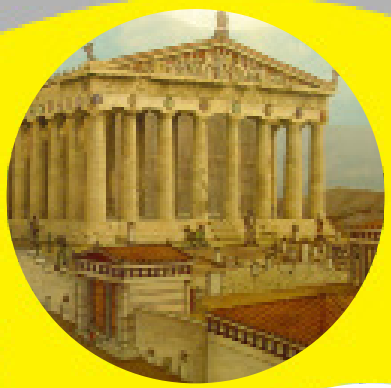
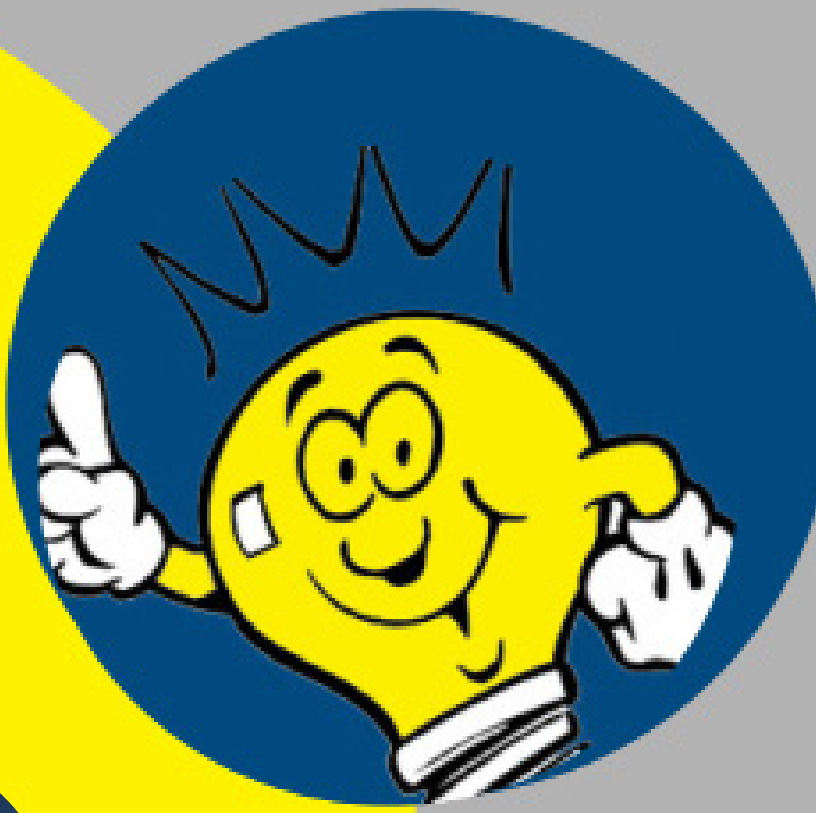
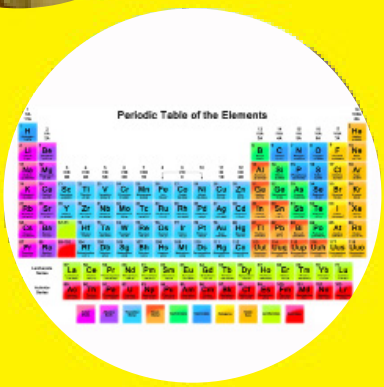
EPMagazine

History of Science and Technology







EPM No. 42
Issue 3,
December 2016
ISSN 1722-6961

Year 2016
Issue 3 - December
I.S.S.N.1722-6961

International Editorial Board

Brasov Editorial Board

Brasov, Romania

Transilvania University of Brasov
Dr. Ioan Mesota National College
Mircea Cristea Technical College

Students Anca Ungureanu, Andrei Miloiu, Andrei Pîrv, Timea Koppandi, Andrei Toderasc, Alexandru Mathe, Adrian Baku
Teachers Elena Helerea, Monica Cotfas, Melania Filip

Boggio Lera Editorial Board

Catania, Italy

Students Tiziano Grillo, Silvio Reitano, Santi Murabito
Teacher Angelo Rapisarda

Fagaras Editorial Board,

Fagaras, Romania

Dr. Ioan Senchea Technological High School

Students Sebastian Mesaros, Robert Verestiuc, Roberta Oprean, Agnes Ercsei, Felix Husac
Teachers Luminita Husac, Gabriela Talaba, Emanuela Puia

Model Experimental High School Editorial Board

Thessaloniki, Greece

Students Athina Stergiannidou, Spyros Terzin, Eugenia Xaki, Niki Kozaiti, Ioannis Mantamas, Evaggelia Varlami, Christos Emmanouilidis, Dimitrios Zora
Teachers Nikos Georgolios, Marilena Zarftzian

Webmaster **Rick Hilkens**
webmaster@epmagazine.org

International Cooperators

Schools	*Coordinators*
School 127 I. Denkoglu, Sofia, Bulgaria	Tzvetan Kostov
Suttner-Schule, Biotechnologisches Gymnasium, Ettlingen, Germany	Norbert Müller
Ahmet Eren Anadolu Lisesi Kayseri, Turkey	Okan Demir
Priestley College Warrington, UK	Shahida Khanam
Victor Babes National College Bucuresti, Romania	Crina Stefureac
C. A. Rosetti High School Bucuresti, Romania	Elisabeta Niculescu
Gh. Asachi Technical College Iasi, Romania	Tamara Slatineanu
IES Julio Verne, Bargas, Spain	Angel Delgado

EP*M* Official Website: www.epmagazine.org

EP*M* Online Magazine: epmagazine.altervista.org

EP*M* Greek Website www.epmgreece.blogspot.com

Cover of the magazine: Dimitris Tsitos
Magazine Layout: Andra Tudor, Cristian Musuroi

Editorial

Vasilis Vogiatzis

General

Mir-Yusif Mir-Babayev

14-16

17-19

17-19

Fun Pages

EDITORIAL

Water and Homo Sapiens

by Vasilis Vogiatzis
Physical Science Teacher, Thessaloniki, Greece

The western man of the industrial era is proud of his Technology.

So much so that he has no moderation. He has become arrogant.

History shows and current events prove that he has done so unwittingly. It has now sunk in that differences are always resolved at the expense of the Weaker party. However, even though human differences are resolved with the blood of the poor, our differences with Nature are always resolved at the expense of us all.

Nature is Moderate. This is the lesson she has always taught us. Every creature lives in balance with the environment. With the exception of the arrogant western-minded man, who shattered his Relationship with Her.

But let's take things from the beginning.

Heat with her children, Precipitation and Wind, shaped the Earth and gave her Life. Man was a small part of that creation. Once he felt that, sometimes in the middle of floods and some other times while producing food, he saw God in the Water. In every spring, in every Body of Water. It's in the Fairy Tales.

While his Mind was rising, the Spirit of God withered inside him. Priests took His place and we surrendered the responsibility for our salvation to them.

Until we reached the industrial revolution. That is when the Water was used to produce more and more "goods" with the blessing of the priests, the violence of the State, and the seductive reward claimed by factory owners, i.e. Profit. These "goods" had to be consumed without moderation to allow him, the crown of Creation, to subdue the Earth!

In this task, the Water of Life acted as a simple courier of energy and all sorts of chemical substances and, especially, Garbage.

Garbage. What a frivolous mental concept!

And here we are today.

Man was only brought to his senses when he saw water sold in plastic bottles, poison flowing in the rivers, drying-up lakes, springs that stop flowing, glaciers crumbling to pieces, melting Poles, sea currents that gradually break their natural cycle, rising sea levels that drown the ones that are least responsible for this disaster, hurricanes that strike one after the other. But was Man really brought to his senses?

Recycling and renewable energy sources are gaining ground but Consumerism and Profit are still the pillars of our perception of development, which led us where we are today. What's more, wars are still waged over oil.

Fortunately, I am worried because I see the mighty play like kids with buttons and printed pieces of paper without regard for the truly Mighty One, Nature.

However, because Water is within our grasp, each one of us, you, me, anybody who wants to be called a Man must:

"Love responsibility and say that
I alone will save the world.
If it is lost, I will be the one to blame."

Nikos Kazantzakis, Ascesis: The Saviors of God

ΕΚΔΟΤΙΚΟ ΣΗΜΕΙΩΜΑ

Το Νερό κι ο Άνθρωπος ο Σοφός

Ο δυτικός άνθρωπος της βιομηχανικής εποχής είναι περήφανος για τη Τεχνολογία του.

Τόσο που έχασε το Μέτρο. Έγινε αλαζόνας.

Η Ιστορία το δείχνει και τα τρέχοντα γεγονότα, αποδεικνύουν ότι δεν το κατάλαβε. Μάθαμε πια ότι οι διαφορές λύνονται πάντα εις βάρος του Αδυνάτου. Κι αν οι ανθρώπινες λύνονται πάντα με το αίμα των φτωχών, οι διαφορές μας με τη Φύση λύνονται πάντα εις βάρος όλων μας.

Η Φύση είναι το Μέτρο. Το διδάσκει. Κάθε πλάσμα της ζει σε ισορροπία με το περιβάλλον. Εκτός από τον αλαζονικό άνθρωπο με τη δυτική σκέψη, που διατάραξε την Σχέση του μαζί Της.

Ας πάρουμε όμως τα πράγματα από την αρχή.

Η Θερμότητα μαζί με τα παιδιά της, τον Υετό και τον Άνεμο, διαμόρφωσαν τη Γη και της έδωσαν Ζωή. Μικρό μέρος της κι ο άνθρωπος. Όταν το ένιωσε αυτό, πότε με πλημμύρες και πότε με τη δημιουργία τροφής, είδε στο Νερό το Θεό. Σε κάθε πηγή, σε κάθε Σώμα Νερού. Το λένε τα Παραμύθια.

Όσο ο Νους του ψήλωνε τόσο το Πνεύμα του Θεού έσβηνε μέσα του. Την θέση Του έπαιρναν οι ιερείς, που τους παραδώσαμε την ευθύνη για τη σωτηρία μας.

Ώσπου φτάσαμε στην βιομηχανική επανάσταση. Τότε, με την ευλογία των ιερέων, τη βία του Κράτους και το δέλεαρ του μισθού των εργοστασιαρχών, του Κέρδους, το Νερό χρησιμοποιήθηκε για την παραγωγή όλο και περισσότερων “αγαθών”, που έπρεπε να καταναλώνονται χωρίς μέτρο για να κατακυριεύσει, αυτός, η κορωνίδα της Δημιουργίας, τη Γη!

Σ’ αυτό το έργο, το Νερό της Ζωής έγινε απλός κουβαλητής: ενέργειας και χημικών ουσιών κάθε είδους και κυρίως Σκουπιδιών.

Το Σκουπίδι. Τι επιπόλαια πνευματική επινόηση!

Και φτάσαμε στο σήμερα.

Ο άνθρωπος έπρεπε να δει το νερό να πουλιέται σε πλαστικά μπουκαλάκια, τα ποτάμια να κουβαλάνε δηλητήρια, τις λίμνες να στεγνώνουν, τις πηγές να στερεύουν, τους παγετώνες να καταρρέουν, τους Πόλους να λιώνουν, τα θαλάσσια ρεύματα να σταματάνε σιγά-σιγά το φυσικό τους κύκλο, την θάλασσα να ανεβαίνει, πνίγοντας ήδη τους αθωότερους, τους τυφώνες να ξεσπάνε ο ένας πίσω από τον άλλο, για να ταρακουνηθεί. Ταρακουνήθηκε;

Η ανακύκλωση και οι ανανεώσιμες πηγές ενέργειας εξαπλώνονται, αλλά η Κατανάλωση και το Κέρδος παραμένουν τα θεμέλια της αντίληψης για την ανάπτυξη, που μας οδήγησε στην κατάσταση που είμαστε. Και οι πόλεμοι για το πετρέλαιο καλά κρατούν.

Ευτυχώς, είμαι ανήσυχος. Γιατί βλέπω τους ισχυρούς να παίζουν σαν παιδιά με τα κουμπιά και τα τυπωμένα χαρτάκια. Αδιαφορώντας για τον αληθινά Ισχυρό της Γης. Τη Φύση.

Ωστόσο, επειδή το Νερό περνάει από το χέρι μας, ο καθένας μας, εσύ, εγώ, για να είναι Άνθρωπος πρέπει:

«Ν’ αγαπά την ευθύνη
να λέει εγώ, εγώ μονάχος μου
θα σώσω τον κόσμο.
Αν χαθεί, εγώ θα φταίω»

Ν. Καζαντζάκης “Ασκητική”

EDITORIALE

Acqua e Homo Sapiens

L'uomo occidentale dell'Era industriale è orgoglioso della sua tecnologia.

Così tanto da non presentare nessuna moderazione, divenendo arrogante.

La Storia mostra, e gli eventi attuali provano, come ciò sia avvenuto inconsapevolmente. Adesso siamo in ambasce, e le differenze sociali spesso si risolvono a spese della parte più debole. Le differenze sociali e tecnologiche spesso si risolvono con il sangue del povero, a differenza della Natura, i cui problemi si risolvono sempre a spese di tutti noi.

Madre Natura è giudiziosa, e questa virtù è la lezione che Essa spesso ci dà. Ogni creatura vive in equilibrio con l'Ambiente, con l'eccezione dell'arrogante uomo occidentale che ha rotto ogni rapporto con Lei.

… ma riprendiamo dall'inizio.

D'intesa con i suoi figli, Precipitazione e Vento, ha plasmato la Terra e ha dato ad essa la Vita. L'uomo era solo una piccola parte di questa Creazione. Percepito ciò, ha visto Dio nell'Acqua, dopo averne seguito i flussi e trovato nutrimento in ogni sorgente e in ogni Corpo di Acqua. Tutto questo, purtroppo, solamente nel mondo dei sogni.

Mentre la sua mente cresceva, lo Spirito di Dio arretrava dentro di lui. I predicatori hanno preso il Suo posto e ci siamo arresi a questi altri uomini per mediare la nostra Salvezza…

… fino a quando non arrivò la rivoluzione industriale, quando l'Acqua veniva usata per produrre una moltitudine di beni con la benedizione dei preti, la violenza dello Stato, e il premio materiale reclamato dagli imprenditori, quali il Profitto. Questi beni dovevano essere consumati senza moderazioni per permettere a lui, che si sentiva Creatore di Tutto, di dominare la Terra!

In questo ambito, l'Acqua della Vita agiva come una semplice trasportatrice di energia e di ogni tipo di sostanze chimiche, soprattutto, rifiuti.

Rifiuti (sempre e comunque inquinanti). Che concetto intellettualmente frivolo!

Ed eccoci ai giorni nostri.

L'Uomo si rese conto dei suoi errori quando vide l'acqua venduta in bottiglie di plastica, veleni scorrere nei fiumi, laghi prosciugarsi, sorgenti scomparse, ghiacciai ridotti a pezzi, fusione dei Ghiacci Polari, correnti marine che gradualmente interrompono il loro ciclo naturale, innalzarsi del livello dei mari che affoga gli innocenti, uragani che colpiscono uno dopo l'altro. Ma l'Uomo si è veramente reso conto dei suoi errori?

Il Riciclo e sorgenti di energia rinnovabile stanno guadagnando terreno ma il Consumismo e il Profitto sono tutt'oggi i pilastri della nostra percezione di sviluppo, che ci ha condotti allo stato attuale. E c'è di più: guerre che vengono ancora dichiarate per il petrolio.

Sono preoccupato perché vedo i potenti giocare come bambini con bottoni e pezzi di carta stampata senza rispetto dell'unica Entità veramente Potente: Madre Natura.

Tuttavia, poiché l'Acqua rientra nell'ambito delle nostre conoscenze , ognuno di noi, tu, io, chiunque voglia essere definito Uomo deve:

Assumermi le mie responsabilità e dire che
Io da solo salverò il mondo.
Se non lo farò, io sarò il colpevole.

Nikos Kazantzakis, *Ascesis: The Saviors of God*

Technical University
Azerbaijan
Baku, Azerbaijan
mirbabayevmiryusif@yahoo.com

First oil wells in the world

by Mir-Yusif Mir-Babayev

On January 1st, 1825, Baku oil fields had started to be administrated directly by the Tsar Treasury at the same time, Nikolay Ivanovich Voskoboynikov talented mountain engineer was seconded together with his mission-mate ensign Talalayev to be sent to Baku Town in accordance with the Mountain expedition in order "to check and accept; Baku town's major wells and warehouses with white and black oils as the public property located in Balakhani, Binagadi, Surakhani and Bake from Tarumov, tax-farmer holders had to present the detailed registration book signed commonly about the number of wells and warehouses, their status and quantities of unsold oil still stored at warehouses; which buildings and assets belonging to the tax-farmer had to be handed over to the Treasury; how much unsold and stored oil in Masazyr and Zykh was in Baku; are the warehouses comfortable in use" [The State Historical Archives of the Republic of Azerbaijan, f. 24, op. 24, d. 390, p. 2].Balakhani, Binagadi, Surakhani, Masazyr and Zykh are the settlements of Baku on Absheron peninsula (*Author*).

After having successfully accomplished the mission, Voskoboynikov sent the extensive report to the Mining expedition about the status of the oil and salt resources of the Absheron. It is interesting that his materials remain currently the only source where one can find a comprehensive description of the status of the public and private oil wells of the Absheron under the lease-out system and on the eve of its transition to the direct State administration.

In this context, in accordance with the data of Voskoboynikov, there were 17 wells near Bibi-Heybat on January 1st, 1825 leased out by Tarumov, 1 private well; 82 public wells with black oil in Balakhany. Voskoboynikov noted the following in the "Mining Journal" (1827): *"The peninsula of the Absheron represents by itself woodless and almost fruitless piece of lands… But nature has filled the gaps of this country by forming in its terrestrial bowels abundant sources of oil and salt which meet not only the needs of the local residents, but also serve as a prerequisite of their wealth… But what is black oil – black tar? It is mainstream in entrails of the earth, but it sorts out to the surface of this ancient land in various altitudes and even on the seabed".*

Furthermore, N.I. Voskoboynikov worked several times as the director of the Baku oil and salt fields in 1825 and 1834-1838, which positively impacted the development of the Azerbaijani oil history. His main achievements are the following: elaboration of the extensive action plans in the fields of extraction, exploration, storage and sales of oil.

Pictures 1, 2: Oil recovery from well on the Absheron peninsula (photos from Azerbaijan National Archives / ANA).

Having faced in his pathway significant obstacles put by the power of the rich elite, which had absolutely been against cessation of wells to the Treasury (such as E.F. Kankrin, Minister of Finances; general E.A. Golovin, Commander-in-Chief in the Caucasus who had replaced general A.P. Yermolov and others), Voskoboynikov undertook full-scale measures in the Absheron, which definitely favoured the creation and development of the oil industry in Azerbaijan: concreting of pavement at oil warehouses; equipment to get the lighting kerosene by refining of the Surakhani oil; accounting for oil by installing cuttings in oil storage facilities; the use of white and black oil instead of turpentine, tar and cod-liver oil for lighting the houses, street lamps and lighthouses; as well as "impregnate timber with oil, which is used for the construction of the top sides of ships"(Acts Collected by the Acts of Caucasian Archaeographic Commission) [ACAC, volume 9, page 50].

In 1837, the Trans-Caucasus Society for the Promotion of Industry and Trade created by the initiative of Voskoboynikov, which ensured data collection on oil consumption in all Caucasus. Activities of this

Society favoured oil sales in Azerbaijan and Trans-Caucasus as a whole.

The oil refining plant of Voskoboynikov became the first such plant in the Absheron which started its activities in Balakhany in 1837 and mastered "special refining facility and steel bulks for transportation" [ACAC, v. 9, p. 651]. But he did not succeed in completing the process of refining oil into kerosene; Voskoboynikov resigned in 1846 and left the Absheron forever.

In accordance with data of the Caspian Chamber of the State of Properties of the Ministry for Public Properties in 1842, there were 136 functioning wells in the Absheron, which annually yielded up to 3.8 thousand tons of oil; in fact, the oil extracted in large quantities was exported to Persia. The deepest point of the wells was up to 14 sazhens (1 sazhen is equal 2.13 meters; sazhen is an Old Russian measure of length).

