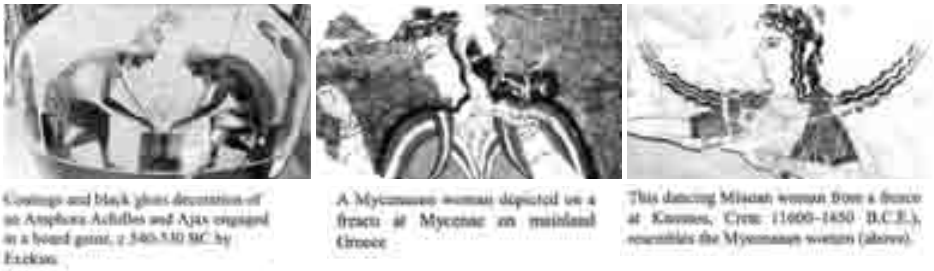
Keywords: history; ancient chemistry; alchemy; analytical chemistry.

Introduction

Alchemy is one of the most valuable and complex cultural and humanist heritages of our today's science. Through the paths of mysticism, allegoric analogs, hermetism, metaphysics, and strange religious beliefs, chemistry managed to emerge. Finally, as a self - centered scientific discipline somewhere in the 17th century, thanks to the work of a few truly enlightened people. Many of the earliest chemists, physicians, and philosophers were also alchemists.

Ancient Greek Alchemy

Already from the epoch of Homer, there are references to processes closely associated with chemistry. The technology of ceramics, the painting of the Attic Vases with coatings and black gloss and the Mycenaean and Minoan frescos, (Fig.1) is today subject of investigations by many analytical archaeometrists.



Coatings and black gloss decoration of an Amphora Achilles and Ajax engaged in a board game, c 540-530 BC by Exekias

A Mycenaean woman depicted on a fresco at Mycenae on mainland Greece

This dancing Minoan woman from a fresco at Knossos, Crete (1600–1450 B.C.E.), resembles the Mycenaean women (above).

Figure 1. Painting and decoration technologies in ancient Greek artifacts.

The Ancient Greek philosophers

The roots of metaphysical alchemy in Greece with the pre - Socratic philosophers Empedocles, and Heraclitos, who established the concept of the principal elements, fire, air, water, and earth named ρίζες (roots). They also proposed forces promoting interconnection of these elements φιλότης, στοργή or αρμονία, (love, harmony), or their dissociation νείκος, κότος, (strife.). Heraclitos suggested the possibility of these changes through their opposing properties (hot- cold, wet - dry). Leucippus and Democritus developed the theories of atomism. Aristotle added the fifth element of ether, whereas Plato gave shapes to all atoms through his platonic solids and used for the first time the word " στοιχείον" (element).

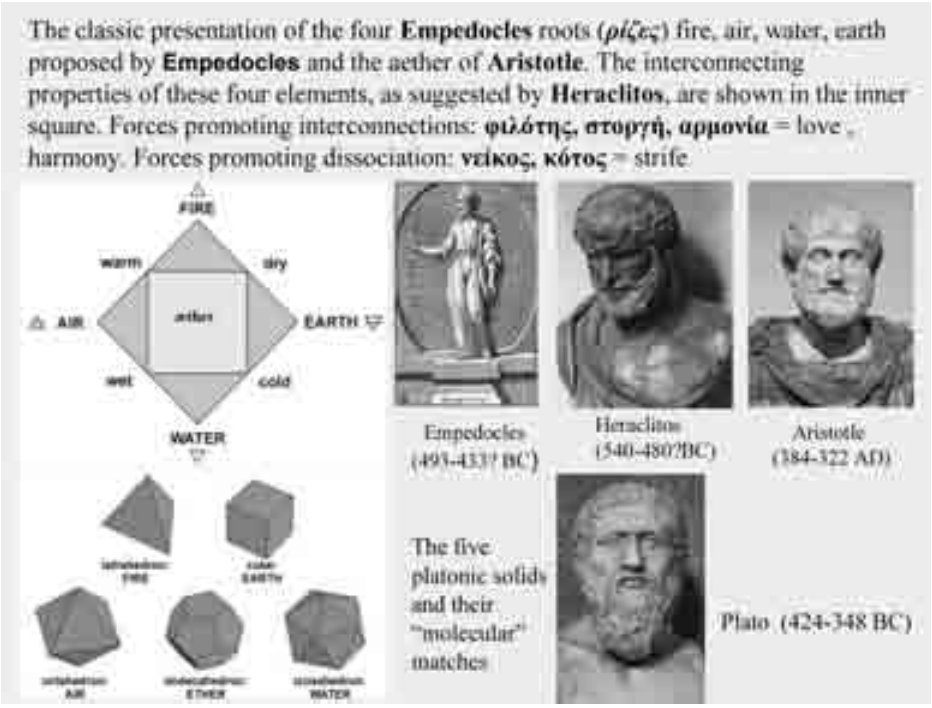


Figure 2. The classic presentation of the four roots (ρίζες) fire, air, water and ether and their interconnections produced by the Greek philosophers.

Alchemy in Hellenistic Egypt

The Western Hellenic - Alexandrian alchemy was based mainly on the philosophy of matter of Greek schools. Elements of technology, religion, mythology, and Hellenistic philosophy, combined to form the earliest alchemy in the West. Zosimos of Panopolis, a Gnostic Christian writer, wrote the oldest books on alchemy, while Maria the Jewess (Mary the Prophetess), an early alchemist, invented several kinds of chemical apparatus, the first alembic and the water - bath, known as bain - marie.

During the Hellenistic era and up to the 4th century AD, many philosophers and experimentalists studied materials and processes for making gold, silver, and precious stones and develop processes for dyeing purple textile, glasses, metals and practicing extraction, and distillations.

The Alchemy in the Muslim world

In the late 8th century, the Arab Jābir Ibn Hayyān (Latinized as "Geber") introduced a new approach to alchemy, based on controlled experimentation, in contrast to the ancient Greek and Egyptian alchemists, whose works were often allegorical.

The elemental system in medieval alchemy originated with Gerber, which included the five classical elements (aether, air, earth, fire, and water) in addition to three chemical elements sulphur, mercury and salt representing metallicity and volatility and solidity. The Islamic chemists discovered that, aqua regia could dissolve the noblest metal, gold[3].

Little is known about the alchemists of the Byzantine Empire. The undefeatable weapon of the Byzantines, liquid fire (hygron pyr), first developed on 672 AD, seems to be a chemical invention that kept invaders away for centuries. Its secrets were never revealed and eventually lost. Its composition remains a matter of speculation, including combinations of pine resin, naphtha, quicklime, calcium - phosphide, sulfur.

In Europe, following the 12th century Renaissance, alchemists played a significant role in early modern chemistry and medicine. However, they continued to believe in the four elements and their work continued to be guided by Hermetic principles. In the middle ages the alchemists, are often associated with obscurity and fraud, though, much of what they did was the real science of their time.

East Asia

Whereas European alchemy eventually centered on the transmutation of metals into noble metals, Chinese alchemy had a more obvious connection to medicine. The philosopher's stone of European alchemists can be compared to the Grand Elixir of Immortality of Chinese alchemists. Chinese alchemists invented gunpowder as a potion for eternal life. It was used in fireworks by the 10th century and later as gunpowder against Europe. Chinese alchemy was closely connected to Taoist forms, such as Acupuncture and Moxibustion and martial arts such as Kung Fu.

Mystics, myths and prejudices for the metals

Metals have been historically associated with similarities to Gods, planetary deities, numbers, symbols, geometric figures, sexuality, body organs, colours, etc.[2,3]

Cu, Sn, Pb and Fe were referred to in early alchemy as prima materia for metal transmutation while Ag and Au were highly appreciated by popular classes as symbols of dignity, richness and power, even of divinity, perfection and immortality.
Alchemy's three tasks for metals were:
Matter ennoblement (metal transmutation), body ennoblement (pharmacological use of metals), spiritual ennoblement (preparation of elixirs of longevity, immortality and ascetical practices).
Metals were considered in antiquity alternatively as telluric incorporations of cosmic principles, solidified cosmic energies, planetary elements, astral spirits condensed in the telluric matrix, condensed solar energy, etc. Extended thoughts gave rise to a embryological concept on their genesis whereby the earth plays the role of a telluric nurse or matrix, where the seeds of metals grew, ripened ennobled to become finally precious metals (Ag, Au).
The following ideas and aspects related to metals lasted up to the 18th century:
1) The feeding and growth of metals in the bowels of the earth 2) the regeneration of exhausted mines 3) opinions of sickness and healing of metals and minerals, 4) the revivification of metal seeds by sprinkling the mine with water 5) the concept of metal fertilization, etc. Also curious principles arose in the 16-17th c. related to palingenesis and the so - called "metal vegetations" such as the growing of Diana's and Saturn's trees, typical crystallization phenomena interpreted by Homberg and Lemery.

Figure 3. Diana's and Saturn's trees: vitalistic aspects of the Alchemists for the regeneration of metals.

The mystics of metals also present special interest in eastern civilizations, assuming to derive from divine hierogamic marriages. They also believed that the birth and ennoblement of metals are based on the mystical significance of the red colour as related both to blood and life, deriving from minium and cinnabar.

Metaphysics of metals

Historically the philosophy of matter is essentially qualitative metaphysics, until Lavoisier's definition based on chemical analytical criteria. We must recall different theories:

The monistic matter theories to a concept of ancient pre - Socratic Greek philosophers, the four or five elements theories bound to the names of Empedocles, Plato and Aristotle, the five elements theories of the Indian panchatouan and of the wu - hsing Chinese theories. Plato considered in his "Timaeus" that metals were buildt by forms of solidified water thus accounting for their fusibility. With the exception of gold, all metals should contain varying amounts of water mixed with earth, the later separating as rust on aging. The metal content of earth should account for the stability and hardness of the metals.

Late modern period

Beginning around 1720 AD, a concrete distinction was drawn between "alchemy" and "chemistry". By the 1740s, dominates the concept of gold making, people believed that alchemists were charlatans and the tradition a fraud. The decline of European alchemy started with the rise of modern science and its disdain for "ancient wisdom". Although the seeds of these events were planted as early as the 17th century, alchemy reached its decline only in the 18th century.

The earlier Analytical Chemistry

During the middle ages, alchemists began to assemble scattered knowledge that later became chemistry and analytical chemistry. The *phlogiston theory*, was developed by J. J. Becher (1635 - 1682) late in the 17th century and popularized by G. E. Stahl (1659 - 1734), stating that all flammable materials contain phlogiston (form of the Greek *phlogistos*) a substance without colour, odour, taste, or weight. Once burned, the "dephlogistated" substance was held to be in its "true" form, the calx (salt).

Some of the founders of Chemistry: Robert Boyle (1627 - 1691) introduced the term "analyst" in his 1661 book *"The Sceptical Chymist"*. Antoine Lavoisier (1743 - 1794) used balance to disprove the phlogiston theory and demonstrated

the law of conservation of mass. In 1843, Talbot, Kirchhoff and Bunsen introduced spectroscopy[4].

Up to the second half of 19th c about 90 elements were discovered and chemical analysis was organised in systematic schemes. In 1876, W. Gibbs (1839 - 1903) introduced the concepts, *free energy, chemical potential, phase rule and chemical equilibria* as fundamental principles for chemistry.

In 1834, Michael Faraday published a paper *"On Electrical Decomposition"*, introducing the terms *electrode, anode, cathode, anion, and cation*. In 1847, he discovered also the differences in optical properties of gold colloids from those of the bulk metal. Therefore he is considered the first to report what today is called metallic nanoparticles.

In 1827 J.W. Dobereiner, in 1862 Alexandre - Émile de Chancourtois (1820 - 1886) and later John Newlands (1837 - 1898)[5] and Lohar Meyers, detected periodicities in characteristic properties of the 56 elements known at that time. Dimitry Mendelejeff (1834 - 1907)[6] in 1869 is credited as the discoverer of the *law of periodicity*, the creator of the first version of the Periodic Table of elements. For the empty spaces of his Table he dared to predict the properties of elements yet to be discovered. In this way, Mendelejeff became both a discoverer and an inventor. He and the chemists became "prophets", which only the astronomers claimed until then, and the periodic table became the instrument for the reduction of the "entropy" of the knowledge in natural sciences.

The revolutionary steps of Analytical Chemistry

In the first quarter of the 20th century there were many important developments, which answered questions raised after the works of Svante Arrhenius (1859 - 1927) on the dissociation of electrolytes and the introduction of pH by P. L. Sørensen (1868 - 1939).

As society became more sophisticated and dependent on advanced technology, it became more dependent on chemistry. The questions *what is it?* and *how much is it?*, were now completed with new questions, linked to *economy, trade, forensic chemistry, health, food safety, archaeology, space science, ethics*, in servicing governments, and *environmental quality*. From this time on, chemistry started a struggle against the so - called *analytical error, reliability* and focusing to the collection of larger numbers of data, which arose constantly in our society.[2]

Conclusions

Modern chemistry, as all sciences, differs from all previous traditions of knowledge in three decisive ways: 1) The assumption that we do not know anything *(Ignora-*

mus). It considers that the things we know may be proved wrong as we gain more knowledge. 2) Modern science is trying to gain knowledge, by gathering observations and then using mathematical tools to link these observations to global theories. 3) For modern science it is not enough to create theories; it uses them to acquire new powers and to create new technologies.

The Scientific Revolution was not only a revolution of knowledge. It was primarily a revolution against ignorance.

Today, chemistry is a scientific tool to serve society, the environment, the humanistic sciences and democracy, using continuously knowledge from almost all fields, and as H.M.NH Irving[7] stated is *engaged in a never ending campaign to which there can be no ultimate victory, although there will be many outstanding successes and triumphs along the way"*.

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THE FRENCH ACADEMY OF SCIENCE, A 350 - YEAR - OLD INSTITUTION AIMED TO PROMOTE SCIENCE

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The aim of the presentation will be to provide an overview of the French Academy of Sciences and of its roles. The French Academy of Sciences was founded in 1866 by the king Louis the XIV to promote the development of sciences and to provide advices and recommendations to the government. At the present time, the Academy includes 270 academicians and 120 foreign associates divided into two sections : basic science (mathematics, physics, chemistry, information science, sciences of the universe) and life science (molecular and cellular biology, genomics, human biology and medical sciences).

The five main missions of the French Academy of Sciences are to:

1. Encourage and sustain scientific life by organizing public conferences, debates and colloquia on an approximately bi - monthly basis. The Academy awards every year around 60 prizes.
2. Promote scientific education from primary school to higher education. The Academy strongly supports the Foundation “La main à la pâte” whose objective is to improve the quality of teaching sciences at school.
3. Transmit knowledge by publishing the “Comptes Rendus de l’Académie des Sciences” in seven different disciplinary areas. Most public conferences and colloquia can be downloaded from the Academy web site (http://www.academie-sciences.fr/fr/).
4. Promote international exchanges and collaborations with a special attention to emerging countries. The Academy actively participates to several European and international academic networks.
5. Provide expertise, advices, and reports to the government, national agencies and the scientific community. Working committees of the Academy are devoted to sustainable development, energy resources, spatial research, biosecurity, science and metrology, society and ethics, philosophy and history of sciences.

ENERGY AND MODERN CIVILIZATION: THE EMERGING GLOBAL LANDSCAPE AND ITS CHALLENGES - THE ACTIVITIES OF THE ACADEMY OF ATHENS

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Abstract

Energy is and will remain the most critical parameter in every country's development and in world - wide efforts to alleviate poverty and protect the environment and curtail climate change. The total world energy consumption continues growing and the world - energy mix continues changing. The use of oil and coal is decreasing and that of natural gas is increasing. Although there is a clear shift in the energy mix toward Renewable Energy Sources, the use of oil, coal and natural gas will continue to dominate energy consumption for decades and therewith lies the problem and the challenge: in the coming decades, fossil fuels will continue to prevail and will continue to exacerbate climate change. Negative Emission Technologies aiming at removal of CO_2 (many Gt of CO_2 per year) from the atmosphere may not be possible, and urgent mitigation measures will be needed at the source, foremost in the combustion industry. Burning fossil fuels to generate electricity, will continue because the demand of modern civilization for electricity will continue to grow; by 2050, it may reach 30 TW, that is, twice its present level. Thus, the need of renewable electricity and decarbonization. In 2005, the Academy of Athens established its Energy Committee to provide sound information to the Greek citizens and independent and scientifically-documented advice to the State on energy resources, uses, needs, conservation, planning, perspective and energy policy. The Committee accomplishes its purpose by in - depth studies by experts, conferences, workshops, lectures, bulletins and widely distributed and free - of - charge books.

Keywords: energy; electricity; society; climate; Academy of Athens Energy Committee.

Introduction

Emerging world - wide facts relating to energy

Energy is and will remain the most critical parameter of every country's development, a challenge in its struggle to alleviate world poverty, and a crucial factor in

understanding human intervention in the environment and climate change. Two factors that exemplify the profound impact of energy on society are (i) the increase in world population and (ii) the climate change and its consequences[1].

Fig. 1. shows the increase in world population between 1250 and ~ 2000[2]; clearly the energy revolution since 1800 is primarily responsible for the enormous increase in world population from ~ 1 billion in 1800 to ~ 8 billion in ~ 2000.

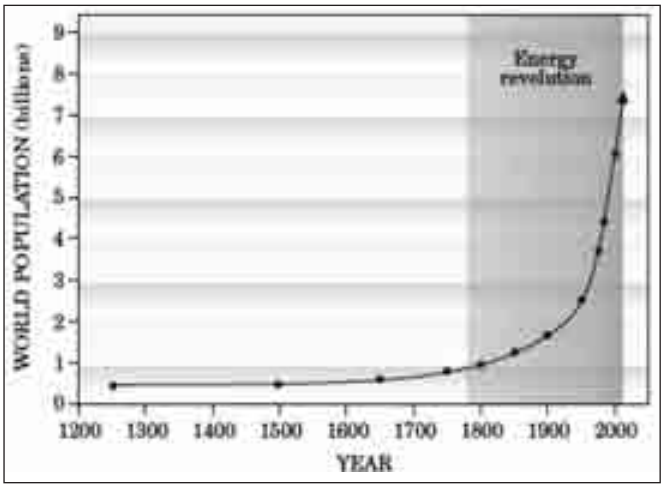
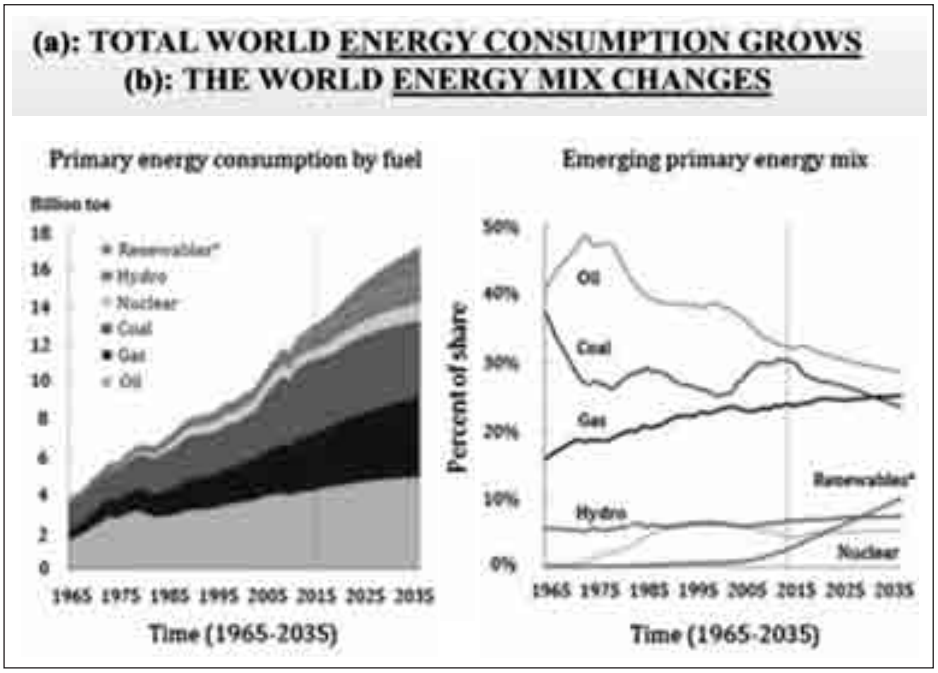


Figure 1. World population growth since the 13th century and its precipitous increase in the energy revolution.[2]

Regarding climate change, it is becoming the challenge of the 21st century. Clearly, humanity cannot face this challenge without addressing the impact on climate change of energy production and use. Many studies and reports (see, for instance, Anderson and Peters[3] and EASAC)[4] make it abundantly clear that Negative Emission Technologies (NET), i.e., technologies to remove many hundreds of Gt of CO_2 per year from the environment, will NOT be possible and urgent mitigation measures are needed at the source, foremost in the combustion industry (capture and utilization of CO_2 at the source) and possibly new techniques of breaking up the CO_2 molecule.

The total world energy consumption grows and the world energy mix changes

The growth of the total world energy consumption between 1965 and 2035 is shown in Fig. 2a and the changes in the world energy mix in the same time period is shown in Fig. 2b (BP2017 Energy Outlook)[5]. It is clearly seen from these figures that the use of oil and coal is and will be decreasing and the use of natural gas is and will be increasing. Also the use of oil, coal and natural gas in the next decades will continue to dominate energy consumption, and herewith lays the problem and the challenge.



a. b.

Figure 2. (a) Trends in primary energy consumption by fuel between 1965 and 2035; (b) Emerging primary energy mix (per cent of share) vs time (1965 - 2035) [BP 2017, Energy Outlook.[5]

There is a clear gradual shift in the energy fuel mix toward the Renewable Energy Sources (RES), which will be increasing in the years ahead. Irrespective of these changes in the global energy mix. In the coming decades, the fossil fuels oil and coal, will continue to prevail and will therefore continue to exacerbate climate change.

The global energy landscape is changing

Digitization and modern telecommunications ensure consumer access to and participation in the energy market.

Electricity storage (e.g., at hydro, batteries, fuel cells) enhances the system's operational flexibility and reduces the need for fossil fuels.

Natural Gas (NG) is offered to cover system's reliability until stochastic RES are further developed. The NG is emerging as an energy resource with greater use for electricity generation and for transport partly because its burning generates lower percentages of GHGs compared to other fossil fuels.

Electricity and NG markets will be affected by the challenges in the transport sector such as vehicle electrification, vehicle re - engineering, alternative fuel development, and transport infrastructure.

The challenges are great

These include:

Security of energy sources, stable supply, and affordable prices.

Transition to “Clean Energy” (low - carbon or no carbon at all).

New ways to access existing sources of energy, for instance shale gas. There are vast deposits of shale, but shale is too dense for gas to flow freely. Horizontal drilling and hydraulic fracturing are used to extract gas from shales, especially in the USA.

New energy sources, even new carriers of energy besides electricity.

While global action is not sufficient to limit global average temperature rise below 2 ^{o}C, four energy policies can help keep the < 2 ^{o}C target alive:

Adopt specific energy conservation and energy efficiency measures.

Limit construction and use of least - efficient coal - fired power plants.

Phase - out subsidies to fossil-fuel consumption.

Minimize methane emissions from upstream oil and gas production, especially, in shale - gas production. In Fig. 3 [Brantley et al][6], methane in groundwater concentrations high enough to be flammable can occur naturally is clearly seen. Such high quantities of methane are normally related to the thousands of natural gas wells drilled in shale-gas extraction. The picture with the flaming tap water was taken in Granville Summit, Pennsylvania, in March 2012. It exemplifies the risk of this technology and the concerns of society. Besides methane escape, there are concerns about the enormous quantities of water needed in drilling, possible flows of chemicals under pressure used in drilling polluting surrounding aquifers, and small size but large numbers of earthquakes induced by fluid injection (Mc Garr et al)[7].

Figure 3. Methane in ground water at high enough concentrations to be flammable can be related to natural gas wells (Brantley et al.).[6]

Global electricity and its recent transformation

Electricity is the most important energy carrier today.

Over the last 50 years electricity consumption increased by a factor of ~ 4.5. The demand for electricity will continue to grow in the future. By the year 2050, it may globally reach 30 TW, which is twice its present level.

