

EP Magazine

History of Science and Technology



Technology for Green Energy

Romanian Medicine by Luminita Husac, Laura Oancea
EPMeeting in Catania by Evaggelos Zikos
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Evolution (part 3) by Keiron Pain

3-2012
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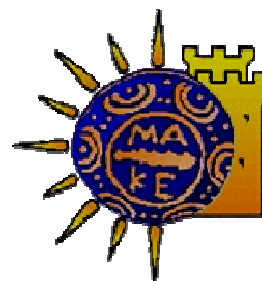
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Romanian Medical Science, Progress and Innovation (En)

The Romanian health system does not have a positive image either in Romania or abroad. However, 2012 brings to our attention impressive innovations in cardiovascular surgery, neurosurgery and removal of organs for transplant, of which we mention only a few.

In our country, the first liver transplant in a patient diagnosed with colorectal cancer with liver metastases was conducted in January by Professor Irinel Popescu, head of the Fundeni Centre for Digestive Diseases and Liver Transplant Institute.

The month that followed brought on the Romanian medical firmament a procedure of cardio-pulmonary postoperative assistance of ECMO type, following an open heart surgery. According to this procedure, for the very first time, the heart, lungs or both are put to a rest and the patient can stay in ICU for more than a week.

In March, an operation of bilateral fetal hydrothorax treated in utero was performed. If fetal lung fluid accumulates too much, this would lead to a compression of the fetus' lungs. Medical manager of the "Regina Maria" Obstetrics and Gynaecology Clinic in Bucharest, Dr. Hadi Rahimian, placed a thoraco-amniotic shunt inside the fetus, by which the fluid from the lungs was drained into the amniotic fluid. This allowed the normal development of the fetus' lungs inside the womb up until birth.

Bucharest University Emergency Hospital performed for the first

Stiinta medicala româneasca, progres si inovatie (Ro)

Sistemul de sănătate românesc nu beneficiază de o imagine pozitivă nici în România, nici în străinătate. Totuși, anul 2012 aduce în atenția noastră premiere impresionante în chirurgia cardiovasculară, neurochirurgie și în prelevarea de organe pentru transplant, dintre care menționăm doar câteva.

Primul transplant hepatic la un pacient diagnosticat cu cancer colorectal cu metastaze hepatice în țara noastră a fost efectuat în luna ianuarie, de către prof. dr. Irinel Popescu, șeful Centrului de Boli Digestive și Transplant Hepatic de la Institutul Clinic Fundeni.

Luna următoare a adus pe firmamentul medicinei românești o procedura de asistare cardio-pulmonară postoperatorie de tip ECMO după o operație pe cord deschis. Conform acestei proceduri, pentru prima dată, inima, plămânul sau ambele sunt puse în repaus și pacientul poate sta la Terapie Intensivă mai mult de o săptămână.

În martie, a fost realizată o operație de hidrotorax fetal bilateral tratat in utero. Dacă în plămânii fătului se acumulează lichid în cantitate prea mare, acest lucru ar conduce la comprimarea plămânilor acestuia. Directorul medical al Spitalului de Obstetrică și Ginecologie Regina Maria din București, Dr. Hadi Rahimian, a montat la nivelul fătului un șunt toraco-amniotic, prin care lichidul din plămâni a fost drenat în lichidul amniotic. Acest lucru a permis dezvoltarea până la o mărime normală a plămânilor fătului în uter până la naștere.

Spitalul Universitar de Urgență din

time in Romania and Central and Eastern Europe, in October, a prosthetic knee surgery. This medical institute is the first centre in Romania and one of the first two centers in Europe which have been accredited for this type of procedure.

Beginning with the rudimentary medicine practised by Samuel Hahnemann and up to this day, the Romanian medicine has come a long way. Despite insufficient funds and inappropriate technological equipment, it is the human passion after all which has promoted and will continue to promote the creative spirit in the welfare of mankind.

București a efectuat în luna octombrie o operație de protezare de genunchi, în premieră atât la nivel național, cât și la nivelul Europei Centrale și de Est. Instituția medicală este primul centru din România și printre primele două centre din Europa care au fost acreditate pentru acest tip de procedură.

Pornind de la medicina rudimentară practică de Samuel Hahnemann și până în ziua de astăzi, medicina românească a parcurs un drum lung. Deși cu fonduri insuficiente și aparatură mai puțin performantă din punct de vedere tehnologic, pasiunea omului este cea care a dus și va duce mai departe spiritul

Progresso e innovazione: Scienze mediche in Romania (IT)

Il Sistema Sanitario romeno non ha dato un'immagine positiva di sé sia in Romania sia all'estero, almeno fino al 2012, anno nel quale l'attenzione viene focalizzata sulle eccellenti innovazioni in chirurgia cardiovascolare, neurochirurgia ed espianto e trapianto di organi, tanto per citarne alcuni.

Nel nostro Paese, il primo trapianto di fegato in un paziente affetto da cancro coloretale con metastasi epatiche, è stato eseguito in gennaio dal Professor Irinel Popescu, direttore del Centro *Fundeni* per le Malattie Digestive e Trapianti di fegato.