In 1846, Vasily Nikolayevich Semyonov (1801-1863), a member of the Caucasus Main Administrative Council proposed to drill an oil well at a depth of 21 m for oil exploration being the first deepest well in the world. Drilling works were led by major Alekseev, director of Mining Engineer Corps of the Baku oil fields [ACAC, v.10, p.137]. Azerbaijan overtook America by 13 years: the first drilled American oil well is dated 1859. However, it is indeed in 1859, after tapping huge artesian sources in Venango, Pennsylvania, the commercial oil field started to be used.

In his address to FyodorPavlovich Vronchenko (1779-1852), stats-secretary dated 8th -14th of July, 1847, Grand Duke Mikhail Vorontsov, Governor-General on the Caucasus (1782-1856), officially confirmed the completion of drilling the first ever oil well in Bibi-Heybat: *"I authorized the Shemakha Public Chamber to conduct oil exploration works in Baku uyezd, on the shore of the Caspian, in Beybad tract using earth augers at the basis of required fees to the amount of 1000 roublesin silver allocated by you in 1845 for this purpose. With this result, acting Director of Baku and Shirvan mineral fields reported that they had tapped …. Oil in Beybad*…" [ACAC, v.10, p. 145].

Also, the Caucasus Vice-Roy Prince Vorontsov led the Russian delegation to the Great Exhibition which opened in London on 1 May 1851. Samples of Baku (Absheron) oil were displayed in the Chemical products section under the numbers: 32) Black oil from the Shemakha province of Baku district, from the Bibi-Heybat, Balakhani and Surakhany wells; and 33) White oil from the Surakhany well. Thus, this was eight years before the drilling of the first well in the USA.

An interesting fact: in 1858-1859 Vasily Kokorev (1817-1889), Peter Gubonin (1828-1892) and German baron Nicolay Tornow (1812-1882) constructed the first factory in Surakhani near the temple of fire-worshippers, to receive lighting material from Balakhani oil. The photonaphthyl (light oil) received there from 1861 became the first competitor of American kerosene in the markets of Russia empire.

Vorontsov Mikhail Semyonovich (1782-1856) – the Russian commander and the statesman. Besides high home awards, in January 1819, he became the honourable knight of the order of Bath – the higher military award of Great Britain (Grand Cross Breast Star). In 1844, he was the commander-in-chief of Russian forces on the Caucasus and the Caucasian governor. In May, 1845 he has acted with forces in the well-known Dargin's campaign which in two months of difficult fights has been finished with a capture of village (aul) of Dargo – the base station of Shamil. For this campaign Vorontsov has been erected in princely advantage and he has been appointed a chief of Kura's chasseur's regiment.(Kura is big river in Trans-Caucasian – Author).

However, even in 1844, V.N.Semyonov in his presentation letter to the Governor General of Caucasus noted that annual revenues from black oil sales were ranking from 80 to 85 thousand roubles in silver, but these sums could be raised to 100 thousand, if it is possible to do the following:

1) To rebuild two main wells.

2) To drill deeper wells using auger.

3) To dig up new wells using the method proposed by Voskoboynikov.

4) To create a precipitation tank for the separation of oil from water.

5) To ensure conditions for oil refining

[The Archives of Department for Mining and Salts Affairs; section 4, table 2, file #2465].

In 1848, a new well which had yielded 110 poods of oil per day was constructed in that epochin Balakhani; for the construction and arrangement of this well, 1100 roubles in silver were spent [ACAC, v.10, p. 868].

Before going ahead with the story, we should underline that in 1911 on the 52nd anniversary of the American oil well in the memory of Edwin Drake (1819-1880), the founder of the American oil business, the drilling of the first well in Pennsylvania in 1859 initiated the establishment of the Oil Museum (Drake Memorial Museum). Russian magazine "Oil Business" published in Baku from 1899; in 1911 wrote that "… *the history of the oil industry will be presented at this museum in line with desire of its founders, and samples of sand, oil, tools and objects related to that period of time, as well as the library dedicated exclusively to the theory and history of the oil industry will be collected for this purpose. Founders of the museum had the goal to make it a kind of Mecca for all those who had any interest in the oil industry'*["Oil Business", 1911, #16, p.34].

At the moment, the serious construction works on creation of the biggest Oil Museum on the East are carried out in Baku by SOCAR (State Oil Company of

Azerbaijan Republic). Museum will be placed in Bibi-Heybat settlement of Baku, behind of the big Bibi-Heybat mosque.

It is indeed the success of the oil business in the United States that prompted attention to the European (Galicia) and later to the Caucasian (Absheron) oil fields.

The intensive construction of oil wells in depths of 45-50 m started in 1872 which halts completely the construction of new wells.

Production rates of the Absheron and American wells were given in comparison in the article entitled "Oil in the United States and Russia" written by P.A. Chikhachev (1809-1890), a prominent geographer and orientalist, who had visited European, and Near and Middle East countries for almost 30 years: the Absheron wells yielded 3 times more oil than the Americans; the height of oil fountains in the Baku oil region reached 84 m, while it was just 19 m in the USA [*Azerbaijan Oil Industry* magazine, 2000, #5, p.56].

The first powerful fountain, known as "Vermishevskiy", in the Absheron started inside a well located on the site of "Khalafi" Trading Society on June 13th, 1873. This well produced more than 90 million poods of oil in just three months of operation. On the 14th of October 1875, a new second strong fountain at a depth of 45 sazhens (96 meters) was initiated in the oil field of "Souchastniki" Company; during one month this well yielded up 150000 to 200000 poods per day. This fountain formed four large oil lakes in Balakhani [Balayev S.G., 1969, p.66].

In accordance with data of S. M. Lisichkin, the overall number of functioning wells in 1873 was equal to 158 and the drilled oil wells (chinks/derricks) were just 9, but in 1876, the number of functioning wells and drilled oil wells (chinks/derricks) was the same - 62.

This means that digging up new wells for dredging out the surface oil using the obsolete manual method stopped; the steep rise in the number of drilled oil wells started by using new techniques in oil extraction and refining in that epoch: the first steam machines were emerging in the market; large capacity spoons in length relevant to the wells' deep or long steel buckets with an opening bottom were used for oil extraction and its pouring into trough leading to warehouses.

In the end of the present article, we shall present the notes of I.A. Shteyman, an engineer and administrator of the Mining Mines on the Caucasus which contains, in our opinion, the necessary and important proposal for that epoch about the organizing of the oil business in the Absheron by using private capital: *"In spite of the huge development of the American oil business, the Caucasian oil could compete with the American… The abolishing of the farming system will become an important step towards the development of the industry. Once the government repeals the farming system, it will open up useful possibilities for the private sector. The most principal of its obligations should be the elimination of all economic obstacles put on development of any oil field. The rest will depend on the skills of private people to get involved in the business and their entrepreneurial knowledge. In this respect, it is not possible not to envy the skills of our transatlantic friends"* [Notes of the Caucasian Branch of Russian Technical Society, 1899, document # 10].

In February 1872, Russian Emperor Alexander the Second (1818-1881) approved the project "On Rules in the Oil Business and Excise from the photogenic production" in Saint-Petersburg by writing the following resolution on the document presented to him – *"To be so!"* [Gorny Journal, 1872, # 3, p.20]. This switched the green light for Russian, local and foreign capitals to the Azerbaijani oil.

Picture 3. Russian Emperor Alexander the Second (ANA).

Thus, we must note that drilling the world's first deep well in Bibi-Heybat in 1846 marked the end of the well-mine period on the Baku (Absheron) oilfields.

At the end of the article we will present the dates of drilling of the world's first oil wells (c/w references):

1846. Successful drilling of a 21 m oil exploration well in Baku (Bibi-Heybat, Azerbaijan). Works were supervised by mayor Alekseev, the director of Baku oilfields [Acts Collected by the Caucasian Archeographic Commission, Tiflis, 1885, vol. 10, document 1143, p.145; Fooks I.G., Matishev V.A., 2000, *Illustrated stories of the history of Russian oil and gas business. Part I* – Moscow, Neft-Gas publishing house, p. 71].

1857. First drilling of oil wells at Bend, northeast of Bucharest, on the Romanian side of the Carpathians. This year was registered as a beginning of Romania's oil production [www.geohelp.net/world.html].

1858. First oil well in North America at Oil Springs in Ontario, Canada [www.geohelp.net/world.html].

1859. Edwin Laurence Drake and Bill Smith drilled the first a 21 m well in Titusville (Pennsylvania)

[William Brice, 2009, *Myth Legend Reality. Edwin Laurence Drake and the Early Oil Industry* – Pennsylvania, Oil region Alliance, p.311].

1864. Russia's first development well was drilled to the depth of 198 m in Kudako river in Kuban under the supervision of Colonel Ardalion Novosiltsev [Fooks I.G., Matishev V.A., 2000, *Illustrated stories of the history of Russian oil and gas business. Part I* – Moscow, Neft-Gas publishing house, p.137].

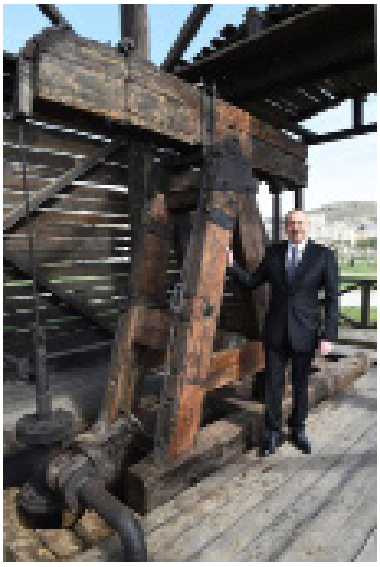
1897. China is considered the world's oldest oil producing country. Oil production with the use of bamboo pipes started over 2000 years ago. Contemporary oil history in China began in the 1897. The first field with insignificant oil resources was discovered by Chinese-Russian drilling team in Dushantszi district in southwestern part of Jungar basin [Perodon A., 1994, *History of large oil and gas discoveries. Translated from French* – Moscow, Mir Publishing House].

1899. Well # 7 in Karashungul field produced the first gush of oil from the depth of 40 m. This heralded the beginning of the official history of Kazakhstan oil development [Cherdabayev R.T., 2010, *Oil: yesterday, today and tomorrow* – Moscow, Alpina business books publishing house, p.204].

1904. Mexican Petroleum Co. drilled La-Pas # 1 well to the depth of 502 m on April 3, 1904. The initial production rate was about 500 barrels daily [Perodon A., 1994, *History of large oil and gas discoveries. Translated from French* – Moscow, Mir Publishing House].

Recently, on 26-April-2017 the President of Azerbaijan Republic Ilham Aliyev (see below 4 photos) has visited the restored first oil well on Bibi-Heybat (Baku settlement) – the world`s first mechanically drilled oil facility. Addressing the oil-men the head of Azerbaijan state said that Azerbaijan is the birthplace of oil and the oil industry began from here.

Picture 4. Ilham Aliyev, the President of Azerbaijan Republic, standing at the monument commemorating the drilling of the first oil well in the world (Azernews, 26 April, 2017).



Picture 5. President Ilham Aliyev standing next to an old walking beam at the replica site (Azernews, 26 April, 2017).

Picture 6. From left to right: Rovnag Abdullayev – President of SOCAR; Ilham Aliyev – President of Azerbaijan Republic and Khoshbaht Yusifzada – First vice-president of SOCAR (Azernews, 26 April, 2017).

Picture 7. The stone monument stands in front of a replica of the original derrick (Azernews, 26 April, 2017).

"Today, when almost 200 years have passed, Azerbaijan makes its voice heard in the world as an oil and gas country" – the President noted.

President Aliyev said that this year (2017) Azerbaijan will celebrate the extraction of two billion tons of oil. *"Azerbaijan is a country where first industrial method of oil production was applied. Today Azerbaijani oil serves our people and strengthens our state"*, said Ilham Aliyev.

REFERENCES:

Acts Collected by the Caucasian Archeographic Commission, Tiflis, 1884, vol. 10, document 112, p.137.

Acts Collected by the Caucasian Archeographic Commission, Tiflis, 1885, vol. 10, document 1143, p.145.

Balayev S.G., 1969.*Oil of the country of eternal fire*: Baku, Azerneshr Publishing House, 160 p.

Lisichkin S.M., 1969. *Petroleum industry of USA*: Moscow, Nedra Publishing House, 270 p.

Fooks I.G., Matishev V.A., 2000, *Illustrated essays on the history of the Russian oil and gas business. Part 1*: Moscow, Publishing House of Oil and Gas, p.71.

Mir-Babayev M.F., 2002. Azerbaijan's oil history. A chronology leading up to Soviet era:*Azerbaijan International (*Magazine), Sherman Oaks, (USA), AI 10.2 (Summer), p.34-41.

Mir-Babayev M.F., 2007.*Concise history of Azerbaijani oil:* Baku, Azerneshr Publishing House, 292 p.

Mir-Babayev M.F., 2011. The role of Azerbaijan in the world's oil industry: *Oil-Industry History* (USA), v.12, #1, p.109-123.

Wysatta Mike, 2017.History of Azerbaijan oil chronical further in second book. -*"Reservoir Solutions"*, (USA-Canada), April-June, v.20, # 2, p.10-12.

www.geohelp.net/world.html

Azernews, 26 April, 2017.

Liceo Classico Statale "Nicola Spedalieri" Catania, Italy
giongrandi-privitera@libero.it

Evoluzione del Telefono

The evolution of the telephone

by Giongrandi Martina

Introduzione

Oggigiorno il fenomenale sviluppo tecnologico ha contribuito a rendere la solitudine e la voglia di socializzare, da sempre collocate ai margini opposti della catena comportamentale degli individui, due facce della stessa medaglia.

È certamente assodato esservi fra le cause più significative di questa pressante e cospicua tendenza all'auto-emarginazione sociale l'uso spregiudicato del telefono cellulare.

Basterebbe infatti osservare lo sguardo dei passanti, assorto nel display del proprio cellulare mentre camminano per strada o in qualsiasi altro contesto sociale, per cogliere nella moderna mentalità collettiva un gran senso di disinteresse per gli aspetti di vita quotidiana, a causa di un morboso attaccamento ad esso. D'altra parte tuttavia il suo fascino non risulta certamente trascurabile o infondato, date le allettanti funzionalità tecnologiche che offre: un sempre più accurato interesse per il design, un' evidente attenzione per le proporzioni, per la qualità audio, foto, video, etc.

Di fatto teniamo oggi nelle nostre mani un prodotto sofisticatissimo: lo smartphone, che assembla insieme vari dispositivi, tanto da poter essere paragonato, per funzionalità e certuni perfino per grandezza, ad una sorta di mini-computer, e dunque lungi dall'esser descritto come semplice apparecchio di comunicazione vocale.

Pertanto ai figli della nuova era, che vivono nella convinzione che nulla sia oramai irraggiungibile, sembra difficile immaginare o rendersi conto del lento e faticoso cammino e dei ripetuti tentativi che le scienze, la fisica in questo caso particolare, e le tecnologie hanno compiuto nel tempo per raggiungere questo apparentemente piccolo traguardo: comunicare a distanza con la voce.

Obiettivi

Date queste premesse, avrebbe senz'altro un grande impatto educativo intraprendere un excursus storico, ponendo un ben meditato confronto fra

Introduction

The extraordinary technological development of the 21st century is contributing to make solitude and socializing, usually placed on the opposite edges of the individual's behavioural chain, two sides of the same coin.

It is certainly well founded that, among the most significant reasons of such a pressing and conspicuous inclination to social self-exclusion, there is the unscrupulous use of the telephone.

It would be enough to observe the look of most people absorbed in the display of their cell phone while walking down the street or in any other social context, to grasp a great sense of disinterest in the aspects of daily life in modern collective mentality, due to a morbid attachment to the object itself.

However, on the other side, its charm cannot be neglected, if only the tempting functionalities it offers are carefully taken into account: more and more accurate attention to design, size, audio and video quality.

As a matter of fact, today we hold in our hands a very sophisticated product: a smartphone, which puts together various devices altogether, so that it can be compared to a sort of mini-computer, for its functionality and also for its dimensions, far from being described as simple voice communication device.

For these reasons, the so called millennials could hardly ever imagine or understand the hard and slow process and the repeated attempts that sciences, physics in this particular case, have accomplished over the years to achieve this seemingly small goal: communicating at a distance with the voice.

Objectives

Seen this introduction, a short historical excursus will be necessary to explain how it all came about, to draw a meditated comparison between the modern phones (only for their phonic side) and those prototypes of fixed telephony, born during the first decades of the 17th century, which later brought to a technological evolution, strategically based on business, as a clear desire of exceeding the simple need of communicating with great distances.

Method

The method used has included reading books, magazines and also surfing the Internet. It would have certainly been far more exciting to have had the chance to turn back the time, and witness the astonishment printed in the faces of the people a moment after the spread of the first telephone call and the first message; or even more, to be able to interview the scientists concerned and ask them which their maximum aspirations were and then

il moderno cellulare (solo per la sua parte fonica) ed i prototipi di telefonia fissa che nacquero nei primi decenni dell'ottocento, i quali portarono successivamente ad una evoluzione tecnologica, strategicamente commerciale, dettata da un chiaro desiderio di voler andare oltre la semplice necessità di comunicazione a distanza.

Metodo

Il metodo utilizzato è stato quello di leggere libri, riviste, e di eseguire anche ricerche su internet. Sarebbe stato di certo entusiasmante aver avuto la possibilità di tornare indietro nel tempo ed assaporare lo stupore stampato nel volto delle persone un attimo dopo esser venute a conoscenza di una notizia talmente eclatante come quella della prima telefonata e della trasmissione del primo messaggio o, ancor più, poter intervistare gli scienziati interessati e domandare loro quali fossero le massime aspirazioni a cui fossero in grado di tendere ed infine potergli mostrare a cosa siamo giunti oggi! Chiedere cosa pensano degli aspetti positivi e negativi che dalla moderna tecnologia telefonica derivano.

Questo è stato ovviamente impossibile. Anche se, collegando le notizie all'epoca dei rispettivi inventori, alle loro vicende personali, siamo riusciti a calarci nelle loro realtà e difficoltà.

Excursus storico

Il primissimo approccio che si ebbe con il mondo della telefonia avvenne intorno alla seconda metà del 1600 con l'invenzione del telefono meccanico, che fu realizzato in seguito alla necessità di voler trasmettere la voce ad una certa distanza.

Tra i principali scienziati che si cimentarono con la sua sperimentazione, vi fu nel 1665 Robert Hooke (Freshwater 1635 – Londra1703), uomo illustre che si distinse in qualità di fisico, biologo, geologo ed archeologo nel Seicento. Già nel 1667 gli fu concesso il titolo di inventore del primo prototipo di telefono meccanico, a cui per molti anni fu attribuito il nome di "telefono a spago" o "telefono degli innamorati".

Le sue funzionalità, a dir poco sorprendenti per l'epoca, si basavano sulla trasmissione del suono tramite onde sonore create in seguito alla vibrazione dell'aria che, grazie all'ausilio di 2 bicchieri di carta o lattine collocati ai lembi opposti del filo, teso quando qualcuno parla, raggiungevano l'orecchio del destinatario consentendogli di interpretare il suono trasmesso dall'emittente convertendo le onde in impulsi nervosi, che il cervello decifrava come suoni.

Numerosissime sono le discussioni che in passato nacquero in seguito all'esigenza di attribuire la paternità del telefono ad uno scienziato piuttosto che ad un altro ed ebbero ufficialmente fine solo nel 2002, dopo anni di fraintendimenti, false notizie e sentenze erronee.

show them what we have reached today! To finally ask them what they think of the positive and negative aspects brought about by the modern phone technology. This has been obviously impossible, but we have managed to understand their realities and difficulties, by linking the news at the time of the respective inventors to their personal events.

Historical excursus

The very first approach with telephony occured around the second half of the 1600, with the invention of the mechanical telephone, which was realized following the need to transmit the voice at a certain distance. Among the main scientists who tried this experimentation, there was in 1665 Robert Hooke (Freshwater 1635 – London 1703), an illustrious man who distinguished himself as a physicist, biologist, geologist and archaeologist in the seventeenth century. In 1667 he obtained the title of inventor of the first prototype of mechanical telephone, to which was given the name of "tin can telephone" or "lover's telephone".