Electrical systems are gradually being characterized by scattered RES units, decentralized small systems, and scattered production and consumption. Production, storage, and consumer/electricity providers, constitute the upcoming model of evolving new electrical systems.

It has long been known that countries with high electricity consumption, such as the USA and EU, offer their citizens a high degree of freedom of choice. The GDP of a country correlates with its electricity consumption[8] (Fig. 4).

Energy and poverty

Energy is a major factor of social well being and the key for poverty eradication; Peoples' poverty is essentially energy poverty.

The challenge of any society is its moral responsibility to make modern forms of energy, especially electricity, accessible to and affordable by all its citizens.

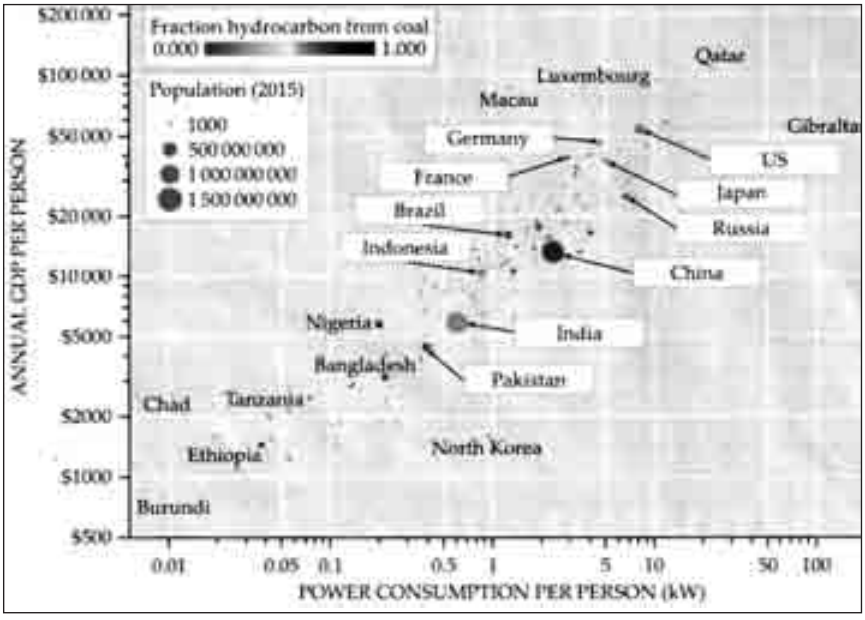


Figure 4. Relation between the annual GDP per person and the consumption of electrical power per person for various countries (Marder et al.).[8]

The role of energy as a prerequisite of poverty eradication and higher standard of living is gradually being widely recognized[1].

Yet, energy poverty is hard to define and even harder to measure.

Some have defined it in terms of access to modern energy services (affordable and reliable electricity) and clean household facilities.

Others have defined energy poverty as 1kWh per person per day.

The IEA suggested 250 kWh per household per year for rural and twice that amount for urban households.

Based on such definitions of energy poverty in terms of electrical energy consumption, 1.3 - 1.6 billion people in the world have no access to electricity and some 2.4 - 3.0 billion rely on traditional use of biomass for cooking and heating and have incomes less than $2 per day.

Despite progress being made, if present trends continue, by the year 2030 some 1.4 billion people will lack access to electricity and more than 2.6 billion will still rely on traditional biomass fuels.

The Earth Institute[9] claims that at levels of electricity usage of 2000 kWh per person per year, access to modern needs becomes possible. Regrettably, however, the IEA[10] envisages the poverty level rising slowly and reaching 800 kWh per household per year by 2030; by comparison, the average annual household consumption in the 27 EU countries in 2008 was ~18,000 kWh.

The energy situation in Greece

In Greece:

The use of lignite is decreasing, the use of NG and RES is increasing, and the use of imported oil continues at a high level.

High levels of exhaust emissions continue, mainly due to the high use of imported fossil fuels in road transport.

Among the primary energy sources, only the RES, Lignite, and Energy Conservation and Energy Efficiency constitute Greece's domestic energy sources. In the future, any discovery and exploitation of significant indigenous NG deposits or oil fields will be crucial for the country's development.

The energy sector of Greece will adapt to the framework of the European Union Policy.

Elements of the long - range planning of Greece

As to the long - range planning of Greece, the Energy Committee of the Academy of Athens suggested that Greece should:

i) Take advantage of the technological advantages that lead to a low CO_2 energy mix at a competitive cost.

ii) Proceed immediately with the necessary infrastructure and investment in energy storage technologies, smart grids, and digitization.

iii) Make effective use of the energy sector to:

Protect the environment and reduce climate change;

Extend the provision of NG across the country and promote the use of NG and LNG in transport;

Reduce road transport, produce and use biofuels, and use renewable electricity for transport including railways;

Moderate the price of electricity by improving efficiency.

The Energy Committee of the Academy of Athens: its mission and work

Through its Energy Committee, the Academy of Athens is helping Greece with its Energy Needs and Resources. The Academy's Energy Committee was established in 2005 to play a consultative role in the energy issues of Greece.

Since then, the Committee has provided broad and sound information to the Greek citizens, and independent science - based advice and recommendations to the State, on Greece's energy resources, needs and long-range prospects.

The Committee achieves its purpose through in-depth studies by Greek and foreign experts of the energy issues, via Symposia, Workshops, Working Gups, Lectures, Books, Press Releases and Books of Proceedings of the Symposia, Workshops and Working Groups, which are distributed widely and (usually) free of charge. Table 1 lists the Symposia / Workshops / Working Groups, the year they were held, and the topic they dealt with.

Table 1. Symposia / Workshops / Working Groups / Year / Topics

The Academy of Athens: Helping Greece with its Energy Needs and Resources	
Symposium/Workshop/Working Group, Year	**Topic**
Symposium, 2006	Energy Conservation
Symposium, 2008	Energy and the Environment
Working Group, 2009	Nuclear Power and the Energy Needs of Greece
Symposium, 2010	Materials for Energy Applications
Working Group, 2011	Electricity Generation in Greece: Fossil Fuels, Renewable Energy Sources and Prospects of Energy Supply
AA/EASAC Workshop, 2011	Concentrating Solar Power
Symposium, 2012	Greek Hydrocarbons: From Research to Exploitation
Symposium, 2013	Renewable Energy Sources: Prerequisites for Mass Penetration in Power Generation
Symposium, 2014	Waste Management and Energy Exploitation in Greece
Symposium, 2015	Energy and Development Planning in Greece
Symposium, 2016	Energy and Transport in Greece: Requirements and measures for clean and sustainable energy in transport
Working Group, 2018	Energy Perspectives of Greece in 2030 with Horizon in 2050
Symposium, 2018	Hydrocarbon Research in the Eastern Mediterranean: Prospects and Challenges
Symposium, 2019	Energy Research in Greece

Conclusions

It is hoped that these findings and recommendations for Greece, made by the Energy Committee of the Academy of Athens, can similarly be helpful to other countries in the region.

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THE POLITICAL DIFFICULTIES CONCERNING CLIMATE CHANGE AND NEGATIVE EMISSIONS

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EASAC - the European Academies' Science Advisory Council - is formed by the national science academies of the EU Member States, Norway and Switzerland to enable them to collaborate with each other in providing independent, evidence - based science advice to European policy - makers, especially to the Commission, the Parliament and the national governments.

A controversial issue in discussions and decisions both in the EU and in national governments about climate change mitigations have lately been the development of negative emission technologies (NETs) and the use of forest biomass instead of coal in electricity generation.

As global emissions of carbon dioxide (CO_2) continue to exceed levels compatible with achieving Paris Agreement targets, attention has been focusing on the role of bioenergy as a 'renewable' energy source and its potential for removing CO_2 from the atmosphere. EASAC examined these issues in two reports in 2017/18, but since then many peer-reviewed papers and international reviews have been published. EASAC has thus revisited these important issues and updated its earlier findings in a Commentary from February this year.

Carbon capture and storage (CCS) - which is critical to several NETs - will need to be developed and deployed rapidly. Nevertheless, EASAC emphasises - in line with its 2018 report - that mitigation must remain the highest priority. CCS technologies cannot make up for a lack of effort to mitigate CO_2. EASAC noted the danger of moral hazard in accepting as legitimate future scenarios that are based on assumed CCS of many gigatonnes of CO_2 each year via unproven technologies.

On bioenergy, switching from coal to imported biomass continues at many millions of tons per year, driven by rules that allow this to be counted as zero emissions at the combustion stage, and thus help to reduce countries' emissions declared in the EU emissions trading system. However, the science showing the extent of perverse

effects has become stronger and that this policy is bringing forward the date when we overshoot the Paris targets and increase the risk of dangerous climate change.

Sources

Multi - functionality and sustainability of the Europeans forests. EASAC policy report 32, 43 pages, 2017.

Negative emission technologies: what role in meeting Paris agreement targets? EASAC policy report 35, 37 pages, 2018.

Forest bioenergy, carbon capture and storage, and carbon dioxide removal: an update. EASAC commentary, 11 pages, 2019.

THE ASSOCIATION OF PROFESSORS EMERITI OF THE UNIVERSITY OF ATHENS (SOKPA) - OUR FORTY YEAR ANNIVERSARY

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Abstract

The Association of Professors Emeriti of the University of Athens celebrates in 2019 its 40 years anniversary.
We have had a steady expansion, activities including yearly lecturers and teaching courses composing the "Citizens University". We have advanced the collaboration with the Associations of universities in Greece and have contributed towards the foundation of the European Association of Professors Emeriti.

Keywords: Professors Emeriti; University of Athens; SOKPA.

Introduction

My intention is to present some significant points from the 40 year history and activities of our Association (SOKPA). The full Greek name of our Association sounds different from the word Association. Namely it is "Soma", which means body / corpus of Emeriti - "Homotimon"- (i.e. equally honoured) as compared to their active peers, the Professors of the National and Kapodistrian Universityof Athens which was established in the year 1837.
From now on I shall refer to our Association as "Body", since this term is also frequently employed to denote Associations or Societies, i.e the "Body Politic" in English usage.

History

In the year 1979 a small group of Professors Emeriti decided to create an Association aimed at the continuation of their educational role, the idea of mentoring and towards a broader social service.
In the history of our Body many Boards of Directors have succeeded each other in close collaboration and spirit of "camaradérie". In an amendment of our Bylaws in 2017 it was stated that each member could only serve 2 terms of three years each.
We have changed our seat 3 times. Unfortunately, in December 2008 our first loca-

tion had to be changed because of a catastrophic fire, which led to the destruction of a part of our archives.

Goals of SOKPA

The goals of the Association were expressed in Article 4 of the Bylaws:

a. The study of matters pertaining to University Education especially aspiring to progress and reform.

b. The expression of opinions and views to the Government and to University Principals, and provision of every type of aid towards the implementation of the goals of University Education.

c. The contribution and the motivation of the members of the Association in regard to the matters of University Education and function.

In an amendment of 2017, two more paragraphs were added:

d. The participation in scientific and technological research of the University of Athens.

e. The communal, moral, scientific and health support of Emeriti and retired Professors of the University of Athens.

Activities

The Association, which counts 347 active members, has engaged in many activities pertinent to its founding aims.

Thus it has organised a series of yearly lectures delivered by its members but also by invited Professors from other Universities. In the academic year 2018-2019, 15 such lectures were delivered, and attended by many persons not associated with the University.

Since 2014 the "Body" has organised 4 courses addressed to the general public with the title "The University of the Citizens". The disciplines represented so far have been Medicine, Law, Literature, Religion / Theology. History is represented in 2019, and the Physical Sciences will be represented in 2020.

From these courses, 3 books on Law, Literature and Theology have been produced. Also a book on Emperor Hadrian: Athens - Rome 117 - 2017 has been published in 2018.

In addition we publish, three times every year, a Bulletin with the title: "The Communion of Emeriti" ("Homotimon koinonia"), with information about our activities, programs etc. and we have a webpage (www.somaomotimon.uoa.gr). Our body yearly has a new year's dinner, and has organised visits to interesting sites and excursions.

Problems and needs of Emeriti

We have presented the problems and needs of the Emeriti and Retired Professors to the Ministry of Education on numerous occasions with satisfactory results; thus we have succeeded in re - establishing various privileges of Professors Emeriti, such as teaching in pre - and post - graduate programs.

We have also appealed to the minister of Labour; after the economic crisis, pensions suffered unnecessary reductions. Also we are trying to establish better conditions for continuing professional activities by the Emeriti Professors.

Since 2017 SOKPA has organised the welcoming Reception of Professors finishing their Academical career in the University of Athens. Also, it is hoping to establish a welfare action under the auspices and with the collaboration of the Archbishop of Athens and All Greece.

Efforts towards further growth

We have taken an initiative for establishing cooperations with the other universities in our country. Thus, as described elsewhere, our Body was instrumental in founding the Federation of the Associations of Professors Emeriti of Greece. This includes the Association of Professors Emeriti in Northern Greece based in Thessaloniki, the National Technical University of Athens, and the Athens University of Economics and Business. Our Body also was instrumental in the success of the Founding Congress and the 1st International Congress of the European Association of Professors Emeriti.

H.E. The President of the Hellenic Republic Professor Emeritus (Law) Prokopios Pavlopoulos is our Honorary President.

Conclusions

I would like to end my presentation as an epilogue with a question. Should it be acceptable in the 21st century that the capital/richness of knowledge of Emeriti and Retired Professors be ended in the same moment with their official retirement?

The negative answer is very clearly documented by the facts from the history of the modest initiative of our Association.

FRENCH ACADEMY OF MEDICAL SCIENCES

(Its influence is based on the reputation and experience of its members)

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The French language has two meanings to the word emeritus. This is a personality who has completed their professional activity but enjoys the honours related to their work and experience. It is also the adjective attributed to a person who has a particular experience in a specific field. It appears to me that the latter is the best to define the titular members of the French Academy of Medical Sciences who are distinguished academics. This is the reason why I think that the Academy has been given this role in Health field. The voting age of a titular member is around 65, which is close to the age of university professors' retirement to become emeritus professors. In the countries where Academies of Medical Sciences exist, we can notice two main types of structural patterns: some of them are very selective, retaining only a limited number of high reputation members, while others bring together a large number of mainly professionally active members in order to cover a wide spectrum of skills. The organisation of the French Academy of Medical Sciences is intermediate: in addition to the 135 fellow-members, there is a set of corresponding members, mainly professors of universities and hospital practitioners in full activity. They allow think tanks and workshops to be in full relationship with the current affairs.

Fellow - members and corresponding-members are divided into four divisions such as:

1. Medical specialties
2. Surgical specialties
3. Biological and pharmaceutical sciences
4. Public health

This fourth division has in its ranks a representation of veterinarians.

The Academy is responsible for advising public authorities on Public Health issues, promoting the development of knowledge in Health field. The institution is also participating in the international influence of French Medical sciences. In addition, following the evolution of Medical sciences, the Academy strives to promote ex-

changes and information between, on one hand, Science and the innovations linked to it, and on another hand, the Public which is often traversed by wrong, unfavourable, even dangerous streams of opinions.

The mission of the Academy is independent

Questions submitted to the Academy and decisions are published in reports and press releases. These files are prepared by specialised committees.
Through some examples of recently published press releases and reports, the nature of the work carried out in recent months will be highlighted, with emphasis on the recommendations that have been made.

Conclusions

Emeritus university professors and emeritus health professionals are at the heart of the activity of the Academy, they play a decisive role in the influence and authority of the Academy of Medical sciences in Health field.

BRIEF OVERVIEW OF THE HISTORY OF THE FRENCH "NATIONAL ACADEMY OF MEDICINE"

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The Foundation

In December 1820, King Louis XVIII created by ordinance the Royal Academy of Medicine on the advice of his doctor, Baron Portal, who urged him to join together experts able to advise his government on public health. The Academy will commemorate this year the bicentenary of its creation. The first members of the Academy were appointed by the king who chose, among the most famous doctors of the time, only those living in Paris because of the long duration of travel from the main cities of the kingdom. Let us quote some of them: Dominique Larrey, surgeon of the armies of the first empire, Jean-Nicolas Corvisart, personal physician of the Emperor Napoleon I and of his two successive wives, Josephine de Beauharnais and Marie-Louise of Austria, Antoine Dubois who had delivered Marie - Louise. Before the revolution, there existed medical societies such as the Royal Society of Medicine and the Royal Academy of Surgery, which, considered as corporations, were abolished by the "Le Chapelier Act" in 1791. Article 2 of the 1820 ordinance defines the statutes and missions of the Royal Academy of Medicine as follows: "This academy will be specially instituted to answer the requests of the government on all that concerns public health, and mainly on the epidemics, the diseases peculiar to certain countries, epizootics, the various cases of forensic science, the spread of the vaccine, the examination of new remedies and secret remedies, both internal and external, natural or artificial mineral waters. It will take care of all the objects of study or research that can contribute to the progress of the different branches of the art of healing". To best fulfill these functions, the Academy included pharmacists, veterinarians and "free members" from its inception to cover all areas of public health. Among the latter, the most famous are the zoologist Georges Cuvier, the chemists Claude-Louis Berthollet and Joseph - Louis Gay - Lussac, and the physicist Joseph Fourier. This initial nucleus of academicians then proceeded by co - optation to the election of new members.

The nineteenth century

Among the many tasks that were asked by the royal government, the most important were to spread vaccination against smallpox throughout the country and to define the best preventive measures and treatments against cholera epidemics, frequent in the 19th century. The academy created a network of correspondents in all departments of the country to convince the population of the benefits of vaccination. The academy organized a dispensary in its premises where infants could be vaccinated by transferring pus taken from the skin of infected heifers on the arms of these children, who had been first scarified. In 1831, the Academy published its conclusions on the treatment of cholera morbus. Rejecting the traditional treatments such as bloodletting, opium or calimel, the academicians insisted on the need to compensate for vomiting and stool whose frequency led to the patient's death. One of the most famous battles of the Academy was in 1835 its conviction of homeopathy introduced in France by its creator Samuel Hahneman, a German doctor, who moved to Paris. This event showed the independence of the Academy from the government whose Prime Minister François Guizot supported this practice. Exchanges on the great problems of the time were sometimes stormy. Always famous academicians presented, at the weekly meetings of the Academy, discoveries that have up to now never been denied. These include, among many others, Claude Bernard, Paul Broca, Jean - Martin Charcot, Louis René Villermé and Louis Pasteur. Claude Bernard was the initiator of experimental medicine. He discovered many physiological phenomena including the function of glycogen storage of the liver and the digestion of fats by the pancreatic juice. He trained many collaborators around him as we can see in a famous painting that the Academy possesses. The name of Paul Broca is attached to the discovery of the locations of the motor cerebral areas. Jean-Marie Charcot described new neurological diseases and, by his descriptions of hysteria, opened the doors of the unconscious to his pupil Sigmund Freud. Louis-René Villermé is the first in France to have carried out epidemiological studies. Among other things, he showed that overall mortality was increased in poor neighborhoods in comparison with wealthy neighborhoods and that, similarly, the size of conscripts depended on their origin, being higher among those coming from wealthier neighborhoods whose food was more abundant. Louis Pasteur who was not a doctor, is the most famous of the free members of the Academy. His work on asepsis and the development of the first vaccinations in animals (chicken cholera, anthrax) and humans (rabies) are universally known. He triumphed over Felix Pouchet by demonstrating the inanity of spontaneous generation by a simple experiment: a culture broth is heated in a bottle

with a straight neck and in a gooseneck bottle to kill the microorganisms. Then, the broths are left in the open air for a few weeks. Microorganisms enter the straight neck flask and contaminate the broth. In the gooseneck bottle, the microorganisms cannot reach the broth and grow there; so when there is no outside contamination, the broth remains clear.

The twentieth century

From its foundation, the Academy moved several times because the number of academicians increased and it was necessary to enlarge the premises. It was only in 1902 that the Academy was able to settle in its hotel in the rue Bonaparte. The architect Justin Rochet, influenced by the art nouveau style, multiplied the floral motifs in the mosaic tiles and the grand staircase leading to the floor of the meeting room that has recently been restored to its original pastel gray color. The ceiling is decorated with a calligraphy of the name of the academy by Georges Mathieu and behind the platform where the academy executive board sits, stands the Hippocrates statue by Dimitrios Filipottis, a gift from a Greek sponsor. The Academy was organized into sections and members not living in Paris called non - residents were recruited. Its name also changed three times according to the political events. From royal, it became imperial and then national. The Academy, soon after its creation, decided to encourage research by distributing prizes that were financed by generous donors. Initially, these prizes answered questions of the jury on a medical problem; but, quickly, the Academy accepted prizes respecting the wishes of the donors, but whose themes were chosen by the candidates.

The twentieth century was marked by considerable progresses in medicine, to which several academicians have contributed. An important place must be given to Marie Curie. She was the first woman elected to the Academy and distinguished herself by being awarded two Nobel Prizes. During the First World War she created the first radiology ambulances for fracture treatment. Pasteur's students and those who succeeded them also occupy a special place. Gaston Ramon prepared from diphtheria and tetanus toxins, toxoid - free but immunogenic toxoids that were utilized as anti - diphtheria and anti - tetanus vaccines. Emile Roux, Director of the Pasteur Institute, developed the anti-diphtheria serum. More recently, Jean Dausset and Luc Montagnier were awarded the Nobel prize, the former for the discovery of HLA groups allowing organ transplantations in humans to be better accepted by the recipient and the latter for the identification of the HIV (Human immunodeficiency virus). At the beginning of the century, Charles Richet and Alphonse Laveran were also awarded

the Nobel prize. Charles Richet discovered anaphylaxis paving the way to the development of immunology. Alphonse Laveran showed that hematozoons were responsible for malaria. He also identified the protozoan responsible for Kala Azar. Many other academicians gained a wide recognition. Early in the century, Felix Widal showed the role of alimentary salt in the formation of oedema. Important contributions in organ transplantation were brought by academicians. Jean Hamburger succeeded in transplanting a kidney from a dizygotic twin to his brother and René Kuss in transplanting, for the first time, a kidney to an unrelated recipient. The Academy counted among its members illustrious characters, including Georges Clemenceau, a physician by profession, considered in France as the architect of victory ("l'artisan de la victoire") at the end of the first world war. The Academy evolved towards a greater involvement in the medicine-related scientific, ethical, administrative and societal issues of the time, making known its position and making recommendations to the public authorities. The German occupation of Paris was a difficult time that showed the determination of many academicians to resist the Nazis. Charles Richet Jr, the son of the Nobel prize, was deported to Buchenwald. Louis Pasteur Valery Radot, the grandson of Louis Pasteur, animated a network of resistance. At the end of the war, it was necessary to reconstruct French medicine and, in particular, to raise it at the level of what was done in the United States. Many doctors devoted themselves to this task, a number of whom were elected to the Academy like Jean Bernard, Jean Hamburger, Jean Dausset, Robert Debré, Jean Lenègre.

The present time

Nowadays, the Academy of Medicine demonstrates that it remains an indispensable institution to advise and, possibly criticize, the government on its public health decisions. It is also an institution giving the public, through its website and its releases to the newspapers, an exact view of medical problems and, thus, fights against "fake news" often spread by the press and social networks. Indeed, academicians are independent of political power and express their opinions freely. Coming from diverse backgrounds, they cover all areas of medicine. They remain close to the ever-changing medicine with their corresponding members, most of whom are professionally still active. The Academy is increasingly consulted by both Houses of Parliament when laws affecting medicine are being prepared. It is developing its international contacts and, to this end, has created a foundation that has organized meetings with local academies in several countries. The Academy of Medicine was one of the founding members of the European Federation of Academies of Medicine

and of the Interacademy Partnership that is a world organization. As examples of international cooperation, the Academy participates, with Chinese academies, in the redaction of a report comparing the situation of tuberculosis in France and China that is in progress and, on the request of the Science Advice for Policy by European Academy (SAPEA), a report on transforming the future of ageing has been written and presented by its author, Jean-Pierre Michel in the academies of several European countries. This report will provide scientific perspectives for a better social and medical care in the European countries. Another of its missions is to keep books and archives in its library, including more than 100 incunabula, which represent an important source of documentation for all those, many of whom are academicians, who work and write on topics of the history of medicine. As written here above, the Academy celebrates in 2020 its bicentennial and thus hopes to affirm its perpetual youth.