Il mese successivo ha portato, all'attenzione della medicina romena, la procedura per l'assistenza cardiopolmonare postoperatoria del tipo ECMO (Ossigenazione extracorporea attraverso membrana), seguente un'operazione a cuore aperto. Secondo questo protocollo, per la prima volta il cuore, i polmoni o entrambi sono messi a

Η Ιατρική Επιστήμη στη Ρουμανία, Πρόοδος και Καινοτομία (Gr)

Το Ρουμανικό σύστημα υγείας δεν έχει θετική εικόνα ούτε στη Ρουμανία, ούτε στο εξωτερικό. Όμως, το 2012 έχει να επιδείξει εντυπωσιακές καινοτομίες στην καρδιαγγειακή χειρουργική, στη νευροχειρουργική και στην αφαίρεση οργάνων για μοσχεύματα, από τις οποίες αναφέρουμε μόνο λίγες.

Στη χώρα μας, η πρώτη μεταμόσχευση ήπατος σε ασθενή που διαγνώσθηκε με καρκίνο του παχέος εντέρου και μετάσταση στο ήπαρ έγινε τον Ιανουάριο από τον καθηγητή *Irinel Popescu*, Διευθυντή του κέντρου *Fundeni* για Νοσήματα του Πεπτικού Συστήματος και του Ινστιτούτου Μεταμόσχευσης του Ήπατος.

Ο μήνας που ακολούθησε έφερε στο Ρουμανικό ιατρικό στερέωμα μία μέθοδο καρδιοπνευμονικής μετεγχειρητικής βοήθειας τύπου *ECMO* (εξωσωματική οξυγόνωση μεμβράνης), που ακολουθεί μία εγχείρηση ανοιχτής καρδιάς.

riposo e il paziente può stare in ICU (Intensive Care Unit – Unità medica per le cure intensive) per più di una settimana.

In Marzo è stato condotto un trattamento intrauterino dell'idrotorace bilaterale nel feto. Se il fluido polmonare fetale si accumula in notevoli quantità, si osserva la compressione dei polmoni. Il direttore della Clinica Ostetrica e Ginecologica "Regina Maria" di Bucarest, Dr. Hadi Rahimian, ha collocato nel feto uno shunt toraco-amniotico, attraverso il quale il fluido è stato drenato dai polmoni al liquido amniotico.

Il servizio di emergenza ospedaliera dell'Università di Bucarest ha eseguito la completa ricostruzione di un ginocchio, lo scorso Ottobre, per la prima volta in Romania e nell'intera Europa centro-



orientale.

Questo Centro è il primo nel nostro Paese, e uno degli unici due accreditati in Europa per eseguire tali interventi.

A partire dalla Medicina rudimentale applicata da Samuel Hahnemann, e arrivando ai nostri giorni, la Medicina Romana ha fatto lunghi passi in avanti, e ciò nonostante i fondi insufficienti e le attrezzature tecnologiche non all'avanguardia: è la passione che promuove lo spirito creativo

Sύμφωνα με αυτή τη μέθοδο, για πρώτη φορά, η καρδιά, οι πνεύμονες, ή και τα δύο μαζί τίθενται σε αδράνεια και ο ασθενής μπορεί να παραμείνει στην Μονάδα Εντατικής Θεραπείας για περισσότερο από μία εβδομάδα.

Το Μάρτιο έγινε μία ενδομήτρια επέμβαση αμφοτερόπλευρου εμβρικού υδροθώρακα. Η συσσώρευση υπερβολικού πνευμονικού υγρού στο έμβρυο μπορεί να οδηγήσει σε συμπίεση των πνευμόνων του εμβρύου. Ο Διευθυντής της Μαιευτικής και Γυναικολογικής Κλινικής "Regina Maria" στο Βουκουρέστι, Dr Hadi Rahimian, τοποθέτησε μία θωρακοαμνιακή αναστόμωση μέσα στο έμβρυο, από την οποία το υγρό από τους πνεύμονες αποστραγγίστηκε στο αμνιακό υγρό. Αυτό επέτρεψε την κανονική ανάπτυξη των πνευμόνων του εμβρύου μέσα στη μήτρα μέχρι τη γέννηση.

Στο Πανεπιστημιακό Νοσοκομείο Επειγόντων Περιστατικών του Βουκουρεστίου έγινε για πρώτη φορά στη Ρουμανία, αλλά και στην Κεντρική και Ανατολική Ευρώπη, τον Οκτώβριο, μία προσθετική επέμβαση στο γόνατο. Αυτό το ιατρικό ινστιτούτο είναι το πρώτο στη Ρουμανία και ένα

από τα πρώτα δύο ινστιτούτα που πιστοποιήθηκαν για αυτό το είδος της επέμβασης.