Fig. 1: Illustrazione del telefono meccanico del 1882 dalla " Biblioteca de la Facultad de Derecho y Ciencias del Trabajo Universidad de Sevilla".
Fig. 1. The 1882 mechanical telephone.

Its functionalities, surprising for the time, were based on the transmission of sound through noise waves created as a result of the vibration of the air which, thanks to the aid of 2 paper cups or cans placed at the opposite edges of the wire, stretched when someone speaks, reached the recipient's ear, allowing him to interpret the sound transmitted by the broadcaster by converting the waves into nerve impulses, which the brain deciphered as sounds.

Many disputes were raised in the past in the attempt to attribute the paternity of the telephone to a scientist rather than to another, and they officially ended only in 2002, after years of misunderstandings, fake news and erroneous sentences.

From a legal point of view, the official patent for the invention of the telephone was attributed to the scientist Alexander Bell in 1876,who managed to

Da un punto di vista legale, il brevetto ufficiale per l'invenzione del telefono fu attribuito allo scienziato Alexander Bell nel 1876, il quale riuscì a battere sul tempo i suoi avversari, grazie a delle cospicue somme di denaro in suo possesso, che impiegò ottimamente per far richiesta alla comunità scientifica. In realtà, però, altri scienziati prima di lui si impegnarono molto e rivendicarono il titolo per l'invenzione di un primo prototipo di telefono, in grado di trasmettere efficientemente la voce umana ad una rilevante distanza, da presentare al più presto alla comunità scientifica.

Primo fra tutti Johann PhilippReis (Gelnhausen 1834- Friedrichsdorf 1874), il quale riuscì nel 1861, dopo numerosi insuccessi, sperimentazioni vane ed ardui approfondimenti sull'organo dell'udito, a concludere con successo l'invenzione del "telefono", come egli lo definiva che riuscì a ricoprire una distanza di 100 m, sfruttando le grandi capacità fisiche dell'elettricità per riprodurre suoni musicali ed anche umani ad una certa distanza, mai raggiunta prima d'allora, seppur la ricezione funzionasse in modo discontinuo. La sua scoperta venne fuori dalla convinzione che l'elettricità potesse propagarsi nello spazio senza l'aiuto di materiale conduttore.

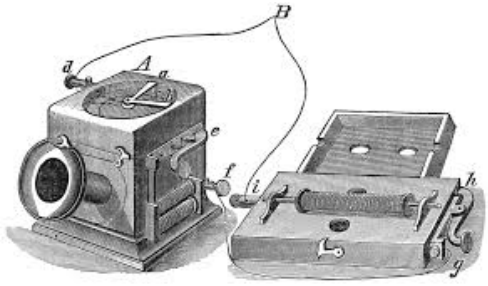


Fig. 2. Telefono di Reis.
Fig. 2. Draw Reis' telephone.

D'altra parte, sventuratamente, Reis non riuscì mai effettivamente a riscuotere interesse o approvazione per la sua invenzione.

Nel 1864 Innocenzo Manzetti ((Aosta1826 – Aosta 1877), scienziato ben apprezzato e conosciuto all'interno della comunità scientifica, diede una grande svolta nell'ambito della telefonia, inventando un apparecchio elettrico capace di trasmettere la voce per più di mezzo km di distanza, sfruttando i principi dell'induzione elettromagnetica.

Il "télégraphevocal" da lui così battezzato, presentato ufficialmente al pubblico nel 1865, si componeva di 2 cornette una per l'emittente e l'altra per il ricevente, unite da due fili elettrici, in grado di trasformare in impulsi elettrici le onde sonore prodotte dalla voce umana senza l'ausilio di particolari strumenti che occludessero la bocca. Stavolta, però, l'impossibilità di ottenere un riconoscimento dal pubblico non derivò dalla disapprovazione ed incredulità circa l'invenzione, quanto piuttosto dall'altissimo

beat his opponents over time, thanks to the large sums of money in his possession, which he excellently used to apply to the scientific community.

In reality, however, other scientists before him got involved and claimed the title for the invention of a first telephone prototype, able to efficiently transmit the human voice at a considerable distance, to be presented as soon as possible to the scientific community.

First of all Johann Philipp Reis (Gelnhausen 1834 - Friedrichsdorf 1874), who succeeded in 1861, after numerous failures, vain experiments and arduous investigations about the hearing organ, to successfully conclude the invention of the "telephone", as he defined it, managing to cover a distance of 100 metres, exploiting the great physical capacities of electricity to reproduce musical and even human sounds at a certain distance, never reached before, although the reception worked in a discontinuous way. His discovery came out from the belief that electricity could propagate in space without the help of conductive material.

However, unfortunately, Reis had never actually managed to collect interest or approval for his invention.

In 1864 InnocenzoManzetti [(Aosta 1826 – Aosta 1877), well-known scientist and alsoappreciated within the scientific community, gave a major breakthrough in telephony, inventing an electrical device able to transmit the voice for more than half a kilometer away, exploiting the principles of electromagnetic induction. The "télégraphe vocal" (the name he attributed to it], officially presented to the public in 1865, consisted of 2 cornets, one for the transmitter and the other for the receiver, joined by two electric wires, capable of transforming the sound waves produced by the human voice into electrical impulses without the aid of particular instruments that occlude the mouth.

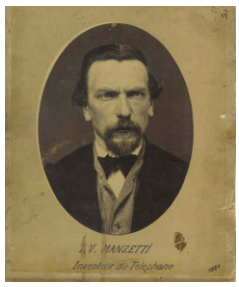


Fig. 3. Innocenzo Manzetti.

This time, however, the impossibility of obtaining recognition from the public did not stem from disapproval and disbelief about the invention, but rather from the very high price to pay for the purchase of the patent.

The Italian Antonio Meucci (Florence 1808 - New York 1889) had a similar fate. Between 1848 and 1849 he was interested in verifying the actual thera-

prezzo da pagare per l'acquisto del brevetto.

L'italiano Antonio Meucci (Firenze 1808 – New York 1889) ebbe una sorte molto simile a quella di Innocenzo Manzetti. Egli tra il 1848-1849 si interessò di verificare le effettive funzionalità terapeutiche dell'elettroterapia di Mesmer, in particolare nei soggetti affetti da reumatismi gravi. Proprio durante il corso di tali esperimenti realizzò l'incredibile: la possibilità di trasmettere la voce umana grazie all'ausilio di un magnete avvolto in un filo conduttore collegato ad un diaframma vibrante (ed a molteplici batterie da cui derivava la produzione di elettricità). Durante l'emissione della voce il diaframma, vibrando, modifica il campo magnetico del circuito, consentendo che si generi corrente elettrica in grado di far vibrare anche il diaframma del ricevente, che in questo modo sarà in grado di ascoltare il suono originale.

L'apparecchio, inizialmente da lui chiamato "telegrafo parlante" e successivamente ribattezzato come "telettrofono", fu da lui utilizzato già nel 1854 per tentare di comunicare costantemente con la moglie, afflitta da un'artrite reumatoide e dunque costretta a rimanere bloccata a letto. Fra il 1864 ed il 1865 perfezionò al massimo il suo telettrofono e riuscì perfino a risolvere prontamente il problema della comunicazione a lunga distanza.

Per una sorte avversa, lo stesso anno Innocenzo Manzetti dichiarò alla stampa di aver costruito un efficiente apparecchio telefonico in grado di trasmettere la voce a distanza. Dunque Meucci, seppur consapevole della professionalità e bravura dell'avversario, dopo aver perfino riconosciuto che il suo modello presentasse imperfezioni rispetto a quello di Manzetti (con Meucci l'emittente doveva tenere nella bocca una barretta di contatto per consentire una efficiente trasmissione vocale, Manzetti raggiunse il medesimo obbiettivo tramite l'utilizzo di una cornetta), cercò ugualmente in ogni modo di rivendicare la sua invenzione. In conclusione ciò che legò strettamente Manzetti a Meucci fu l'impossibilità economica, che costrinse entrambi a rinunciare all'acquisto del brevetto. Infatti, seppur Meucci il 28 dicembre 1872, trasferitosi a New York, fosse riuscito a finanziare ben due volte un brevetto provvisiorio per 2 anni "caveat" in attesa di poter pagare i restanti 250$ per ottenere un brevetto regolare, a causa delle sfavorevoli condizioni finanziarie in cui versava non riuscì a pagare i 10 dollari annuali per il rinnovo.

Alexander Graham Bell (Edimburgo 1847- Beinn Bhreagh 1922), ingegnere e scienziato scozzese, fu dunque di fatto il primo ad aver ottenuto il 7 marzo del 1876 il brevetto ufficiale per l'invenzione del "telefono", come lui in primis lo definì. Figlio di madre sorda e marito di una fra le sue studentesse sordomute dell'Università di Bonston, condusse numerosi studi sull'acustica, cercando di inventare un apparecchio con il quale poter comunicare con entrambe le donne.

peutic functions of Mesmer's electrotherapy, particularly in those affected by severe rheumatism.

During the course of these experiments he realized the incredible: the possibility of transmitting the human voice thanks to the aid of a magnet wrapped in a conductive wire connected to a vibrating diaphragm (and to multiple batteries from which derived the production of electricity).During the emission of the voice, the diaphragm, vibrating, modifies the magnetic field of the circuit, allowing it to generate electrical current, which in turn will be able to make the receiver's diaphragm also vibrate, so that the original sound will be easily heard.

The device, initially called by himself «talking telegraph» and later renamed as «telettrofono», was used by Meuccihimself in 1854 to try to communicate with his wife, afflicted by a rheumatoid arthritis and therefore forced to get stuck in her bed.

Fig. 4: Replica del telefono di Meucci, modello del 1857, nel Museo scienza e tecnologia di Milano.
Fig. 4. Repetition of Meucci's telephone, model of 1857, in the Science and Technology Museum of Milan.

Between 1864 and 1865 he perfected his prototype of telephone and even managed to solve quickly the problem of long distance communication.

For an adverse fate, the same year Innocenzo-Manzetti told the press that he had built an efficient telephone device capable of transmitting the voice at a distance.

Although aware of the professionalism and skills of the opponent, after acknowledging that his model had imperfections compared to Manzetti's (the issuer with Meucci's had to hold a contact bar in the mouth to allow an efficient vocal transmission; Manzetti reached the same objective through the use of a cornet), all the same Meucci tried to claim his invention.

In conclusion, what tightly linked Manzetti to Meucci was their economic impossibility, which forced both of them to renounce the purchase of the patent. In fact even if Meucci, who moved to New York, had managed to finance twice a provisional patent for 2 years "caveat" waiting to be able to pay the remaining $ 250 to get a regular patent, due to his unfavorable financial conditions, he didn't succeed in paying those 10$ useful for the renewal.

Alexander Graham Bell (Edinburgh 1847 - Beinn-Bhreagh 1922), Scottish engineer and scientist, had been the first who obtained on 7 March 1876 the official patent for the invention of the "telephone", as he first defined it.

Nonostante le nobili premesse, sembra al giorno d'oggi accreditata la versione secondo la quale Bell, venuto a conoscenza del telettrofono di Meucci, ne abbia osservato approfonditamente le caratteristiche e abbia riprodotto il telefono traendone grande spunto. Altre ingiustizie gravarono sull'attribuzione del fatidico brevetto: Alexander Bell riuscì perfino a battere sul tempo di 2 ore l'ingegnere statunitense ElishaGray, che analogamente aveva inventato il telefono ad induzione elettromagnetica. Dunque per molti anni fu falsamente considerato lui il reale inventore del telefono, a dispetto delle accuse poste da Meucci nei suoi confronti durante una causa intentata per rivendicare i propri diritti d'autore. A dispetto della realtà, la corte dichiarò persa la causa, permettendo dunque a Bell di avviare la "Bell telephone company" e garantendogli valido il titolo di inventore del telefono; perfino quando nel 1877 fu dato per la prima volta credito dalla Globe Telephone Co. Di New York alle richieste di Meucci, essa dichiarò erroneamente, per favorire Bell, che il telefono inventato da Meucci fosse meccanico e non elettrico. Pertanto il brevetto di Bell non venne più messo in discussione fino al 2002, quando inaspettatamente durante un congresso degli Stati Uniti furono riproposte le veritiere accuse di Meucci nei confronti di Bell, riconoscendogli in definitiva la reale paternità dell'apparecchio telefonico.

Dal 1876 dunque il telefono, da molti riconosciuto come "telegrafo parlante" in quanto molto più veloce nel trasmettere dati ed informazioni rispetto al modello di telegrafo elettrico di Samuel FinleyBreese Morse, comincia a scalare le sue vette, subendo numerosi miglioramenti qualitativi ed estetici. Dal 1881 la maggior parte dei banchieri, degli imprenditori e degli impiegati delle ferrovie trovarono grande vantaggio nell'usufruire del nuovissimo sistema telefonico, dato che la comunicazione, in quanto elemento indispensabile in contesti lavorativi simili, se velocizzata avrebbe assicurato maggiore efficienza.

I primi telefoni constavano di una manovella di chiamata, una pila, un ricevitore ed un microfono.

Dopo la prima guerra mondiale invece, il telefono migliorò le sue prestazioni e perse pesantezza, grazie all'avvento della "cornetta", che unì il microfono al ricevitore sostituendo dunque la manovella e la pila. Perciò essendo molto più semplice da utilizzare aggiunse le case dei benestanti, facendo sì che la tipologia di telefonata variasse: nacque il desiderio di telefonare per semplice divertimento o curiosità, dunque non più per meri scopi lavorativi.

Inoltre negli anni '60-'70 inventano il telefono portatile, che sostituisce la vecchia tipologia di telefono fisso a parete. Un ulteriore passo in avanti si ebbe intorno agli anni 70-80, quando si aggiunsero innovazioni come la segreteria telefonica,il fax, il modem e così via, ed il design del telefono subì ulteriori modifiche, nell'ambito del colore, delle dimensioni, del

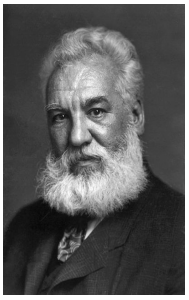


Fig. 5. Alexander Bell.

Son of a deaf mother and husband of one of his deaf-mute students at the University of Boston, he conducted several studies on acoustics, trying to invent a device through which communicate with both women. Despite the noble premises, it seems nowadays accredited the version according to which Bell, learned of the "telettrofono" of Meucci, observed in depth the characteristics and reproduced the phone taking great inspiration. Other injustices burdened the attribution of the fateful patent: Alexander Bell even managed to beat on 2 hours the American engineer Elisha Gray, who had similarly invented the telephone with electromagnetic induction. So for many years he was falsely regarded as the real inventor of the telephone, in spite of the accusations posed by Meucci against him during a lawsuit filed to claim his royalties. In spite of the reality, the court declared lost the cause, so allowing Bell to start the "Bell Telephone Company" and guaranteeing valid the title of inventor of the phone. Even when in 1877 it was first given credit from the Globe telephone Co. of New York to Meucci's requests, it erroneously stated, to support Bell, that the telephone invented by Meucci was mechanical and not electric. Therefore, the patent of Bell was no longer questioned until 2002, when during a congress of the United States had been unexpectedly proposed again the truthful accusations of Meucci against Bell, ultimately recognising the real paternity of the telephone appliance.

Since 1876, therefore, the telephone, identified by many as "talking telegraph", as it is much faster in transmitting data and information than the electric telegraph model of Samuel Finley Breese Morse, begins to climb its heights, undergoing numerous improvements in quality and design.

Since 1881 most bankers, entrepreneurs and employees of the railroads took great advantage from the use of the new telephone system, thinking that the communication, as an essential element in similar working contexts, if speeded up, would have assured more efficiency.

The first telephones consisted of a call crank, a battery, a receiver, and a microphone.

After the First World War, the phone improved its performance and lost its heaviness, thanks to the advent of the "cornet", which replaced the crank and the battery. Therefore being much easier to use added the houses of the wealthy, making the type of phone call varied: the desire was born to call for simple fun

materiale utilizzato (la plastica) etc.. ,contribuendo altresì a far in modo che venisse oramai richiesto in ogni casa o ufficio, stavolta indipendentemente dal patrimonio economico degli acquirenti.

Lo sviluppo del telefono fu allo stesso tempo affiancato da quello del cellulare, che nell'arco di pochi anni riuscì a superare le tipiche funzioni svolte dal telefono, aggiungendo a queste, anche ed in special modo grazie all'avvento di internet, le infinite agevolazioni precedentemente descritte nell'introduzione.

Conclusioni

In definitiva la scienza cova in sé la grandissima capacità di poter aiutare l'uomo nel costruire un futuro quanto più allettante possibile. Per ogni nuovo modello di telefono cellulare, per ogni minima modifica tecnologica in grado di incidere nella società contemporanea, per ogni attimo in cui si supponga di non poter vivere senza telefono cellulare, bisognerebbe risalire alle origini della storia della scienza e tenere bene in mente le necessità e le premesse storico-sociali su cui si basò realmente un'invenzione come quella del telefono.

Si riuscirà mai ad assaporare e godere del sensazionale sviluppo tecnologico senza dimenticarsi di bilanciare una moderna vita virtuale con una ricca, piena e soddisfacente vita reale?

Bibliografia

1. Munro, John (1883) Heroes of the telegraph, riedito da BiblioBazaar LLC, 2008
2. Mauro Caniggia, Luca Poggianti, Il valdostano che inventò il telefono. Innocenzo Manzetti. Aosta (1826-1877), Aosta, Tipografia «La Vallée», 1996.
3. Schiavo, G. E., Antonio Meucci, Inventor of the Telephone, The Vigo Press, New York City, NY, 1958
4. Travis Brown, Historical first patents: the first United States patent for many everyday things, illustrated, University of Michigan, Scarecrow Press, 1994

Iconografia:

Fig.1:https://commons.wikimedia.org/wiki/File:Tel%C3% A9fono_de_cordel_(1882).jpg#globalusage

Fig.2:https://commons.wikimedia.org/wiki/File:PSM_V23_D561_The_reis_telephone_receiver_mechanism.jpg

Fig. 3: http://www.manzetti.eu/innocenzo-manzetti/

Fig.4:https://commons.wikimedia.org/wiki/File:Telefono_di_Meucci__Museo_scienza_tecnologia_Milano_02148-02147_dia.jpg

Fig. 5: https://commons.wikimedia.org/wiki/File:Alexander_Graham_Bell.jpeg

Fig. 6: https://commons.wikimedia.org/w/index.php?curid =16945183

or curiosity, so no longer for mere working purposes. Moreover in the '60s and' 70s scientists invented the portable telephone, which replaced the old type of wall-mounted telephone.

Fig. 6. Common model of telephone during 1950.
Fig. 6. Telefono tipico degli anni '50.

A further step forward took place around the years 70-80, when innovations such as the answering machine, the fax, the modem and so on were added, and the design of the phone underwent further modifications, as far as colour, size, and material used were concerned, given for granted that it was inevitably required in every home or office, regardless of the economic assets of the buyers.

The development of the phone was juxtaposed with that of the mobile phone, which in a few years managed to overcome the typical functions performed by the phone, adding to these, even and especially thanks to the advent of the internet, the infinite benefits previously described in the introduction

Conclusion:

In the end science hatches in itself the great ability to help man to build a future as tempting as possible.

For every new model of mobile phone, for every minimal technological modification able to affect the contemporary society, for every moment in which one supposes that living without a mobile phone is unimaginable, we should all trace back to the origins of Science and keep in mind the needs and the historical-social prerequisites on which such an invention like that of the telephone was based on.

Will the society ever be able to savour and enjoy the sensational technological development without forgetting to balance a modern virtual life with a rich, full and satisfying real life?

Bibliography:

1. Munro, John (1883) Heroes of the telegraph, republished BiblioBazaar LLC, 2008
2. Mauro Caniggia, Luca Poggianti, the Aosta Valley who invented the telephone. Innocenzo Manzetti. Aosta (1826-1877), Aosta, "La Vallée" Typography, 1996.
3. Schiavo, G. E., Antonio Meucci, Inventor of the Telephone, The Vigo Press, New York City, NY, 1958
4. Travis Brown, Historical first patents: the first United States patent for many everyday things, illustrated, University of Michigan, Scarecrow Press, 1994

High school of Paliouri
Paliouri Halkidiki, Greece
vmaligoudis1969@gmail.com.