Figure. Statue of Hippocrates by Dimitrios Filippotis
(Library of National Academy of Medicine, Snapshot by Philippe Fuzeau).

THE ROLE OF THE ASSOCIATION OF PROFESSORS EMERITI IN NORTHERN GREECE

The importance of formally joining our activities with our colleagues in Europe in the interest of spreading scientific knowledge

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Abstract

The Association of Emeritus Professors of Northern Greece was founded at the close of the 20th century. Although it is a comparatively young association, it plays an active role to advocate on matters of academic, social, and international importance. Recent indicative activities include the organization of a National Conference to examine the admittance policies for Greek Universities, organizing jointly with the Aristotle University Medical School a public event highlighting the work of the Clinic of Ophthalmology in Central Africa. The association also proposed the nomination of the Greek Aegean Islands for the 2016 Nobel Peace Prize. Looking forward, we believe that the positive impact of ours and other societies' efforts can be greatly increased by the formation of a larger European Association of Emeriti Professors. Such a move is rightly timed as well, given the upcoming 60th Anniversary of the European Union in March of 2017.

Keywords: activities; Association of Professors Emeriti; Northern Greece.

Introduction

First of all, I wish to warmly congratulate our colleagues of the University of Athens for their excellent idea to establish a common European Association to promote our common goals. We strongly believe that the Professors Emeriti of our Universities constitute a valuable part of the society of our country, and that is why we willingly offer our knowledge and experience to examine existing problems and work for their solutions. Such a move is rightly timed as well, given the upcoming 60th anniversary of the European Union, in March 2017.

Higher education in Northern Greece began in 1926 with the founding of the first University of Thessaloniki. Northern Greece was under occupation up to 1912. Later, the University was renamed as the Aristotle University of Thessaloniki, to honor the great Greek philosopher who was born not far from our city.
Now it is the largest University in the country, with 12 schools and more than 40 departments. This year we celebrate the 90th anniversary of its founding.
Later, new Universities were founded throughout Northern Greece, including the University of Ioannina, Democritus University, and the University of Macedonia.
Although our Association of Emeriti is a comparatively young association, it has more than 400 members, and plays an active role to advocate on matters of academic, social, and international importance.
Recent indicative activities include the organization of a National Conference to examine the admittance policies for Greek Universities. The conference examined relative procedures from 15 European countries, and received input from the Greek Political parties, to obtain a deeper understanding of the overall issues. The findings and recommendations from this conference were sent to the Ministry of Education for review and are under consideration.
The Association joined with the Aristotle University Medical School to present a public event highlighting the work of the Clinic of Ophthalmology, whose recent work in Central Africa is of a highly valuable medical and humanitarian scope.
Joining with the Association of Professors Emeriti of the University of Athens, we proposed the nomination of the citizens of the Greek Aegean Islands for the 2016 Nobel Peace Prize, in recognition of their valiant efforts and heroism, sometimes at peril to their own lives and livelihoods, as they voluntarily helped to rescue thousands of refugees from Syria and other countries.

The Association of Professors Emeriti in Northern Greece

According to the dictionary, “Emeritus” has many meanings, including Respected, Estimable, Honorable, Honored, Popular, and generally Approved by people. It is true that each of us has devoted our efforts during our active academic lives to promote teaching, scientific knowledge and inquiry, and above all to inspire new scientists and scholars to follow this same path. We feel the proudest of this achievement - that many new scientists and educators have benefited from our legacy. Sometimes, I feel that science and knowledge are like a tree. The older generations are the roots, supplying the fundamental structure - the trunk and branches - with nutrients. The newer generations are the leaves and flowers that flourish and continue the tree’s growth, so the cycle can repeat and the orchard grow ever stronger.

Continued economic and social progress, and expanding employment opportunities, are among the fundamental objectives of the European countries, and especially the European Union (EU). In the process of opening up markets for goods and services, citizens were not forgotten. As soon as the EU was set up, it became easier for citizens of one member state to live, to work, and to study in another. Freedom of movement has been extended to job-seekers, students, scientists, retired persons - in fact, virtually to everyone.

Along with this freedom of movement, another important target is to close the technology gap we have with the USA and Japan. In this area, associations, and the new common association, can play an important role. Scientific knowledge will help to encourage growth. Growth must be sustainable in the interests of the long-term health and welfare of our citizens, the environment, and our collective countries. Growth will support and pay for the pensions and healthcare of our elderly citizens, whose contributions to society have gotten us here today.

Moving to another EU country need not be a barrier to our educational, scientific, or vocational training. Thousands of teachers, students and young workers have already discovered the benefits of spending a short or long period in another European country thanks to popular EU programs like Erasmus and Socrates. These projects can serve as examples for Professors Emeriti to facilitate exchange and relevant working groups.Home can be anywhere in Europe, at any age and for any purpose. Why not work together as Professors Emeriti? I feel that Europe, for many of us, means not just a common Union but a common culture, education, and devotion to scientific progress.

It is well-known that scientific research brings new knowledge about our world and leads to new inventions that change our lives. Europe has a proud history of discovery and innovation. Two centuries ago the Industrial Revolution was born in Europe. European Universities, research institutes, and companies are continuing to make exciting progress in physics, chemistry, and life sciences and we are developing energy and information technologies that will shape the world of tomorrow.

But in order to continue this proud tradition of scientific excellence and innovation, and to increase our leading status, Europe must invest heavily in research and put its best brains together. Research is the key to Europe's future. As scientists, this key is in our hands. Our talent, our expertise, and our personal involvement are all vital to opening the doors to our own future too.

Europe's post - industrial societies are becoming increasingly complex. Standards of living are rising steadily, but there are still gaps between developed and develop-

ing countries. This is why it is important for all of us to work more closely together to tackle social problems. There is added value in acting as one, and speaking with a single voice, as the European Professors Emeriti.

Reflecting on the current state of some major aspects of scientific and cultural endeavors, one can see great reason for satisfaction in the achievements of recent decades. But at the same time, we are reminded that there is still so much yet to be done.

Conclusions

I can say that we can work together, the European Professors Emeriti, as a TEAM, whose acronym means:

Together Everyone Achieves More. And I believe that every one of us is a drop, but together we are a river.

THE NEED TO DEFINE THE ROLE OF EMERITI PROFESSORS IN THE EUROPEAN UNION UNIVERSITIES

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Abstract

The goal of the title " Emeritus / a Professor" (E.P.), besides recognition, is to give the opportunity to the retired professor to continue his/her research and teaching activity within the university and to offer to the academic community additional funding for his / her research. However, the role of E.P. varies excessively among the universities in Europe, even in the same country. In this presentation, a European Standard for the role of E.P. at the Universisty is suggested, which could be adopted and implemented by the national authorities and universities. Some indicative actions that may enhance and even substantiate the role of E.P. are lecturing on postgraduate studies, supervising of Master, Ph.D. and Post - doc theses, conducting research work, consulting to electoral bodies for new members of the faculty, attending the meetings of the Senate, making use of the installations and facilities of the University, and actively participate in research projects. In conclusion, Emeriti Professors should have the opportunity to offer their experience to both the academia and to the society, in a voluntary capacity.

Keywords: activities; royalties and obligations; teaching; research; funding.

Introduction

It is my pleasure under the heading of this session to present to you on behalf of the Society of Emeriti Professors of the National Technical University of Athens a paper entitled "The need to define the role of Emeriti Professors in the universities of the European Union". The paper is mainly addressed to those of us that after retirement wish to continue their relationship with their former university department that they served for decades. We believe that such relationship may benefit equally the

department and the retired professors, as we argue briefly in this paper, that might trigger debate afterwards.

The title of "Emeritus / a Professor" is conferred either by the Academic Senate of the University or by the University Honours Committee to a retired member of its academic staff, who had full professorial status immediately before retirement and substantial contribution to the university society.

Generally speaking we can say that the honourable title of Emeritus/a Professor besides recognition gives the opportunity to maintain the continuity of his / her relationship to the university at departmental level in three activities:

a) To undertake lecturing in classes of post - graduate students b) To continue and extend individual or team research work and c) To assist in fund raising for research that benefits the department and young academics through scholarships. It supports also the Emeriti Professors by some additional income that compensates the severe reduction in salary since the academic pension is around half of their previous income. It is also important to mention that the liberation of the Emeriti Professors from their academic duties gives a chance to get on in research work they have wanted to do for years but did not have the time. Thus, in certain cases retirement research work produced results that benefited mankind. I quote as an example the case of Sir Alan Battersby FRS from newspaper "The Guardian"[1] on May 3rd, 2001. An article by Joe Plomin refers to Alan Battersby, emeritus professor in organic chemistry at Cambridge University, who five years after his retirement won the prestigious Robert Alonso Award in the United States for research that led to decipher the biosynthetic route of the essential health aid complex vitamin B12.

Going through the relevant literature it seems that there are no standard criteria and procedures for the award of the title of Emeritus Professor. They vary considerably and in extreme cases even between the departments of the same university. These are, however, exceptions and most of the universities follow standard rules and procedures. Certain universities have gone a step ahead and the voluntary relationship between the Emeriti Professors and the university through carefully drawn guidance lines provide clarity over some key issues of this relationship and how it is balanced to benefit both sides. I refer to the successful cases of three universities from three continents: the University of Sheffield[2] in the United Kingdom, the University of British Columbia[3] in Canada and the University of Auckland[4] in New Zealand. I expect that there are more worldwide.

Actions to enhance the role of Emeriti Professors

As we mentioned previously Emeriti Professors may continue to support the university endeavour by engaging in a variety of activities in a voluntary capacity under the

headings of Teaching, Research and Funding. It is recommended that involvement in any of these activities without intrusion should be discussed in detail between the interested Emeritus Professor and the Head of the Department or with a Senior Professor in advance of retirement. They should review over time the advantages that both sides have with the presence of an Emeritus Professor and former colleague in the Department. There are no red lines in this collaboration but careful and amicable handling of each case will benefit both the Department and the Emeriti Professors. It is a win - win case.

In the United States the potential attribution that an Emeritus Professor can offer to the Department is recognized in two ways: By creating grants for retired faculty members,as it happens in the University of Minnesota or by an annual award to the Department that effectively involves emeritus as faculty members.Purdue University, in Lafayette, Indiana, offers a similar award for retired professors, which also comes with an additional cash award presented by TIAA - CREF. Some other universities have created an emeriti or retired faculty association. The University of British Columbia has gone a step further by announcing in 2018 the establishment of the UBC Emeritus College, which held its first symposium this April.

It is interesting to mention that the 23 campuses of the State University of California through their Retired Faculty Association founded in 1985 have grown now as an active organization of 2800 members that is constantly seeking ways to mutually benefit its members and their former university campuses. The retired professors provide thousands of hours of free lecturing to students and engage in other activities that aid their former departments and in exchange they have certain privileges (parking, access to library, computer facilities etc).

Using experience and available literature views from European countries and universities we came to the conclusion that the following is a list of actions[5] that could officially be undertaken by Emeriti Professors to upgrade the academic processes at a university department in its three activities. The list could be used to initiate a campaign to formulate a first approach for a future "Relationship Agreement" between the Association of Emeriti Professors and their former university.

In teaching

i. To undertake lecturing in postgraduate studies when specialized subjects necessitate expert tutoring.

ii. In cases that temporally understaffing justifies the call of services of an Emeritus Professor.

iii. To undertake the supervision of Master's, Ph.D's and Post - doc thesis. It follows and is self understood that participation in the relevant examination procedure and bodies is included.

iv. The Emeriti Professors may continue to conduct research work and be team partners.

v. To submit as a group partner participation proposals to research programs announced by the European Committee or other organizations. Most of these programs have large budgets and call for the participation of the industry as well. In that case the participation of an Emeritus Professor might be very important to win the proposed project.

vi. Research projects funded by the European Commission or of any other source (state, industry, etc.) secure funds for young researchers to participate in them. Thus, young and old are the only persons liberated from administration duties and do most of the work. The young participants have the advantage that they do not know what is impossible and that may result in original work.

Intellectual property

Another important issue that has to be addressed is the copyright of the academic work originated and produced by Emeriti Professors during their career in the university. It includes pilot plans, computer programs and codes implementing original ideas etc. It is understood that the copyright of published work is more or less ensured through European legislation to safeguard it. Nevertheless, Emeriti Professors leave behind enough material, which with little further effort may lead to the production of extended outcomes, which frequently are attributed to their successors, which is not fair. We understand that science proceeds on existing knowledge and new findings, provided that this is appropriately acknowledged to the pioneers Emeriti Professors that they initiated it.

Plan to establish a European policy of the role of Emeriti Professors

Our presentation leads to the conclusion that a necessity exists to establish a regulatory framework to define the role of Emeriti Professors across the European universities. It will refer to Professors of all academic disciplines that wish to be connected to their former university department and the department, realizing the value of the offered services in a voluntary capacity and on a probono basis, is willing to proceed towards a Relationship Agreement that will benefit both sides. Such agreement will include royalties and obligations leading to strengthening the academic performance of the department.

We believe that time has come to discuss and update professor Sydney Albert's of the California State University, Los Angeles, article in 1986 "Academe"[6] dealing with an emeriti bill of rights. It recommends twenty privileges that retired faculty member should have, which even if they are low cost benefits they may pay large dividends for the institutions and the retiredfaculty alike. More recent and relevant to our presentation is a paper by Seth Fishman published in the May - June 2012 issue of the American Association of University Professors[7] in which he examines an emeriti bill of rights. Sources for relevant data can also be found in the Human Resources and Policy and Procedures chapters of the internal regulations of certain European universities that will help to build our case.

The core vision is to convert the classical "retirement model" to "an integral component of the University", until it is right biological time for the Emeritus Professor to retire.

Conclusions

Careful consideration of the above is needed to avoid on one hand exaggerations and on the other to recognize the necessity of updating and adjusting our findings to the European environment,which is far away to that existing in American Universities. It could lead progressively to the formulation and to the implementation later on of the draft text of the first European University Relationship Agreement between Emeriti Professors and the University. We believe that the European Association of Professors Emeriti (EAPE) is the most appropriate body to commence this task that will establish the role of Emeriti Professors in the European Universities.

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THE HISTORY AND ACTIVITIES OF THE EUROPEAN ACADEMY OF SCIENCES AND ARTS

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The European Academy of Sciences and Arts has an enormous valuable pool for the emeriti too. The emeriti should be more involved in all research activities and should act as tutors to the young generation.

The European Academy of Sciences and Arts is a learned society which has been founded in 1990 by Felix Unger, Kardinal König and Nikolaus Lobkowicz. At present there are over two thousand members registered, whereby 90% are from Europe and 10% outside of Europe. In overall there are additionally 34 Nobel Prize Winners: It is important to stress the Nobel Prize Winners, nine of them have been already members of the Academy when they later got the Nobel Prize.

The main mission is acting interdisciplinary, transnational and building bridges. The two thousand members are in eight classes as Humanities, Medicine, Arts, Social Sciences - Law and Economics, Technical and Environmental Sciences, World Religions and Corporate and Public Governance. A specific emphasis is in meetings which should be interdisciplinary, for example Artificial Intelligence. Another part of the work are reports to the European Union and the Food and Agriculture Organization (FAO). A specific aim is driven to the Tolerance project; the first Prize of Tolerance was awarded to Teddy Kollek, later additionally the Rings of Tolerance were handed over in Cologne. The Academy composed the Charter of Tolerance which was handed over to the United Nations in November 2002.

In evaluating the age distribution we have a mean age of near to 70 years. This reflects the age of the Academy, the elder people joined the Academy in an age around 50 to 60 years 30 years ago and there are gradually aging. With the new concept of nomination the mean age of the new members is 59 years.

What is the main emphasis in the message what we can do? Academies are the site where valuable experience of all members can be compiled. It is important to

stress out that the knowledge of emeriti is very very important to develop future steps for the society and to teach the youth. This was the reason why we founded the Alma Mater Europaea as a bridge between emeriti and students.
No society can avoid anymore not having the emeriti included in the whole educational and scientific work. It is shaping Europe too.

THE ASSOCIATION OF PROFESSORS EMERITI OF THE ATHENS UNIVERSITY OF ECONOMICS AND BUSINESS: GOALS AND OBJECTIVES

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Abstract

The Athens University of Economics and Business (AUEB) was founded in 1920. It has changed two names before its present name. It aims at promoting the goals and experience of the University and assisting its students and graduates towards realizing their business ideas and plans. It participates in volunteer and social responsibility organized by student groups and training of unemployed persons.

Keywords: Athens University of Economics and Business; undergraduate and postgraduate teaching; volunteering; corporate social responsibility.

Introduction

The AUEB is a relatively small University specializing in the fields of Economics, Business Administration, and Applied Informatics.

It was founded in 1920 as the Athens Higher School of Commercial Studies by the Prime Minister Eleftherios Venizelos, Greece's great political figure following the existence of similar Schools in European capitals and with the academic assistance of the Swiss economist of the University of Lausanne Georges Paillard.

In 1926 it was renamed as Athens Higher School of Economics and Business and in 1978 it started offering masters' courses. In 1989 it received the name of Athens University of Economics and Business and ever since it has enjoyed a spectacular growth in its student intake and its undergraduate and graduate programs followed by a high reputation of excellence in its fields in Greece and abroad. Today it has 8 departments and 25 master programs in the three areas of its specialization.

In 2020 the University will celebrate its 100th anniversary. Over the years its graduates have held prominent positions in the Greek Economy as entrepreneurs, heads of Companies, Public Organizations, Banks as well as in the area of Politics and

Higher Education. At present many of its graduates serve in academic Institutions and large companies abroad.

Our Association of Professors Emeriti is a very young entity established in 2018 with its first official board elected in March 2019. In April 2019 AUEB joined forces with the Emeriti Associations of the University of Athens, the National Tehnical University and the Association of Universities in Northern Greece in order to form the Greek Federation of Associations of Professors Emeriti, following the initiative of the University of Athens.

At present our Association has 30 members. Our objectives fall into three major categories:

Interests of our members, Promotion of our University and Assistance to our students and graduates.

Interests of our members

We are planning various activities and initiatives which aim at representing the interests of our members. In collaboration with other similar associations and within the newly established federation or professors emeriti, various steps as well as collective legal action is being taken in order to reclaim parts of our pensions which were reduced dramatically over the past years. Also efforts have been made to change legislation which does not allow our members to be paid for services rendered to the University, unless they stop receiving their pension or accept a serious pension cut. Efforts for active involvement in funded research programs, election committees and doctoral supervision. Our members were excluded from these activities mainly following a law passed in May 2016. At the same time due to lack of academic staff many of our members continue to teach at the undergraduate and post- graduate levels without being paid.

Promotion of our University

Activities which contribute to the academic reputation and promotion of our University both locally and internationally, through the presence and the research work of our members and through the assistance offered to our University for the accomplishment of its strategic plans which include excellence in research, high quality in undergraduate and graduate education, expansion in new fields of the economy and further accreditation by international bodies.

Participation in funding efforts made by the Rector and vice-rectors of the University, using our networks of connections and contacting possible sponsors some of which are ex - students of ours.

Participation in the celebration of 100 years since the creation of the University which will take place in 2020 by participating in the organization of conferences and various events and by assisting in updating the lists of graduates and gathering relevant information.

Assistance to our students and graduates

One of the problems our students face is getting their first job or deciding which are the steps they should take in order to enhance their professional career. By offering professional advice, mentoring, and career counselling and through joining forces with our career office in its initiatives to fight unemployment, we can help both students and graduates who can profit from our long years of experience.

Additional advice to our student teams who plan to engage in an entrepreneurial activity, have a business idea and wish, with the assistance of the enterpreneurship center of AUEB, to develop a business plan which will help them in establishing their own start - up company.

Participation in volunteering and corporate social responsibility initiatives organized by student groups under the guidance of the University aiming at helping the poor, give advice to SMEs and train unemployed persons in improving their skills.

Conclusions

As a newly founded Association, we are most willing and confident that we can accomplish our objectives and make a positive contribution to our members, our University, our past and present students and the Greek society in general, through lessons drawn from our long years of experience in economic and administrative matters.

At the same time, we are also looking forward to contributing to the causes of the newly founded Confederation of Professors Emeriti which will allow us to join forces with colleagues from other Universities for our common benefit.

THE FEDERATION OF THE ASSOCIATION OF PROFESSORS EMERITI OF GREECE

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Abstract

My presentation describes the efforts of founding of the Federation of the Association of Professors Emeriti of Greece (FAPE). The text of the manuscript includes: A short history of the foundation of Greek universities, a history of foundation of four bodies of Professors Emeriti in Greece as well as a short description of the Statutes. The founding of FAPE and the content of the statutes will be described in more detail. In addition to the above, because the statutes of the Bodies includes an article for promoting the objectives of European Union, some important dates for Europe (9 May 1945, 9 May 1950, 21 May each year, 26 May 2019 and 30, 31 May, 2019) will be presented.

Keywords: bodies of Professors Emeriti purposes; days of Europe; federation.

Introduction

The founding and the development of universities in Greece since 1837, after the creation of the new state in 1830, were as follows: In 19th century, three universities were founded, in the 20th century, seven for the first 50 years and nine the last 50 years and in the 21st century, another five new universities, with a total number of universities 24, all of which are public. In the last reformation the Higher Technical Institutions were changed to universities (Higher Educational Institutions).

Foundation of Bodies of Professors Emeriti in Greece

The first **Association of Professors Emeriti of the University of Athens** was founded in 1979. The Statutes (Bylaws) include thirty - five articles. Three (3) amendments have been effected during the period of forty years:
In the 1st Amendment of the statutes in 1984, article 5 for membership status was modified:

As member of the Association is automatically enrolled every Emeritus Professor of the University of Athens, who wishes by his participation to contribute to the realization of the defined goals under Article 5. The addition to the article 5 was as follows: As member of the Association can be enrolled every former full professor as well as associate professors who are elected as permanent staff.
In the 2 amendment of the statutes in 2004 was added to article 5 the following:…. assistant professors can be enrolled.
The 3 amendment of the statute in 2017 was modified as follows: Addition to article 5: The administrative council can award the following titles: Honorary President: This title is awarded to members of the Association who have rendered outstanding services to the Association. This title was awarded to the Emeritus Professor Mr. Prokopios Pavlopoulos, the President of the Hellenic Republic,and to the former presidents, Professors Emeriti George Bozonis (dec.) and George Daikos.

Honorary Members: This title has been awarded to outstanding members of Universities in Greece and abroad. It has been awarded to the Emeritus Professor-Academician, Mr Loukas Christophorou, member of the Academy of Athens and to the Professor - Academician Mr. Stamatios Krimizis, member of the Academy of Athens.

Friends of the Association: This title has been awarded to outstanding members of the Society in Greece and abroad: It has been awarded to His Beatitude the Archbishop of Athens and all Greece Ieronymous II, and Dr. Antonis Papadimitriou, President of the Onassis Foundation.
Addition to paragraph 3 of article 13: The members of administrative council can be elected only for two - 3 year terms.

The Body - Association of Professors Emeriti of Universities of Northern Greece

Year of foundation 1999. This Association includes members from four universities: Aristotelian University of Thessaloniki, Macedonian University in Thessaloniki, University of Ioannina and Democritus University of Thrace. The Statutes include 10 articles: Members of this Association can be elected in accordance to the article five (5) of the Statutes.

The Association of Professors Emeriti of the National Technical University of Athens

Year of foundation 2017. The Statutes includes thirty-seven (37) articles. Article five (5) for members: Professors Emeriti and professors with ten years term in the University.

The Association of Professors Emeriti of the Athens University of Economics and Business

Year of foundation 2018. According to the article five (5) of the Statutes members can be: professors emeriti, former professors and associate professors.

Federation of Associations of Professors Emeriti in Greece

On 2 April 2019 it was decided by representatives of the four Associations already mentioned to create a Federation of the Associations of Professors Emeriti of Greece (FAPE).

The main principles of the new federation are as follows:
Each Association is equal to each other, in other words, each body has the same number of representatives in the General Assembly of the Federation. The Presidency will change after two years from the older to the newer Associations. In addition to that the General Secretary will be located in the Athens office of the Association of Professors Emeriti.
We are in the process of applying to the Magistrate's Court for approval of the Statutes for the creation of the Federation. The main purpose of the creation of the new Federation is to strengthen the presence of Professors Emeriti, over Greece and Europe, in education, science and society.
My presentation will focus on the main points of the Statutes of the new Federation.