Ξεκινώντας από τη βασική ιατρική και την εναλλακτική ιατρική που ασκήθηκε από τον Samuel Hahnemann μέχρι σήμερα, η ρουμανική ιατρική έκανε μία μεγάλη διαδρομή. Παρά τους ανεπαρκείς πόρους και τον ακατάλληλο τεχνολογικό εξοπλισμό, είναι το ανθρώπινο πάθος, μετά από όλα αυτά, που προώθησε και συνεχίζει να προωθεί το δημιουργικό πνεύμα για το καλό της ανθρωπότητας.

The travel in Catania

The experimental High School of Un. of Macedonia participated in the 17th decennial EPM meeting in Catania 23-29 September 2012. The Greek team arrived in Catania on Sunday evening after a tiring trip and although all members seemed exhausted, we had a walk to the central square of Catania.



Ear of Dionysius cave.

The next day, after the opening ceremony of the meeting, we visited Syracuse, the archaeological park, then we went to the cave called "Ear of Dionysius" and then we visited the ancient theater there.

On Tuesday morning, after having watched the presentations, we visited the seismological museum. There, an experienced seismologist guided us around the exhibits.

On Wednesday we

made a trip to Etna. We walked for 2 hours to 2600m altitude, where we could watch the volcanic site. In the evening we came back to Catania and we went out for a walk.

On Thursday after the official program and an interesting tour in BoggioLera school, we went to the beach to swim in the sea.

On Friday we went to another school of Catania (Enrico Fermi) and we listened to some presentations by the students. Finally, on Saturday morning we left from Catania to return - via Rome - to Thessaloniki.

The trip in Catania was so nice! We discussed about the future and the development of our magazine, we made new friends, we saw places that we will not probably visit again and we also learned new knowledge about Syracuse, Etna mountain, Vesuvius and generally about

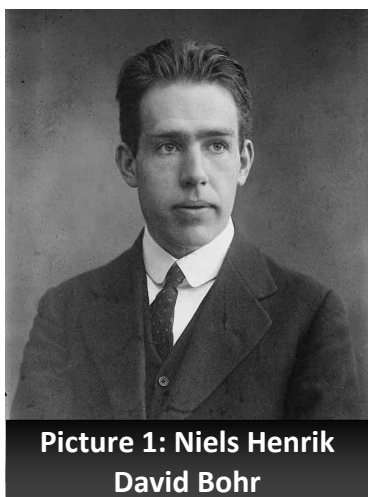


At mount Etna

Italian culture and civilization.

Bohr and quantum's atomic model

Bohr's atomic model was introduced in 1913 by Niels Bohr. Bohr atom is a planetary model, where the electrons are in stationary circular orbits and the electrons orbit the nucleus at set distances, and it is based on laws of Planck and Einstein's photoelectric effect.



Picture 1: Niels Henrik David Bohr

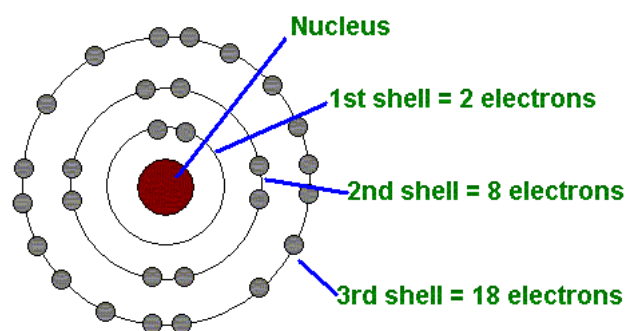
The Bohr's atomic model was an expansion on the Rutherford model. Bohr's atomic model overcame the several flaws of Rutherford model.

Rutherford's

atomic model leaves many questions, because Rutherford's electrons lose energy, collapsing on the atom itself; also, Rutherford's atomic model was not compatible with Maxwell's laws. The Bohr's atomic model is important because it describes most of the accepted features of atomic theory and explains the Rydberg formula. Also (characters) the Bohr model shows that the electrons are in orbits of differing energy around the nucleus. For Bohr(characters), the energy of an electron is quantized, that is, there is nothing between an orbit and another. The level of energy that normally occupies an electron is called the ground state. When an electron changes orbit it makes a quantum leaps. The difference between the two orbits (ground state and electron's excited state) is emitted

Bohr e modello quanto- meccanico

Il modello atomico di Bohr e il modello quanto meccanico sono molto importanti perché spiegano come sono gli orbitali, di che forma sono, quanti elettroni ci sono negli atomi e come sono disposti. Il modello di Bohr è un ampliamento di quello di Rutherford, e anche se ha delle imperfezioni, resta pur sempre importante. E' importante soprattutto per gli studi sullo spettro di emissione, ma parte con l'aiuto delle leggi di Planck e l'effetto fotoelettrico di Einstein. Il modello quanto meccanico nasce con le prime ricerche di De Broglie, che scopre che le particelle hanno elementi tipiche delle particelle e delle onde. E' rilevante anche il principio di indeterminazione di Heisenberg, e l'equazione di Schrödinger. Con questo modello si scoprono le varie forme degli orbitali e quanti elettroni possono contenere.