Periodic Table-Nomenclature of basic chemical elements

Περιοδικός Πίνακας - Ονοματολογία βασικών χημικών στοιχείων

by Vasiliki Papachristodoulou - Xristina Chatzikonstantinou - Margarita Lemoni - Athanasia Evlogimenou

Εισαγωγή

Τα χημικά στοιχεία είναι οι απλούστερες ουσίες, από τις οποίες είναι φτιαγμένοι οι ζωντανοί οργανισμοί και η άβια ύλη. Κάποια από αυτά έχουν ιδιαίτερη σημασία για τον άνθρωπο, γι αυτό τα παρουσιάζουμε παρακάτω. Ο περιοδικός πίνακας είναι ένας κατάλογος, σε μορφή πίνακα που διατάσσει τα χημικά στοιχεία με βάση τον ατομικό αριθμό τους και τις επαναλαμβανόμενες χημικές τους ιδιότητες. Τα χημικά στοιχεία παρουσιάζονται κατά αύξοντα ατομικό αριθμό. Ο περιοδικός πίνακας αποτελείται από 7 οριζόντιες γραμμές, που ονομάζονται περίοδοι και 18 κάθετες στήλες, που ονομάζονται ομάδες, ενώ συμπληρώνεται από κάτω με 2 έξτρα οριζόντιες γραμμές.

Introduction

Chemical elements are the simplest species which build up all the living organisms and the non-living matter, as well. Some of them have a particular importance for the humans and this is the reason they are presented below.
The periodic table is a catalogue in a form of a table that lists the chemical elements according to their atomic number, as well as their recurrent chemical properties. The chemical elements are presented according to their serial atomic number. The periodic table consists of seven horizontal lines, called periods and eighteen vertical columns, called groups. Below the table there are also two extra horizontal lines.

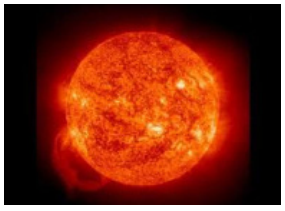
Origin of the names of the chemical elements

1. HYDROGEN

Its name derives from the ancient Greek words ‘ύδωρ’ (water) and ‘γίγνεσθαι’ (becoming), implying that when it reacts with oxygen, it turns into water.

Usage

It can be used as a source of energy, as a type of energy currency as it can produce energy.

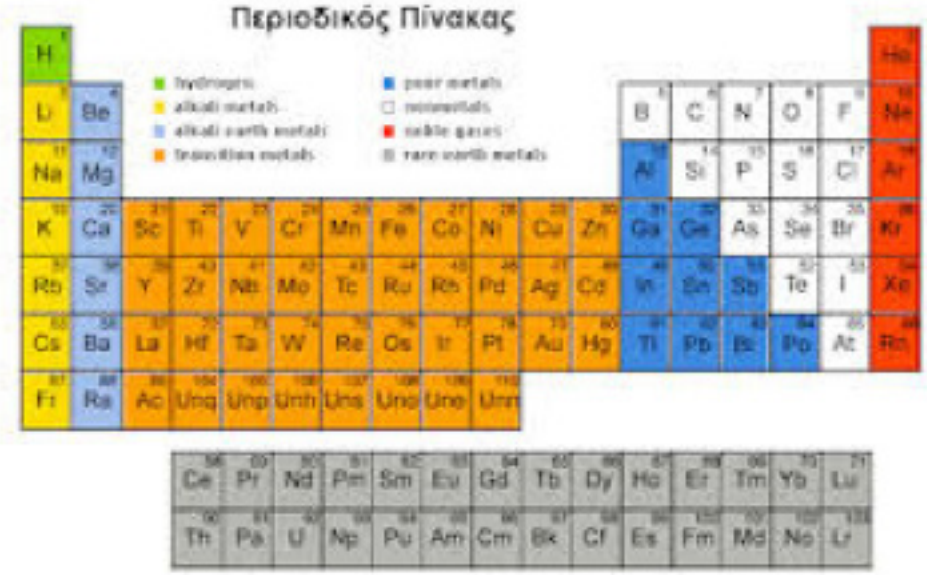


2. HELIUM

It took its name by the sun as it was originally discovered there.

Usage

Helium was used in cryogenic (it is its mostly common use, covering almost ¼ of its production), as well



Προέλευση ονομάτων χημικών στοιχείων:

1. (H) HYDROGEN ΥΔΡΟΓΟΝΟ

Το όνομα του παράγεται από τις ελληνικές λέξεις ύδωρ και γίγνεσθαι. Δηλαδή όταν αντιδρά με το οξυγόνο γίνεται νερό.

Χρήσεις

Μπορεί να χρησιμοποιηθεί ως φορέας ενέργειας, δηλαδή ως μια μορφή ενεργειακού νομίσματος. Το υδρογόνο μπορεί να χρησιμοποιηθεί για να παραχθεί ενέργεια.

2. (He) HELIUM ΗΛΙΟ

Ονομάστηκε έτσι από το όνομα του ήλιου, γιατί εκεί βρέθηκε πρώτη φορά.

Χρήσεις

Το ήλιο χρησιμοποιήθηκε στην κρυογονική (είναι η μεγαλύτερη χρήση του, που καταναλώνει περίπου το 1/4 της παραγωγής του) και στην ψύξη μαγνητών υπεραγωγιμότητας, με ειδικότερη εμπορική εφαρμογή τούς σαρωτές MRI. Άλλες βιομηχανικές χρήσεις του είναι ως αέριο συμπίεσης και καθαρισμού.

3. (Li) LITHIUM ΛΙΘΙΟ

Το όνομα του παράγεται από την ελληνική λέξη λίθος = πέτρα, η οποία αποδεικνύει την ορυκτή προέλευση του.

Χρήσεις

Το λίθιο και οι ενώσεις του έχουν αρκετές βιομηχανικές εφαρμογές, που περιλαμβάνουν το θερμοανθεκτικό γυαλί και τα κεραμικά. Χρησιμοποιείται, ακόμη στις τηλεοράσεις και στους υπολογιστές. Ιχνοποσότητεςλιθίου βρίσκονται σε όλους τους ζωντανούς οργανισμούς.

4. (C) CARBON ΑΝΘΡΑΚΑΣ

Η ονομασία του στοιχείου αυτού προέρχεται από την Λατινική λέξη carbo που σημαίνει ξυλοκάρβουνο.

Χρήσεις

Είναι παρόν σε όλες τις γνωστές μορφές ζωής, ενώ στο ανθρώπινο σώμα ο άνθρακας είναι το δεύτερο (κατά μάζα) πιο άφθονο χημικό στοιχείο, περίπου 18,5%, μετά το οξυγόνο. Αυτή η (σχετικά υψηλή) αφθονία του άνθρακα, σε συνδυασμό με τη μοναδική του ικανότητα να σχηματίζει τέτοια τεράστια ποικιλία οργανικών ενώσεων έκαναν αυτό το χημικό στοιχείο τη βάση κάθε γνωστής μορφής ζωής. Υπάρχουν αρκετές αλλοτροπικές μορφές του άνθρακα, από τις οποίες οι πιο γνωστές είναι ο γραφίτης,τοδιαμάντι και ο άμορφος άνθρακας. Σύγχρονες μορφές άνθρακα είναι υλικά όπως το διαμάντι, ο νανοσωλήνας άνθρακα και το γραφένιο που έχουν τις υψηλότερες θερμικές αγωγιμότητες από όλα τα γνωστά υλικά as magnet cooling superconductivity, being mostly commercially applied as scanners MRI. Other industrial uses involve compression and cleaning gas.

3. LITHIUM

Its name derives from the Greek word ‘λίθος’, meaning stone, justifying thus its mineral origin.

Usage

Lithium and its compounds have various industrial appliances, involving heat resistant glass and ceramics. It is also used in televisions and computers. Lithium can be traced in all living organisms.

4. CARBON

Its name derives from the Latin word *carbo* which means charcoal.

Usage

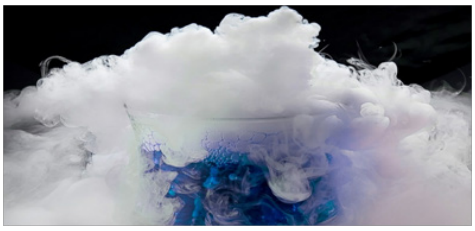
Carbon is present in every known life form, while in the human body it is the second more abundant element, as far as its mass is concerned, about 18.5%, the first being oxygen. Its abundance, as well as its unique ability to form a wide variety of organic compounds, justifies the fact that this chemical element is fundamental in every known life form. There are several kinds of allotropic forms of carbon, some of which are the graphite, the diamond and amorphous carbon. Contemporary forms of carbon are elements such as the diamond, the carbon nanotube, as well as the graphine that have higher thermal conductivity compared to other known elements.

5. NITROGEN

Nitrogen is included in several industrial compounds both inorganic, such as ammonia (NH3) and nitric acid (HNO3), and organic such as nitro-compounds (RNO2), mostly propellants and explosives, as well as nitrile (RCN). Compounds like ammonia and nitrile are of vital importance in industrial fertilizers but they are also significant pollutants that cause

5. (N) NITROGEN ΑΖΩΤΟ

Πολλές σημαντικές βιομηχανικές ενώσεις, τόσο ανόργανες, όπως η αμμωνία (NH3) και το νιτρικό οξύ (HNO3), όσο και οργανικές, όπως οι νιτροενώσεις (RNO2, που είναι προωθητικά και εκρηκτικά) και τα νιτρίλια (RCN), περιέχουν άζωτο. Ενώσεις όπως, η αμμωνία και τα νιτρικά είναι νευραλγικής σημασίας για βιομηχανικά λιπάσματα, αλλά ομοίως και νευραλγικής σημασίας ρυπαντές, προκαλώντας πολλές φορές ευτροφισμό σε υδάτινα οικοσυστήματα.



6. (O) OXYGEN ΟΞΥΓΟΝΟ

Η ονομασία του προέρχεται από τις ελληνικές λέξεις οξύ και γίνομαι, διότι είναι αναγκαίο για το σχηματισμό κάθε οξέος.

Χρήσεις

Το οξυγόνο παράγεται βιομηχανικά με κλασματική απόσταξη υγροποιημένου (ατμοσφαιρικού) αέρα, αλλά και με τη χρήση ζεολίθων με κυκλική συμπίεση για τη συγκέντρωση του οξυγόνου από τον αέρα, με ηλεκτρόλυση του νερού, και ενίοτε με άλλους τρόπους. Η χρήση στοιχειακού οξυγόνου περιλαμβάνει την προώθηση πυραύλων, οξυγονοθεραπεία, συστήματα υποστήριξης ζωής σε αεροσκάφη, υποβρύχια, διαστημόπλοια και δύτες. Το οξυγόνο είναι το κύριο συστατικό της ζωής και αποτελεί το 20% v/v του ατμοσφαιρικού αέρα.

7. (F) FLUORINE ΦΘΟΡΙΟ

Προέρχεται από την ελληνική λέξη φθορά. Αυτή η ονομασία αποδεικνύει την ισχυρή διαβρωτική επίδραση των ενώσεών του (υδροφθόριο). Η αγγλική του ονομασία είναι η λέξη fluorine και προέρχεται από την λατινική λέξη flue = ρέω, κυλώ.

Χρήσεις

Είναι το πιο δραστικό από όλα τα στοιχεία .Γι' αυτό το στοιχειακό φθόριο είναι πάρα πολύ επικίνδυνο, πολύ περισσότερο από τα άλλα αλογόνα, ακόμη και από το χλώριο, που χρησιμοποιήθηκε ως χημικό όπλο κατά τον Α΄ Παγκόσμιο Πόλεμο. Προκαλεί εύκολα οξειδώσεις, για αυτό και χρησιμοποιείται στην υγιεινή των δοντιών. Επίσης χρησιμοποιείται ως συστατικό της οδοντόκρεμας.

8. (Ne) NEON NEON

Του δόθηκε αυτή η ονομασία, όταν ανακαλύφθηκε ένα νέο αέριο (μετά το αργό) στον ατμοσφαιρικό αέρα.

eutrophication of aquatic ecosystems.

6. OXYGEN

Its name stems from the Greek words "οξύ" and "γίνομαι", meaning oxy and becoming, as it is necessary in the formation of all acids.

Usage

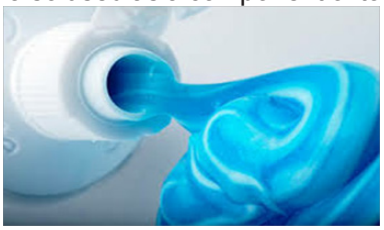
Oxygen is industrially produced by fractional distillation of liquefied air, by using circular compaction zeolites to collect oxygen from the air, as well as by water electrolysis, among others. The use of elemental oxygen involves rocket propulsion, oxygen therapy, life-support systems on aircrafts, submarines, spacecrafts and divers. Oxygen is the major component of life and it constitutes the 20% v/v of the atmospheric air.

7. FLUORINE

Its name derives from the Greek word "φθορά", meaning decay. Its name denotes the strong corrosive effect of its compounds (hydrogen fluoride). Its English name stems from the Latin word flue, meaning "to flow".

Usage

It is the most active elements of all. As a result, elemental fluorine is extremely dangerous, a lot more than the other halogens even chlorine, that was used as a chemical weapon during War World I. It easily causes oxidation and for this reason it is used in tooth hygiene. It is also used as a component of toothpaste.



8. NEON

It took its name when a new gas (after the argon) was discovered in the air.

Usage

Neon is used as the major component of high performance lamps carrying the same name, the use of which is currently relatively widespread (e.g. automotive industry). Neon was discovered by the British chemists Ramsey and Trevers in 1898 along with the

Χρήσεις

Το αέριο νέο χρησιμοποιείται ως κύριο συστατικό των ομώνυμων λαμπτήρων υψηλής αποδόσεως, η χρήση των οποίων σήμερα είναι σχετικά διαδεδομένη (π.χ. αυτοκινητοβιομηχανία). Το νέο ανακαλύφθηκε από τους Βρετανούς χημικούς Ράμσεϊ και Τρέιβερς το 1898 μαζί με τα ευγενή αέρια κρυπτό και ξένο.

9. (Na) SODIUM ΝΑΤΡΙΟ

Η λέξη σόδα προέρχεται από την αραβική λέξη natrum, απ'όπου φαίνεται να πήρε το όνομα του.

Χρήσεις

Το νάτριο είναι το 6ο πιο άφθονο χημικό στοιχείο στη λιθόσφαιρα της Γης. Πολλά άλατα του νατρίου είναι εξαιρετικά διαλυτά στο νερό, όπως το χλωριούχο νάτριο (NaCl), που είναι η κύρια διαλυμένη ουσία στους ωκεανούς της Γης. Το νάτριο αποτελεί συστατικό της σόδας. Τα ιόντα νατρίου μαζί με τα ιόντα καλίου σχηματίζουν μία αντλία ενεργητικής μεταφοράς ουσιών διαμέσου των κυτταρικών μεμβρανών.

10. (Mg) MAGNESIUM ΜΑΓΝΗΣΙΟ

Η ονομασία προέρχεται από την αρχαιότητα και συγκεκριμένα από την Μαγνησία, περιοχή της Μ. Ασίας, πλούσια σε ορυκτά του μετάλλου αυτού.

Χρήσεις

Το μαγνήσιο είναι το ενδέκατο (11ο) πιο άφθονο στοιχείο της μάζας του ανθρώπινου σώματος. Τα ιόντα του (Mg^{2+}) είναι απαραίτητα για όλα τα ζωντανά κύτταρα, όπου διαδραματίζουν σημαντικό ρόλο στον έλεγχο σημαντικών βιοχημικών λειτουργιών. Αρκετές ενώσεις του μαγνησίου χρησιμοποιούνται καθημερινά για ιατρικούς λόγους, ως καθαρτικά, αντιόξινα (π.χ., το γάλα της μαγνησίας), και για σταθεροποίηση παθολογικής διέγερσης νεύρων, του αίματος και το σπασμό των αγγείων.

11. (Al)ALUMINUM ΑΡΓΙΛΙΟ ή ΑΛΟΥΜΙΝΙΟ

Η ονομασία του προέρχεται από την αγγειοπλαστική ύλη (άργιλος, δηλ. πηλός) που χρησιμοποιήθηκε στην κατασκευή αγγείων από τους αρχαίους Έλληνες και τους Ρωμαίους. Στα λατινικά ονομάζεται alumen δηλαδή όξινο άλας.

Χρήσεις

Εξαιτίας της σχετικά χαμηλής του πυκνότητας και της μεγάλης του ικανότητας να δημιουργεί μεγάλη ποικιλία κραμάτων, έγινε στρατηγικό μέταλλο για την αεροδιαστημική (και όχι μόνο) βιομηχανία. Είναι, επίσης, εξαιρετικά χρήσιμο στη χημική βιομηχανία, τόσο αυτούσιο ως καταλύτης, όσο και με τη μορφή διαφόρων ενώσεών του.

noble gas krypton and xenon.

9. SODIUM

The word soda comes from the Arabic word natrum, which is most likely the origin of sodium.

Usage

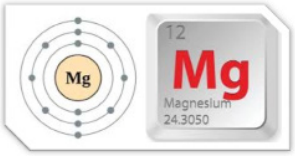
Sodium is the sixth most abundant chemical element in the lithosphere of the Earth. Many sodium salts are extremely soluble in water, such as sodium chloride (NaCl), which is the main dissolved substance in the oceans of the Earth. Sodium is a component of soda. Sodium ions along with potassium ions, form an active substance transfer pump through the cell membranes.

10. MAGNESIUM

The name originates from ancient times and in particular from the area of Magnesia, a region in Minor Asia, rich in minerals of this metal.

Usage

Magnesium is the eleventh most abundant element in the mass of the human body. Its ions (Mg^{2+}) are essential for all living cells, where they play an important role in controlling important biochemical functions. Several magnesium compounds are used daily for medical purposes, such as laxatives, antacids (e.g., milk of magnesia), as well as for stabilizing pathological nerve stimulation, and blood and vascular spasm.

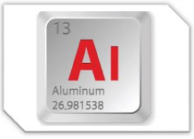


11. ALUMINUM

Its name comes from the material used for pottery (aluminum, meaning clay), which was widely used for the creation of clay pots by the ancient Greeks and Romans. In Latin it is called alumen, meaning oxalate.

Usage

Due to its relatively low density and high capacity to create a wide variety of alloys, it became a strategic metal for aerospace industry, among others. It is also extremely useful in the chemical industry, both as a catalyst, and in the form of its various compounds.



12. SILICON

Its name derives from the word 'πυρ' which means fire. Its symbol comes from the Latin word silex.

12. (Si) SILICON ΠΥΡΙΤΙΟ

Το όνομα του προέρχεται από τη λέξη πυρ = φωτιά. Το σύμβολό του προέρχεται από το λατινικό silex.

Χρήσεις

Το πυρίτιο και οι ενώσεις του έχουν πολλές βιομηχανικές χρήσεις. Αυτό περιλαμβάνει την απευθείας χρήση πυριτιούχων ενώσεων με τη μορφή πηλού, άμμου και πετρωμάτων. Τα πυριτικά άλατα χρησιμοποιούνται (συνήθως) για την παραγωγή τσιμέντου και στόκου, και όταν συνδυάζεται με άμμο και χαλίκια, παράγεται μπετόν. Πυριτικά άλατα παράγουν επίσης λευκά κεραμικά, όπως η πορσελάνη. Μια από τις πιο σύγχρονες πυριτιούχες ενώσεις είναι το καρβίδιο του πυριτίου (SiC) .

13. (P) PHOSPHORUS ΦΩΣΦΟΡΟΣ

Παράγεται από τις ελληνικές λέξεις φως και φέρω, διότι έχει την ιδιότητα του να φέρει φως στο σκοτάδι.