Article 2: Purposes

1. The unified representation of the FAPE Members' Associations in the major issues of interest to the Associations and their members.
2. Coordination of the activities of the Association Members.
3. Strengthening the relations and communication between the Associations, Members for the benefit of the community.
4. Promotion of the goals of the members of the Associations.
5. The study of issues related to higher education and higher education institutions and related issues of Professors Emeriti.
6. Promoting the objectives of the European Union in cooperation with the European Association of Professors Emeriti and other similar Unions.
7. The expression of opinions to the State and the Universities, as well as the provision of any kind of assistance for the realization of the goals of university education.

8. Contribution and exploitation of FAPE Members' Associations for issues related to Higher Education and the operation of the Universities of the Country in collaboration with professional bodies related to the scientific issues of the members.
9. Claiming pension and financial issues in general that contribute to the improvement of the financial situation of the member associations.
10. Defending the social affairs issues of the member - organizations.

Article 3: Means of implementation

1. The achievement of the above objectives shall be pursued by FAPE by any appropriate and legal means, mainly by: a) organizing lectures, educational and research programs and opinions, as well as other scientific, social and cultural events, b) participation in Greek and international scientific societies, in the context of a joint effort to promote science, c) the publication of a scientific journal and d) the organization of pan - Hellenic conferences of FAPE.
2. The Board of Directors of FAPE can award honors to original research papers, fund research work, provide scholarships for the retraining of young scientists and proclaim scientific competitions on subjects that promote its goals.

Article 4: Founding members

1. Members of FAPE may become Primary Associations of Professors Emeriti of Greek Universities. Only one Association of Professors Emeriti from each University may be a member of FAPE.
2. Membership Associations are equal and maintain their autonomy.
3. The Presidency of FAPE will alternate between the Associations Members every two years according to the seniority of the Primary Member Association.
4. For the registration of a Primary Association to FAPE it is required: a) A decision of the General Assembly of the Association, which is evidenced by a copy of the relevant minutes b) a Copy of the Statutes of the Association c) application for registration with fee payment d) copy of the register of the members of the Association.
5. The General Assembly of the Representatives of FAPE decides whether or not to accept the application for registration of each Association - Member.

Important days of May for Europe

The article 2 of the Statutes, paragraph 6 declares: Promoting the **objectives of the European Union** in cooperation with the European Association of Professors

Emeriti and other similar Unions. I would like to mention some important days of May for Europe:

9th of May - Day of Europe

9th of May 1945, was day of the end of 2nd World War.

9th of May 1950: was also the day of the **Schuman Declaration**, it was the statement made by the French minister of foreign affairs Robert Schuman on 9 May 1950.

It proposed to place French and German production of coal and steel under one common high authority. This organization would be open to participation of Western European countries. This cooperation was to be designed in such a way as to create common interests between European countries which would lead to gradual political integration, a condition for the pacification of relations between them: "Europe will not be created all at once, or according to a single plan. It will be built through concrete achievements which first create a de facto solidarity. The coming together of the nations of Europe requires the elimination of the age - old opposition of France and Germany".

21st of May - World Day for cultural diversity for dialogue and development

The following statements were declared on the occasion of this day from the Body for cultural diversity:

Three - quarters of the world's major conflicts have a cultural dimension.

Bridging the gap between cultures is urgent and necessary for peace, stability and development.

Cultural diversity is a driving force of development, not only with respect to economic growth, but also as a means of leading a more fulfilling intellectual, emotional, moral and spiritual life.

This is captured in the seven culture conventions, which provide a solid basis for the promotion of cultural diversity.

Homo Virtualis is the conception of a humanity of sciences, cultures and social values.

26th of May - European Parliament Elections, 2019 - 2024

The voting results give the real message that there is a growning trend of euroscepticism, which means that the European Union has to take measures to satisfy European people, based on principles and priorities of the Union.

The young generation knows only the freedom and enjoys peace and prosperity in the frame of European Union and shows almost apathy to the future of European Union. The mobility programs Erasmus promotes the concept of **Citizen Europe**.

30th of May to 1st of June 2019: 1st International Congress of EAPE

The Associations of Professors Emeriti of Greek universities, the Federation of Professors Emeriti of Greece, as well as the European Association of Professors Emeriti, which organized the First International Congress with the theme of **The Capital of Knowledge**, are working to promote the objectives of the European Union, to save the future of European civilization and to improve our home, Europe.

Conclusions

I would like to conclude my presentation by remembering the imagination of Victor Hugo (1802 - 1885): In 1849, Victor Hugo imagined that there would be one day in the future in which the United States of America and the United States of Europe will shake hands with each other, over the Atlantic Ocean.

STUDENTS' PERCEPTION OF THE ROLE OF PROFESSORS EMERITI (Pr Em) IN EDUCATION

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Abstract

As a Medical Students' (MS) organization concerned about medical education, Hel MSIC (Hellenic MS' International Committee), recognizes the crucial role of Professors Emeriti (Pr Em) in it. Their contribution to the improvement of medical schools' curricula is believed to be a matter of utmost importance as they acquire lifelong experience of medical schools' function, of MS' needs and of healthcare systems' demands. In addition, Pr Em are considered to be ideal individuals to assume the role of a mentor for MS because they are highly aware of the requirements of their respective specialty. Also, they could contribute to the maintenance of MS' mental health which is an issue subjected to a lot of discussion recently. Pr Em could also assist MS' organizations to improve the academic quality of their activities and act as advocates towards curriculum changes.

Keywords: Pr Em; Hel MSIC; medical education; healthcare system; mentorship.

Introduction

In the environment of rapid medical advancements, new challenges and new knowledge, the role of all contributors of medical education seems to be crucial. Students with their active participation and engagement, in collaboration with the academic staff, should constantly strive to provide society with well educated, well trained and sensitive doctors. Pr Em with their guidance and consultation can assume a major role in medical education. Regarding their long experience in this field and their undeniable contribution to medicine, their assistance as educators and coaches is more than necessary and truly welcomed by Medical Students' (MS). From areas of research to personal development, as well as in public health issues and government advocacy, Pr Em and MS can together have a highly considerable impact and

achieve positive changes. Active students' organizations such as Hellenic MS' International Committee (Hel MSIC) organize activities in the fields of Medical Education, Public Health, Human Rights, Sexual & Reproductive Health and Research & Professional Exchanges. They consist of a number of students who are highly aware of issues related to medical schools' curriculum, intercultural learning, global health and human resources, and with the contribution of Pr Em they will be able to implement their ideas.

Curriculum development and advocacy

As MS are witnessing, some of the medical schools in Greece are going through a constant effort of reconstruction and improvement of their curricula, in order for them to correspond to MS needs and provide students with the essential knowledge and skills, in as many fields as possible. However, we haven't reached the perfect version of a medical curriculum yet. It is also obvious that even though students request to acquire a substantial involvement in the process of medical school curriculum reconstruction but they are not provided with the opportunities and the tools to do so. The Standing Committee on Medical Education of Hel MSIC has set as a goal the implementation of a situation analysis and needs assessment so as to offer a realistic, argument - based proposal to medical schools. During this procedure we realized that the role of Pr Em from all around Europe should be highly considered. Through their experience and familiarity with various medical education and health systems all around the world, they could gather all the best practices and effective methods and propose them to the Faculties, supporting the effort for a complete, holistic, effective and sustainable medical curriculum, for both students and professors. However, no matter how impeccable a medical curriculum is - particularly considering its current situation - there will always be room for more practice, hands - on experience and better acquisition of skills, as far as students are concerned[1]. Furthermore, young students seem to be more and more concerned about issues in the field of education and healthcare and feel the need to be engaged in every matter about their future professional conditions. Hel MSIC has set as a goal for the next years to promote statements and theses about such issues, representing MS of Greece. In the next step of advocacy to the respective authorities, we consider Pr Em support to be significant[2], as they have realized the weaknesses of healthcare systems and medical education.

Mental health

As many recent studies reveal, the mental health of healthcare professionals including MS is deteriorating and this phenomenon has been subjected to a lot of discus-

sion. The working environment, the working hours, the demands of medical schools in the sectors of both knowledge and skills, the emotional burden, the sacrifices of social life and the sense of responsibility towards the patient are some of the factors which lead a considerable number of MS to a wide variety of problems related to their mental health. In the highly demanding and competitive environment of a medical school, signs of burnout, emotional outbreaks and symptoms of mental illnesses[3] are observed among MS on a daily basis. Pr Em could assume a vitally important role in maintaining a socially sustainable environment of medical education. They could intervene in interprofessional relationships, in the delegation of working tasks and hours as well as in the conflicts between healthcare professionals. They could also have an active role as mental health consultants in hospitals affiliated to universities and provide help to MS and junior doctors in order for them to realize the importance of their own mental health, set it as a priority as healthcare professionals in the future.

Mentorship

Furthermore, Pr Em are individuals who have achieved a lot in the field of medicine and education, acquired a lot of experience and had a substantial contribution to various scientific fields. Throughout their studies, MS come across various medical specialties and educational opportunities but they still have a sense of insecurity towards career orientation. Pr Em could contribute to MS professional development[4,5]. They could provide them with advice, present opportunities according to their goals and assist them in their professional development. MS need opportunities in order to become familiar with various education and health systems across the globe, mobility, healthcare workforce's characteristics research and social accountability which will help them choose the career they desire to follow. Raising awareness on the abovementioned issues should be Faculties' responsibility, as well as other relevant Organizations' and stakeholders', highlighting the importance of Pr Em guidance and contribution.

Students' organizations

As mentioned before, Hel MSIC organizes various activities in six fields which have as an underlying and most important aim to reveal MS needs that are not fulfilled by medical schools and gradually incorporate them in the curriculum. In these six areas of action, Pr Em support is considered to be prominent, as they could offer their knowledge and experience in order to increase the academic quality of our Hel

MSIC activities by contributing to the formation of their scientific content. The mission of those activities is to respond to current affairs, deficiencies of medical education and demands of contemporary healthcare. Under those circumstances, there will always be opportunities for fruitful exchange of ideas and collaboration with Pr Em. Research methodology, clinical skills development, doctor - patient communication, prevention and non - communicable diseases, comprehensive sexual education and many more consist some of the subjects that Hel MSIC is currently working on and a collaboration with Pr Em could be achieved. The powerful combination of MS' unquenchable enthusiasm and Pr Em lifelong experience could bring the change that everyone of us would like to see in medical education and health in general.

Conclusions

As MS and active members of a students' organization, we envision a society of MS and future physicians equipped with values and social conception, in order to promote humanism and an holistic approach of medicine. Therefore, we strongly believe that a future collaboration between Pr Em and Hel MSIC would fortify our efforts and would contribute to medical education. We could realize its weaknesses and work effectively towards its enhancement, getting the most out of students' voluntary work and Professors' experience.

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BACK TO LEARNING. THE ROLE OF MENTORSHIP

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Abstract

Mentoring as a desired practice in educational organizations has come to the forefront in discussions about learning and teaching in recent decades. How to develop good practices as mentors / masters in schools and workplaces and as professors in our institutions of higher education is a crucial question. Mentoring as a concept in educational theory in the European tradition is closely connected to what has been called the *Socratic Method*. The role of the teacher is to be an interlocutor, a person of experience with whom young people can converse. Questions and reflections should help to develop young peoples' curiosity and engagement in the search of new knowledge. This understanding of knowledge and learning corresponds with an apprenticeship model of learning. Contradictions between outlooks on ways of learning area central issue in our times. I discuss this problematic in relation to the scientific work of John Dewey, Paulo Freire, Maria Montessori and Lev Vygotsky.

Keywords: social division of knowledge; vocational pedagogy; pedagogy of professions; cultural - historical activity theory.

Introduction

For the past decades the development of information technology has brought revolutionary changes to the work of the hand and the mind in all practical professions as well as raising challenges to scientific work and the art of teaching. The expansion of education in formal institutions after World War II has created new fundamental questions about learning and teaching in society. In Norway 60 years ago, universities were the domain of a small elite. Most people had seven years of schooling. With industrial capitalism, vocational education and training of the working class developed in technical / vocational schools where hands - on learning in workshops is central as it is through apprenticeships in workplaces. Today young people are expected to complete thirteen years of formal schooling before entering the labor market and / or institutions of higher education. This is part of a global trend which harbors among other things a belief that the expansion of equal rights

to higher education will solve class contradictions in society. Reality has shown the complexities in these issues[1,2].

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 prospered and learned when they were in activity in the workshop in the vocational school or in the workplace, while they found little meaning or relevance to the many hours spent in general education classrooms. They showed up in the workshop, but they failed to show up for the academic class[3]. What are the reasons that vocational students' and apprentices' experiences of learning and meaning in the workshop setting and working life have contrasted so sharply and so negatively with those of the school where learning takes place in classrooms? The practice in master / apprenticeship traditions and mentoring might play a key role in this regard.

The concept Mentor was inspired by Greek mythology. The character of Mentor in Homer's "Odyssey" brought the concept to life. Though the actual Mentor in the story is a somewhat ineffective old man, the goddess of Wisdom, Athena, takes on his appearance in order to guide young Telemachus in his time of difficulty. Through her actions, she is the wise Mentor to the young man.

New mentoring voices

New mentoring voices have come to the fore in the recent decades. Women have entered the scientific world and have posed new fundamental questions to the traditional social division of knowledge. Women have also entered as participants in academic positions and they have presented theories critical of the prevalent ways of thinking in both social and natural sciences. One central question, posed by both men and women, is whether scientific paradigms have remained encapsulated within those intellectual traditions that emerged in Europe in the sixteenth century, the era which saw the increased dominance of science in Western Capitalist societies. The philosopher Thomas Kuhn called in his book *The Structure of Scientific Revolutions* for a change of paradigms in both natural and social sciences[4]. The sociologist Dorothy E. Smith calls for a shift of paradigms in her book *Institutional Ethnography. A Sociology for People*[5]. In pedagogy, the need for changes has created many schools of thought during the past hundred years.

One of the women pioneers, both as a pioneer in the medical profession and a revolutionary in pedagogy, was the Italian scientist Maria Montessori. She was the first woman to be allowed into the study of medicine in Italy, in 1896. She is famous as a philosopher and practitioner in educational science. Her ideas have

given inspiration to educators worldwide. Her devotion to research and practice among deprived children has spread its influence far beyond Italy. There are Montessori - inspired kindergartens and schools in many parts of the world, in Scandinavia, as well as in Latin America and Africa. She became an inspiration and a mentor for many educational scientists in the previous century. She had a strong belief in everybody's ability to learn and was deeply concerned about the teacher's ability to adjust and redeem the inherent abilities in human beings. A teacher should be a guide and a mentor.

Mentoring and the Socratic method

Mentoring as a concept in educational theory is closely connected to what is called *the Socratic Method*. The role of the teacher was to be an interlocutor, a partner with whom young people could converse, discuss and analyze. Questions and reflections should help to develop young peoples' curiosity and engagement in the search for new knowledge. Through conversations and through posing and answering questions, participants' inherent understandings and insights are elaborated, clarified and deepened. Thanks to Socrates' famous student, Plato, and Plato's famous student, Aristotle, *the Socratic method* has come down to us. Another part of his thinking, *the Socratic turn*, implied turning away from mere perceptual knowledge and attempting broader, comparative explanations of external things. *The Socratic turn* involved respect for competence and the work of practitioners in various walks of life. Aristotle, following Socrates and Plato, developed his thinking about learning by taking practical craft competence as his "self - evident" starting point and model.

Socrates questioned whether science and philosophy of his time were really in touch with the living course of human life. We can ask the same question today. Time in academic classrooms has increased and time in workshops learning has decreased in recent reforms. Students and apprentices in the vocational trades prospered and learned when they were in practice in the workshops, whether in vocational schools or in the workplace; conversely, they did not find much meaning or relevance in the academic classrooms. Meaning and motivation are two sides of the same coin. The students I observed, and those I taught, regarded academic classrooms as contributing little meaning for their future life, since their scientific underpinning of their practical learning was presented as phenomena far away from their practical reality. On the other hand, the hands-on learning they found in school workshops and working life stayed with them for life.

Mentoring in the apprenticeship model of learning

Workshop learning has its roots in apprenticeship learning as it was practiced in the guild system of feudal Europe. The guilds were organised in three ranks: master, journeymen and apprentices. Older and younger people worked and learned together in workshops. Hands - on learning was the order of the day. The master demonstrates, instructs and explains. The apprentices train and repeat, assisting each other with the help of the master till they perform the tasks without assistance. Vocational schools as they developed in the industrial era borrowed from the traditions of the guild system. Here, workshops were the main learning arena. On the other hand, there are the traditions of the classical Cathedral Schools of the Middle Ages, where students are sitting in rows listening to a teacher in front of them. Individual learners are disciplined by clock - hours and evaluated and graded in accordance to what they reproduce in exams. The reforms in education have tried to challenge these traditions and make the twain meet without much success till now.

These starkly contrasting traditions are present and visible in the educational system today and part of the contradictions between the work of hand and mind, between intellectual and manual labour as it has developed in society in recent centuries. It permeates our activities and is also fundamental to how we pose questions in scientific research[6]. The Brazilian scientist, Paulo Freire, attacked the traditional school for having "a banking concept of education" in which the student was viewed as a savings account to be filled with information from the teacher - savings which students could withdraw from the bank later. As an alternative, he suggested a Socratic approach: *"A Pedagogy of Questioning"*[7].

From Socrates to Vygotsky in the new science of learning

The questions posed by Socrates are central today both in science and pedagogy. New insight is emerging. Paulo Freire pointed to the dialectic between theory and practice. Theory without practice would be mere abstract thinking, just as practice without theory will be reduced to naïve action[7,8]. "Learning by doing" is a well - known concept from John Dewey's laboratory schools in Chicago. Another of Dewey's insights following *the Socratic turn* is his point of departure in that there is a form of useless theory that stands opposed to practice. Real scientific theory is located within the bounds of practice and functions as the impetus for expansion; it provides direction toward new possibilities[9]. This also mirrors the work and insight of Lev Vygotsky a hundred years ago[10,11]. He criticized traditional teaching for having an atomistic view of learning. Among other things, he felt that both the splitting

up of school subjects and the parcelling out of teaching content into individual subjects contributed to the elimination of the meaningfulness of the individual subjects. Knowledge, he argued, cannot be taken out of its natural context and passed on in isolation; it can only yield meaning and create motivation if it is taken up as a part of a whole.

He laid the groundwork for a scientific understanding of how human beings learn through activity and cooperation. As Vygotsky said: Neither the mind nor the hand can do much alone. The deed is brought to fruition through activity and cooperation. This points towards transcending traditional perceptions in the present social division of knowledge in society.

Conclusions

New knowledge and practices are evolving. Research from both neuroscience and social science on learning are becoming part of critical debates in educational theory. These developments also lay the groundwork for challenging practice in educational institutions. “The master - apprentice learning model”, “learning through activity”, “situated learning”, “social learning” and “learning by doing” are now important concepts in the academic debate about learning[12,13].

Learning theories rooted in master/apprentice traditions pose fundamental questions to the unnatural separation from our own humanity as it is practised in educational systems. Concepts relevant to the present century are vocational pedagogy and vocational didactics. Vocational pedagogy, a learner - centered approach to teaching and learning and vocational didactics, teaching and learning as they pertain to working life are new concepts in the field of education describing how youngsters in vocational school workshops learn through activities and in cooperation with a mentor and each other[14,15].

The concept Pedagogy of professions has developed in relation to the contradictions in higher education, and new doors are opening towards adopting the master / apprenticeship traditions with mentoring and student cooperation. All this promises a brighter future for education everywhere.

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A NEW BEGINNING FOR EMERITI AT THE UNIVERSITY OF BRITISH COLUMBIA: THE UBC EMERITUS COLLEGE

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Abstract

In recognition of the contributions and future potential of the University of British Columbia (UBC) emeriti, UBC and its Association of Professors Emeriti established an emeritus college in 2018. Baldwin and Zeig define an emeritus college as an organized unit of a university established to promote the continued intellectual, scholarly, and social involvement of retired faculty members. The emeritus college at UBC is the first of its kind in Canada and the latest one of a total of a very small number of them in North America. At UBC emeriti are working productively as a group of volunteers with a small paid staff and university funding to be creative and unique. This brief presentationon the experience of the UBC Emeritus College discusses our actions of the past few years and introduces some of our ideas, future programs and activities.

Keywords: Emeritus faculty; Emeritus colleges; faculty development; retirement; universities and colleges.

Introduction

Established in 1987, UBC's Association of Professors Emeriti (UBC - APE) was the first association of retired emeritus faculty in Canada. The original purpose of UBC - APE was quite modest and practical: to create a social network of retired professors and advocate for a university-administered health care plan for retired faculty. Three decades later, the new UBC Emeritus College that replaced APE in 2018 acts to recognize and broaden the intellectual, social, and community volunteer networks of emeriti, and helps to sustain and deepen the University's commitment to its emeriti[1]. This accords with Flaherty's review[2] of the role of the emeritus colleges

in North America: that they serve as a permanent intellectual bridge to retirement for emeritus faculty. APE partially filled that role at UBC before the establishment of a formal emeritus college.

Even though the concept of the emeritus college had great merit, the prospect of convincing UBC of the need for one appeared daunting. Circumstances changed abruptly, however, following the arrival and expression of full support by the new president of UBC, Dr. Santa Ono, in 2016. At the president's invitation, emeriti in 2017 began drafting a full proposal for an emeritus college. We were naïvely unaware of how much work lay ahead for us. There simply were no clear blueprints to provide guidance, either for the University or for APE. In the end, we were able to establish the UBC Emeritus College quite quickly, but we then faced uncertainty in our attempts to implement the plan. This paper will describe what was involved in achieving and celebrating this noteworthy new home for UBC emeriti, and in planning for the secure future of the Emeritus College at the University of British Columbia.

Inaugural year of the UBC Emeritus College, May 2018 to June 2019

Our proposal[3] to the governing bodies of the university took one year and the efforts only of a very small committee of our Association to prepare: UBC's Senate and Board of Governors approved the proposal in May - June, 2018. In order to develop strategies for organizing and re - organizing committees, programs, budget, staff, physical space, and publicity for the College, we then held two one - day summer planning retreats of our College Council. Over the winter of 2018 - 2019, the College negotiated a generous operating budget from the University; wrote job descriptions for, and hired, two part-time members of staff; created a substantial website; and negotiated and planned for temporary quarters and, eventually, modest permanent space in new building scheduled for 2022.

Most difficult of all were the College's negotiations with representatives of UBC's Senate and legal department over terms of reference for the governance of the College. The document had to incorporate the traditional structures of UBC - APE and also to comply with the myriad policies, regulations, and systems at UBC. Dissolution of the former UBC - APE was a necessary final step to implementing the College. The Senate and Board approved the terms of reference document[4] in March - April 2019, less than one year after the founding of the College.

We celebrated the one - year anniversary of the College in two different but equally

important ways. First, we held a very successful public event: a two - day interdisciplinary symposium, "Scholarship and the Future University,"[5] in April 2019. Invited speakers and panelists presented research and provoked discussion on topics ranging from the impact of World University Rankings on the changing nature of academic work, and interdisciplinary approaches to an emerging new area of research: "Outer Space Studies". We also established the UBC Emeritus College Priorities Endowment Fund, which will be necessary for sustaining the programs of future generations of emeriti. Making the endowment possible was a personal donation of 50,000 $ (approximately 37,500 €) from a UBC professor emeritus. The donor asked that his gift be used for promoting alternatives to the common practice of "closing the door behind" emeritus professors when they retire. It was this large donation that enabled the College in 2019 to establish at UBC a protected, high - interest endowment fund from which the Emeritus College receives a portion of the annual interest earned to spend on any aspect of its programs or operations. The University recently announced it will provide a donation that will match the original gift.

The Emeritus College has also in its first year increased its outreach to associations of retired university faculty in Canada, the United States, and abroad. Members of our executive have, for example, given talks on the founding of the College at the AROHE (American) meeting in Atlanta (2018), and in 2019 at the international congress of the European Association of Professors Emeriti in Athens, and at the College and University Retiree Association of Canada (CURAC) annual conference. We also sponsored the UBC Emeritus College panel, "Extending the Academic lifespan: Staying Connected After Retirement", at the annual Congress of the Federation of the Humanities & Social Sciences in Canada and presented the College's first Annual Report to the UBC Senate.