Il modello di Bohr fu ipotizzato dal danese Niels Bohr nel 1912. E' un modello planetario con un nucleo al centro e gli elettroni che stavano in orbite stazionarie circolari intorno al nucleo. E' basato sulle leggi di Planck e dell'effetto fotoelettrico di Einstein. Il modello precedente quello di Bohr era il modello di Rutherford. Il modello di Rutherford creò

by the atom with photons. The Bohr's atomic model shows that each electron has a set energy. From the electron's excited state, the electron can return at its ground state. Bohr discovered also that the closer an electron is to the nucleus, the less energy needs; conversely, the further an electron is from the nucleus, the more energy it needs. He also discovered that each energy level may contain varying quantities of electrons. Even if it contains some errors, the Bohr model is very important. The energy of the orbit is related to its size. Bohr used Planck's constant and obtained a formula for the energy levels of the hydrogen atom. Bohr postulated that the angular momentum of the electron is quantized.

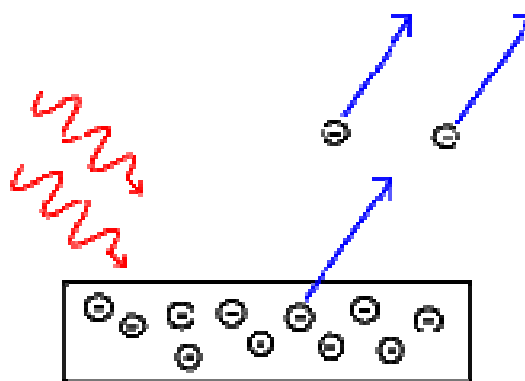
Planck's laws and photoelectric effect

For Bohr the light is a electromagnetic radiation of a particular nature. Planck thought that the light was formed by packets of energy, called quanta; each quantum has a respective frequency. Planck's law was formulated to explain the radiation emitted by a blackbody. For a blackbody that does not exceed the hundreds of degrees, many of the radiation emitted are in the infrared part of the electromagnetic spectrum. At higher temperatures, a part of the radiation is radiated as visible light. The value of Planck's constant $6.62606957 \times 10^{-34}$ joule·second, with a standard uncertainty of $0.00000029 \times 10^{-34}$ joule·second. Einstein, for explain the photoelectric effect, said that the light was formed by packets of energy, called photon. A bright light emits many photons. Einstein's photoelectric effect is based on experiments conducted on a metal foil bombarded with electromagnetic energy, where electrons may be expelled only if they have the same frequency of the energy administered. Bohr takes an atom of hydrogen and administered energy, and the atom, overcome the maximum threshold, changed orbit (1 to 2, 2 to 3...). Bohr discovered 7 orbit in the hydrogen atom. This phenomenon is corresponded with the studies by Balmer. Balmer discovered which the spectrum was formed from various

alcuni problemi perché gli elettroni perdevano energia e collassavano sull'atomo stesso, e non era compatibile con le leggi di Maxwell. Il modello di Bohr risulta essere un perfezionamento del modello di Rutherford. Inoltre secondo il modello di Bohr l'energia è quantizzata, e questo comporta che tra un orbita e l'altra non ci sia niente. Gli elettroni stanno in determinate orbite con la loro energia. Se viene somministrata energia in un elettrone quest'ultimo cambia orbita. La differenza tra il livello iniziale dell'elettrone e quello finale (ottenuto somministrando energia) viene emessa dall'atomo con i fotoni. L'elettrone può ritornare al suo stato iniziale. Anche se il modello di Bohr contiene alcuni errori, è molto importante. Bohr fece i suoi esperimenti sull'atomo di idrogeno, dove scoprì sette livelli energetici. Le ipotesi di Bohr erano in corcondanza con le scoperte di Balmer. Quest'ultimo (un fisico svizzero dell'800) scoprì che la luce era costituita da varie lunghezze d'onda, costituite ognuna da varie frequenze.

Legge di Planck ed effetto fotoelettrico

Secondo Planck la luce era formata da pacchetti di energia chiamati quanti; ogni quanto aveva una sua determinata frequenza, e questa legge fu ipotizzata per spiegare le radiazioni emesse da un corpo



Picture 1 Photoelectric effect

wavelengths, and all the wavelengths had got various frequencies.