Χρήσεις

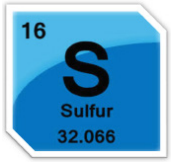
Ο φωσφόρος είναι απαραίτητο χημικό στοιχείο για τη ζωή. Η φωσφορική ομάδα είναι συστατικό του DNA, του RNA και του ATP, και επίσης των φωσφολιπιδίων, από τα οποία σχηματίζονται οι κυτταρικές μεμβράνες. Η χαμηλή συγκέντρωση φωσφορικών αποτελεί σημαντικό περιορισμό ανάπτυξης για κάποια υδάτινα οικοσυστήματα. Σε οικονομική κλίμακα η μεγάλη πλειοψηφία των φωσφορούχων ενώσεων καταναλώνονται ως λιπάσματα. Τα φωσφορούχα λιπάσματα χρειάζονται για να αναπληρώσουν το φωσφόρο που τα φυτά αφαιρούν από το έδαφος.

14. (S) SULFUR ΘΕΙΟ

Η ονομασία του προέρχεται από το (ομηρικό) θείον και από κάποιο ρήμα που έχει τη σημασία του καπνίζω, βγάζω καπνούς. Το σύμβολό του προέρχεται από το λατινικό του όνομα sulphur.

Χρήσεις

Το θείο είναι ένα από τα απαραίτητα χημικά στοιχεία για όλες τις (γνωστές) μορφές ζωής και χρησιμοποιείται ευρύτατα σε βιοχημικές διεργασίες. Το θείο σε οργανική μορφή βρίσκεται στις βιταμίνες βιοτίνη και θειαμίνη. Το θείο είναι σημαντικό συστατικό πολλών ενζύμων και αντιοξειδωτικών μορίων. Οργανικά συνδεδεμένο θείο αποτελεί συνθετικό όλων των πρωτεϊνών, αφού περιέχεται στα αμινοξέα κυστεΐνη και μεθειονίνη.



15. (Cl) CHLORINE ΧΛΩΡΙΟ

Προέρχεται από την ελληνική λέξη χλωρός που σημαίνει κιτρινοπράσινος. Αυτή η ονομασία προσδιορίζει το χρώμα του ίδιου του αερίου στοιχείου.

Χρήσεις

Το χλώριο χρησιμοποιείται στην παραγωγή μεγά-

Usage

Silicon and its compounds have many industrial uses. This involves the direct use of silicon compounds in the form of clay, sand and rock. Silicates are commonly used to produce cement and stucco; when they are combined with sand and gravel, concrete is produced. Silicates also produce white ceramics such as porcelain. One of the most contemporary silicon compounds is silicon carbide (SiC).

13. PHOSPHORUS

Its name comes from the Greek words ‘φέρω’ και ‘φως’ (bring and light respectively), as it brings light to the dark.

Usage

Phosphorus is an essential chemical element for life. The phosphate group is a component of DNA, RNA and ATP, as well as of the phospholipids from which the cell membranes are formed. Low phosphate concentration is a significant constraint of the development of some aquatic ecosystems. On an economical scale, the vast majority of phosphorus compounds are consumed as fertilizers. Phosphorous fertilizers are needed to replenish the phosphorus removed by the plants from the soil.

14. SULFUR

Its name comes from the (homeric) sulfur and from some kind of verb that has the meaning of smoking, to produce smoke. Its symbol derives from its Latin name sulfur.

Usage

Sulfur is one of the essential chemical elements for all (known) life forms and it is widely used in biochemical processes. Sulfur in organic form is found in the vitamins biotin and thiamin. Sulfur is an important component of many enzymes and antioxidant molecules. Organically bound sulfur constitutes a synthesis of all proteins, as it is included in the amino-acids cysteine and methionine.

15. CHLORINE

It derives from the Greek word ‘χλωρός’, which means yellow-green. Its name identifies the color of the gas element itself.

λης ποικιλίας καταναλωτικών προϊόντων, που περιλαμβάνουν περίπου τα ⅔ των (βιομηχανικών) οργανικών χημικών, όπως το πολυβινυλοχλωρίδιο (PVC), καθώς και ως ενδιάμεση ουσία για την παραγωγή άλλου είδους πλαστικών, καθώς και άλλων προϊόντων που (τελικά) δεν το περιέχουν (το χλώριο). Ακόμη, ως συνηθισμένο απολυμαντικό, τόσο το στοιχειακό χλώριο, όσο και αρκετές αντίστοιχες χλωριούχες ενώσεις, χρησιμοποιούνται περισσότερο απευθείας σε πισίνες, για να τις κρατήσουν καθαρές και υγιεινές, καθώς και για τη χλωρίωση του πόσιμου νερού.

16. (K) POTASSIUM ΚΑΛΙΟ

Το κάλιο είναι ένα στοιχείο που προέρχεται από την στάχτη των φυτών. Η αραβική λέξη για τη στάχτη αυτή ήταν alqali (αλκάλια). Το όνομα του στοιχείου προέρχεται από την αραβική λέξη qalaj, που σημαίνει αποτεφρωμένος, επειδή αυτό βρίσκεται στις στάχτες των φυτών. Το όνομά του στα αγγλικά προέρχεται από τις λέξεις pot και ash, που παραπέμπει σε δοχείο με στάχτη.

Χρήσεις

Ιόντα καλίου συναντάμε εντός και εκτός των κυττάρων, τα οποία μαζί με το νάτριο σχηματίζουν την αντλία καλίου-νατρίου, αλλά και ρυθμίζουν την ισορροπία του νερού στα κύτταρα. Ένα μεγάλο ποσοστό του καλίου πηγαίνει στην παραγωγή λιπασμάτων, ενώ χρησιμοποιείται ακόμη στην υαλουργία και στη σαπωνοποιία. Βρίσκεται σε αρκετή ποσότητα στις μπανάνες.

17. (Ca) CALCIUM ΑΣΒΕΣΤΙΟ

Το όνομα του, ασβέστιο, οφείλεται στην παρουσία του στοιχείου στον ασβέστη. Η αγγλική του ονομασία είναι η λέξη calcium.

Χρήσεις

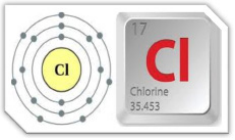
Το ασβέστιο αποτελεί το 1,5% του σωματικού βάρους, δηλ. περίπου 1160 γραμμάρια. Το 99% του ασβεστίου απαντά στα οστά υπό μορφή συμπλόκου, το δε 1% ανευρίσκεται στα δόντια, το δέρμα και το πλάσμα του αίματος.

Συμπέρασμα

Συμπεραίνουμε ότι η γνώση μερικών βασικών ιδιοτήτων των σημαντικότερων χημικών στοιχείων μπορεί να μας βοηθήσει σε διάφορους τομείς της καθημερινής μας ζωής.

Usage

Chlorine is used to produce a wide variety of consumer products, including about two-thirds of (industrial) organic chemicals such as polyvinylchloride (PVC), and as an intermediate for the production of other plastics, as well as other products that ultimately do not contain it. Moreover, as an ordinary disinfectant, both elemental chlorine and several other chlorine compounds are more directly used in swimming pools in order to keep them clean and healthy, as well as to chlorinate drinking water.



POTASSIUM

Potassium is an element deriving from the ashes of plants. The Arabic word for ash was al qali (alkali). The name of the element comes from the Arabic word qalaj which means incinerated because it is met in ash plants. Its English name comes from the words pot and ash, which implies a pot of ash.

Usage

Potassium ions are met inside and outside cells, which alongside with sodium form the potassium-sodium pump; they also regulate the water balance in the cells. A large proportion of potassium goes into fertilizer production, while it is also used in glass and soap industries. Finally, it is found in sufficient amounts in bananas.

CALCIUM

Its name, calcium, is justified by the presence of the element in the lime.

Usage

Calcium accounts for 1.5% of body weight, that is about 1.160 grams. 99% of calcium is found in the bones as a complex, while 1% is met in the teeth, skin and blood plasma.

Conclusion

Studying the above elements we realize that the knowledge of some important properties of them would be very helpful in our everyday life.

Bibliography

1. *Χημεία Α΄ Λυκείου*, Σ. Λιοδάκης κ.ά., ΟΕΔΒ.
2. http://greeksurnames.blogspot.gr/2011/01/blog-post_07.html, last visit 5 April 2017.
3. *Χημεία Γ' Γυμνασίου*, Π. Θεοδορόπουλος κ.ά., ΟΕΔΒ 2016 2016.
4. Χημείας απόσταγμα, Α. Βάρβογλης, εκδ.Τροχαλία, 1992.
5. Η κρυφή γοητεία της Χημείας, Α. Βάρβογλης, εκδ. Τροχαλία 1994.

2nd Experimental Leceum of Athens
Athens, Greece
aimilios439@gmail.com
gibal2011@gmail.com
leftkarak@gmail.com

Levers: Applications to the Acropolis of Athens, Greece

Μοχλοί: Εφαρμογές στην Ακρόπολη των Αθηνών

by Aimilios Spiliopoulos - Dimitra-Dio Balafa - Lefteris Karakostas-Deliprimis

Εισαγωγή

Οι μοχλοί είναι ένα αντικείμενο πολύ σημαντικό στην καθημερινή ζωή από τα αρχαία χρόνια μέχρι σήμερα. Όμως, πριν περιγραφούν οι πανάρχαιες εφαρμογές τους και ιδίως, αυτές της κατασκευής της Ακροπόλεως των Αθηνών, είναι απαραίτητο να περιγραφούν σύντομαορισμοί και νόμοι της Φυσικής που βρίσκουν εφαρμογήστους μοχλούς.

Αρχικά, καλό θα ήταν να διευκρινιστεί η σημασία της έννοιας του μοχλού (Dana Mackenzie: 2012).

Τι είναι μοχλός ;

Στη Φυσική *μοχλός* είναι ένα άκαμπτο αντικείμενο που σε συνδυασμό με ένα υπομόχλιο μπορεί να πολλαπλασιάσει τη μηχανική δύναμη που ασκείται σε ένα άλλο αντικείμενο. Αυτή η απλή μηχανή αποτελείται από μια δοκό ή μια άκαμπτη ράβδο ικανή να περιστρέφεται πάνω σε μια σταθερή άρθρωση ή ένα υπομόχλιο. Με βάση τη θέση του υπομοχλίου, ένας μοχλός ενισχύει μια δύναμη εισόδου (είναι γνωστή ως προσπάθεια) για να παρέχει μεγαλύτερη δύναμη εξόδου (είναι γνωστή ως φορτίο).

Introduction

Levers have always been a very important tool in daily life from ancient times until today. However, before we describe their ancient applications and specifically, those in the construction of the Acropolis of Athens, it is necessary to briefly describe some of the physics theorems that pertain to levers.

Firstly, we should define the structure and the principle of operation of a lever (Dana Mackenzie:2012).

What is a lever?

A lever is a set-up that allows one to gain a mechanical advantage when moving an object, or when applying force to an object. (Usher A.P.: 1929)

In fact, this simple machine consists of a beam or a rigid bar capable of rotating on a a fixed hinge, or a fulcrum. On the basis of the location of fulcrum, a lever amplifies an input force (effort) to provide a greater output force (load).

According to the related positions of those three parts, levers are classified into three classes (Fig. 1):

1. First class (The fulcrum is between the load and the effort).
2. Second class (The load is between the fulcrum and the effort).
3. Third class (The effort is between the fulcrum and the load).

If we assume that levers balance works, then, work done by effort and load are always equal. It has to be pointed out that work done by a Force is calculated by the product of the distance covered by an object during its movement multiplied by the driving force applied on its direction of motion. If small effort and big distance from the fulcrum are chosen, multiplied load in small distance from the fulcrum can be applied. In other words, the lever allows us to “exchange” effort with distance, thus multiplying the load. This can be explained theoretically with the concept of torque and its application to the balance of rigid bodies. In levers of the first class, considering the ratio of the distances of the load and effort from the fulcrum, we can calculate the mechanical advantage of the lever, that is, the number showing how many times the effort is multiplied. If the distances are equal, we are talking about a scale. Examples of levers of the first class are seesaws, crowbars, hammers, and so on.

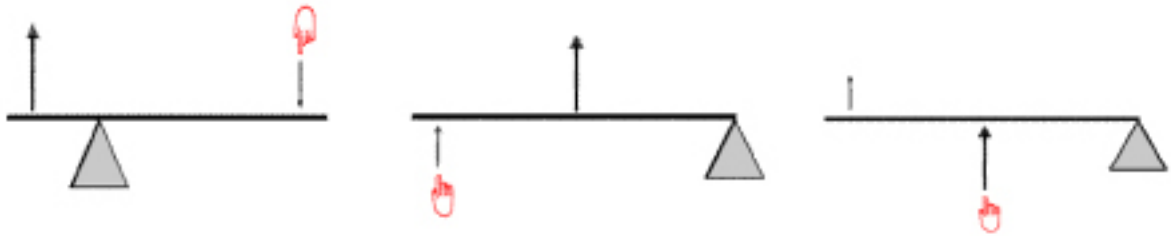


Fig. 1. Level first class. Level second class. Level third class.
Εικ. 1. Μοχλός πρώτου τύπου. Μοχλός δεύτερου τύπου. Μοχλός τρίτου τύπου.

Από τον τρόπο με τον οποίο διατάσσονται αυτά τα τρία μέρη, οι μοχλοί χωρίζονται σε τρεις κατηγορίες (Εικ. 1):

1. *Πρώτου τύπου* (το υπομόχλιο βρίσκεται μεταξύ φορτίου και προσπάθειας)
2. *Δευτέρου τύπου* (το φορτίο βρίσκεται μεταξύ υπομοχλίου και προσπάθειας)
3. *Τρίτου τύπου* (η προσπάθεια βρίσκεται μεταξύ υπομοχλίου και φορτίου)

Αν υποτεθεί ότι οι μοχλοί είναι «ζυγοί» έργων, τότε τα έργα της δύναμης εισόδου και της δύναμης εξόδου είναι πάντα ίσα. Επισημαίνεται ότι το έργο δύναμης υπολογίζεται από το γινόμενο του διαστήματος που διανύει ένα σώμα κατά την κίνησή του και της εφαρμοζόμενης στην κατεύθυνση της κίνησης δύναμης. Επιλέγοντας μικρή δύναμη εισόδου και μεγάλη απόσταση από το υπομόχλιο, μπορείς να ασκήσεις πολλαπλάσια δύναμη εξόδου σε μικρή απόσταση από το υπομόχλιο. Με άλλα λόγια, ο μοχλός μας επιτρέπει να «ανταλλάσσουμε» δύναμη με απόσταση πολλαπλασιάζοντας τη δύναμη εξόδου. Αυτό θεωρητικά εξηγείται με την έννοια της ροπής και την εφαρμογή της στην ισορροπία στερεού σώματος. Στους μοχλούς πρώτου τύπου, λαμβάνοντας υπόψη τον λόγο των αποστάσεων του σημείου εφαρμογής της δύναμης εισόδου και του φορτίου από το υπομόχλιο αντίστοιχα, καθορίζεται το μηχανικό πλεονέκτημα του μοχλού, δηλαδή ο αριθμός που δείχνει πόσες φορές πολλαπλασιάζεται η δύναμη εισόδου. Εάν οι αποστάσεις είναι ίσες, τότε μιλούμε για μια ζυγαριά. Παραδείγματα μοχλών πρώτου τύπου είναι η τραμπάλα, ο λοστός, το σκεπάρνι κ.ά.

Σε μοχλούς του δευτέρου τύπου, επειδή η απόσταση του σημείου εφαρμογής της δύναμης εισόδου από το υπομόχλιο είναι πάντα μεγαλύτερη από αυτήν του φορτίου από το υπομόχλιο, η δύναμη εισόδου είναι πάντα μικρότερη από το φορτίο για να προκληθούν ίσες ροπές και να υπάρχει ισορροπία. Παραδείγματα μοχλών δευτέρου τύπου είναι ο καρυοθραύστης, το κουπί ενός κανό κ.ά.

Σε μοχλούς του τρίτου τύπου, η δύναμη εισόδου είναι μεγαλύτερη από το φορτίο, αντίθετα με τους μοχλούς πρώτου και δεύτερου τύπου. Όμως, η μετατόπιση του σημείου εφαρμογής της δύναμης εισόδου είναι μεγαλύτερη από τη μετατόπιση του φορτίου. Από τη στιγμή που αυτές οι κινήσεις γίνονται ακριβώς στον ίδιο χρόνο, το φορτίο μετακινείται ταχύτερα από το σημείο εφαρμογής της δύναμης εισόδου. Παραδείγματα μοχλών τρίτου τύπου είναι το ρόπαλο του μπέιζμπολ, το κουπί μίας βάρκας κ.ά. (Usher A.P.: 1929).

Η εφαρμογή των μοχλών στην κατασκευή της Ακρόπολις των Αθηνών

Τον πέμπτο αιώνα π.Χ. στον Χρυσό αιώνα του Περικλή, χτίστηκεν Ακρόπολις των Αθηνών. Ήταν ένα ιδιαιτέρως δύσκολο εγχείρημα λόγω των μη εξελιγμένων μηχανικών εργαλείων και υλικών, του κεκλιμένου βράχου, του μεγάλου βάρους του μαρμάρου και του μεγέθους της κατασκευής. Έτσι, πολλές εφαρμογές μοχλών χρησιμοποιήθηκαν και ουσιαστικά εκείνοι οι μοχλοί λειτούργησαν ως πολλαπλασιαστές της εφαρμοζόμενης δύναμης εισόδου, από την εξόρυξη του μαρμάρου μέχρι την ανύψωσή του στη στέγη του Παρθενώνα (Μανόλης Κορρές: 2000).

Για να εξορυχθεί το μάρμαρο από το βουνό, τοποθετήθηκαν σφήνες για να δημιουργηθεί κενό (Εικ. 2). Σε αυτό το κενό τοποθετήθηκαν πρώτα μοχλοί πρώτου τύπου, κατασκευασμένοι από σίδηρο. Το υπομόχλιο ήταν στην πραγματικότητα μέρος του ίδιου του βουνού και συγκεκριμένα η άκρη του. Το φορτίο βρισκόταν μέσα στο βουνό και ασκούνταν στο μάρμαρο. Η προσπάθεια επιλέχθηκε να τοποθετείται μακριά από το βουνό, με σκοπό να γίνει ο λόγος των αποστάσεων μεταξύ προσπάθειας και υπομοχλίου, καθώς και μεταξύ φορτίου και υπομοχλίου, πολύ μεγάλος. Μερικές φορές μοχλοί δεύτερου τύπου τοποθετούνταν στην προσπάθεια· το υπομόχλιο ήταν το δάπεδο, η προσπάθεια ήταν τα ανθρώπινα χέρια και το φορτίο ήταν η προσπάθεια του πρώτου μοχλού. Χάρη σε αυτό το σύστημα η ανθρώπινη δύναμη πολλαπλασιαζόταν έως και τριάντα φορές (κάτι που έκανε την κίνηση του μαρμάρου τριάντα φορές μικρότερη από αυτή των ανθρώπων) και ως αποτέλεσμα, ο βράχος εξορυσσόταν (Μανόλης Κορρές: 2000).

Πολλές φορές χρησιμοποιούνταν τροχαλίες για να μετατρέπεται η κίνηση σε εφαρμοζόμενη δύναμη. Οι τροχαλίες είναι συσκευές με δίσκους τυλιγμένους με σχοινιά. Η χρήση τους εξαρτάται από τη συναρμολόγηση των δίσκων. Οι τροχαλίες διέπονται από τους ίδιους ακριβώς νόμους με τους μοχλούς πρώτου τύπου.