Transitional programs of interest

Just before becoming an emeritus college, the Association in 2017 had negotiated with UBC for a research expense reimbursement fund of 100,000 $ (approximately 75,000 €) per year from the president's office. The fund awards partial reimbursements to support individual retired UBC faculty and librarians with the continuing scholarly activities for which they have no other sources of funding and emeriti created and funded the new UBC President's Award for Distinguished Service by an Emeritus Professor that is presented annually at a special ceremony of the College. Two award winners have been chosen to date: one is a Business School emeritus

professor who applied his talents after retirement to rescuing small arts programs throughout British Columbia. The other is a Dante Scholar who retired from the Faculty of Arts in 2002 and since that time has developed and run a special scholarship fund and program for orphaned, secondary school girls who showed academic promise from the poorest, HIV - AIDS - ridden, parts of Kenya. Programs such as the two just described recognize and encourage the multiple aspects of academic life after official "retirement".

What lies ahead

In this busy past year for the Emeritus College we have taken time out to consider future plans. Among the ideas being discussed are: 1) making the Emeritus College Interdisciplinary Symposium an annual and eagerly - anticipated event 2) establishing a downtown Vancouver Emeritus Research Lecture Series on topics of interest to the public 3) introducing an annual award for excellence in the engagement of UBC emeriti with new areas of innovation, research, artistic creation, and collaborations. These and other ideas for future programs have the potential to secure additional donations for the College's endowment fund and thus safeguard the long-term future of the College.

Conclusions

Universities and colleges are recognizing the bold fact that, as Baldwin and Zeig[6] have argued, "the intellectual and social capital faculty build over a lengthy career do not expire with retirement". The possibilities for emeritus professors today, it seems, are becoming endless. In our experience, however, without the enthusiastic support of the university, establishing an emeritus college would be impossible. Even when strongly supported by the university, bringing an emeritus college into being requires a great deal of effort on the part of usually only a few individual emeriti to keep up the momentum, which is critical. UBC emeriti believe that the UBC Emeritus College has been worth the time and effort as it provides the best intellectual bridge to retirement for those who want to remain engaged intellectually, academically, and socially post - retirement.

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TEACHING THE IDEA OF EUROPE: THREE EPIC MOMENTS

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Abstract

Homer, Virgil and Dante in their respective epics illustrate some of the fundamental aspects of European culture. All three may be seen as mentors of a European idea and of Europe as a distinct space of converging cultural traditions. Becoming aware of those traditions today is crucial in view of the fact that concerted European policies mainly focusing on politico - economic issues seem inadequate to ensure what Jean - Claude Juncker recently referred to as our "collective (European) libido" and love for Europe.

Keywords: politics; culture; tradition; pagan; Christian.

Introduction

It was only a couple of weeks ago that the President of the European Commission (EU), Jean - Claude Juncker, commenting on the state of the EU, complained that "We don't love each other. We have lost our collective libido … Five or six years after the Second World War there was one. Yet these days it should be much easier for Europeans to fall in love with each other than it was in 1952". Juncker is certainly right on at least one score: In the immediate aftermath of the Second World War enthusiasm was particularly strong for a politically unified Europe which would hopefully be immune to the temptation of yet another outburst of animosities among European states. The movement culminated at an emotional congress at the Hague in May 1948 and the Council of Europe was founded one year later. The creation in the following years of the European Coal and Steel Community, the European Common Market, the Single Market, through to today's European Union is a well - known narrative, where, as might be expected, political and economic considerations played an increasingly important role.

Europe as cultural space

Now, I will not hasten to doubt that people may be wracked by some kind of libido for an institution where politicians and economists rule the roost or that a Brussels - based matchmaker service may arrange full blown love relationships. On the

other hand, I allow myself to think that when Juncker complained about the lost libido and love at the back of his mind he had, even if vaguely, something broader and more idealistic than the present realities of the European Union. And I believe that this broader and more idealistic something is the idea of Europe as a space of more or less convergent cultural traditions and of Europe as a particular form of moral consciousness. And I hope that you will agree with me that throughout history people have found it more natural to fall in love, often in passionate love, with ideas rather than with economic graphs and political pacts.

I am using the expression "idea of Europe" in full awareness of a work published in 1947 by the Italian historian Federico Chabod[1] and titled, precisely, "L' idea di Europa'. It is the first of a long series of publications by European scholars and historians on Europe as a cultural space which, despite internal diversities, as a whole displays the kind of common denominator that allows it to be clearly distinguished from other cultural traditions - from what is *not* Europe. In our days of political correctness and cultural inclusivity this way of thinking may sound rather unfashionable, but this is how Chabod[1], and many others with him, started to work out the peculiarity of Europe's intellectual, spiritual, cultural and educational traditions.

Homer, Virgil, Dante

Unlike others, Chabod[1] goes all the way back to Antiquity in search of the birthdate of the idea of Europe, but more importantly he sees the core of this idea in what he calls "the European Republic of Letters". This Republic has, of course, many magistrates, ranging from the dawn of European history to our days, but I choose to single out three epic moments which in my view constitute three crucial contributions to the ways in which Europe, and by extension the West, have always looked upon fundamental issues of human existence and morality. These three epic moments are represented by Homer and his two epic poems, the *Iliad* and the *Odyssey*, the Roman Virgil and his epic on Aeneas, the mythical forefather of the Roman nation, and Dante Alighieri with his magisterial *Commedia Divina*. I tend to think of them as providing a powerful and defining mentorship on what I would broadly term as a distinct tradition of European humanity.

In the beginning was Homer. Coming at the end of a long tradition, the *Iliad* and the *Odyssey* are the very first European narratives which negotiate the place of man in a world poised between the exigencies of war and the promise of peace, between personal ambition and collective responsibility, between the right to exact revenge and the recognition of the demands of common humanity, between the powerful drive to conquer and explore and the irresistible longing for hearth and home. Despite the

distinctly archaic profile of their heroes, the Homeric epics show them involved in passions, desires, aspirations and doubts which we can still recognize as constituents of our existential and moral thinking. In fact, the Homeric poems right at the beginning of European literature monumentalize such aspects of human existence in ways that became paradigmatic for the following centuries of Greek cultural life. It was an old, time - honored conviction that Greece was "schooled" by Homer. If they had known the word, the ancients might well have preferred to rephrase: Greece was mentored by Homer. And after all, our celebrated mentoring originates with Homer's Mentor, the disguised ego of Athena, goddess of wisdom.

Some eight centuries after Homer, the Roman poet Virgil, with Homer as his guide, composes his own epic about the Trojan Aeneas, who after the fall of Troy is instructed by the gods to sail west towards a new home in Italy. It is ordained by fate that the refugees of Troy and the local Italian tribes, after a bloody confrontation, will blend into one nation, and Aeneas' successors will found Rome, the city which is destined to rule the whole world. While Homer's epics present us with the universal aspects of human condition, Virgil fashions out of Homer a modern narrative motivated by a political and ideological agenda. The historical Rome which emerges out of the Aeneas myth is a superpower which presents itself as a civilizing force and claims geopolitical as well as divine authorization for its expansion. However, beyond imperialist triumphalism Virgil's modern sensibility allows us to clearly see the huge human cost involved in the pursuit of power, recounts the miseries of exile and lost homeland and sheds light on the crucial issues of nation building and national identity. The Rome prophesied in his poem outgrew its historical specificity to become in the following centuries a kind of metaphor and symbol both for the celebrants and the critics of the will - to - power. If Homer is our mentor on the universals of human condition, Virgil's mentorship calls our attention to the fact that behind the historical process there lurks not only the heroic code of exceptional individuals but also particular ideological and political programmes and collective projects which monitor the pace of History.

Virgil infused historical and ideological meaning into a Homeric narrative dominated by heroic idiosyncracies; Dante, taking Virgil as his guide, makes the epic form the vehicle of a purely spiritual journey. And if Virgil's Aeneas is the embodiment of a collective ideological impulse towards the historical reality of a worldly *imperium*, the *Divine Comedy* radically christianizes the epic form to transform it into an allegory of the soul's progress towards God. Virgil substitutes a meaningful scheme of History for Homer's all - embracing anthropology, Dante's metaphysical

vision substitutes the City of God for the City of Caesar, the spiritually eternal for the historically circumstantial. His mentoring is not of this world.

An adoptive European, T.S. Eliot saw the close relationship between Dante and Virgil as the bridge between the pagan and Christian worlds. More importantly, he saw his own idea of Europe enshrined in and guaranteed by its literary, political and religious traditions. Opinions as to who best represents these traditions will no doubt vary. In my view, the epic triad I have chosen to briefly present sums up not only the main features, characteristics and aspects which lie at the roots of a distinctly European conception of the human condition but at the same time this epic triad, these three epic moments in their chronological succession seem to me to best illustrate the main twists and turns of the historical process that defined Europe's cultural identity and peculiarity. Homer, Virgil and Dante uniquely complement each other to make up a fundamental compendium of the ideas that historians, intellectuals and educators have in mind when they talk about the idea di Europa. Homer was Virgil's mentor, Virgil was Dante's mentor. In a sense, by virtue of participating in European culture, we are all their mentorees.

Conclusions

Whether today we can fall in or out of love with Europe is an increasingly complex question contingent upon the vagaries of our fast moving, technologically driven, multicultural times. However, if through historical experience and by the hard way we have learned that the down - to - earth realities of a political and economic union are not enough to maintain the libido whose loss the president of the European commission laments, there is room for considering whether the idea of Europe as a form of cultural continuity and moral consciousness might contribute something that politicians and economists have so far failed to give.

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BACK TO THE CLASSICS

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Abstract

It is an unfortunate fact that in educational programmes classical education has been sidelined for a long time now, mainly in Greece, and to a far lesser extent in Italy, the two countries of classical antiquity that created the great Greco - Roman civilization on which Europe has been built.

I believe that now, in a multicultural and constantly changing society, a new, future - oriented approach to classical studies is needed.

Keywords: classical antiquity; Greco - Roman civilization; classical letters; globalization; classici contro.

Introduction

European thinkers have contributed a great many reflections and lessons on the value of classical antiquity, the timeless importance of Greco - Roman civilization and the need to impart this knowledge to the young in order to ensure proper education.

Can Classical Letters hold out in the era of globalization or should we perhaps modernize our approach to classical texts?

What should our educational policy be and how should we - especially Greeks and Italians - act to ensure the preservation of Classical Letters?

Return to learning the classics

Salvatore Settis[1], in his book "The Future of the Classical", answers the question and shows the way to this approach. It would be a good thing, Settis points out, if, even in a "global" framework, the Greco - Roman "Classical" retained, at least compared to any other historical civilization, a unique and unequalled distinctiveness that made it increasingly necessary to know in order to understand not only its long history but also the components of contemporary civilization, especially that stemming from European tradition.

The "Classical" could justifiably still be an object of study and attention and it would be advisable to recommend again its inclusion in education, not as a stereo-

typical and privileged dialect of the dominant classes or an elite but as an effective means to perceive the multiplicity of civilizations in the modern world, as an aid to comprehend the process of their mutual interpenetration.

Basing now classical studies on a framework of "globalization" we should not only denounce the vulgarized and outdated image of "Classical" as an out-of-time value but also suggest a view of the "Classical" extending into the future and process some fundamental principles of a new status of classical studies in a cultural framework subject to the radical changes imposed by our era. But to achieve this, we have to start from a shared view on the "sciences of antiquity" and therefore restrain the excessive interior segmentation of the disciplines of classical studies - a fragmentation of intentions and goals that often prevents us to realize the gradual marginalization of classical studies in the modern world - so as to reformulate the function and fate of the "Classical" towards a new goal.

The cultural study of the "classical era" may actually be - with the focus always on the present - by far the most appropriate field of analysis and comparison of civilizations, both because it is suitable for the exploration of the mutual contributions of ancient civilizations (e.g. Mesopotamia, Egypt, Greece, as well as the Etruscans, the Romans, the Galatians and the British) to one another and because those ancient cultural exchanges are very relevant, since it is from them - and not from a pure, exclusively Greco - Roman "classicity" - that the civilizations of Europe were born. Namely, because they have made us what we are today.

The "Classical" can and must be the key to an even broader comparison with "other" civilizations, genuinely "global" in a sense, because it is precisely in a "global" context that the long course of the history of all civilizations must be studied, with priority given to the phases of formation and exchanges (therefore, among others, in the classical era) or because the forms of cultural hegemony, acculturation and "globalization" of the Greco-Roman world can be a good reference standard.

The contribution of the Ancient Greek Spirit to the evolution and formation of Modern European Civilization is at least dual, as Prof. Prokopios Pavlopoulos, the President of the Hellenic Republic[2], points out; on the one hand the Ancient Greek Spirit shaped this civilization, and on the other hand it is showing us today the way to defend our civilization, mainly by preventing it from degenerating into a barren empirical field of plain knowledge accumulation and collection of plentiful yet pointless information.

The collective action “Classici contro”

In late 2010 in Italy, a collective action named “Classici contro” dealt with this unpleasant reality, one so ominous for Classical Letters, featuring the timeless value of the thought of the classics, which enables man to deal with the problems of modern world society.

So what does “Classici contro” mean? Who lead this movement and what are their specific activities?

The name “Classici contro” echoes the verses of the Greek poet Manolis Anagnostakis “Are you for or against?”. It seeks challenge with an untreasured contact between two words that normally don’t go together. This is the interpretation made by one of the two protagonists of this initiative, Alberto Camerotto, Professor of Greek Language and Literature at Ca’ Foscari University.

Ca’ Foscari University of Venice, in an effort led by Professor Camerotto and Filippomaria Pontani, Professor of Classical Philology, took the initiative to turn to society. In historic theatres of Italy expert scientists speak freely before the audience on crucial matters preoccupying citizens of any era, while at the same time highlighting the wisdom of the classical ancient authors through the tragedies and comedies of the Athenian theatre on equivalent issues of the antiquity, such as democracy, justice, and freedom of speech, as well as tyranny, demagoguery, populism, and xenophobia.

Given the fact that classical education has been pushed aside from the culture and education of European citizens, the two inspirators of this action seek the challenge: “Classici contro”. Through the papers of many eminent scholars there emerge the thought and discourse of the classics, surprising readers as they relate to so many issues of their own time.

The first 16 papers, bearing the title “Classici contro”[3] were published first in Italy in 2012, edited by the inspirators of this initiative, and then in Greece, with the same title «Κλασικοί κατά», edited by the historian Nikos Moschonas, Emeritus Research Director of the National Hellenic Research Foundation. The editor’s brief but exceptionally concise preface informs readers about the course of action followed by the groundbreaking creators and contributors of the effort to revive classical antiquity.

The 16 papers are divided into three thematic entities: 1. Foreigners and citizens 2. The City and 3. Authority. All papers are particularly interesting and I will indicatively cite a characteristic and especially didactic for our time excerpt from the paper of Professor Salvatore Settis, of the Scuola Normale Superiore di Pisa:

"The idea of common good has a dimension both ethical and political and entails a strong feeling of responsibility among generations: we must work today for the sake of the future generations. Now is the time for today's *militant intellectual* (if such people do exist) to make his voice heard, showing the advantages of an insightful look guided by the *revolutionary power of the past*. For those who never look back, towards their ancestors, will never be able to look ahead, towards their descendants."

The presentation of the Greek edition of the book took place at the Istituto Italiano di Cultura in Athens. Reading the collection of the 16 papers of the Italian thinkers, the reader realizes that the logos of the Greeks and Latins can waken and challenge citizens, and especially those governing present - day multicultural Europe, which seems to have forgotten its principles and values, blindly following the rules of money.

In 1996 the Greek Ministry of Education initiated an effort to create a European Centre of Classical Letters through cooperation between Greece and Italy with the aim of preserving the common cultural heritage containing the necessary elements that bring together the young in an effort to continue building a United Europe of values. Later on, in 2003, during the Greek presidency of the Council of the European Union, as a Special Secretary of the Ministry of Education, I had the honour to organize an international conference[4] on the same subject in Athens and in the symbolic place of Delphi. Personages of the Classical Letters, acting as representatives from all member states of the European Union, as well as from non - member states, have supported the establishment of this Centre and noted its activities. Unfortunately, these initiatives were afterwards forgotten and the vision of the creation of a Centre of Classical Letters has remained unfulfilled. Recently, Professors Th. Papanghelis and A. Regakos, of Thessaloniki University, along with the rector of the same university, announced the foundation of a Centre of Archaeognostic Sciences.

Today, as humanistic values seem to have been forgotten, conditions have matured and it is imperative to move ahead. I believe that during the first international conference of the European Association of Professors Emeriti the message that must be heard is that there should be a centre of classical archaeognostic studies in Greece. Today it is more imperative than ever before to return to the classics and the establishment of such a centre in Greece would be a loud message to United Europe.

Conclusions

Instead of being seen as an unalterable paragon, the "Classical" should become once again what it used to be, namely the motive for a systematic comparison not

only between ancient and modern but also between our "own" civilizations and the "other" ones: a comparison always serving the present. Because the constant invocation and reformulation of the "Classical" is and has always been nothing but an incessant quest for our ancestors, who are by definition far from us, but also by definition belong to us, who brought us to the world and are born and reborn by us every time we refer to them in the present and for the present.

Therefore, the texts of the ancients may help Europe find the path it has lost and, with the help of the past, teach it how to avoid the danger of returning to the dark and dreary era of the Middle Ages. The classics may have lost and still be losing many battles, but not the war.

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PLANS TO EXPAND THE ACTIVITIES OF THE UNIVERSITY OF BRITISH COLUMBIA EMERITUS COLLEGE

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Abstract

The factors leading to the establishment of the University of British Columbia (UBC) Emeritus College are accounted for and provide the background for a description of the College's unique character. The academic work of the College will be interdisciplinary and aim, through community outreach, to contribute to the public good. The College will pursue two new projects: the appointment of a Visiting Emeriti Professor and the sponsorship of a Public Intellectual Community Forum.

Keywords: collaboration; interdisciplinarity; community outreach; accountability; public good.

Introduction

A number of factors provided a supportive context for the emergence of the UBC Emeritus College in 2018. A recent increase in life expectancy, the abolition of mandatory retirement, and the cultural shift toward a delayed and more flexible retirement have all led to retirement being seen in North America as a pathway rather than a single point in time. In this context, an Emeritus College - a relatively recent innovation in higher education - offered an intellectual pathway to retirement while maintaining a close connection to the University and academia. In this context, the College was created to promote the continued intellectual, scholarly and social involvement of retired faculty members.

The UBC Emeritus College

Within Canadian universities, the UBC Emeritus College is the only fully recognized academic unit representing Emeriti. As an integral part of the University we have moved beyond the original goals of being an advocacy group for benefits and social community goals when the UBC Association of Emeriti was formed over 30

years ago. In this new, visible role, the potential to add to the internal and external lives of the university is significant. Like other research-intensive universities, UBC is a rich and complex system. The outputs of this system, multivaried in themselves, significantly benefit society as a whole. The role of the Emeritus College is to add to the richness of that complexity and therefore to the value of the outputs. The College does this by providing an identity continuum from one's academic career, through transition, into a productive post - retirement association with the University.

As our terms of reference make clear, the College seeks to enrich intellectual focus and continued educational involvement for all retired UBC employees who hold emeritus status granted by the UBC Senate; to promote active participation of Emeriti within the functions of UBC; and to increase UBC's profile, status, and involvement within local, national and international communities. Through research and engagement, our intent is to foster global citizenship and advance a sustainable and just society. Our partnership with the university enables our members to continue contributing their creative, intellectual and scholarly talents to the mutual benefit of the University, the College and the community at large.

The language we are using emerges from our own recent history, but also resonates with some of the key themes contained in UBC's Strategic Plan 2018 - 2028, "Shaping UBC's Next Century"[1], i.e (accountability, collaboration, inclusion and engagement). As members of the College, we are accountable in a way that is different to our time as faculty within particular departments and faculties / schools. As an inclusive interdisciplinary academic unit, we are responsible for providing an integrated and more far - reaching contribution to problems of social importance that face society. Structurally, we are set up to collaborate and we intend to make this one of our major commitments. We hope to create and help define a collaborative and inclusive research culture and, in turn, contribute to sustainable and positive change.

The Emeritus College is a unique academic unit at UBC in that members represent almost all academic disciplines and fields. It follows that the culture and environment of the College should provide a natural growth opportunity for interdisciplinary projects and programs and events. While our College shares the general vision of the handful of other emeritus colleges, all located within the United States[2, 3, 4], it has the additional aim to provide a nexus for interdisciplinary collaboration[5, 6]. Signaling this commitment to interdisciplinarity, the College in April 2019 celebrated the first year of its founding by holding an interdisciplinary symposium: Scholarship and the Future University (https://emerituscollege.ubc.ca/program)[7].

There is broad acceptance that interdisciplinarity is of paramount importance in addressing the most pressing issues facing science and society; there is also an acknowledgment of the difficulties involved in fostering this direction in leading research universities[8]. An emeritus college, with its wide-ranging membership, is uniquely positioned to contribute to strengthening the culture of interdisciplinarity in institutions of higher education.

Because the College is committed to increasing UBC's profile, status and involvement within the local, national and international communities, we intend to cultivate an outward orientation in our community development. Our aim in doing so is to help enable the translation of knowledge into policies and practices that contribute to the public good. Where possible, we should align our efforts more closely with the priority issues in BC and beyond. We can and should demonstrate the public relevance of the work done by our members. We are committed to forming and strengthening intellectual, social and community volunteer networks.

New program proposals

Building upon the commitments to interdisciplinarity and community outreach and the desire to contribute to the public good, the College is embarking on two major pilot projects in the 2019 - 2020 academic year. First is the appointment of a UBC Emeritus College Visiting Professor. Our visitor will be expected to spend two weeks in residence on campus and we will actively seek the support of all the relevant academic units on campus with the expectation that our visitor would give a limited number of lectures in conjunction with these other units. We are combining our choice of Visiting Professor with the general theme of our annual symposium. The potential themes that are guiding our pursuit of a suitable candidate are The Future of Democracy, The City in Transition and the Age of Surveillance Capitalism. Once our visitor is in place, the College will invite members of the College, who are working in the same academic area, to present papers in a series of panels over a one-and a-half day period. The Visiting Professor will provide the keynote address.

Second is the establishment of a Public Intellectual Community Forum. We are taking a lead from "Strategy 16: Public Relevance" of UBC's Strategic Plan (p. 65). The aim of the Initiative is to build connections and capacity between researchers at UBC and the community at large in areas that are likely to lead to public benefit. As a pilot project the College will invite a panel of three UBC emeriti who have expertise in a specific knowledge area. Each knowledge area should have particular relevance for our community but should also resonate with national and internation-

al communities. The issues that we tackle will inevitably depend on the expertise of our members. Examples of the type of issue we might address include Migration and Immigration; Public Health and the Opioid Crisis; Property Defined as a Commodity; and Community Action and the Climate Emergency.We will locate the event at the Main Vancouver Library[9].

Conclusions

This short presentation has provided a description of the UBC Emeritus College and outlined how the College is defining its academic role along two trajectories: interdisciplinarity and community outreach. An underlying assumption that surfaces in various ways is the attachment to increased accountability and the need to contribute to positive change. Two new program initiatives are designed to fulfill this objective.

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GIVING OTHERS THE CHANCE WE HAD, THE CHALLENGE OF FAIR ACCESS TO UNIVERSITY

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Abstract

Studying at university remains a life changing experience for many young people today, but the opportunity is still not available for all who have the ability to succeed in higher education and wish to do so. Barriers remain in virtually every country in the world, including parental wealth, ethnicity, gender, religion and socio - economic class. In our increasingly knowledge - based economies, this lack of access to higher education is not only wasteful of talent but it is economically as well as socially and politically damaging. This paper discusses the scale of the problem of the lack of fair access both from an English and global aspect. Activities being promoted to widen participation, such as scholarships, grants, loans and fees are assessed and the importance of long - term strategic outreach - programmes are stressed. Opportunities for Governments, Universities, charities and retired academics to contribute are outlined.

Keywords: fair access to university; widening participation in higher education; social mobility.