Emission Spectrum

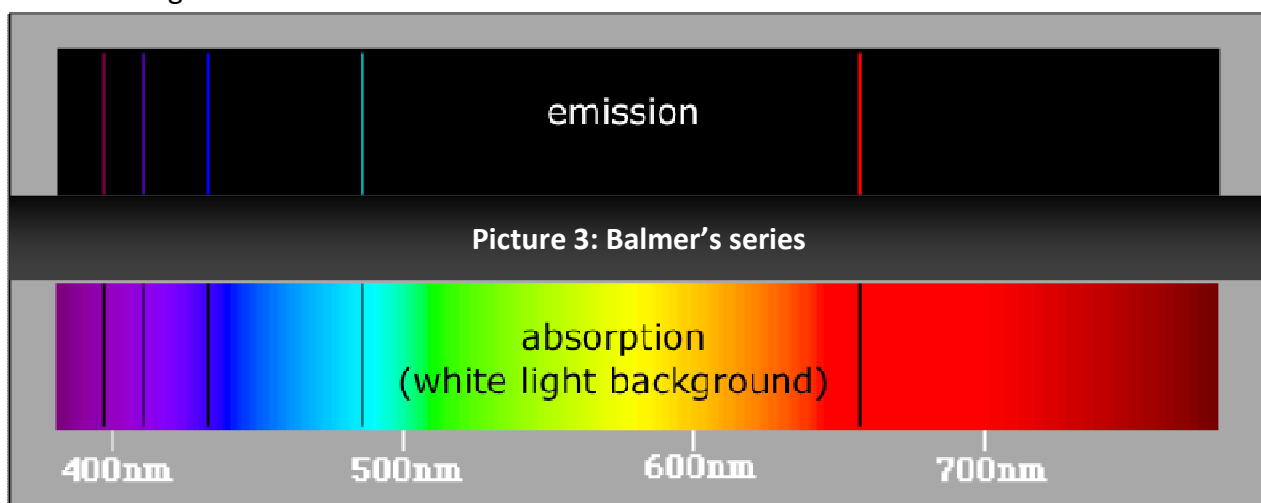
The energy released by electrons occupies the portion of the electromagnetic spectrum that we detect as visible light. Small variations are seen as light of different colors. All colors of the visible spectrum are visible when the white light is diffracted with a prism. But, when the light emitted by a hydrogen atom is fragmented, not all colors are visible. As Bohr thought that the electrons are in

nero. Ad alte temperature, una parte delle radiazioni vengono radiate come luce visibile.

Invece l'effetto fotoelettrico di Einstein fu spiegato dicendo che la luce era formato da pacchetti di energia chiamati fotoni. E' basato sugli esperimenti su una lamina di metallo

$$\frac{1}{\lambda} = R \left(\frac{1}{4} - \frac{1}{n^2} \right)$$

Balmer's formula



different energy levels, he found seven energy levels of the hydrogen atom.

Bohr hypothesized then that when an electron receives energy from outside, the electron changes orbit. When the electron returns at the original orbit, the electron issued a photon and an energy transition occurred. In addition to Balmer's series, there are the Lyman's series and the Paschen's series.

Observations

Also the electron revolved in a circular and stationary orbit, as the Rutherford's atomic model. Bohr's atomic model results in an improvement of the Rutherford's atom and each orbit corresponds to certain energy values. The energy of the photon issued corresponds at the different energy between two orbits.

Bohr explained how electrons could

bombardata con energia elettromagnetica, e gli elettroni possono essere espulsi solo se la frequenza è uguale o maggiore di quella dell'energia somministrata.

Spettro di emissione

L'energia rilasciata dagli elettroni occupa una porzione di spazio dello spettro elettromagnetico vista come luce visibile. Piccole variazioni sono viste come luce di diversi colori. Quando la luce bianca viene deframmentata, sono visibili tutti i colori dello spettro visibile. Ma quando viene deframmentata la luce emessa da un atomo di idrogeno, non tutti i colori sono visibili. Allora Bohr ipotizzò che l'elettrone cambiava orbita quando riceveva energia. Ci sono varie serie di emissione: la serie di Balmer, di Paschen e di Lyman.

Osservazioni e problemi del modello di

jump from one orbit to another only by emitting or absorbing energy in fixed quanta.

The Bohr's atomic model is fine for simple atoms (such as hydrogen), but not for more complex atoms. The Bohr's atomic model doesn't explain the Zeeman effect, it violates the Heisenberg Uncertainty Principle, and does not work with complex atoms.



Picture 4: Louis-Victor Pierre de Broglie

10 years later contradictions appeared to the Bohr's atom. It was necessary to make new hypothesis and not to

Results

miss the property of particles such as the electron, proton and atom. Despite all, Bohr's atomic model was very important, especially for the astronomy. From the atom of Bohr the quantum atomic model was born.

Quantum mechanical atomic model

The Quantum mechanical atomic model is based on the quantum theory: matter has characteristics both of the particles and of the waves. According to the uncertainty principle, it's impossible to know the exact position and position of an electron at the same time; or one or the other. The quantum mechanical atomic model is based on probability; because it uses even complex shapes of orbitals, amount of space in which it is likely to find the electron. To describe the electron and their orbital four quantum numbers were introduced: "n", "l", "m" and "ms".

Schrödinger's equation

The Schrödinger equation is very important for quantum Physics. Thanks to it you can find out where the particle is, its momentum and you can solve the wave functions of the parti-

Bohr

Il modello di Bohr non spiega l'effetto Zeeman, e viola il principio di indeterminazione di Heisenberg. Inoltre non funziona con atomi complessi ma solo con atomi semplici.