Για να κυλιστεί και να συρθεί το μάρμαρο (δηλαδή, να τραβηχτεί με μεγάλη δύναμη), χρησιμοποιήθηκαν βαρούλκα (Εικ. 3). Αυτές είναι συσκευές με άξονα γύρω από τον οποίο τυλίγονται σχοινιά προκειμένου να τραβηχτεί οτιδήποτε είναι δεμένο στην άλλη άκρη του σχοινιού. Ο άξονας αυτός είναι λεπτός για να τυλίγονται τα σχοινιά αργά κατά την κίνηση, ενώ η δύναμη εξόδου (φορτίο) εφαρμόζεται πολύ κοντά στο κέντρο του άξονα (υπομόχλιο). Μακριά πείρους βγαίνουν κάθετα στον άξονα όπου εφαρμόζεται η ανθρώπινη δύναμη (προσπάθεια). Όλα

Application in the construction of the Acropolis of Athens

In the fifth century B.C., during the Golden Age of Pericles, the Acropolis of Athens was built. It was an extremely difficult task because of the unsophisticated mechanical tools and materials, the highly inclined floor of the Sacred Rock, the great weight of marble and the size of the structure. Thus, many applications of levers were used and essentially those levers functioned as multipliers of applied input force, from the extraction of the marble to its elevation to the roof of the Parthenon (Manolis Korres: 2000).

For the marble to be extracted from the mountain, wedges were placed to make a void (Fig. 2). In this void first class levers, made of iron, were placed. The fulcrum was actually part of the mountain itself and specifically its edge. The load was inside the mountain and exercised on the marble. The effort was chosen to be placed far from the mountain, with a view to making the ratio of the distances between the effort and the fulcrum, as well as that between the load and the fulcrum, very high. Sometimes second class levers were applied on the effort; the fulcrum was the floor, the effort was human hands and the load was the effort of the first lever. Thanks to this system human power was multiplied up to thirty times (which made the movement of the marble thirty times smaller than that of the men) and as a result, the rock was extracted (Manolis Korres: 2000).

Lots of times pulleys were used to convert movement to applied force. Pulleys are apparatuses with discs wrapped with ropes. Their use depends on the assembly of the discs. Pulleys are governed by the exact same laws as levers of the first class.

For the marble to be rolled and dragged (thus, to be pulled with great force), winches were used (Fig. 3). These are apparatuses with an axis around which ropes are wrapped in order to pull anything that is tied on the other side of the rope. This axis is thin for the ropes to be wrapped slowly during the motion, while the output force (load) is applied very near the center of the axis (fulcrum). Long pegs come out vertically to the axis where the human force is applied (effort). All

In levers of the second class, as the distance of the effort from the fulcrum is always greater than that of the load from the fulcrum, the effort is always smaller than the load to cause equal torques and thus, balance. Examples of levers of the second class are nutcrackers, canoe paddles, and so on.

In levers of the third class, the effort is greater than the load, as opposed to levers of the first and second classes. However, the shift of the effort is greater than the shift of the load. When those shifts are done in the exact same time, the load moves faster than the effort. Examples of levers of the third class are baseball bats, boat paddles, and so on (Usher A.P: 1929).

μένου επίπεδου μεγάλης κλίσης του Ιερού Βράχου, του μεγάλου βάρους του μαρμάρου, του μεγέθους του κτίσματος. Έτσι πολλές εφαρμογές των μοχλών χρησιμοποιήθηκαν στην κατασκευή και ουσιαστικά οι μοχλοί λειτούργησαν ως πολλαπλασιαστές δύναμης, από την απόσχιση του μαρμάρου μέχρι την ανύψωσή του στην οροφή του Παρθενώνα. (Manolis Korres: 2000)

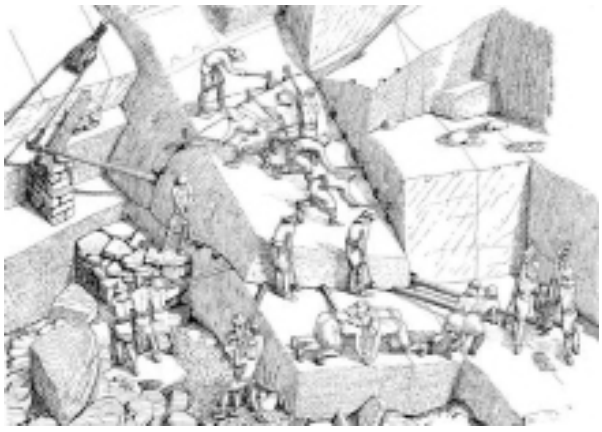


Figure 2: The extraction of the rock (p. 21)
Εικόνα 2: Η εξόρυξη του μαρμάρου.

Για να κοπεί το μάρμαρο από το βουνό, τοποθετούνταν σφήνες για να δημιουργήσουν κενό (Εικ. 2). Σε αυτό το κενό σιδερένιοι μοχλοί πρώτου τύπου τοποθετούνταν. Το υπομόχλιο ουσιαστικά ήταν μέρος του βουνού και συγκεκριμένα η άκρη του. Το φορτίο βρισκόταν μέσα στο βουνό και ασκούσε δύναμη πάνω στο μάρμαρο. Επέλεγαν το σημείο εφαρμογής της δύναμης εισόδου να είναι αρκετά μακριά από το βράχο, με στόχο ο λόγος των αποστάσεων του σημείου εφαρμογής της δύναμης εισόδουαπό το υπομόχλιο και του φορτίου από το υπομόχλιο να έχειπολύ μεγάλη τιμή. Στο σημείο εφαρμογής της δύναμης εισόδου μερικές φορές τοποθετούνταν και μοχλοί δευτέρου τύπου, όπου το υπομόχλιο ήταν το πάτωμα, το σημείο εφαρμογής της δύναμης εισόδου ήταν τα χέρια του ανθρωπίνου δυναμικού και το φορτίο ήταν το σημείο εφαρμογής του πρώτου μοχλού. Με αυτό το σύστημα η ανθρώπινη δύναμη πολλαπλασιαζόταν έως και τριάντα φορές (κατ' επέκταση, η κίνηση του μαρμάρου ήταν τριάντα φορές μικρότερη από αυτήν των ανθρώπων) και τελικά ο βράχος αποκοβόταν. (Manolis Korres: 2000)

Πολλές φορές, τροχαλίες χρησιμοποιούνταν για να μετατραπεί η κίνηση σε δύναμη. Οι τροχαλίες είναι συσκευές με δίσκους γύρω από τους οποίους τυλίγονται σχοινιά. Η χρήση τους ήταν ανάλογη της συνδεσμολογίας των δίσκων. Ακριβώς όπως σε ένα μοχλό πρώτου τύπου, οι ίδιοι νόμοι ισχύουν και για τις τροχαλίες.

Για να γυριστεί και να συρθεί το μάρμαρο (άρα να τραβηχτεί με μεγάλη δύναμη) χρησιμοποιούνταν βαρούλκα (Εικ. 3). Αυτά είναι συσκευές με έναν άξονα περιστροφής γύρω από τον οποίον τυλίγονται σχοι-

this functions like a second class lever, so, in a specific, long distance human movement the rope which holds the marble moves for a very small distance applying great force (Manolis Korres: 2000).

Second class levers were also used to elevate the marble a little, in order to get it on a carriage and have it moved. Finally, to lift the finished marbles up on the buildings of the Acropolis, a complicated system consisting of three axis winches was used to pull other winches from which the marbles hung, along with pulleys.

Figure 3: The same rock, using winch elevated to the roof of Parthenon (last page).
Εικόνα 3: Το μάρμαρο με χρήση βαρούλκου ανυψώνεται για να τοποθετηθεί στον Παρθενώνα.

Conclusion

Thanks to all those complicated mechanical systems using simple laws of physics, ancient Greeks managed to complete the very difficult construction of the classical Acropolis of Athens, using their minds at a time when technology was very limited.

References:

Books

Usher A. P., *A History of Mechanical Inventions*, McGraw Hill book company inc., First edition published in New York, 1929.

Dana Mackenzie, *The Universe in Zero Words: The Story of Mathematics as Told Through Equations*, Princeton University Press, Published April 29th 2012.

Manolis Korres, *The stones of the Parthenon*, Published by Melissa, December 2000.

From Internet

1. http://www.pi.ac.cy/pi/files/epimorfosi/program/kath_tehnol/mechanismoi_Mettas.pdf
2. http://www.archaiologia.gr/wp-content/uploads/2011/07/95-8.pdf
3. http://www.engineeringtoolbox.com/levers-d_ 1304.html
4. http://www.bbc.co.uk/schools/gcsebitesize/design/

νιά, ώστε να υπάρχει η δυνατότητανα τραβηχτεί οτιδήποτε είναι δεμένο στην άκρη του σχοινιού. Ο άξονας αυτός είναι λεπτός, έτσι ώστε τα σχοινιά να τυλίγονται πιο αργά κατά την κίνηση ενώ η δύναμη εξόδου (φορτίο) να εφαρμόζεται πολύ κοντά στο κέντρο του άξονα (υπομόχλιο). Μακριοί πάσσαλοι προεξέχουν κάθετα στον άξονα, όπου εκεί ασκείται η δύναμη των ανθρώπων (προσπάθεια). Όλο αυτό συμπεριφέρεται ως ένας μοχλός δευτέρου τύπου, άρα σε μιας μεγάλης απόστασης συγκεκριμένη κίνηση των ανθρώπων το σχοινί που συγκρατεί το μάρμαρο κινείται σε μικρή απόσταση ασκώντας πολύ μεγάλη δύναμη. (Manolis Korres: 2000)

Δευτέρου τύπου μοχλοί χρησιμοποιούνταν επίσης για να σηκωθεί λίγο το μάρμαρο και να μπει σε κάποια άμαξα ώστε να μετακινηθεί. Τέλος, για να ανελκυθούν τα τελειοποιημένα μάρμαρα στα κτήρια της Ακροπόλεως, ένα περίπλοκο σύστημα αποτελούμενο από τριών αξόνων βαρούλκα τα οποία τραβούσαν άλλα βαρούλκα από τα οποία κρέμονταν τα μάρμαρα, χρησιμοποιούνταν μαζί με τροχαλίες.

Συμπέρασμα

Με όλα αυτά τα πολύπλοκα μηχανικά συστήματα, που όμως χρησιμοποιούν απλούς νόμους της Φυσικής, οι Αρχαίοι Έλληνες κατάφεραν να διεκπεραιώσουν αυτήν την πολύ δύσκολη και εντυπωσιακή κατασκευή της κλασσικής των Αθηνών Ακροπόλεως, χρησιμοποιώντας το μυαλό τους σε μια εποχή όπου η τεχνολογία των ανθρώπων ήταν περιορισμένη.

systemscontrol/mechanismsrev1.shtml
5. https://www.math.nyu.edu/~crorres/Archimedes/Lever/LeverLaw.html
6. http://www.enchantedlearning.com/physics/machines/Levers.shtml

Television series

1. Albert Barillé, *Il était une fois... les Découvreurs, Episode: Archimède et les Grecs.* https://fr.wikipedia.org/wiki/Internet_Movie_Database

Iconography

Fig. 1: https://commons.wikimedia.org/w/index.php?curid=935469 Iainf 9 July 2006 (UTC) https://commons.wikimedia.org/w/index.php?curid=935465, Iainf 9 July 2006 (UTC) https://commons.wikimedia.org/w/index.php?curid=935472, Iainf 9 July 2006 (UTC)
Fig. 2: Manolis Korres, *The stones of the Parthenon,* Published by Melissa, December 2000, p.21
Fig. 3: Manolis Korres, *The stones of the Parthenon,* Published by Melissa, December 2000, last page.

Optional

https://www.pathwayz.org/Tree/Plain/LEVERS (Figure1 - option 2)
http://kids.britannica.com/comptons/art-53664/In-a-first-class-lever-the-fulcrum-is-between-the (Figure 1 - option 2)

Experimental Leceum of the University of Macedonia
Thessaloniki, Greece
vgiannakidis1@gmail.com

Changes on Earth and Life

Αλλαγές στη Γη και στη Ζωή

Rebecca Giannakidou

Εισαγωγή

Σήμερα, περισσότερο από κάθε άλλη φορά, οι επιστήμονες στρέφουν το βλέμμα τους στον πλανήτη Γη. Με την κλιματική αλλαγή προ των πυλών, το ενδιαφέρον τους επικεντρώνεται στις ανανεώσιμες πηγές ενέργειας και στη δικαιότερη και σοφότερη διαχείριση των φυσικών πόρων.

Στο 35ο Διεθνές Γεωλογικό Συνέδριο που διεξήχθη στη Νότιο Αφρική, οι ερευνητές μιλούν για μια νέα γεωλογική εποχή, στην οποία εικάζουν ότι εισήλθε η Γη, στα μέσα του προηγούμενου αιώνα. Υπάρχουν και άλλες θεωρίες, που τοποθετούν την έναρξη της νέας εποχής σε διαφορετικά χρονικά σημεία (π.χ. βιομηχανική επανάσταση). Την ονομάζουν Ανθρωπόκαινο, για να τονίσουν τον καταλυτικό ρόλο της ανθρώπινης επίδρασης. Ήρθε να αντικαταστήσει την Ολόκαινο εποχή που ξεκίνησε πριν από 11.700 χρόνια, μετά το λιώσιμο των πάγων που σήμανε το τέλος της εποχής των Παγετώνων. Το περιβάλλον με τις συνεχείς μεταβολές του, αλληλεπιδρούσε με τη ζωή και καθόριζε την εξέλιξή της. Ο ρυθμός εξέλιξης ήταν αργός και εξαρτιόνταν μόνο από τις φυσικές διεργασίες. Στην εικόνα 1, βλέπουμε τον άνθρωπο να κρατά το μέλλον της ανθρωπότητας στα χέρια του. (Η Γη εισήλθε στην Ανθρωπόκαινο Εποχή, 2016. Η κόλαση στην Ανθρωπόκαινο εποχή, 2016).

Σήμερα ο άνθρωπος με τη χρήση της τεχνολογίας, επιδρά σε παγκόσμιο επίπεδο και αλλάζει γοργά τον πλανήτη. Η επέμβαση του ανθρώπου είναι καθολική, στο υπέδαφος (εξόρυξη ορυκτών και μεταλλευμάτων), στην επιφάνεια του εδάφους (μονοκαλλιέργειες, δημιουργία αστικών κέντρων) και στην ατμόσφαιρα (εκπομπή αερίων που αλλάζουν τη σύστασή της). Με τα επιτεύγματά του προσπαθεί να κατανοήσει και να ελέγξει τον φυσικό και να τον εκμεταλλευτεί προκειμένου να αποκομίσει το μεγαλύτερο δυνατό κέρδος. Στην αλλαγή που έχει επιφέρει υπάρχουν και αρνητικές συνέπειες που εντοπίζονται κυρίως στη ρύπανση του περιβάλλοντος. Δυστυχώς ο σοφός άνθρωπος δεν είναι σε θέση να γνωρίζει τις μακροχρόνιες επιπτώσεις αυτών των αλλαγών, με τα πρώτα σημάδια

Introduction

Nowadays, scientists concentrate on Planet Earth more than ever. Climate change is a current affair and their interest is directed towards renewable energy sources and how to use the natural sources better and wiser.

Researchers have talked about a new geological epoch, in which they assume that the Earth has entered in the middle of the previous century. There are many theories, which support that the transitionto the new epoch became at different times (for instance, during the Industrial Revolution). They call it “Anthropocene” in order to emphasize the determining importance of human impact. It has taken the place of Holocene an epoch beginning 11,700 years ago, after the ice melting that signified the end of the Ice Age. The environment, constantly changing, was interacting with life and determined its evolution.

These days, humans have an impact globally and change the planet quickly, using advanced technology. Human interference is catholic on the underground (excavation of minerals and ores), the ground (monocultures) and the atmosphere (emission of gases that change its formulation). With his achievements, man tries to understand and controlhis natural world and take advantage of it so as to profit as much as possible. In the change he has brought about, there are ramifications that principally have to do with the environmental pollution. Unfortunately, the “wise” man is not capable of knowing the long-term consequences of these changes. Global warming (greenhouse effect) as a result of human activity as well has increased the average temperature of the planet 0,6 °C with a margin of error of 0,2 °C. Quite a lot of people believe that the countdown for the human species has already begun.

How the Earth formed

Εικόνα 1. Ο άνθρωπος ορίζει το μέλλον της ανθρωπότητας.

The Earth formed from heterogeneous materials from our solar system the same period with it (sun, planets, astronomical objects). According to the oldest materials found in our solar system, the Earth has been dated back to 4.54 billion years. Its formation continued for the next 10 to 20 million years after consecutive bombardments of astronomical objects, such as asteroids and comets. The volcanic eruptions, the collisions with meteorites and tectonic moves finally shaped its surface. The tectonic forces

τους να εντοπίζονται κυρίως στο κλίμα. Η υπερθέρμανση (φαινόμενο του θερμοκηπίου) εξαιτίας και της ανθρώπινης δραστηριότητας, έχει αυξήσει τη μέση θερμοκρασία του πλανήτη κατά 0,6 °C με περιθώριο λάθους 0,2 °C. Δεν είναι λίγοι εκείνοι που εικάζουν, πως η αντίστροφη μέτρηση για το ανθρώπινο είδος ξεκίνησε (Υπερθέρμανση του πλανήτη, χ.η.).

Πώς σχηματίστηκε η Γη

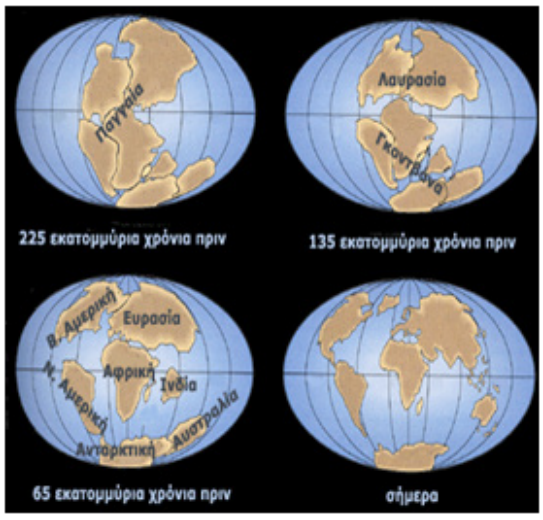
Η Γη σχηματίστηκε από ετερογενή υλικά του ηλιακού μας συστήματος, την ίδια περίοδο με εκείνο (ήλιος, πλανήτες, ουράνια σώματα). Σύμφωνα με τα παλαιότερα υλικά που βρέθηκαν στο ηλιακό μας σύστημα η Γη χρονολογήθηκε στα 4,54 δισεκατομμύρια έτη. Ο σχηματισμός της συνεχίστηκε για τα επόμενα 10 με 20 εκατομμύρια χρόνια, έπειτα από συνεχείς βομβαρδισμούς ουρανίων σωμάτων, όπως αστεροειδείς και κομήτες. Οι ηφαιστειακές εκρήξεις, οι συγκρούσεις με μετεωρίτες και οι τεκτονικές κινήσεις διαμόρφωσαν τελικά την επιφάνειά της. Φυσικά, επειδή οι τεκτονικές δυνάμεις συνεχίζουν να υφίστανται, η επιφάνειά της συνεχώς μεταβάλλεται. Στη δεύτερη εικόνα δίνονται κάποιες σημαντικές μεταβολές της επιφάνειας της Γης έπειτα από τις τεκτονικές κινήσεις σε διάστημα εκατομμυρίων ετών (Πώς βρίσκουμε την ηλικία της Γης 4,54 δισεκατομμυρίων χρόνων; 2003. Ηλιακό σύστημα, χ.η.).

Ο χρόνος από τη δημιουργία της Γης μέχρι σήμερα, διαιρείται σε γεωλογικούς αιώνες ανάλογα με τα πετρώματα και τα απολιθώματα που βρέθηκαν. Οι αιώνες διαιρούνται σε περιόδους και οι περίοδοι σε εποχές. Υπάρχουν κι άλλες υποδιαιρέσεις, αλλά αυτές είναι οι πιο γνωστές. Στον πίνακα, δίνονται οι γεωλογικοί αιώνες και οι πιο γνωστές υποδιαιρέσεις τους για να μπορούμε να έχουμε μια συνολική εικόνα των μεταβολών που συνέβησαν από την αρχή της δημιουργίας της Γης μέχρι και σήμερα (Γεωλογική περίοδος και Πανγαία, 2013. Γεωλογικός χρόνος χ.η.).

Πίνακας: Γεωλογικοί αιώνες.