Introduction

My life story is similar to that of many 'baby boomers' of the immediate post-war generation who were given a remarkable opportunity for upward social mobility through higher education. I was the first in my family to benefit from university and the first from my estate and primary school. Obtaining my BSc and PhD from Imperial College enabled me both to have a successful academic career in analytical chemistry and latterly to lead a dynamic new University. After my retirement as a Vice - Chancellor and Chief Executive, the UK Government appointed me to the independent role of Director of Fair Access to Higher Education in England, established because of the recognition that the social mobility which had benefitted me and my generation had stalled.

When I was appointed as Director in 2012 only 14% of 18 year olds from the most disadvantaged fifth of the population went into higher education (HE) compared

to 42% from the most advantaged quintile. By the time I was replaced in 2018 the respective figures were 21% and 48% (all figures from the Universites and Colleges Admissions Service - UCAS - Analysis and Research Department). While I can look back on an increase of some 50% in access from the most disadvantaged quintile it is still 2.3 times more likely that you will be in HE if you come from the most advantaged compared to the least advantaged groups. The situation for the universities that ask for the highest entry qualifications is even more acute with a corresponding ratio of 5.5 the only consolation being that it was 8.5 before the appointment of a Director of Fair Access and subsequent action.

A 2011 Harvard research study showed that applicants with a white, wealthy, alumnus as a parent were 45% more likely to be admitted to an Ivy League university and that students with parents in the top 1% of the income scale are 77 times more likely to attend one of the 30 most elite American universities than those with parents from the bottom 20% of the income scale.

Figures from UCAS show that applicants from lower socio - economic groups are significantly less likely to get an offer of a university place when they apply. Black and Asian students are also less likely to get an offer of a place than White students. Disadvantage does not end at admission, statistics published by the UK Higher Education Statistics Agency (HESA) consistently show that those from the most disadvantaged quintile are less likely to obtain a first or upper second class degree. For Black students there is a substantially lower rate of awards of these so - called 'good degrees' even when adjusting for prior attainment.

The roots of disadvantage

It is clear that disadvantage begins early in life and is impacted upon by parental education, income, profession or socio-economic class. I have shown above some of the impacts of ethnicity in English HE. In Australia and Chile it is clear that 'first nation' students are markedly less likely to enter university. In countries with religious diversity it is often Muslim students who access university less. Where you were born and live is influential too. The more remote and rural your location, the lower your prospects for HE participation.

In most western nations the wide disparities of HE participation by gender experienced a few decades ago have been overcome. Indeed the under-participation of women has been replaced by an over-participation of a few percentage points. The exception to this is often in science, mathematics, computing engineering and construction, often referred to as STEM subjects. The European Union's statistics agency, Eurostat, reports that while 58% of all EU graduates are female, in STEM male graduates outnumber their female counterparts by nearly two to one.

Widening participation policies

The Eurydice Report[1] of the European Commission noted a wide diversity of approaches in different European states to widening participation to HE. Most nations had initiated concrete measures to widen participation but only nine countries had defined attainment targets for specified groups. For example, in Belgium (Flemish Community) the target refers to children whose parents do not hold a HE qualification and has been set at 60% by 2020. Finland focuses on increasing male participation, with the ambition that gender differences in young age groups will be reduced by 2020 and halved by 2025. Lithuania also addresses gender with the ambition to increase female participation in mathematics and science. Ireland aimed to double the number of students with disabilities in the period 2006 to 2013. The report notes that there is, as yet, little systematic monitoring of the social dimensions of entrants to HE. Consequentially there is little evidence as to which of the many national approaches are most effective.

In an international report Jamil Salmi[2] surveyed the HE equity policies of 71 countries. Only 32% had specific targets for defined groups and only 11% had a comprehensive equity document, although a further 11% had a document for a specific group. The report identifies a small number of countries who have consistent strategies, goals and targets for widening participation and a larger group where frequent changes in government have resulted in a lack of continuity. Four out of five countries prioritise the needs of low-income and disabled students, while three out of five target gender groups (typically women). A number target care leavers. Many use financial support to widen access and some use non - monetary support, most frequently contextualised admissions where entry requirements are lowered for students from disadvantaged groups. The use of outreach and bridging programmes are becoming increasingly popular as is the creation of institutions specifically designed to serve remote areas or minority groups. It is, however, clear that a number of countries are still paying only “lip service” to fair access.

Why does it matter and what can be done?

In developed nations, the most successful. are those that make the greatest use of high - level skills and knowledge. There is a strong economic argument for fair access to HE so as not to waste talent which is needed to build a competitive knowledge - based economy. Our complex and increasingly diverse societies need to offer opportunity for all citizens, the social cohesion argument for fair access. Indeed without offering equity how are leaders going to be elected in democracies, this is the political argument. As educators our ambition is to enable, everyone to achieve their full potential, this is the moral imperative that drives us. Traditionally universities were exclusive. Today they must help shape more inclusive societies.

UNESCO estimates that there were 90M students in 2000, rising to 140M in 2006 and 220M in 2016. How can we ensure this growing number of students is representative of all classes, races and religions? We have seen that in response to the challenge of fair access many initiatives have been taken in different countries but the effectiveness of these has not been fully assessed, partly because of a lack of sound monitoring and research or because of the lengthy timescale necessary.

The quickest returns are on efforts to support students from disadvantaged backgrounds in applying to, progressing in and succeeding in HE. Large sums of money have in some jurisdictions been used in scholarships, bursaries and grants. This together with contextual offers and affirmative action has led to marginal but worthwhile improvements in fair access. The gains have been less than expected because they only target students who have already intended to study at university. A much greater number of the disadvantaged have never realised that studying at university is a realistic option for them and consequentially do not take the right academic pathway at school, even assuming that it is available, or obtain the necessary qualifications for entry. Realising this many Governments, charities and universities are establishing outreach programmes to reach potential students who traditionally have never considered the option of HE. The aim is to increase aspiration and then achievement in such groups. To be successful outreach programmes need to start early, preferably in the primary stage of education, and be sustained up until entry to HE. To be successful these programmes need to work with key influencers including teachers and the parents or carers.

Conclusions

These long term, sustained outreach programmes are expensive and must be targeted carefully. Following the last global recession Governments are increasingly reluctant to spend the sums of money required for success in outreach and many charities are now entering the field, realising that going to university is a major driver of upward social mobility. There is also a key role for retired professionals and professors emeriti in working with children and young people to enthuse them and to share subject knowledge. I hope many members of the European Association of Professors Emeriti will respond energetically to this vital challenge, so that others may have the chance that we had.

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THE CONTINUOUS CONTRIBUTION OF PROFESSORS EMERITI TO THE CONTINUING POSTGRADUATE MEDICAL EDUCATION

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Abstract

An Emeritus Professor of Medicine could be active in various fields, such as: teaching, lecturing, advising PhD thesis, guiding young physicians to writing a scientific paper and, most importantly, contributing to the field of continuing postgraduate education, in his / her specialty. After the first author's (NJA) election as Professor of Pathology in 1990 in the University of Ioannina Medical School, she was seriously thinking how to fulfill the void in continuing education. In 1995, after the preparation of the bylaws, she applied to the Executive Committee of the European Society of Pathology (ESP, Brussels, June 1995) and was officially appointed as the Director and Organizer of such Courses. One year later, the first (Ioannina University Courses in Pathology, IUCP), in the field of Gynaecological Pathology / Oncology was held, and its success gave her the strength to continue organizing IUCP biannually. After her retirement on 2007 and up to now, this is her main activity as a Professor Emeritus.

Keywords: Ioannina University; courses in pathology; IUCP; continuing education.

Introduction

The **Ioannina University Courses in Pathology (IUCP)** are postgraduate Courses on selected topics of Human Pathology that have been offered since 1996, after the unanimous decision of the Executive Committee (Brussels, June 1995) of the European Society of Pathology, to give the ESP auspices to the organization of the IUCP, within the frame of the European Institute for Continuing Medical Education (EICME).

History of IUCP

Since the beginning, two Courses (or Part I and Part II) have been offered each year. The aim of the Courses has been to bring together young Pathologists or 4th

and 5th year residents with Tutors, experts in the various fields of Pathology and to encourage active participation of all colleagues during the discussions following the lectures and the slide seminars, providing an in - depth review of Diagnostic Surgical Pathology. Special emphasis has been given to morphological features, newly recognized entities and modern laboratory techniques. A limited number of didactic lectures, given by established and distinguished investigators, cover each topic theoretically. After the experience gained from the first course (May 1996), a number of distinguished clinicians were gradually incorporated in the list of invited speakers. For many years a tradition was established, where the Opening Lecture was offered by a distinguished clinician, specialist on the subject, the Opening Lecture has always been dealing with "The challenge for co - operation with the Pathologist".
Until 2008, individual lectures regarding imaging and therapeutic approaches (chemotherapy, radiotherapy, surgery) were also offered by specialized clinicians distinguished in the field. During the last years clinicians incorporate their talks in multidisciplinary sessions. Furthermore, the Scientific Programme is enriched with many Slide Seminars, which are offered in the form of interactive case presentations. The duration of each Course (or each Part) has been approximately 2 days (~14 credit hours). Each Course has been designed for 40 - 50 pathologists and clinical colleagues related to the subject. Over the years, besides the Greek students we also had participants from: Cyprus, Balkan Countries, Hungary, Czech Republic, Russia, Georgia, Italy, Spain and Jordan, who accounted for approximately 25% of the student body. A brief curriculum vitae stating particular experience or interest in the topic of the Course is always required for the preparation of the final list of tutors and participants, and for the archives of the Institute. Diplomas are given for regular attendance only and include the number of credit hours. At the end of each course students are asked to complete an evaluation questionnaire, with the scope to test the quality and effectiveness of the Course, and to improve the content of the Educational Programme. This questionnaire covers: the content of provided information, the quality of presentations and the effectiveness of the teaching style. The above categories are graded from 1 - 5, from very good to very poor. The results from this evaluation system are mailed to the Speakers and kept in our archives. In addition, a multiple - choice examination is completed by the Participants, without the obligation to sign their names.
In the First Series sixteen Courses were offered and covered the following topics: *gyn, bone / soft tissues, pediatric, skin, liver, lung, breast, prostate, salivary glands, thyroid, oesphagus, stomach, duodenum. biliary tract, pancreas, small - large intestive, kidneys and urinary bladder pathology / oncology.* The statistical data of the First Series are: 206 tutors, 560 students and 293 credit hours.
The vital participation of tutors and students, along with the experience gained

provided the encouragement to continue with the second series of courses. in the second series twelve courses were offered and covered the following topics: *vulva, vagina, cervix, endometrium, ovaries, accessories, prostate, breast, skin, bone & soft tissue (25th silver course), lung, pleura, mediastinum, kidneys and adrenals, liver pathology / oncology.* The statistical data of the second series are: 190 tutors, 529 students and 180 credit hours.

In 2010, consistent with our commitment for interactive participation of all (organizing committee, tutors and students) in the realization of IUCPs, a questionnaire was distributed at the end of the Course asking for the preferred subject of IUCP 2011. The topic *gyn pathology / oncology* was voted by the vast majority for 2011. This topic was offered for the third time, thus, the Third Series of IUCP commenced. In the following years the topics were *liver pathology / oncology (2012), breast pathology / oncology (2013), skin pathology / oncology (2014) and head and neck pathology / oncology (2015).* In 2016 the 33rd IUCP with the topic *neuro pathology / oncology* was offered. Starting from 2017 the organization of IUCP has been passed to the Hellenic Society of Pathology. In 2017 the topic lung pathology / oncology, in 2018 the topic *gastrointestinal pathology / oncology* and in 2019 the topic of gynaecological pathology / oncology were offered. For 2020 the topic *soft tissue pathology / oncology* has been scheduled.

During the first author's (NJA) long career in organizing the IUCP, she has faced several challenges and has learned a lot from hands-on experience. For a successful organization the active involvement of a University Medical School is necessary. Publicity should also be provided by the official Societies of Pathology (Hellenic, European Society of Pathology and IAP). Furthermore, personal communication with the directors of large national and international hospitals is always helpful. For this reason an attractive poster is always circulated through e-mail with all the available information (Figure). Participation is always encouraged if the registration fees are the lowest possible. This cannot be achieved without sponsoring by the Societies of Pathology. Since the aim of the Course is educational we always encourage the participation of residents and young Pathologists from our neighboring Balkan countries, by waiving their registration fee.

Conclusions

We believe that with the organization of the in Ioannina IUCP, along with ESCOP (European School of Pathology) and Euro Cell Path, has significantly contributed to the field of Continuing Medical Education in Europe.

The fields of Continuing Medical Education and post-graduate education are the main fields where an Emeritus Professor of Medicine can contribute. In Greece the laws regarding responsibilities of Emeritus Professors have changed over the previ-

ous decades, and today in Hellenic Universities a Professor Emeritus can participate in a PhD thesis as the Principal Advisor, or as a Member of the PhD thesis Committee (7 - members total). He/she can also teach medical students. This change in the law reflects the shift in modern society, where the age of retirement is just a number, and does not reflect the actual intellectual abilities of the person. Thus, the Universities honor retired Professors of Medicine, whose world recognition after many decades of scientific devotion is believed to add to the value of the University, with the title of Professor Emeritus, and grant them all relevant privileges and responsibilities.

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https://www.pathology.gr/IUCP/

Figure.
Posters of IUCP courses

ON THE REDEFINITION OF THE UNIVERSITY ETHICS IN THE NEW ERA

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Abstract

Lately, much discussion is going on about the role of the Universities in the rapidly changing, "globalized", "knowledge - based" society. In many cases, the terminology used could be considered irrelevant if measured in the so - called "old - fashioned" way. First of all, to a very great extent, society "changes" rapidly because of the rapid technological change that flows from the Universities themselves.
Terms like "client", "customer" and "services" used to be out of the cultural context of the University, and had been considered as terminology related to business. Things seem to have changed (have they really?) as virtually everything in life today tends to be considered as "business". As we all know, business is about profit for those who take the risks. How can these terms be re-defined to cover the relation between University and Society? Who are the "clients" and what are the anticipated "profits"? What will be the future of those who do not fulfill the clients' demands? We will attempt in what follows to provide some answers and stress the need for the modern University to maintain some of its traditional ethics.

Keywords: ethics; culture; market; quality; globalization; historic consciousness.

Introduction

Let us point out what we consider to be the most important role of the University today as ever; the evolution of culture and science, the identification of real social needs and the partial, at least, fulfillment of those needs. We insist on needs, as opposed to desires, since the latter are dictated to Society by the Market. Giving up this role could easily lead us to a market-centered analysis of education, culture and the role of Institutions in fulfilling Society's real needs. However, this would imply the recognition of the infallible, almighty Market as defined in the current financial climate, as the driving force of History itself. Are we confident enough to accept such a responsibility, or is the pursuit of "wealth for wealth" and "development for development" that blinds our view of History?

Those who stand for such a new order of things, present the following "simple" argument: Universities have to satisfy their students' needs. If all that students demand is knowledge required to find a job, then that is all that Universities should provide. "Successful" Universities (are supposed to) have "satisfied clients", that is, graduates who have a "good" job (or a job at all!). Culture and development of Historic consciousness are of second priority. I might say that this is a naive line of argument, but I will not. In fact this is a very sophisticated argument that is supported by the current state of the job market. If we took into consideration the undeniable fact that the market is driven rather by the pursuit of wealth than by the desire for society's development, we would have implicitly and sub-consciously accepted that it is the logic of profit that determines the role of Universities, which is of course absurd. Furthermore, is it not the Market itself ever requiring innovations to its structure and operation? Who can implement those innovations, if not University graduates who are able, however, to question the market's functions? This is precisely why Universities must keep their distance from the market place; that is, in order to produce graduates who are able to debate and innovate.

The University is a Social and Professional institution based on well-accepted concepts such as institutional autonomy and freedom of teaching and research. It cannot be governed by non-academic managers and external interests without compromising its socially attributed self-determination.

Institutional autonomy and academic freedom

During the last twenty years or so, the vast majority of public Universities has suffered the harsh reality of two contradictory trends: an increase in the services expected of Universities and a drop, in real terms, in the financial resources at their disposal.

The increase in financial pressure upon Universities is caused by both external and internal causes. Externally, we are told that Universities cannot escape the consequences of globalization in the world today and the heightened environment of competition that this creates. For Universities, financial resources are harder to obtain because competition from other activities is stiffer and costs are controlled by both private and public bodies more rigorously. At the same time we are told by every Government in the World that Education is today the State's first priority! Internally, Universities face pressure on their unit costs, sometimes because of their mistakes, e.g. their resource management tends to be very rigid and inefficient. Universities must, therefore, question themselves on their activities. There is no doubt, that they

must adapt better to society's expectations, share tasks among themselves, enhance their administrative efficiency and improve transparency in terms of teaching and research activities. This does not mean, however, that they have to participate or even contribute to today's head - on, mega - competition that leads to winner-take-all situations, because then they would compromise their role. There is, simply, a clear need to re-structure and also to find additional source of funding. What they certainly should not do is to compromise academic freedom and autonomy for the sake of financial profit, for the sake of the administrators' definition of "efficiency". The only profit a University must recognize is the Educational profit that is a sum of knowledge, culture, ethics and social issues. The problem of University funding is beyond the field of commercial economics, and University policy cannot be based solely on the criterion of financial efficiency. Education (and fundamental research of course) is a "collective good" and as such it should be offered by public institutions to everyone, irrespective of financial status. After all, the same is true for all other collective goods (e.g. Defense, Security etc.). This does not create an inequity because the differences in financial status are reflected upon the different tax-rate scales. All that is, therefore, needed is some administrative restructuring in order to reinforce decision-making procedures and improve flexibility.

The Universities must defend the cause of the, extremely important, social role they play in the transmission and acquisition of new knowledge and the critical analysis of Society's needs. They must demand an increased proportion of GNP to be spent on education, showing simultaneously that they are changing in their structures, and not in their principles, so as to fulfill their mission in a better way. They must still try to find additional funding, either as no-strings-attached donations, or primarily by making material, laboratory and human resources available, within the framework of applied research and life-long learning. Training, applied research and life-long education are private goods and as such they may be offered either by public or private Institutions and may involve fees.

We therefore reach the following moral question: how can Universities retain their autonomy and academic freedom on the one side and still be able to attract the funding required to survive, on the other. This leads us, I suppose, to the definition of freedom: can there be freedom without the means to exercise it? In a market-centered context, the answer is "no"; the freedom of the individual is limited not only by the freedom of others but also by their financial power. It seems reasonable that those who pay can have specific demands, so that good use of their investment is being made.

Even the above argument, that may describe the general order of things in the market area, does not hold true for Universities. The funding of Universities is not equivalent to financial investments. In a quite generic definition of the term "investment", such funding can be viewed as an investment of Society to those structures that will turn the wheel of Historical evolution. This should be the main demand from Universities. The fulfillment of the market needs is only one of the many facets of their role. Another facet is the contribution to the definition of Society's development targets. This can be easily forgotten under the pressure of "satisfying the market's needs", which is by no means the most important part of the Universities' role.
In this context, academic freedom and self - determination of Universities cannot be compromised for any management - oriented and market-centered model of operation. The main "investor" in the "University business" is Society itself; not the market, not any profit-seeking agent. It is therefore only Society who is entitled to "demand" anything from Universities and who should expect "profits" from their activity, not in terms of direct material wealth, but in terms of evolution. University leaders must and can define coherent institutional identities and University targets, by a decision-making process based on the consensus of constituent departments, staff and students.

New technologies and the importance of the media

Another topic that has stimulated a number of vivid discussions is that of the use of new technologies and media in education. The rapid development of new technologies has implications for the provision of higher education. New learning environments have been proposed and communication of knowledge has become possible through many new media, especially new interactive digital networks and services. It is proposed that the instructional process can be partly or even fully automated. There are also several cases where discussion for new pedagogical frameworks is made. It is also often supported that the delivery of knowledge can be made not only by traditional institutions, but also by media organizations. Before proceeding further, it is useful to make a few definitions.
Culture is everything persons receive from their social environment, in terms of social behaviour, ethics, customs, and values. It is not a collection of knowledge items, but the conception of the historical evolution by the individual. This only partially corresponds, but is not limited, to an amount of knowledge. *Training* is a process for delivering knowledge. Strictly speaking, training has little to do with the formation of person's character and social - behaviour code, but only with their ability to

do a more or less specific job. *Education* is a social service that covers both culture and training. It is usually offered by community as an organized social process for delivering culture, ethics and values, as well as vocational training. Education aims at reproducing the social structures and develop a consciousness that will lead to further evolution of Society.

Therefore, the point to be made here is that, perhaps, the new media can be used for training, but not for the delivery of culture that is and has to retain its social character. We should not abandon the concept that the educational systems' main intent should be the production of active and useful citizens. It is a fact, of course, that current educational paradigms are subject to great change, using new technologies and media. However, what will be the social implications of replacing classrooms with networks and other media tools? We must strongly support the argument that technology and new media must supplement, not substitute, traditional learning processes. The new tools and media should not redefine the notion of pedagogy which is, and must remain, in the core of every educational system, and involves necessarily interaction between students and teachers. This interaction is necessary to bring people together, to counteract the isolation of learners, to help the student to acquire the skills of managing the wealth of information available and to develop intellectually.

Technology must be regarded as a tool to achieve goals, not as an end in itself, and should be judged against University aims; especially in the undergraduate classroom, where academic tuition is not only a procedure of delivering "bare" knowledge content, but also an opportunity for discussion and development of critical thought and of critical assessment of knowledge.

No matter what help can the new media and telecommunications networks provide, it is still not clear whether the inspiration and living paradigm existing "in the air" in any live tuition, can be delivered through a multimedia high-speed network.

In this context, technology is expected to support, but not substitute classroom academic tuition, and should reduce, not increase, the gap between students and teachers. That is why private enterprises designing educational delivery systems, computer firms, publishers, TV and the like will never become competitors of the University. The University must use innovative approaches to teaching, based on the use of new technologies (computer - aided learning, self - instruction courseware, virtual laboratories, teleteaching and videoconferencing) to help improve the quality of both teaching and learning, without of course compromising the live classroom and seminars debates and the student Café discussions. On the other

hand, Universities should certainly use distance learning techniques for continuing and adult education, after answering convincingly the following questions:
How should the knowledge content be organized, structured and presented in order to be used effectively in distance learning environments?
How should distance learning co-exist with traditional methods of teaching?
What subject areas are best offered for delivering through distance learning and at what level of specialization?
How will the certification of distance learning courses be made?
What administrative structures are required to support distance learning activities?

International relations and globalization

"Globalization" in the post-modern world does not mean more than the reign of market forces, and its consequent increase in competition. The University should, however, maintain its socially attributed distance from both, market and competition. Furthermore, Universities, by their very name, have always had links and contacts that reach well beyond their nation; and knowledge is universal. Therefore, globalization, in admittedly another context, is already well known to the University.
The meaning of "knowledge - based" society disintegrated recently in only the notion that continuous vocational training is necessary in a world where "production requirements keep changing with the application of new knowledge". We can be rather skeptical about this notion as only a small percentage, about 12%, of the knowledge produced annually finds its way to implementation in production.
Why, I wonder, should Universities accept the above misconceptions, invented and promoted by administrators, and not react in the direction of restoring the proper meaning of matters such as the above?
The rapid progress of science/engineering leads to the introduction of new production processes and the forms of labour relations change radically. As we mentioned earlier, we are now speaking of a knowledge-based society and of a broad market that will determine the development of new service-products in accordance with the customer's requirements.
Again, this concentration of attention to market requirements, and the linking of investments with new products, while looking for common cultural fields on a foundation that the Universities have to prepare, is for us a matter of considerable concern. As it has been already apparent, the "Globalized dimension" in education for us is not so much associated with market requirements as with the evolution of culture itself.

We believe that there can be no "Globalized dimension" without a synthetic acceptance of diversity in the multi - cultural, multi - lingual World, without a pluralistic linguistic policy, without the development of a historic conscience among citizens.".

Another descriptive term frequently used with respect to the future Globalized society is the "society of learning". The terms "culture", "education", "learning", "vocational training", which refer to complementary activities in every modern society and are provided by various types of institutions, are often confused with terms denoting the ways in which they are performed, such as "distance learning", "life - long education", "multimedia education" etc., while the notion of education, the Greek word is "παιδεία", is artfully avoided and all institutions offering "post - secondary" education are placed on an even footing.