Come nel modello di Rutherford gli elettroni orbitavano in orbite circolari e stazionarie e il modello di Bohr è un miglioramento del modello di Rutherford. Il fotone emesso corrisponde alla differenza tra le due orbite e infine spiegò come gli elettroni possono saltare da un'orbita all'altra solo attraverso l'emissione o l'assorbimento di energia. Dopo 10 anni nascono contraddizioni sul atomo di Bohr. Era necessario ipotizzare nuove ipotesi e non perdere la proprietà delle particelle di elettroni, protoni e atomi. I risultati del modello atomico di Bohr furono molto importanti, soprattutto per l'astronomia. Dall' atomo di Bohr nasce il modello quantistico atomico.

Modello quanto-meccanico

Il modello quanto meccanico si basa sulla teoria dei quanti, e quindi la materia ha caratteristiche sia delle onde che delle particelle. Ma secondo il principio di indeterminazione è impossibile sapere allo stesso tempo la posizione o la velocità dell'elettrone. Il modello quanto meccanico si basa sulla probabilità di trovare l'elettrone in un orbitale (regione in cui è molto probabile trovare l'elettrone) e gli orbitali sono: "n,l,m,m_s".

Equazione di Schrödinger

L'equazione di Schrödinger è l'equazione enunciata nel 1926 dal fisico austriaco Erwin Schrödinger ed è molto importante per la fisica quantistica. Grazie a questa equazione è possibile sapere dove si trova l'elettrone e risolve le funzioni d'onda della particella. Fornisce il comportamento di un sistema dinamico, e l'energia è rappresentata dal numero quantico "n". L'energia non può essere mai zero. L'equazione nasce dalle conferme che le particelle hanno

cle. The Schrödinger equation provides the behavior of a dynamic system and is a wave equation that predicts the likelihood of events. The energy is quantized and has a quantum number n , and energy can never be zero.

Quantum number and orbitals

The quantum numbers describe the position of the electron and the amount of electrons that can stand in an orbital.

Quantum number "n": is a quantum number that describes the distance of the orbital from the nucleus and the size of the orbit. It has got positive integer values: 1, 2, 3, ...

The angular momentum quantum number or quantum number "l": the quantum number "l" defines the shape of orbital. It has positive integer values (0 to $n-1$); "l" corresponds to the s-p-d and f. The subshell are orbitals that have the same value of number quantum "n" but different values of number quantum "l".

Quantum number "m": the quantum number "m" describes the orientation of the orbital in the space. It has values from $-l$ to 0 to l :

Example: $L = 1$ $M = -1, 0, 1$

Spin quantum number "m_s": the spin quantum number "m_s" specifies the value and orientation of the axis of rotation of an electron. It has values $\frac{1}{2}$ or $-\frac{1}{2}$.

The Pauli exclusion principle states that in an orbital can be only two electron with opposite spin.

The electron configuration is an arrangement of the electrons belonging to the orbitals of an atom. the arrangement of electrons takes place with the principle of the Aufbau:

1s, 2s, 2p, 3s, 3p, 4s, 3d, 4p, 5s, 4d, 5p, 6s, 4f, 5d, 6p, 7s, 5f

Findings

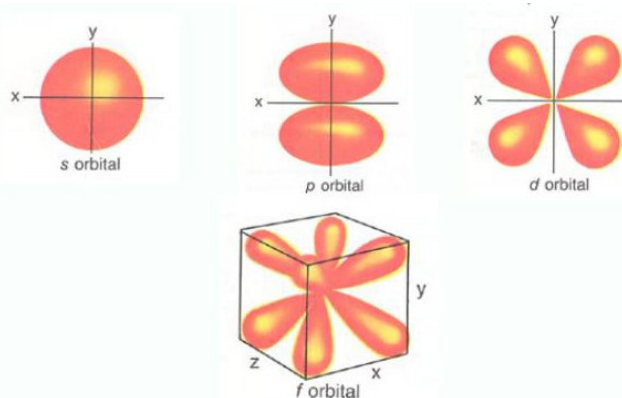
The Bohr and quantum's atomic model is very important for the science because the Bohr's atomic model is an expansion of the Rutherford's atomic model and it describes most of the accepted features of

caratteristiche sia delle particelle che delle onde (movimento ondulatorio).

Numeri quantici e orbitali

I numeri quantici sono quattro: n, l, m, m_s . Gli orbitali sono una regione di spazio in cui c'è la probabilità di trovare l'elettrone. Sono di vari tipi e forme.

Numero quantico principale n: il numero quantico principale n descrive la distanza tra gli orbitali e il nucleo. Può avere valori positivi: 1, 2, 3, 4, 5, 6, 7, ... I valori in teoria continuerebbero all'infinito, ma fino ad oggi ci si ferma al valore 7, perché rientrano tutti gli elettroni di tutti gli



Picture 5: Orbitals

elementi della tavola periodica.