Αιώνας	**Περίοδος**	**Εποχή**
Καινοζωικός	Τεταρτογενής	Ολόκαινος
		Πλειστόκαινος
	Τριτογενής	Πλειόκενος
		Μειόκενος
		Ολιγόκαινος
		Ηώκαινος
		Παλαιόκενος
Μεσοζωικός	Κρητιδική	
	Ιουρασική	
	Τριαδική	

continue to exist and so the Earth's surface continuously changes. In the first picture, we can see some important changes on the Earth's surface after tectonic moves throughout millions of years. The time from the creation of Earth until today is divided in geological eons depending on the rocks and the fossils found. The eons are divided in periods and the periods in epochs. There are more subdivisions, but these are the most common ones. In the table, there are the geological eons and their most known subdivisions in order for us to have a total picture of the changes that have happened from the Earth's formation up until today.



Picture 2. The changes of the Earth.
Εικόνα 2. Μεταβολές της Γης.

Table: Geological eons.

Eon	**Period**	**Epoch**
Cenozoic	Quaternary	Holocene
		Pleistocene
	Τριτογενής (neogene)	Pliocene
		Miocene
		Oligocene
		Eocene
		Paleocene
Mesozoic	Cretaceous	
	Jurassic	
	Triassic	
Palaeozoic	Permian	
	Carboniferous	
	Devonian	
	Silurian	
	Ordovician	
	Cambrian	
Precambrian		

Παλαιοζωικός	Πέρμια
	Λιθανθρακοφόρος
	Δεβόνιος
	Σιλούριος
	Ορδοβίσια
	Κάμβριος
Προκάμβριο	

Πώς ξεκίνησε η ζωή

Η ζωή εμφανίστηκε στους ωκεανούς της νεοσχηματισμένης Γης, 4 δισεκατομμύρια χρόνια πριν. Τα υλικά υπήρχαν ή έφτασαν από τον ουρανό με τους μετεωρίτες και τους κομήτες. Όταν η επιφάνειά της κρύωσε, με το νερό που μετέφεραν οι κομήτες σχηματίστηκαν οι ωκεανοί. Μέσα σ' αυτούς με την ενέργεια του Ήλιου και των ηλεκτρικών εκκενώσεων των κεραυνών, τα χημικά συστατικά ενώθηκαν σε τυχαίους συνδυασμούς άπειρες φορές. Από τις ενώσεις αυτές, προέκυψε το πρώτο μόριο που μπόρεσε να αντιγράψει τον εαυτό του. Έτσι δημιουργήθηκε ο πρώτος ζωντανός οργανισμός (αβιογένεση). Για 2 δισεκατομμύρια χρόνια η εξέλιξη ήταν αργή. Τότε τα πρωτο-βακτηρίδια χρησιμοποίησαν το ηλιακό φως και το διοξείδιο του άνθρακα για να τραφούν και απέβαλλαν οξυγόνο. Το οξυγόνο άλλαξε την υπάρχουσα ατμόσφαιρα. Η προστασία που παρείχε από την υπεριώδη ακτινοβολία το στρώμα του όζοντος που δημιουργήθηκε, εκτόξευσε τη δημιουργία πολλών, διαφορετικών μορφών ζωής. Συνεχείς μεταλλάξεις δημιούργησαν έναν τεράστιο αριθμό ειδών, που εξαπλώθηκαν σ' ολόκληρο τον πλανήτη (Η εξέλιξη της Γης, χ.η.).

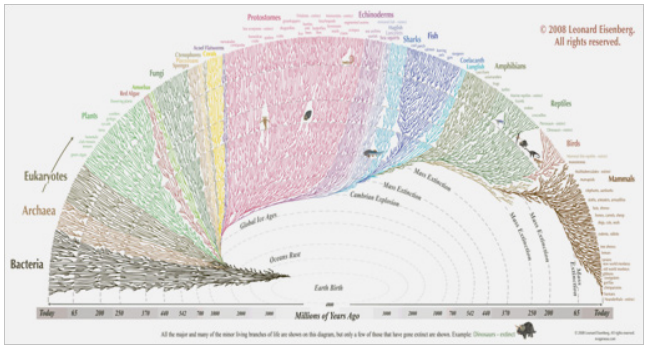
Η ζωή όπως τη γνωρίζουμε σήμερα, χρειάστηκε πολύ χρόνο, αναλογικά με την αντίληψη που έχει ο μέσος άνθρωπος για το χρόνο. Οι ιδιαίτερες συνθήκες που επικράτησαν στο περιβάλλον, βοήθησαν στη δημιουργία της ζωής, αλλά και οι μορφές ζωής το μετέβαλλαν με τις διεργασίες τους. Η αλληλεπίδραση αυτή υφίσταται από την αρχή μέχρι σήμερα. Το 99% των ειδών που εμφανίστηκαν στη Γη από τη γένεσή της, εξαφανίστηκαν στο πέρασμα των αιώνων, εξαιτίας της αλλαγής του φυσικού τους χώρου (οικοσυστήματος) (Η «Εξαφάνιση των ειδών» στον *Ελληνικό Κόσμο*, 2014).

Η εξαφάνιση είναι μια διαδικασία, παλαιά όσο και η ζωή και είναι άρρηκτα συνδεδεμένες. Ο λόγος είναι κυρίως η κατάρρευση των οικοσυστημάτων, δηλαδή του συνόλου των βιοτικών και αβιοτικών παραγόντων, μιας περιοχής και των μεταξύ τους σχέσεων αλληλεπίδρασης. Κάθε μορφή ζωής εντάσσεται σ' ένα τέτοιο σύστημα και εξαρτάται από αυτό. Τα οικοσυστήματα μέσω αυτορρυθμιστικών μηχανισμών έχουν την ικανότητα να διατηρούνται σε ισορροπία. Όταν όμως οι μεταβολές είναι μεγάλες, οι μηχανισμοί αυτοί δεν επαρκούν (Οικοσύστημα, χ.η.).

Η εξαφάνιση των δεινοσαύρων και των μαμούθ

How life began

Life appears for the first time in the oceans of the newly-formed Earth 4 billion years ago. The materials already existed or arrived from outer space with meteorites and comets. When its surface cooled down, the oceans shaped with the water that the comets transferred. Inside them with the solar energy and the energy of the electric discharge of the lightnings/thunders, the chemical materials united in random combinations countless/infinite times. These compounds resulted in the first molecule that could copy itself. That is how the first living organism was created (abiogenesis). For 2 billion years, the evolution was slow. Then, the proteobacteria used the solar light and the carbon dioxide to feed themselves and emitted oxygen. The oxygen changed the existing atmosphere. The protection provided by the ozone layer that formed from the ultraviolet radiationboosted the creation of a lot of different forms of life. Consecutive mutations created an immense number of species that spread to the whole planet. The second picture shows the interaction between life and the planet and the evolution of species.



Picture 3. The Earth forms life and the Earth changes the planet.
Εικόνα 3: Η Γη διαμορφώνει τη ζωή και η ζωή αλλάζει τον πλανήτη.

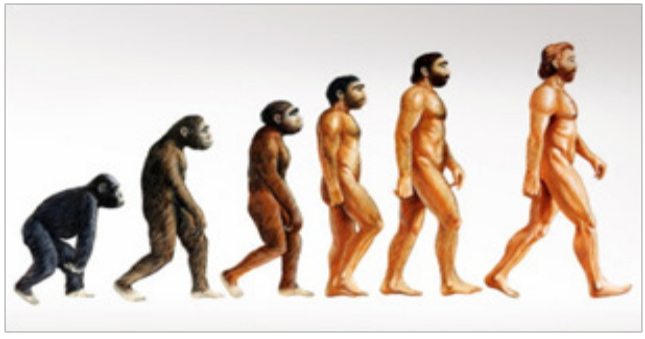
Life as we know it today took really long time to evolve compared to the perception of the average person for the time. The special conditions that were dominant in the environment helped the creation of life and the forms of life altered it with their processes. This interaction has existed from the beginning until today. The 99% of the species that have appeared on Earth since its birth have disappeared over the centuries because of the modification of their natural habitat (ecosystem).

The extinction is a process as old as life and they are closely connected. The reason is principally the collapse of the ecosystems, the combination of living and non-living factors of a region and the interaction between them. Every form of life is integrated in such a system and is depended on that. Ecosystems have the ability to maintain a balance through self-regulating mechanisms. Nevertheless, when the alterations are vast, these mechanisms are not adequate.

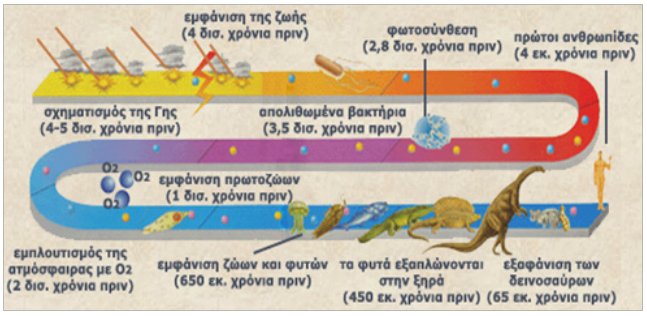
είναι αποτέλεσμα ξαφνικών ή μεγάλης έκτασης μεταβολών του περιβάλλοντος. Οι επιστήμονες πιστεύουν ότι από τη αρχή του γεωλογικού χρόνου συνέβησαν έξι μαζικές εξαφανίσεις των ειδών, στο τέλος της Κάμβριας, της Ορδοβίσιας, της Δεβόνιας, της Πέρμιας, της Τριαδικής και της Κρητηδικής περιόδου (δεινόσαυροι). Οι εξαφανίσεις αυτές σηματοδοτούν και το τέλος των περιόδων που συνέβησαν. Συνδέονται με κλιματολογικές αλλαγές, μεταβολές στη στάθμη των θαλασσών και μεταβολές φυσικών υλικών (πετρωμάτων και ιζημάτων του ωκεάνιου πυθμένα). Στην εικόνα 4 απεικονίζεται η εξέλιξη της ζωής (Οι μαζικές εξαφανίσεις των ειδών πάνω στη Γη κατά τον Παλαιοζωϊκό-Μεσοζωϊκό αιώνα, 2004).

Επίλογος

Οι μαζικές εξαφανίσεις έδωσαν το χώρο σε νέα είδη ώστε να μπορέσουν να εξελιχθούν. Οι συνεχείς μεταλλάξεις οδήγησαν τελικά στον άνθρωπο. Ο άνθρωπος κυριάρχησε στη Γη μέσα από τους κοινωνικούς δεσμούς που δημιούργησε.



The extinction of dinosaurs and mammoths is a result of sudden or large-scale changes in the environment. Scientists believe that, from the beginning of the geological time, six mass extinctions have occurred, in the end of the Cambrian, the Ordovician, the Devonian, the Permian and the Triassic andthe Cretaceous period (dinosaurs). These extinctions signal the end of the periods in which they happened (as well??). They are related to climatologic changes, changes in the sea level and changes of natural elements(rocks and sediments of the seafloor). In the thirdpicture, the evolution of life is depicted.



Picture 4. The evolution of life.
Εικόνα 4. Η εξέλιξη της ζωής.

Epilogue

The mass extinctions (_) to new species so that they can evolve. The constant mutations lead to the (_) of human. The human dominated the Earth through the (_) that he created.

Bibliography

Γεωλογική περίοδος και Πανγαία. (2013). Retrieved-March 11, 2017, from http://exereuniseis-ghs.blogspot.gr/2013/05/blog-post_7749.html

Γεωλογικός χρόνος. (χ.η.). Retrieved January 6, 2017, from https://el.m.wikipedia.org/wiki/Γεωλογικός_χρόνος

Η «Εξαφάνιση των ειδών» στον «Ελληνικό Κόσμο». (2014). Retrieved March 11, 2017, from http://www.kathimerini.gr/794713/article/politismos/atzenta/h-e3afanish-twn-eidwn-ston-ellhniko-kosmo

Η Γη εισήλθε στην Ανθρωπόκαινο Εποχή. (2016). Retrieved March 11, 2017, from http://www.youmagazine.gr/2016/08/earth-has-shifted-into-a-new-geological-era-5267/

Η εξέλιξη της Γης. (χ.η.) retrieved January 6, 2017, from http://www.eugenfound.edu.gr/frontoffice/portal.asp?cpage=NODE&cnode=58

Η κόλαση στην Ανθρωπόκαινο εποχή. (2016). Retrieved March 11, 2017, from http://www.cnn.gr/focus/apopseis/story/45702/h-kolasi-stin-anthropokaino-epoxi

Ηλιακό σύστημα. (χ.η.). Retrieved January 6, 2017, from https://el.m.wikipedia.org/wiki/Ηλιακό_σύστημα

Οι μαζικές εξαφανίσεις των ειδών πάνω στη Γη κατά τον Παλαιοζωϊκό-Μεσοζωϊκό αιώνα. (2004). Retrieved February 7, 2017, fromhttp://www.physics4u.gr/articles/2004/massextinction.html

Οικοσύστημα. (χ.η.). Retrieved January 6, 2017, from https://el.m.wikipedia.org/wiki/Οικοσύστημα

Πως βρίσκουμε την ηλικία της Γης 4.54 δισεκατομμυρίων χρόνων;. (2003). Retrieved January 6, 2017, from http://www.physics4u.gr/faq/earthage.html

Υπερθέρμανση του πλανήτη. (χ.η.). Retrieved January 6, 2017, fromhttps://el.m.wikipedia.org/wiki/Υπερθέρμανση_του_πλανήτη

Student, Electrotechnics study program Electrical Engineering and Computer Sciences Faculty
Transilvania, University of Braşov
perseneasorana@yahoo.com

Nikola Tesla: Patents and Inventions

Nikola Tesla: Brevete şi invenţii

by Perşenea Sorana Andreea

Introducere

Nikola Tesla (n.10 iulie 1856 - d.7 ianuarie 1943) este unul dintre cei mai mari inventatori ai sfârșitului de secol XIX și începutului de secol XX [1]-[4].

Invențiile, precum și munca teoretică ale lui Tesla (Fig. 1) au pus bazele cunoștințelor moderne despre curentul alternativ, sistemele de distribuție a energiei electrice, motorul de curent alternativ şi sistemele de transmisie a energiei fără fir.

Celebrul inventator a deschis calea unor inovării tehnologice, fundamentate de introducerea pe piaţă a noi produse şi tehnologii. Astfel, multe din lucrările lui Nikola Tesla trec dincolo de invenţie, fiind considerarte inovări tehnologice.

Scopul acestei lucrări este de analiză a invenţiilor şi brevetelor lui Nikola Tesla şi de stabilire a marilor direcţii în care aceste invenţii au deschis noi căi de dezvoltare tehnologică.

Brevete și/sau invenții?

Există o diferenţă între un brevet şi o invenţie? Răspunsul la această întrebare este foarte simplu. În general,termenii “invenție” și „brevet” sunt deseori folosiți ca sinonime. Deşi semnificaţia acestor termeni este apropiată, totuşi înțelesurile lor sunt foarte diferite.

Scopul brevetului este de a proteja invenția. Un brevet înregistrat la Comisia de brevete a unei ţări asigură dreptul absolut de proprietate a deținătorului de brevet de a păstra, utiliza sau de a vinde invenția.

Durata de valabilitate a unui brevet este limitată. Astfel, în cele mai multe țări valabilitatea brevetului este de 20 ani. Mai important este că valabilitatea brevetului este limitată teritorial. În toate țările în care invenția nu este protejată, aceasta poate fi utilizată liber. Pentru a proteja brevetul şi în alte tări,

Introduction

Nikola Tesla (10 July 1856 - 7 January 1943) is one of the most important inventors of the late nineteenth century and early twentieth century [1]-[4].

His inventions and theoretical works (Fig. 1) laid the foundations of modern knowledge about alternating current, electrical energy distribution systems, alternating current motors and energy wireless transmission systems.

The famous inventor leads the way to technological innovation, based on the marketing of new products and technologies. Thus, many of Tesla's works are considered as technological innovations.

The purpose of this work is to analyse the patents and inventions of Nikola Tesla and to establish the major directions in which these inventions have opened new avenues for technological development.

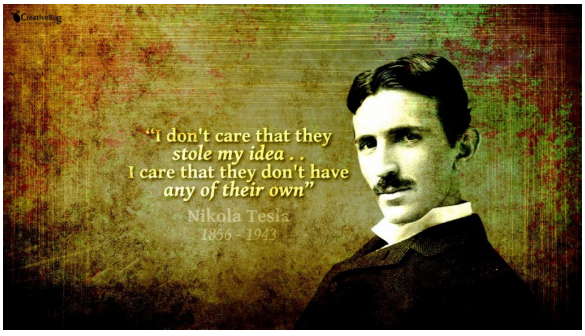


Fig. 1. Nikola Tesla (1856-1943).

Patents and/or Inventions?

Is there a difference between a patent and an invention? The answer is very simple. In general, the terms „invention” and „patent” are often used as synonyms. Although the significance of these terms is close, their meanings are very different.

The purpose of the patent is to protect the invention. A patent registered at a patent commission of a country provides absolute right of ownership of the patent holder to keep, use or sell the invention.

The validity of a patent is limited. However, in most countries the validity of the patent is 20 years. More important is that the patent validity is territorially limited. In all countries where the invention is not protected, it can be used freely. To protect the patent in other countries, the patent owner in one country can apply for registration of patent in other countries.

A set of patents which protect the same invention in different countries constitutes a “patents family”, and the patents which form a family of patents are known as analogous patents.

Nikola Tesla Patents in SUA

Nikola Tesla began his career as an inventor in the years 1881-1882, the period when he worked at the Central Telegraph Office in Budapest, suggesting

deţinătorul de brevet într-o ţară, poate solicita înregistrarea brevetului şi în alte ţări.

Un set de brevete care protejează aceeași invenție în diferite țări constituie o ”familie de brevete”, iar brevetele care constituie familia de brevete se numesc brevete analoage.

Brevetele lui Nikola Tesla înregistrate în SUA

Nikola Tesla și-a început cariera de inventator între anii 1881-1882, în perioada când lucra în Budapesta la Oficiul Central Telegrafic, prin propuneri de îmbunăţătiri la motorul electric. Nu există însă informații că Tesla ar fi dobândit vreun brevet în acea perioadă.

Situația se schimbă la începutul anului 1884 când Tesla ajunge în America și începe să lucreze la compania lui Edison. Thomas Alva Edison (1847-1931) era un inventator recunoscut şi un inteligent om de afaceri care conducea cu succes compania sa. Dar, Edison și Tesla, nu s-au putut înțelege în privinţa muncii prestate, astfel că Tesla părăseşte compania lui Edison şi înființează propria sa companie, numită “Tesla Electric Light & Manufacturing”.

Prima invenție a lui Tesla, propusă pentru brevetare, se referă la îmbunătăţiri ale funcţionării lămpii cu arc electric. La început Tesla propune o structură de lampă cu arc electric care funcționa cu electrozi de cărbune (Fig. 2), controlaţi cu electromagneți. Apoi Tesla îmbunătăţeşte invenția sa anterioară prin automatizarea controlului şi crearea unui sistem de rezervă pentru electrozii de descărcare electrică (Fig. 3). Aceste cereri de brevete de invenţie, depuse la Oficiul de brevete a SUA în 1885, sunt acceptate în 9 februarie 1886.

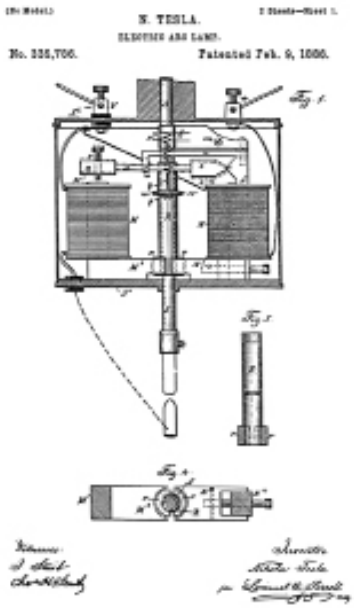


Fig. 2. Brevetul Nr. 335.786: Lampa cu arc electric.
Fig. 2. Patent No. 335.786: Electric arc lamp.

some improvements to the electric machines. But there is no information that Tesla would have acquired any patents in that period.