At a time when education budgets in all countries are shrinking, when the cost of education keeps rising, when technology advances and adjustment costs for the Universities are high, when teaching and learning methods evolve rapidly, and our civilisation is going through a deep and multiform crisis, co - operation among Universities is an obvious necessity. Co - operation will help to ensure economies of scale and will enable the co-operating Universities to take advantage of the skills of teaching - staff members of other Universities. Forming a global knowledge network among all Universities (or rather many collaborating networks of more or less similar institutions) seems a very good idea, provided that this development will be designed to work the other way round from commercial "globalization", e.g. to close the development gap, rather than making it even deeper.

The abstract notion of quality

Universities are suddenly inundated with recommendations as to how to improve Quality. Quality remains a rather abstract notion, as it means vastly different things to different people, and the issue behind it has only come to the fore recently, as governments reduce budgets, whilst expecting increased services for fewer resources. Seen in this context, the real issue here has very little to do with "quality" per se, but rather with who sets the criteria involved in its definition; and, therefore, who controls the academic life. Thinking for a second that, from its earliest days, the purpose of the University has been to define "quality", to pass it over to Society and to forward it in time, one can indeed be very suspicious for this latest rediscovery of "quality". In the academic context, different types of "quality" need to be examined: that of teaching material, that of the delivery method, that of the student's work

and, most important of all, that of the learning process. These "quality" matters have already been traditionally examined by faculties, departments, institutes and laboratories in the Universities and have been bread - and - butter of our academic work. The latter is a holistic process involving teaching, research and interaction with students and it is wrong to sub-divide the task into its simplest and often meaningless components.

These sub - divisions (job control sheets, etc.) are relevant to Industry and Business and to control the progress of great Technical Works but they are totally irrelevant to the University environment, as are also the league - tables of University classifications. The Universities are, of course, morally obliged to give account to students for the quality of teaching they receive, to Society and State for the overall services the latter get and for money spent. They can do so by themselves internally (most have been traditionally doing it) and produce self - evaluation reports, freely available for all to see, judge and comment. They could also consider establishing an ISO - type standard for verifying the quality of education. What they should not do is to allow non-academic consultants and "quality assurers" to infringe on academic freedom and autonomy. We should keep out of the University all those interests whose legitimacy derives simply from their potential to provide the University with additional funding.

The integrative role of the University

So, what is the role of the University in the near future? What is the content of the services Universities should provide to Society? Must Society be seen as a "client", in which case a "pragmatic" analysis leads us to the acceptance of the market - centered, client - server model? Is the "new order of things" defined by administrators, by the new technology tools and media and by the market orientation? Or is it really that old recipes are re - baptized with new names, that old ideas for social control now discover new tools and invent new definitions in order to appear more appealing and "innovative"? What is actually old, is not the conception of University as a studium generale. It is instead the effort to determine the content of University education not by the social needs, but by the financial interest that is old.

Culture is neither something an educational Institution can communicate "virtually", nor a necessary evil on the side of market - dominated education. The multi - faceted crisis of our era, in the consumer-centered world we have built, has its causes in the lack of visions (political and others) for the future, in the lack of historic consciousness. It is common knowledge that the most important role in the

resolution of this crisis is to be played by the content of culture and education: not by the market, not by the tools and the new media, which can only play a complementary role in education. University education should entail culture, training and social issues. Universities serve the community and provide more than knowledge. They identify social needs and ensure the upkeep of the human element of moral judgment, beyond technical performance and achievement. They produce the social forces of debate and innovation, so much needed by Society today. They also play a role as places of socialization, as well as a role in the social integration. Universities are characterised by the high degree of autonomy they grant their teachers and researchers and by the democratic character of decision - making processes, based on consensus (students being included in these processes). As a result, questions about the quality of teaching and research and whether University activities match the needs of Society or not, must be left to the Universities themselves. Universities must also be left free to retain their, socially attributed, distance from the market place, so that they are able to question it, rather than be controlled by it.

Conclusions

The academic neutrality and the critical spirit Universities impart or should impart place them among the very few social establishments that legitimately influence Society, by setting cultural, technical, ethical and moral standards. To do so, Universities need clearly defined targets and procedures, to alleviate the subjective nature of social evolution.

University missions and needs are, unfortunately, poorly known, among the public at large. Constant work to explain is thus necessary, and Universities must raise their voice more audibly in relevant public debates. It is our hope to have contributed to the development of such a debate.

ASTROBIOETHICS: BIOETHICS ISSUES IN SPACE EXPLORATION

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Abstract

Space travel now seems more like a possibility rather than science fiction, which poses a series of moral dilemmas and questions that we must approach responsibly. In this article we explore some of the social, economic and political issues arising from this possibility and make a critical evaluation of the reasons for space exploration. The usual ethical issues related to the environment and security will not be discussed here, but there are many other interesting questions, such as: What would be a fair process for commercializing or granting property rights in space? How likely would a secessionist movement be among settlements? Are there any reasons, such as adventure wandering, or the creation of a backup biosphere, strong enough to justify space exploration? Our point is not that we should refrain from space exploration, but that, if we want to move forward with our journey, we should seriously consider these issues.

Keywords: bioethics; space; astrobioethics; extraterrestrial life.

Introduction

Astrobioethics is a branch of bioethics that examines the ethical implications of life beyond the boundaries of the Earth and the responsibilities and rights that people have in relation to extraterrestrial life, should such life exist. After the first steps of man on the Moon in 1969, enthusiasm for space exploration grew once again. Soon, commercial space travel will become a reality and not just for a small group of disciplined highly - educated astronauts. It seems that we really are on the verge of a new conquest of space and access to new frontiers. But what does that entail? Have we allocated the time to consider what our responsibilities are as pioneers of these borders? Are there ethical and social issues that we should consider beforehand. This experience shows us why discussing space ethics is crucial.

Topics of space ethics - General questions

The prospect of increasing space travel brings with it a number of ethical issues, such as matters of environmental protection, competitive priorities, security risks

and non - proliferation of military technology. A first and natural reaction is the question: should private exploration of space be encouraged, given what we have done for our planet? What can be done to prevent the problems we have on earth in space? Have we first studied our behaviours that contributed to these problems? How can we avoid the same mistakes we have made on Earth?[1] Many questions have been raised about whether we should shift our major investments from space exploration to addressing more pressing problems on earth, such as promoting economic growth in underdeveloped areas, relieving poverty, etc.

Bioethical questions about manned space travel

Until now, the philosophy of space medicine has been to treat what is treatable in space, but in the case of serious injuries or illnesses the ailing crew member must return to Earth as soon as possible. However, such limited possibilities will not suffice for long - term space flights[2]. NASA has begun a lengthy process for a thorough examination of medical policies that will maintain health and provide medical care to astronauts on long - term missions. And now let us cite a few ethical questions related to manned space travel [2,3]:

What kind of information will we tell the crew members millions of kilometres away from Earth?
How much medical training is sufficient for the crew as a whole?
What risk factors are acceptable in exploration missions?
Can we check the genetic abilities of astronauts and not allow them to participate if there is a problem?
To what extent do we allow astronauts medical confidentiality?
Should psychiatric information be treated differently from other medical information?

Questions like these, and many others, are all on the table of space companies (NASA, ESA, etc.) and they discuss these issues very seriously for years before a decision must be implemented.

Ethics of extraterrestrial life

The study of Astrobioethics accepts the possibility that there is life beyond the Earth, and that our interactions with such life could have serious ethical implications. As people explore space, they may have an obligation to protect other life forms and to respect them, especially if complex intelligent life forms are ever discovered. It is also important to consider the ethical relationship between humans and extraterrestrial life, as the possibility of studying the science of life in space is becoming more and more likely[4].

The approach of astrobioethics can be effected from various perspectives. One is purely philosophical, incorporating abstract philosophical concepts into the broader discussion on the subjects involved. Another way has a more scientific character, with an emphasis on determining whether or not there is life somewhere in space, and what form it could take, focusing the discussion on the effects of interacting with extraterrestrial life forms. Astrobioethics incorporates many notions of Earth - related bioethics, recognizing the fact that many of the ethical issues remain the same, regardless of where a life form comes from.

Broader space ethics issues

Rights of ownership and financial matters

If space should be commercialized, then property claims will be raised by governments, businesses, individuals, or by all three, in order to operate business ventures without interference from others. In any case, it seems to be in our nature to acquire or want things to be our own, so these issues will arise anyway[1].

However, despite the United Nations treaties that consider the outer space of common ownership, what would be a fair process for claiming immovable property in space? First of all, we need to understand what it means to have space in common with others. Is our relationship with the site a "positive property community" in the sense that each of us has an equal share of space along with its contents?

On the other hand, if our relationship with space is a "negative property community", then no one has a claim at first sight to that property, that is, no one possesses anything yet, or we share the common starting point of not having any part of space.

Justice and space government

If we were to actually implement the rules of the Earth in space, then the final, albeit morally problematic, way of claiming ownership may be related to a person's ability to defend his property. Even among enlightened people, there will inevitably be disagreements over property rights in space, just as is the case on Earth, so a regulatory or administrative body that has jurisdiction over these territories will be required, together with a further enforcement agency. It will not be enough to govern from Earth-we will need a local organization to maintain law and order in real time, as well as to manage more effectively other issues, such as public order, urban planning and others[1].

Once satellites or planets can be transformed to become habitable and their human

inhabitants are self - sufficient, what motivation do people really have to continue with this regime? Perhaps they no longer want to be a small socio-scientific experiment of the Earth or a new holiday area.

Why explore space?

Indeed, there are many good reasons for wanting to explore space. First is the lust for wandering that is within our DNA. It is the tireless, and undeniably incorrigible, "human spirit" that tends to push our physical, spiritual and creative boundaries. Finding moral imperative or justification for such a project should be a fundamental part of the ethics of space[3].

Beyond obvious scientific reasons, there are other, more realistic reasons to consider. For example, scientists are talking about "backing up the Biosphere" in the event that our Earth becomes uninhabitable, either by our own fault or by some great natural disaster[2].

Another powerful reason for using space is that migrating to other planets is the "social expansion valve" that we need for congestion, since there is a constant reduction of resources on our planet[4].

Another reason is our biological desire to spread our own genetic lines, something that incidentally serves the continuation of our species as well[5]. Furthermore, if we really believe that space exploration is so obviously not problematic from an ethical point of view, then we have an inalienable right to explore space and interact with the world.

If we believe in the Big Bang theory, the origins of this right can perhaps be found somewhere in the fact that we, the Homo sapiens, came from the stars in the first place. The question therefore arises: why do we not have the right to travel back to where we came from?[6]

Conclusions

There seem to be several issues regarding the exploration and development of space that require foresight and advance planning. These issues are related to the social, political and economic context of life in space, in addition to the usual short term space ethics issues. Centuries have passed with philosophical, political and economic theories in our archives. Now is the time to re-evaluate them and apply theory to practice. What we do not want to happen is to rush into conquering space without a "great prospect" strategy - allowing individuals or corporations or governments to jointly make a plan. The point is not that we should not explore space, but

if we want to make our journey, which is unstoppable anyway, we should seriously consider these issues. Finally, morality must go hand in hand with technology and entrepreneurship, no matter where we are in this universe.

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TRANSDISCIPLINARY RESEARCH AND COOPERATION BETWEEN SOCIAL SCIENCES AND THE HUMANITIES WITH BIOMEDICAL SCIENCES FOR THE DEVELOPMENT OF SCIENTIFIC KNOWLEDGE AND THE REALIZATION OF THE MODEL. THE PRACTICE OF INTEGRATED STUDIES

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Abstract

We live in the age of the rise of scientific positivism, methodological particularism and disciplinary chaos. We are witnesses of the processes of the mind destruction, unreasonable particularization of the work process, the fragmentation of the scientific system and the marginalization of philosophy and social sciences. The community of the homo academicus seems to be getting further atomized and enclosed into specialized fortresses, producing thereby people specializing in extremely limited areas. The paper problematizes the importance of the development of multidisciplinary - transdisciplinary research, especially the cooperation between biomedical sciences, and social sciences and the humanities, for the improvement of the complex findings about man, health, and society. It also points to why such research is of key importance for the creation and improvement of the university practice of integrated studies. The author especially points the importance of the biomedicalresearch, social sciences and the humanities in genetics, ecology, anthropology, demographics, psychology and sociology.

Keywords: multidisciplinary and transdisciplinary researches; integrated studies; biomedical sciences; social sciences and the humanities; man and health; sustainable development.

It is not enough to teach a man a specialty. Through it he may become a kind of useful machine but not a harmoniously developed personality. It is essential that the student acquires an understanding of and a lively feeling for values.

Albert Einstein

Humanity is being tempted. Does a possibility to reject barbarism and truly civilize people exist?

Will hominization continue under humanization? Will it be possible to save humanness, realizing it?Nothing is certain, including the worst?

Edgar Morin

In science the investigation of truth must not be separated from the pursuits of Goodness and Liberty.

Immanuel Wallerstein

Introduction

According to the futurologist John Nesbitt, the 21st century is the era of biotechnological sciences in the same way in which the 20th century was the era of sciences such as physics and electronics. The biotechnological revolution as the fourth, postindustrial revolution will bring, according to John Rifkin, through research in genetics and biotechnology a new biological future for millions of people (capable of anticipating and planning their lives)[1]. The rise of medicine as a science, as well as genetic engineering will supplant the importance of geopolitical and geoeconomic engineering and bring humanity into a new kind of civilization. The human lifespan will be increased not only through technological and economic advances but also through achieving biomechanical and ecological standards as well as advances in medicine and sustainable growth. Democratic evolution and social revolution will lay the foundations of the fifth developmentally - civilizational and socially - humanistic emancipatory revolution which will enable humanity to undertake a true leap from "the realm of necessity into the realm of freedom", located on the other side of a class - based civilization.

The addendum of the Statement begins with the thesis that a human being is a multicomplex and indivisible[2] organic - biological, psycho - social and cultural being, meaning that a scientific-diagnostic as well as curative - therapeutic understanding of medical conditions can only be attained through a transdisciplinary, synthetically - integrative approach, an approach which is necessary if one wishes to establish humane treatment. Such an approach should also be affirmed in our understanding of sustainable social development and other global problems of modern humanity.

We live in an era of disciplinary chaos and rising methodological particularism. Scientists - "Spaceaters" - have parceled out the images of both society and individual human beings, and, by following the logic of Popperian neopositivist methodology,

are studying and treating human beings piece by piece, in the spirit of divided labor. The implications of such an approach lead to numerous scientific aberrations with far - reaching consequences as well as to the dehumanization of science and numerous professions. It is against this backdrop of a particular kind of postmodern relativist philosophy that the so-called Bologna reform of higher education has led to the further breakdown of scientific systems, or, in other words, to further divisions of scientific disciplines into courses and themes and to a particular kind of atomization and fragmentation of scientific fields. Within this pseudoscientific perspective the image of society and individual humans is further broken down and dehumanized, with numerous professions possessing a high degree of social responsibility being reduced to a kind of engineering professions, used for single-use urgent or specialist interventions.

We live in a time where theory is degraded and reduced to narrative/discourse about facts, where theory is not concerned with uncovering of the hidden logic/essence behind the facts and explaining the laws of their reproduction, structuring and dynamic development. The age of postideology and postruth has arrived, as per the writings of the postmodernists. Values, ideas and goals worth fighting for have lost their importance. It is as if the pseudocultures of the mass consumerist and spectacle societies have won, along with the philosophy of postmodern relativism and neocynism. Happening right now are processes which lead to the rise of neopositivism and the philosophy of divided labor.

It is as if such a fragmented scientific world, manifested in disciplinary chaos, has broken down and divided the images of the world, the society and humanity, dehumanizing the calling of science and the scientist. Such a divided world of science has started to enslave humanity both in the domain of fact and in the domain of knowledge. It is as if humanity, in spite of technological advances and networking, is living in a refeudalized world of fragments, a world in which responsibility for the whole was lost. Empathy and solidarity are dying moral principles and categories. It is as if the categorical imperative of Kant was suppressed and written off. In that context the importance of a critical mind and civil society is suppressed, as if the unrestrained egotistic individualism has conquered all other values. We live in a newly divided world of selfish individuals - figures of "killer identities" according to A. Maalouf.

Not underestimating the importance of specialist studies and work for different areas of natural, social and technological sciences, the need for the creation of new bridges between sciences and professions, created through transdisciplinary re-

search and integrated studies should be highlighted, so that the current and future Homo Academicus might, during the process of his or her education, gain wider knowledge from other sciences so that, for example, doctors might gain knowledge from socio-humanistic sciences, anthropology, ecology, philosophy, psychology, sociology, humanities and informatics; while engineers and adherents of social sciences might gain knowledge of genetics, bioethics, medical sociology and psychology, mental hygiene, social pathology and sustainable growth.

Only through the cooperation of all sciences and integrated studies can a complete scientific awareness of a specific problem be developed and a humanistic - emancipatory perspective in the understanding and resolution of said problems be reached. In other words, it is only through that cooperation that an awareness that science knows no borders, as well as the awareness that humanity, society and the world are inextricably linked totalities, in a state of high interdependence, in both the scientific and interventional regards, can be gained. Multidisciplinary and transdisciplinary cooperation in science and a system of integrated studies can help us to once again rehabilitate the theoretical and methodological principle of totality in science and to raise our scientific potentials and the professional culture of the highly - educated members of the Homo Academicus.

Our current outlook

Not denying the importance of specialist studies for any type of science or modern profession, we want to highlight the importance of scientific and interprofessional cooperation. In this era of speceating, that is, in the era of rising one - track specialists and rampant particularisms (from ethnic, across identitarian to social - political particularism), a rehabilitation of the principle of totality, a need highlighted not only by the history of the philosophical and the scientific method but also by contemporary epistemology and research practice. This was highlighted not only by such thinkers like Hegel and Marx, but also by Gurvitch, Goldmann, Kosik and Moreno. It was the old anthropologist and ethnologist Marcel Mauss who warned that truth is discovered in the interrelationships between disparate phenomena, found in the same measure in the centre (in the heart of the matter) as well as in the edges, junctions, transboundary areas of science, macro and micro worlds of facts, meaning that every single phenomena is both the product and the creator of a specific whole[2].

In the contemporary development of social sciences two extreme methodological approaches are dominant - the functionalist and the neopositivist. One approach fetishizes the totalizing role of the system, while the other overemphasizes the role

of particular facts. U. Beck described this difference in methodological approaches as a clash between methodological cosmopolitanism and nationalism, while others metaphorically describe the difference as a divergence of two perspectives - those of a bird and a frog - during the process of scientific inquiry[3].

It is high time to reconcile Marx and Popper as scientists and researchers and to leave behind us their ideological divisions. Neither was Marx a saint and a totalitarianist (if one were to read his original texts correctly) nor was Popper a super clean liberal democrat. In the era of postsocialist transition, we are faced with paradox and irony: overnight, a large number of once official Marxists became popperites, and Popper's project of an "open society" became a reproduction of the new, closed and divided society, a restoration of peripheral capitalism[4].

A dialectical approach to scientific research allows researchers to genetically and structurally analyze phenomena in a comparative historical context, to compare facts with possibilities contained in them, that is, to discover a humanistic-emancipatory perspective, possible trends and alternatives in their development. And, in the same way that real science knows no boundaries, researchers must not think that history has ended, meaning that there are no eternal systems and regimes and that we must observe all phenomena and processes in wider metapolitical and historical contexts. It goes to show that a problematization and a creation of a new integrating paradigm build on a new synthesis of the best that philosophy, science, art and religion has to offer is necessary in order to understand and explain the multicomplex processes of interrelations between the global and the local, the macrocosm and the microcosm, which in their mutuality create anew the world and the active, Promethean role of human beings in the creation of history and the achieving of sustainable development, the humanization of society and the enlargement of territories of freedom[5].

Further scientific progress is dependent on contributions made by specialist studies to natural, biomedical and informational sciences as well as new forms of cooperation and integration in contemporary science, especially on great syntheses with philosophy and social-human sciences. Answers to numerous complex answers such as what is life, a human being, health or society, sustainable growth, optimal ways of future human advancement must be sought through an opening of all sciences and their multidisciplinary cooperation/communication. Within this context we want to highlight once again the importance of philosophy and social - human sciences so that contemporary science and the system of education of the *homo academicus* might regain its "soul", that is, so that the principle of totality in research and education of contemporary cadres might be rehabilitated. We wish to remind

of Honoré de Balzac's message that "The doctor belonged to a pleiad of beautiful geniuses of the French school, out of which emerged doctors that were equally deep metaphysicians and skilled analysts".[6]

If in the *era of globalization* science knows no boundaries, then that cooperation is predicated on a highly developed *network of international scientific* and *interuniversity cooperation*, as well as a circulation of the scientifically elite cadres, so that the practices of scientific, medical, academic and social institutions might be improved through the exchange of discoveries and innovations. It is important to highlight within this context the importance of biomedical and social - humanistic sciences in genetics, ecology, anthropology, demography, psychology and sociology.

Conclusions

Pleading for a constantly open dialogue and trans-disciplinary cooperation of natural, technological and social - humanstic sciences, in the spirit of the great scientist and humanist *Edgar Morin*, his dialogics and complex science and ethics, we wish to point out here the need for a remoralization of science and the rebuilding of humanism, without which every scientific advance loses its meaning - if it does not serve humanity, the humanization of the world and the emancipation of humanity[7].

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A LONG - TERM RESEARCH: UTILIZATION OF INDUSTRIAL BYPRODUCTS - RECOVERY OF CRITICAL ELEMENTS FROM BAUXITE RESIDUE

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Abstract

An industrial byproduct is a production residue from an industrial process that could be useful and marketable. Bauxite Residue (BR), also called red mud, is the high alkaline by - product from the alumina production. Its huge global production causes disposal problems and encourages the efforts for its safe management and utilization as a secondary raw material in several applications such as metal recovery. Current presentation is a review of an over 40 year bauxite research and the development of an integrated method for the recovery from BR of critical elements such as Rare earth Elements (REEs), including scandium, yttrium and lanthanides,according to the European Commission's classification. The experiments were performed in lab and pilot plant scale under environmental and economic aspects. The proposed process will be applied in a demonstration plant in the premises of the Greek alumina industry, in the framework of an ongoing European Community's Horizon 2020 Program.

Keywords: bauxite residue; rare earths; scandium; separation; purification processes.

Introduction

Sustainable Development and zero waste production are issues of great interest to the global community our days. Byproducts utilization and reusing of useful secondary raw materials can lead to their saving and environment protection.

Bauxite residue (BR), also called Red Mud (RM), is the voluminous fine alkaline byproduct of alumina production by Bayer process. The global annual production

is about 120 million tons, its accumulation up to 2.7 billion tons and the Greek production rises to 750,000 tons yearly, partially used in cement, bricks, iron and steel industry. As found in an over 40 year investigation from our Lab, Greek bauxites and BR are rich in REEs especially in scandium (Sc), close to its main resources. REEs are elements of high techno-economical interest because of their use in high - tech materials and modern applications. Especially SC is exceptionally expensive with increasing demand in advanced technology applications, such as Al - Sc alloys for aerospace and defense industry, electrolyte in solid oxide fuel cells etc. European Commission's classification of Critical Raw Materials (CRMs) ranks Sc as critically high on both supply risk and economic importance due to decreasing available stockpiles combined with globally limited production and evolution of new applications.https://ec.europa.eu/growth/sectors/raw-materials/specific-interest/critical_en.

In Table 1a the average concentration of REEs oxides per ton Greek bauxite and BR is demonstrated, together with the REEs enrichment factor in BR of almost 2 in comparison to the original bauxites. Furthermore, Sc and REEs oxides prices are presented with their relative value per ton BR. REEs concentration in Greek BR is ~1.2 kg/ton with a Sc_2O_3 content ~ 0.02 g/ton, close to its main resources. Scandium is the most valuable element in BR, comprises about 98% of the total value. Additionally, the concentration of REEs and Sc is almost constant over the years (Table 1b).