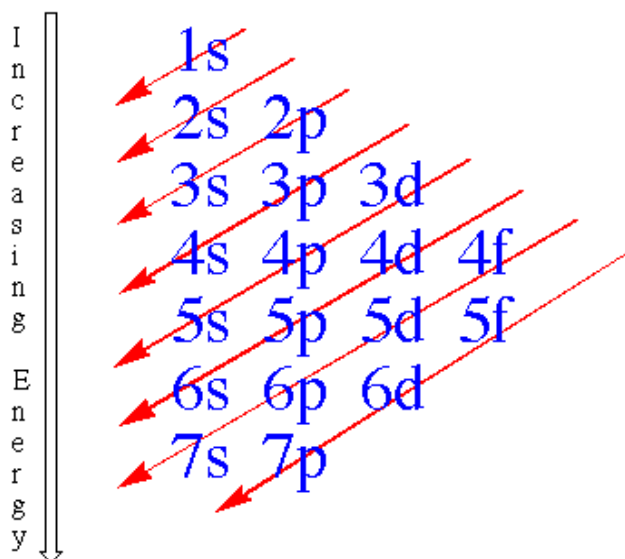
Numero quantico secondario l: il numero quantico secondario l descrive la forma dell'orbitale (s, p, d, f), e ha valori da 0 a $n-1$.

Numero quantico magnetico m: il numero quantico magnetico m descrive l'orientamento dell'orbitale nello spazio, e ha valori compresi tra -1 a 0 a 1.

Numero quantico di spin m_s: il numero quantico di spin m_s descrive i valori e l'orientamento dell'asse di rotazione degli orbitali e ha valori da $\frac{1}{2}$ a $-\frac{1}{2}$.

Il principio di esclusione di Pauli dice che in un orbitale possono stare al massimo 2 elettroni con spin opposto. La configurazione elettronica è una sistemazione degli elettroni che appartengono agli orbitali di un atomo, e

atomic theory and explains the Rydberg formula; the quantum atomic model because it introduced the concept of the orbital and explain the quantum numbers; also the Bohr's atomic model is important for the discovered



of the emission spectrum, which is very important in the astronomy.

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avviene con il principio dell'Aufbau:

1s, 2s, 2p, 3s, 3p, 4s, 3d, 4p, 5s, 4d, 5p, 6s, 4f, 5d, 6p, 7s, 5f

Quindi, se un atomo avrà 5 elettroni, secondo la configurazione elettronica saranno sistemati in questo modo: $1s^2, 2s^2, 2p^1$

Esistono altri metodi per la configurazione elettronica e sono:

Principio delle energie crescenti: gli elettroni riempiono nei livelli energetici più bassi a quelli con energia più alta;

Regola di Hund o principio della massima molteplicità: in orbitali dello stesso tipo gli elettroni li occupano in modo da posizionarsi su tutti in modo che finiscano le coppie.

Conclusioni

In conclusione, il modello di Bohr è molto importante anche nell'astronomia, grazie agli studi sullo spettro si può determinare per esempio, gli elementi di una stella. Con il modello quanto meccanico si può attuare quindi anche la configurazione elettronica. Senza questo modello non sarebbe possibile determinare gli elettroni di un elemento.

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Aurel Vlaicu Icarus above

Aurel Vlaicu Icar deasupra

Aurel Vlaicu was born on the 19th of November 1882 in Bințița near Orastie, in Hunedoara County, and he was a Romanian inventor, engineer and an aviation pioneer. He attended the primary school in his native village, and in 1890 he registered for the elementary school in the city of Orastie. After passing the baccalaureate

Aurel Vlaicu, nascut in data de 19 noiembrie 1882, in Bințița, lângă Orăștie, județul Hunedoara a fost un inventator român, inginer și pionier al aviației române și mondiale. Scoala primară a facut-o in satul său natal, iar în anul 1890 intra in scoala elementara ungurească din orasul Orăștie. După ce obținer-



Fig. 1 Vlaicu as a student in class VI, in Orastie

exam he attended the Mechanics Faculty of the Polytechnic School of Budapest. He was then enrolled in the military service. He obtained the engineering degree in 1907. In 1908, he was employed for a short period of time as an engineer at Automotive Factory Opel Rüsselheim Germany, and then returned to his native village in 1908, where he and his brother John made a glider in 1909, which made a number of flights to Bințița.

ea diplomei de bacalaureat urmează două trimestre la Facultatea de Mecanică a Școlii Politehnice din Budapesta. Face armata timp de un an. Obține diploma de inginer in anul 1907. In anul 1908, a fost angajat pentru o perioadă scurtă ca inginer la Fabrica de Automobile OPEL din Rüsselheim Germania, iar apoi se intoarce în satul natal la sfârșitul anului 1908, unde împreună cu fratele său Ion realizează un planor, prin anul 1909 cu care

In the fall of 1909 after moving to Bucharest, he began the construction of his first aircraft-Vlaicu I, the Army arsenal.

The plane can fly without any modification, which is a breakthrough for early aviation worldwide in June 1910. The "Vlaicu I" will fly for the first time in June 17th, 1910 over the field Cotroceni. He signed the patent no. 2258 for what was named at that time "a flying arrow-shaped machine". With this aircraft he participated in the autumn military maneuvers.