The situation changed in early 1884 when Tesla arrives in America and starts working in Edison’s company. Thomas Alva Edison (1847-1931) was a recognized inventor and a clever businessman who ran a successful company. But Edison and Tesla could not agree on the work performed, so Tesla leaves Edison’s company and sets up his own company, called „Tesla Electric Light & Manufacturing.”

The first of Tesla’s inventions, proposed for patenting, refers to the electric arc lamp functioning improvements. First, Tesla proposes a structure for electric arc lamp which operate with carbon electrodes (Fig. 2), controlled by electromagnets.

Then, Tesla improves his previous invention by automating the control and creating a backup system of the electric discharge electrodes (Fig. 3). These applications of the invention patents, deposited the US Patent Office in 1885, are accepted in February 9, 1886.

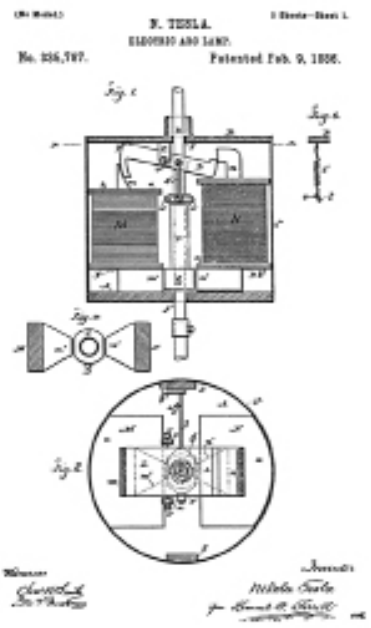


Fig. 3. Brevetul Nr. 335.787: Schița unei lămpi cu arc electric
Fig. 3. Patent No. 335.787: Sketch of electric arc lamp.

By the end of 1885, Tesla filed several patent applications related to the type dynamo-electric machines (generators). A patent application is filed by Tesla on 6 May 1885 and relates to construction of dynamo-electric machines switch (Fig. 4). The patent was approved in 1886.

In the year 1886, Tesla completed three patent applications, the first two for voltage regulators of the dynamo-electric machines (Fig. 5) and the third for a thermo-magnetic motor.

Până la sfârșitul anului 1885, Tesla depune mai multe cereri de brevete de invenţii legate de maşinile electrice tip dinam (generatoare). O cerere de brevet este depusă de Tesla la data de 6 mai 1885 şi se referă la construcţia unui comutator pentru maşinile dinamo-electrice (Fig. 4). Brevetul a fost aprobat în 1886.

În anului 1886, Tesla a completat trei aplicaţii de brevete, primele două privind regulatoare de tensiune pentru maşini electrice tip dinam (Fig. 5), și a treia referitoare la un motor termo-magnetic.

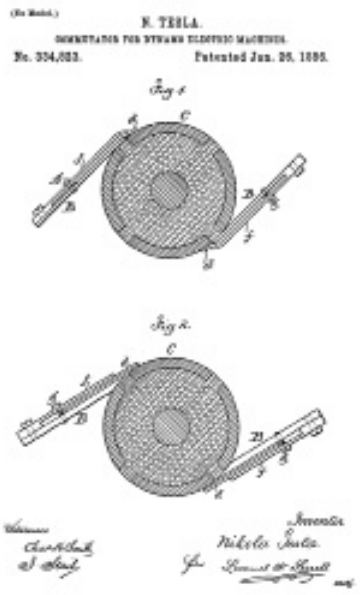


Fig. 4. Brevetul Nr. 334.823: Comutator pentru maşini electrice tip dinam.
Fig. 4. Patent No. 334.823:
Switch for dynamo-electric machine.

În anului 1886, Tesla a completat trei aplicaţii de brevete, primele două privind regulatoare de tensiune pentru maşini electrice tip dinam (Fig. 5), și a treia referitoare la un motor termo-magnetic.

In anul 1887, Tesla înregistrează șase noi cereri de brevete. Cu excepția primelor două aplicații,una referitoare la sisteme de reglare pentru maşini dinamo-electrice și cealaltă referitoare la generatoarele piromagnetice, toate celelalte aplicații de brevete aparțin domeniului curentului alternativ polifazat și se referă la motoare și generatoare bazate pe principiul curenţilor polifazici.

Aceste invenţii sunt rezultatul experimentelor pe care le face şi în urma cărora realizează două motoare de curent alternativ, la cel de al doilea model fiind propuse mai multe tipuri de rotoare. Modelele sale sunt diferite față de cele ale altor inventatori, prototipul lui Tesla fiind polifazic [4].

In anul 1888, Tesla obţine aprobarea pentru 14 brevete, ceea ce reprezintă cel mai mare număr de invenţii înregistrate de el în toată cariera sa. Situația brevetelor înregistrate cu numele Nikola Tesla în

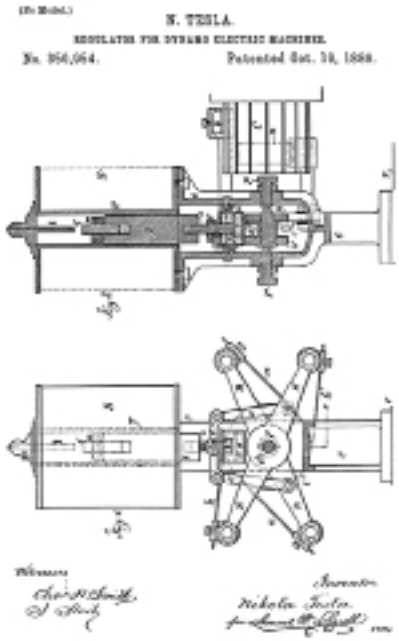


Fig. 5. Brevetul Nr. 350954: Regulator de tensiune pentru maşini electrice tip dinam.
Fig. 5. Patent No. 350954:
Voltage regulator for dynamo-electric machine.

In 1887, Tesla registries 6 new patent applications. Except for the first two applications, one referring to control systems for dynamo-electric machines and the other one referring to piromagnetic generators, the rest of the patent applications belong to polyphase alternating currents domain and related to motors and generators based on polyphase currents principle.

These inventions are the result of experiments that he makes, resulting in the construction of two alternating currents motors, to the second model being proposed several types of rotors. His models are different from other inventors' models, Tesla's prototype being polyphase [4].

In 1889, Tesla receives approval for 14 patents, which represents the largest number of inventions registered by him throughout his career. The situation of the registered patents with the name Nikola Tesla in the period (1886-1900) is shown in Fig. 6.

In 1891, Tesla registers seven patents, in the next year 3, and in 1893 he proposed another 6 patents. The subjects of these applications focused on the production of multi-phase currents and their applications (examples: lighting, electric railway, etc.).

It is interesting that during this period Tesla recorded the first two patents related to mechanical engineering, piston engines and steam engines.

A statistic situation of registered patents with the name Nikola Tesla in the period (1900-1928) is shown in Fig. 7.

Then, Tesla begins experiments on electrical circuits powered by high frequency currents. Later, Te-

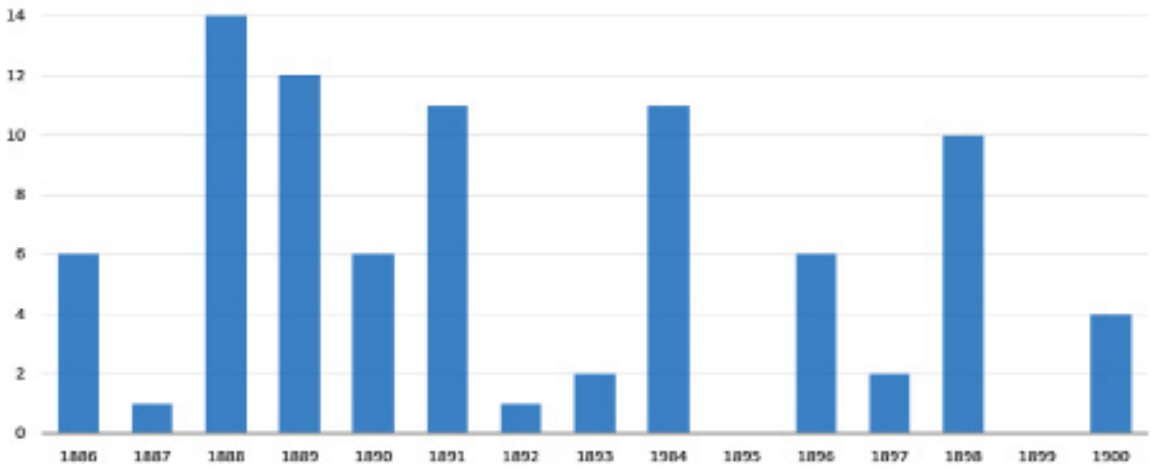


Fig. 6. Numărul de brevete înregistrate cu numele Nikola Tesla în perioada (1886-1900) – statistica realizată de autor.
Fig. 6. Number of Nikola Tesla patents registrated by in the years (1886-1900) – statistics realised by author.

perioada (1886-1900) este prezentată în Fig. 6.

În anul 1891 Tesla înregistrează 7 brevete, în următorul an 3, iar în 1893 propune alte 6 brevete. Subiectele acestor aplicații s-au concentrat pe domeniul producerii curenților polifazați și aplicații ale acestora (exemple: pentru iluminat, pentru căi ferate electrice etc.).

Este interesant că în această perioadă Tesla înregistrează primele două brevete referitoare la ingineria mecanică, pentru motoare cu piston și mașini cu aburi .

sla focuses more on radio and remote control and electricity.

A new topic for which Tesla filed patent documentation is related to methods and machines for air transport.

In total, Tesla has registered 112 patents in the US [5]. Outside the United States, Nikola Tesla also has inventions that are protected in other countries. Thus, Tesla has about 109 patents homologous recorded in 25 different countries.

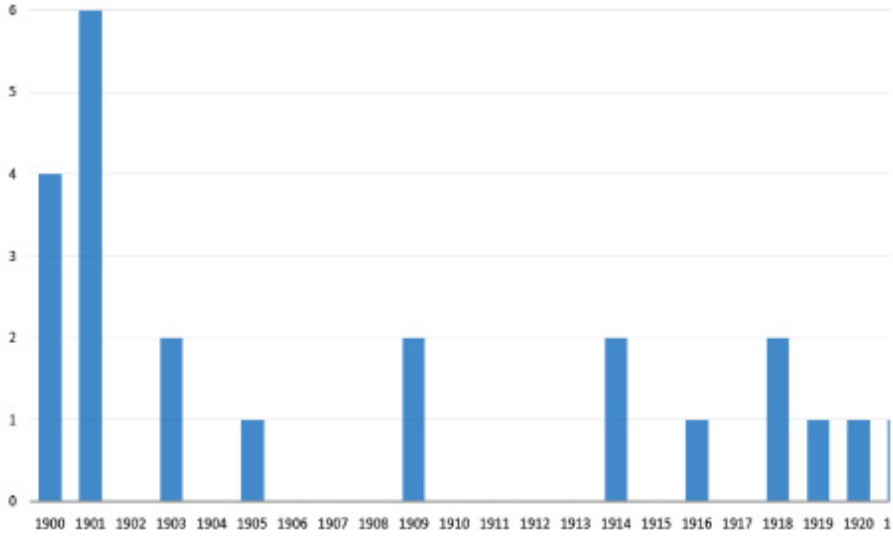


Fig. 7. Numărul de breveter înregistrate cu numele Nikola Tesla în perioada (1900-1928) – statistică realizată de autor.
Fig. 7. Number of Nikola Tesla patents in the years (1900-1920) – statistics realised by author.

Situația brevetelor înregistrate cu numele Nikola Tesla în perioada (1900-1928) este prezentată în Fig. 7.

Apoi, Tesla începe experimentări asupra circuitelor electrice alimentate cu curenți alternativi de înaltă frecvență.

Mai târziu, Tesla se concentrează mai mult pe radio și controlul de la distanță și al energiei electrice.

Un subiect nou, pentru care Tesla depune docu-

Conclusions

Analysis performed on Nikola Tesla's patents and works indicate that the great inventor has contributions which are part of the series of technological innovations of the late nineteenth century and early twentieth century:

Generation, transport and distribution of electric energy of alternating currents;

mentația de brevetare este legat de metodă și aparatul pentru transportul aerian.

În total, Tesla a înregistrat 112 brevete în SUA [5].

În afara Statelor Unite ale Americii, Nikola Tesla și-a protejat de asemenea invențiile şi în alte țări. Tesla a avut aproximativ 109 brevete omoloage, înregistrate în 25 de țări diferite.

Concluzii

Analiza efectuată asupra brevetelor şi lucrărilor lui Nikola Tesla indică faptul că marele inventator a adus contribuţii care se înscriu în seria de inovări tehnologice de la sfârşitul secolului al XIX-lea şi începutul secolului al XX-lea:

– Producerea, transportul şi distribuţia energiei electrice de curent alternativ;
– Principiul de producere a câmpului magnetic învârtitor, aplicat la maşinile electrice de inducţie;
– Principiul de generare a curenților de înaltă frecvenţă;
– Principiul de transmitere a informaţiei prin unde radio;
– Măsurarea şi controlul unor mărimi fizice electrice și mecanice.

Bibliografie

[1] Plăhteanu B., Frunză M., *Nicola Tesla – Geniul inventiv al energiei şi luminii*, Gândirea creativă , activitatea şi opera ştiinţifică, Editura Performantica, Vol. 1, Iaşi, 2012.
[2] Plăhteanu B., Frunză M., *Nicola Tesla – Geniul inventiv al energiei şi luminii, Integrala invenţiilor*, Editura Performantica, Vol. 2, Iaşi, 2010.
[3] Plăhteanu B., Frunză M., *Nicola Tesla – Geniul inventiv al energiei şi luminii*, Integrala invenţiilor, Editura Performantica, Vol. 3, Iaşi, 2011.
[4] Childress D. H., Fantasticele invenţii ale lui Nikola Tesla, Edit. Vidia, București, 2011, p. 335
[5] Šarboh S., *Nikola Tesla's Patents*, Proceedings of the Sixth International Symposium Nicola Tesla, Academic Mind, Marincici A., Stojici M. (Editori), Belgrad, 2006.

Principle of the production of the rotating magnetic field, applied to the electrical induction machines;

Principle of generating high frequency currents;

Principle of transmitting information via radio waves;

Measurement and control of electrical and mechanical physical quantities.

History of Science and Technology

EP*Magazine*

Iconografie

Fig. 1: http://www.activistpost.com/2012/01/10-inventions-of-nikola-tesla-that.html
Fig. 2: https://teslauniverse.com/nikola-tesla/patents/us-patent-335786-electric-arc-lamp
Fig. 3: https://teslauniverse.com/nikola-tesla/patents/us-patent-335787-electric-arc-lamp
Fig. 4: https://teslauniverse.com/nikola-tesla/patents/us-patent-334823-commutator-dynamo-electric-machines
Fig. 5: https://teslauniverse.com/nikola-tesla/patents/us-patent-350954-regulator-dynamo-electric-machines
Fig. 6 and Fig. 7: Author graphs.

Experimental Junior High School
of University of Macedonia

Thessaloniki, Greece
tsitos85@gmail.com

FUN PAGE

Where do these animals live?

Match the following pictures with the place they live in the table

by Vasilis Maramis, Dimitris Tsitos, Illias Begaltsis

A. Arctic tundra

B. Madagascar

C. Europe, Asia

D. Canada, Alaska

E. Central Europe, Central Asia

F. China

G. Egypt

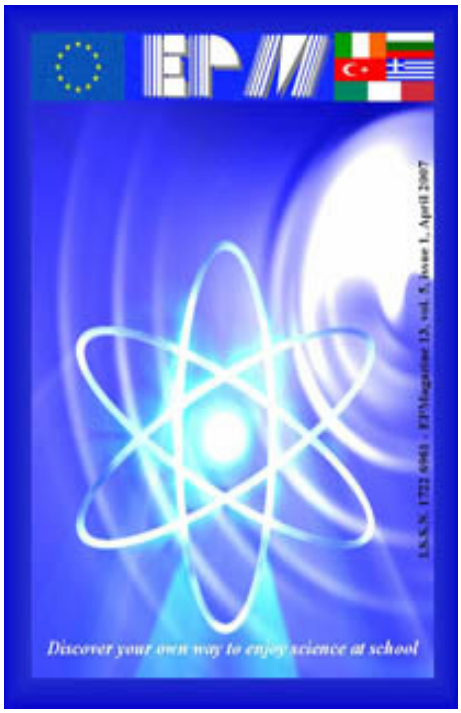
H. India

I. North America

5.C, 4.G, 3.I, 2.A, 1.E, 6.B, 7.D, 8.F, 9.H

The Best EP*Magazine* Covers In My Opinion

Tiziano Grillo



History of Science and Technology

European Pupils *Magazine*

www.epmagazine.org epmagazine.it@gmail.com

Guidelines for Contributors

Authors of original manuscripts who would like their work to be considered for publication in the **European Pupils *Magazine*** are invited to submit their papers to be concerned with the **History** of **Science** and **Technology** as follows:

Papers may be the result of either personal research or classroom practice in the covered topics. Submitted articles should not have been published or being currently under consideration for publication elsewhere. Submitting an article with exactly or almost exactly the same content as found in publications of another journal or conference proceedings may result in the refusal of its publication. Submitted articles have to be sent to issuingepm@epmagazine.org together with the submission form, includes a list of 10 keywords in each language.

Include in your mail:

a. article both in English and in your mother tongue(*.doc or *.rtf format);
b. FOUR pictures per page (at least) in single *.jpg format files;
c. Submission form filled and signed(do not forget 10 keywords in both languages).

Before adding the files as attachments, please make sure the tables and/or pictures are inserted in the proper place and the files can be opened without any problems.

Please, classify your manuscript into one of the following sections:

General (Experts'/Teachers' contribution)
News
Fun Pages
14 to 16 years old (Secondary school)
17 to 19 years old (Secondary school)
19 to 24 years old (University)

Formatted articles should not **exceed 4 pages** (Din A4) including all tables, formulae and pictures. You have to be in the possession of the copy-right for submitted pictures and in order to avoid any problems with unauthorized reproduction we suggest exclusive use of your own pictures. Each image source has to be cited in the

Iconography at the end of the submitted paper. The images must be numerated in the caption i.e. (fig. 1) and in the iconography as well. To avoid problems with the quality of your pictures in the printed version we ask to submit each picture in a single file with a resolution of 300 dpi or higher. The **EPMEditorialBoard** reserves the right not to publish all or some of the included pictures for copyright and/or layout reasons. The last page of the submitted paper has to include the paragraphs:

Bibliography - Iconography

taking care to follow the rules reported in the guideline files you find at http://epmagazine.org/storage/93/guidelines-and-other-info.aspx

In addition, the optional paragraph **Acknowledgements** may be added. To help you submit a suitable article, we add some further recommendations that will avoid delay in publication and unnecessary work both for you and for our **Editorial Team**.

Please use as few special formatting procedures as possible in preparing your manuscript in the text processor. Texts should be written in a clear language without grammatical and/or spelling mistakes in order to make sure that the reader understands what you intend to say. If you are not sure whether your work is likely to be published, consult your national referee or the **Editorial Board** before submitting the finished article. Have a look at the published articles in the web-editions**www.epmagazine.org**

Priority will be given to articles which are expected to interest a broader number of readers. This may particularly be the case when the covered topic corresponds with curricula in the **European Countries**. In case different submitted articles cover very similar topics, the **Editors**will also pay attention to a balanced geographical distribution.

We are sorry to say that contributions without a clear scientific content, lack of originality, poor presentation and/or language, cannot be considered for publishing.

EP*Magazine* is an International Educational Scientific Periodical published by a pool of European Universities and Secondary Schools. Contributions are welcome from every level of educational institutions, students and teachers.

THE VIEWS EXPRESSED IN THE ARTICLES DO NOT NECESSARILY COMPLY WITH THE EPMEDITORIALBOARD'SONES.

E. BOCCIO LERA

LICEO SCIENTIFICO STATALE

CLM

COLEGIUL TEHNIC

Liceul Senchea

9 771722 696000

HST - EPMagazine ISSN