Table 1a.
Economic value of REEs oxides /ton of Greek BR (Ochsenkuehn et al[1], Lymperopoulou et al[2])

REEs oxides	Average concentration of REEs oxides		Average enrichment factor	Target price of oxides 99.5 - 99.99% (U$/kg)	Value 2016 (U$/ ton BR)
	Bauxite (g/tn)	BR (g/ton)			
Sc	92	185	2.0	4200	776 (98%)
Y+Lanthanides	558	1008	1.8	61	15(2%)
Total REEs	650	1193	1.7		791

Table 1b.
Concentration (mg/kg) of scandium and total REEs in BR (1993 - 2016)

	BR 1993	BR 2001	BR 2007	BR 2012	BR 2014	BR 2016	Mean
Sc	127.9	107.0	130.0	110.0	114.7	98.0	**114.6±12.4**
Total REEs	986.1	868.0	1010.5	1040.3	729.7	-	**926.9± 128.2**

Milestones of our long term research

The most important milestones of our over 40 year bauxite research on REES recovery from BR are in chronological order:

Geochemical study and determination of mineralogical and chemical composition of Greek bauxite and BR.

Development and validation of suitable spectroscopic analytical methods (ICP-OES, ICP-MS, INAA) for REEs determination.

Development in lab scale of a novel combined process for the recovery of REEs from BR and their further purification, based on hydrometallurgical treatment (acid leaching), ion exchange, extraction/back-stripping procedures.

Scale up of the developed method in pilot plant founded by the Greek Ministry of Development.

Optimization of Sc isolation processes and individual REEs separation by liquid chromatography.

Development of feasibility studies for foreign and Greek Companies for procedure viability assessment.

Investigation and optimization of the hydrometallurgical process under environmental and economical aspects, funded by a multinational corporation and an EU Horizon 2020 project.

PhDs, undergraduate and postgraduate theses/Dissemination of the research results in international journals and various international and Hellenic conferences.

Results and Discussion

Genesis and transport trends of the 3rd horizon bauxites of Parnassos - Ghiona area in Central Greece was already investigated in 1977, as K.M. Ochsenkühn and M. Ochsenkühn - Petropoulou[3] reported. Minerals hosting REEs in Greek bauxites were identified by electron microscopy according to M. Ochsenkühn-Petropoulou and K.M. Ochsenkühn[4] and an in - depth enrichment of REEs in the investigated bauxite deposits was found by M. Ochsenkühn - Petropoulou et al[5], using modern analytical techniques.

Within the framework of Th. Lymperopoulou PhD thesis[6] (1991 - 1996), an analytical procedure for the direct determination for REEs was developed and validated, revealing an enrichment of REEs by a factor 2 compared to the origin bauxites[1]. Lab scale selective acid leaching method was optimized using several leaching agents under different parameters and the nitric acid proposed, resulted to recoveries up to

70 - 95 % for HREE, Y and Sc, as presented by M. Ochsenkühn - Petropoulou et al[7]. Furthermore, ion exchange, solvent extraction and back - stripping experiments with selective agents were conducted leading to Sc isolation[8].
Based on the above mentioned lab - scale experiments a pilot plant for the recovery of Sc and REEs was designed and constructed (Fig.1)[9,10].

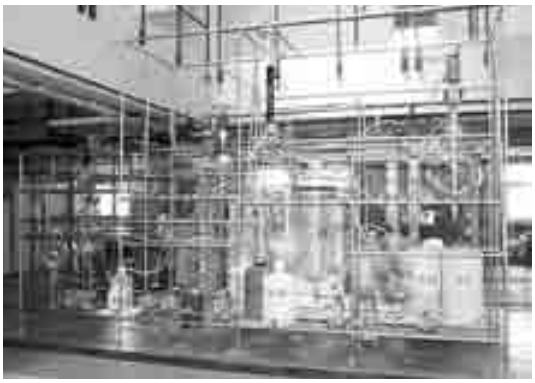

Figure 1. The pilot plant unit for the utilization of Greek BR
(Semi - Industrial Laboratory of School
of Chemical Engineering - National Technical University of Athens).

In Tsakanika's PhD thesis[11] the developed method was further optimized regarding the elution, extraction and back - stripping agents. The proposed method (Fig. 2) resulted in a selective Sc recovery of almost 80 % and a Sc compound of 99 % purity while REEs were obtained in two groups by selective back - stripping solutions. Regarding the separation of the individual REEs in high purity, a Chromatographic method (RP-HPLC/UV-Vis) was developed (Tsakanika et al)[12].

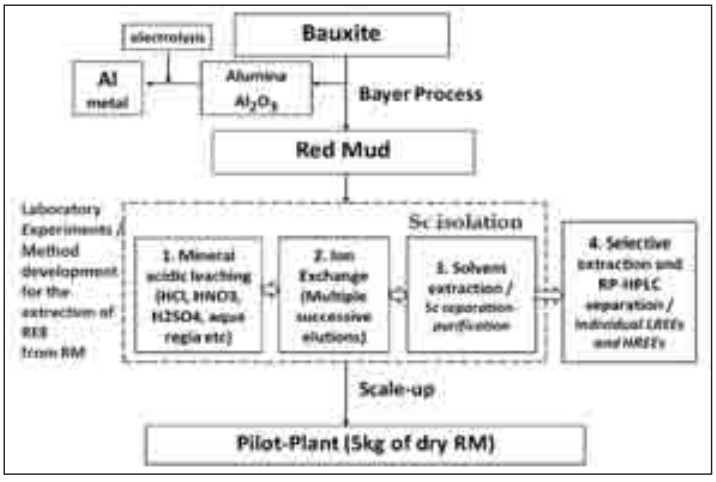

Figure 2. Flow sheet of the developed method for REEs recovery from BR.

Based on obtained data and market information and estimations, a series of feasibility studies under different production capacity levels were performed. Sc price was the most decisive factor for the implementation of Sc production investments while the whole procedure economics and viability is favored with scaled up production. As reagents cost is the most critical factor, sulfuric acid is the best option for BR leaching, due to lower price and smaller environmental impact.

Nowadays our research is focused on the optimization of leaching process for Sc selective recovery using sulfuric acid under several process parameters[13,14,15]. The process will be applied in industrial scale in the premises of Mytilineos S.A., in the framework of the European Community's Horizon 2020 Program-SCALE (http://cordis.europa.eu/project/rcn/206331_en.html), according to the flow - sheet demonstrated in Fig. 3.

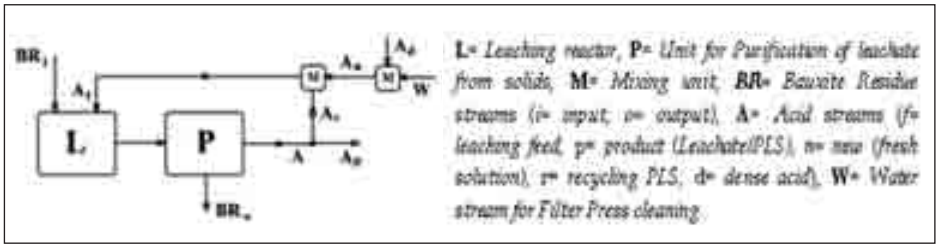

Figure 3. Conceptual design of continuous BR leaching process for Sc recovery.

Conclusions

An over 40 year investigation revealed that Greek bauxites and their industrial residue, the red mud, have a constant content of critical elements such as REEs. Especially Sc concentration in bauxite residue is close to its main resources promoting the exploitation of an industrial byproduct achieving economical and environmental benefit.

The developed method leads to the valorisation of BR leading to an environmentally safer residue. Feasibility studies of the process reveal a balanced viability.

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THE ROLE OF PROFESSORS EMERITI TO THE KNOWLEDGE TRANSFER AND TECHNOLOGY

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Abstract

The transfer of knowledge and technology (KT) aims to engage experts in science, technology and industry in order to create opportunities for transfer of technology and know - how. The basic goal is to create innovation and transfer a positive impact on society that enriches humanity.

There are various basic modes for technology transfer from the public research sector to the business sector, like the non - commercial transfer (seminars, publications etc.), the commercial transfer (consulting, licensing etc.) and the new company generation (direct and indirect spin-offs, technology transfer companies, start-up companies etc.). One interesting and important example of knowledge transfer is the innovative ideas and technologies from physics which have contributed to great advances in medicine, in particular radiation-based medical diagnosis and treatment.

Professors Emeriti from different fields of research and from Universities of various countries could play a very important role in giving momentum to the knowledge transfer KT by applying their experience. They could join their efforts in order to establish collaborations with partners, to exchange their ideas and to finally achieve developing projects, new research Networks and international collaborations towards admirable future perspectives.

Keywords: knowledge and technology transfer; basic research; high energy physics; CERN; innovations; practical exercises.

Introduction

Science and research are important for understanding the world and the universe. Universities and Research Organizations have contributed significantly to the creation of new knowledge through basic research, to the development of new technologies for detectors and accelerators, to the improvement of Information and

Communication Technologies, to the training of the engineers for future and to the unification of scientists and people from all countries and cultures.

Last years in many aspects an increased focus is given to transfer knowledge from basic research connected to various disciplines with the aim to inspire applications and to promote innovation and entrepreneurship as well as many other public benefits.

Knowledge and technology transfer

Knowledge Transfer (KT) is a term used to include a broad range of activities and to create beneficial collaborations between universities, businesses and the public sector. The basic goal is to create innovation and transfer a positive impact on society connected to applications useful for everyday life.

Basic modes for KT transfer according to Upstill and Symington[1] are the following:

1. *Non - commercial transfer* such as publications, seminars, informal contacts and training.
2. *Commercial transfer* such as collaborative research, consulting, licensing and sale of intellectual property with technical services.
3. *New company generation* as direct spin-offs, indirect spin - offs and technology transfer companies.

Especially the non-commercial knowledge transfer from the universities to the public sector is successfully achieved through the open models of the basic science which is an open source like the open source software and hardware with admirable applications.

High energy physics (HEP) and KT

Among the most attractive parts of the basic research HEP is an open science with a tendency to play an important role to Knowledge and Technology transfer! HEP is the physics of Elementary Particles with the main aim to investigate the fundamental structure of matter and the laws that govern these objects. Elementary particle physics has made enormous progress in the last century up to nowadays. Furthermore, theorists work on the possibility of unifying the various forces previously thought to be unrelated. More astonishingly, the history of the Universe itself, has become completely connected with the problems of the smallest scale imaginable.

Theory and experiment walk hand - in - hand. Today's accelerators have reached high energies, at the scale of TeV - if somebody compares with that of old cyclotrons - require several thousand people to run and need huge government support. The Large Hadron Collider (LHC) at CERN is the biggest accelerator today built in order to explore the theory of the Universe beginning and to search for the genesis of the elementary particle mass. The two beams of protons are accelerated in

opposite directions with an upgraded total centre of mass energy 13 TeV inside an underground accelerator ring 27 km in circumference. The LHC is filled with superconducting magnets and accelerating cavities to steer and focus the protons in beams that repeatedly circle the ring. The two beams under the design of an optical model are guided to have head-on collisions in four different detector apparatus known as ATLAS, CMS, LHC - b and ALICE experiments. (Fig.)

Figure. The LHC Accelerator tunnel at CERN.

On July 4, 2012, the two biggest compatible experiments of LHC, ATLAS[2] and CMS, announced the first preliminary results of the Higgs discovery, connected from the CERN amphitheatre with the International Conference ICHEP 2012 in Melbourne through the technique "two way video". The Higgs boson, the only one elementary particle which was not yet detected but it was predicted from the Standard Model to explain how particles gain mass, did its appearance. Francois Englert and Peter Higgs awarded the Physics Nobel Prize 2013 for their theory, known as BEH mechanism, to explain the mass origin on 1964; they had to wait about 50 years for its verification from the HEP experimentalists of LHC!

According to the CERN - Brochure[3] the basic tools of accelerators, detectors and computing are used from CERN in order to fulfille the necessary requirements for extracting the results of the basic research on the elementary particles but nevertheless these tools are also used for knowledge transfer to develop applications of high - technology in various fields as: Medical and Biomedical technology, aerospace applications, industry, robotics, microelectronics and superconductivity. How one research organisation transfers its knowledge and technology and in what way provides positive externalities as Nilsen and Anelli[4] describe about CERN is an interesting issue based on a general policy and principles concerning KT.

Unambiguously, the most important contribution to society from CERN is the World Wide Web, shortly named as WWW, invented by Tim Berners Lee during his time at CERN in 1989. This software and the subsequent developments released as an Open Source to Society.

Knowledge transfer from high energy physics to medicine

Elementary particle techniques used for detection of particle tracks are successfully applied to medicine for diagnosis and treatment of diseases. As Keevil[5] describes physics has spurred significant advances in medical field, from ancient years until today. CERN has a long tradition for contributing to the medical field. In diagnosis using radio - isotopes it is important to keep the dose to patients as low as possible and this is where particle physics comes in. Especially, detectors like sensitive crystals originally designed to measure particles inside the L3 experiment of the LEP (Lepton Electron Positron) Accelerator have been widely used in photon - detectors for medical imaging.

A new monolithic Active Pixel Sensor originally developed to upgrade the inner tracking system of the ALICE experiment during the second long shutdown of LHC, is given to Bergen University for an application of Proton CT (Proton Computed Tomography). Recently PET (Positron - Emission Tomography) scan, a nuclear medicine functional imaging technique with high sensitivity, is used to observe metabolic processes in the body as an aid to the diagnosis of disease. Combination of PET with CT or MRI (Magnetic Resonance Imaging) are showing great promises in oncological applications.

The role of Professors Emeriti to knowledge transfer

Professors Emeriti coming from different fields of research and from Universities of various countries could play a very important role in giving momentum to the knowledge and technology transfer by using their long experience to communicate and inspire students by teaching and research. Non - commercial transfer such as publications, presentations and informal exchanges are among the most important ways information is diffused from public research to industry.

A new activity proposed by the author, called EAPE Network for Practical Exercises Proposal, to be established under the supervision of Professors Emeriti, could play one very important contribution to the knowledge transfer! The University students will have the opportunity to fulfille the training of their practical exercise in the framework of very well organized laboratories or of industry companies all

over Europe. Every year one list of EAPE Practical Exercises could reach all the Universities for the participation of the students in order to benefit the education.

Conclusions

The overview presented shows in summary how "Knowledge and Technology Transfer - KT" with various modes make a significant impact on society in different ways. High Energy Physics research by transferring its KT has contributed to the improvement of health and the quality of life.
Proposal for the establishment of a new activity based on the possibility to define every year a list with positions of practical exercises for the University students in Europe under the supervision of EAPE Professors was discussed.

Professors Emeriti have the ability to organize academic and non-academic collaborative partners, which could offer research and education in great projects to benefit Society.

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SALINIZATION IN COASTAL GROUNDWATER OF GREECE AND ITS INFLUENCE ON THE RISKS OF HEAVY METALS

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Abstract

The air, groundwater and land degradation are threats for human health. The present brief review compiles available data on the groundwater quality affected food quality and ecosystems, and current policy concerning land use and management of groundwater resources. A diversity between the spatial distribution of Cr in soils and groundwater,and the elevated concentrations of Na, B, Li, Ma, Ca in strongly contaminated by Cr (VI) groundwater, suggest that salinity may facilitate the Cr - solubility. The salinization of shallow aquifers may have a major effect on plant/ crops growth and toxicity. The use of multidisciplinary methods in the study of ecosystem processes in response to groundwater and soil system has great potential for sustainable development.

Keywords: salinization; groundwater; heavy metals; health; Greece.

Introduction

Heavy metal/metalloid (As, Cd, Cr, Cu, Hg, Pb, Zn, Sb, Co and Ni) contamination of groundwater and soil has become a serious environmental Problem worldwide. The presence of harmful elements in soils may be related with natural processes or / and human activities and / or transfer of weathered material from rocks and primary raw materials or wastes, surrounding cultivated basins and the application of large amounts of fertilizers/pesticides for long time. The European Soil Data Centre has established their bio-availability, bio-accumulation and a major effect on the human health and ecosystems[1,2]. Dose - dependent differences in element toxicities, the particle size and the oxidation state require serious consideration in health risk assessments. Health problems (lung cancer and dermatitis) are caused by highly toxic and very soluble oxidized Cr (VI), in chromate oxyanions,in contrast to the reduced Cr (III) that is an essential nutrient(ATSDR, 2000).

The scientific interest and sustainable management of groundwater and agricultural-land are attractive subjects, due to the increasing demand for agricultural and water resources[1]. The present brief review focuses on a case study at the C. Evia and Assopos - Thiva basins, compiling available data on the water–soil - plant system and current policy concerning land use and management of groundwater in the frame of the sustainable development.

Contamination of coastal groundwater

A very common source of salts in irrigated soils is the irrigation water itself, affected by sea water in low - lying areas along the coast. The salinization is a common process recorded in coastal land of many coastal countries of the Mediterranean region, including Greece[3,4]. The main aquifers in the Greece are developed in alluvial (Quaternary/Neogene) unconsolidated deposits (porous aquifers) covering the lowlands and semi - mountainous area of Greece (Fig. 1), and in carbonate rocks (karstic aquifers). The Quaternary deposits have an average thickness ranging from <30 m to more than 200 m, at coastal areas of Greece, supplying large quantities of water[5].

Figure 1. Distribution of Quaternary alluvial deposits in Greece (After Daskalaki and Voudouris, 2008)[5]. Simplified geological map of the Assopos-Thiva and C. Evia basins composed by, alternations of marls and marl limestones at the lowest parts, and continental sediments, showing the extent of Quaternary deposits containing transferred material from ophiolites, and the sampling sites of coastal groundwater (triangle) and soils (circle), after Megremi et al. (2019)[4].

Available analytical data on the heavy metal / metalloid concentrations of coastal groundwater[4,6,7,8,9] in C. Evia (Messapia), the Assopos - Thiva, Avlida, Koropi and Loutraki basins (Fig.1) have showed that salinization can be identified on the basis of groundwater chemical composition. Besides the elevated concentrationsof Ca, Mg, Na, Li, B, As, Seand Cl in water samples, which are characteristic of seawater composition[3], the salinization of the coastal groundwater is accompanied by an increase Cr and occasionally Fe, Ni, Mn, Co, exhibiting often concentrations over the maximum acceptable level for Cr tot in drinking water (50 μg/L).In particular, at theAssopos - Thiva Basin concentrationsof Cr (VI) range from <2 to 850 μg/L, at C.

Evia from <2 to 360 μg/L, while at the area of Inofyta, near the Assopos river, have been reported much higher concentrations, up to 8000 μg/LCr tot (Fig. 2b; Megremi et al[4], 2019 and references therein).

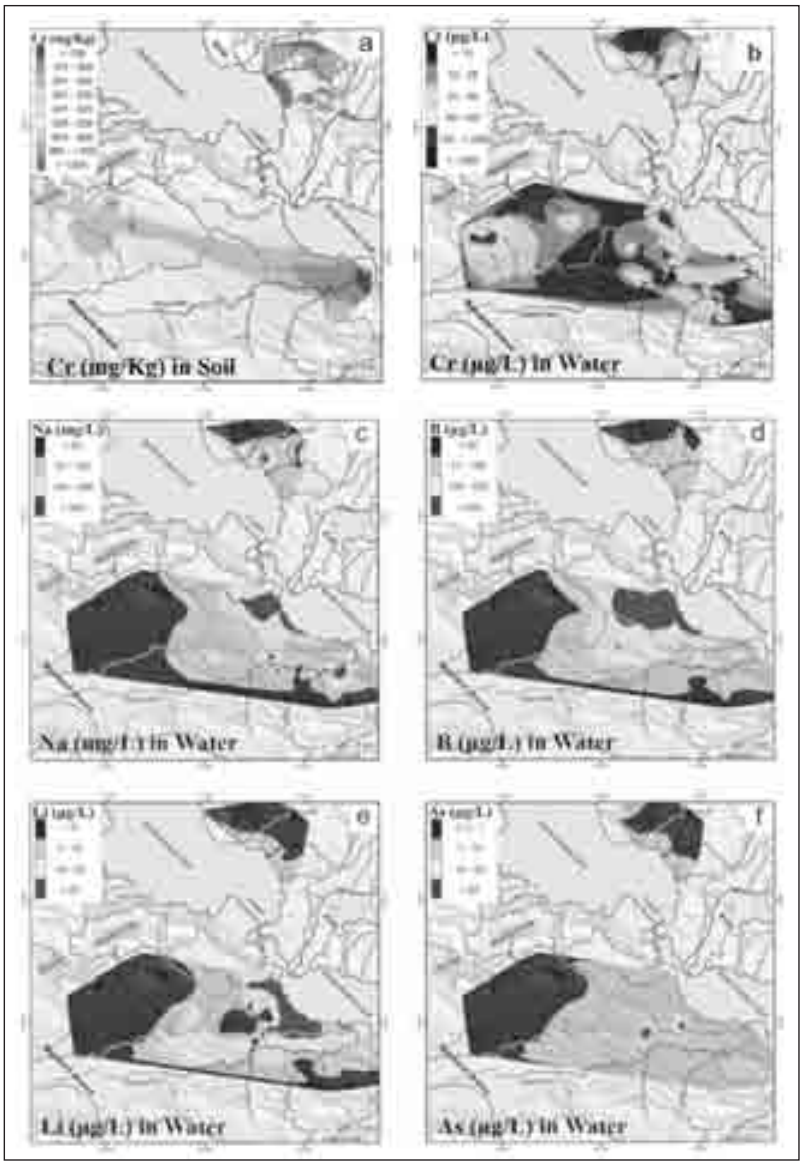

Figure 2a,b,c,d,e,f. Maps of spatial distribution of Cr in soils and groundwater (2a, 2b) showing a diversity between the Cr distribution in soils (Fig. 2a) and groundwater (Fig. 2b) and elevated Na, B, Li and As concentrations (2c, 2d, 2e,2f, respectively) in costal groundwater, affected by seawater intrusion in the C. Evia and Assopos - Thiva basins.

Salinization influence on the risks of heavy metals

A salient feature throughout the studied area is a spatial diversity between the Cr distribution in soils (Fig. 2a) and groundwater (Fig. 2b), suggesting different sources of contamination. It is obvious that the spatial distribution of Cr in groundwater (Fig. 2b) has been affected by additional sources, related to the neighboring industrial activities, and salinization, exemplified by elevated Na, B, Li, and As concentrations (Fig. 2c,d,e,f)[4]. The Cr - mobility through rocks/soils is dependent upon its oxidation state that it is controlled by the soil salinity, redox conditions, pH, and the presence of certain other metals and organic compounds[10]. ACr(VI) - increase in water is strongly effected by seawater intrusion (Fig. 2b - f). However, chromium is not derived from seawater based on the low (<1 μg/L) Cr (VI) concentration and the relatively low stable chromium isotopes (expressed as δ^{53} Cr ‰)[9]. Although information on the role of salinity to the stability of heavy metals is limited, the diversity between the Cr distribution in soils (Fig. 2a) and groundwater (Fig. 2b), and the elevated Cr (VI) concentrations in groundwater, suggest that salinity may facilitate the Cr - solubility.

Management of land use and groundwater

Management strategies to reduce the transfer of harmful elements from soil into groundwater and plants/crops (food - chain), and the reduction of the salinity in the root zone and/or in aquifers are required[11].

Reduction of the metal uptake in shoots / roots of crops by the addition of organic matter, and the bioremediation promising the removal of heavy metals, could be applied for the recovery of contaminated land and groundwater.

A negative trend between chromium isotopes (δ^{53} Cr values) versus Cr (VI) concentrations in water may suggest an on - going and relatively efficient process in the composition of groundwater that facilitates natural attenuation of the dissolved and toxic Cr (VI)[12].

Conclusions

The salinization in coastal groundwater is commonly accompanied by Cr (VI) contamination, exceeding the permeable limits, causing environmental risks for ecosystems and human health.

The definition of contamination / pollution sources, presence of hotspots, the degree and extent of soil and groundwater contamination, in a National and European level is required in order to propose the appropriate policy and protect the food chain.

Increasing food demand (intensive use of cultivated lands) has resulted in critical problems for the societies, agricultural economy and increasing healthcare cost; furthermore investigation on methods for the prevention and control of contamination is required.

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INDEX OF KEY WORDS

INDEX OF KEY WORDS

E

F

G

H

I

K

S

T

U

V

W

AUTHORS
INDEX

AUTHORS INDEX

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