He placed Romania on the second place in the world (after France) in the use of military aircraft, and the airplane Vlaicu I (model 1910) was the first military aircraft of the Romanian Army. Vlaicu first introduced protective ring around the engine, known as NACA ring. He improved wing with variable profile, previously designed by Vuia. He introduced a gearbox between the engine and

propeller; the propeller used two coaxial Contra-rotating, the dual wheel landing gear and the brake inde-

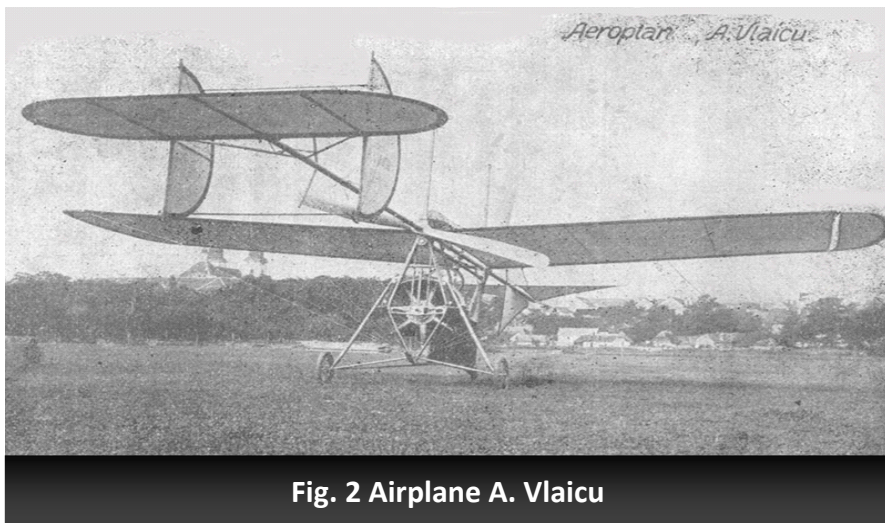


Fig. 2 Airplane A. Vlaicu

pendent wheels.

In 1911 he built the second airplane, Vlaicu II, which won five awards in 1912 in the air rally Aspern, Austria. The competition took place in June 1912 and it brought together 42 riders from 7 countries, 17 from Austria-Hungary, 7 from Germany, 12 from France, the latter team including Roland Garros, the most famous pilot of the time. Vlaicu was the only Romanian in the rally.

During the campaign in Bulgaria in the summer of 1913, he performed missions of aerial observation.

In 1911 he built the second airplane, Vlaicu II, which won five awards in 1912 in the air rally

efectuează un număr de zboruri la Bințiți. În toamna lui 1909 după ce se mută în București începe construcția primului său avion, Vlaicu I, la Arsenalul Armatei.

Avionul poate zbura fără nici o modificare, (acesta fiind un lucru unic pentru începuturile aviației mondiale) în iunie 1910.

Cu "Vlaicu I" va zbura prima dată la 17 iunie 1910 deasupra Câmpului Cotroceni. Înregistrează brevetul nr. 2258 pentru "Mașina de zburat cu un corp în formă de săgeată". Cu acest avion a participat la manevrele militare de toamnă.

A situat România pe locul al doilea în lume (după Franța) în utilizarea avionului cu destinație militară, avionul Vlaicu I (model 1910) fiind primul avion militar din dotarea armatei române. Vlaicu a introdus pentru prima dată inelul protector în jurul mo-

torului, cunoscut sub numele de inel NACA. A perfecționat aripa cu profil variabil (concepută de Vuia), a introdus un reductor între motor și elice, a utilizat două elice coaxiale contrarotative, a introdus direcția dublă, trenul de aterizare pe roți independente și frâna pe roți.

În anul 1911 a construit al doilea avion, Vlaicu II, cu care în 1912 a câștigat cinci premii memorabile la mitingul aerian de la Aspern, Austria. Concursul a reunit între 23 și 30 iunie 1912, 42 piloți din 7 țări, dintre care 17 din Austro-Ungaria, 7 germani, 12 francezi printre care și Roland Garros, cel mai renumit pilot al vremii, un rus, un belgian, un persan și românul Vlaicu. În timpul campaniei din Bulgaria, în vara anului 1913, a îndeplinit misiuni de observație aeriană.

În anul 1914 a proiectat un nou avion cu două locuri, Vlaicu III, coman-

Aspern, Austria. The competition took place in June 1912 and it brought together 42 riders from 7 countries, 17 from Austria-Hungary, 7 from Germany, 12 from France, the latter team including Roland Garros, the most famous pilot of the time. Vlaicu was the only Romanian in the rally.

During the campaign in Bulgaria in the summer of 1913, he performed missions of aerial observation.

In 1914 he designed a new two-seater airplane, Vlaicu III, commissioned by English company Marconi. It was built entirely of metal and can be considered the world's first aircraft of this type.

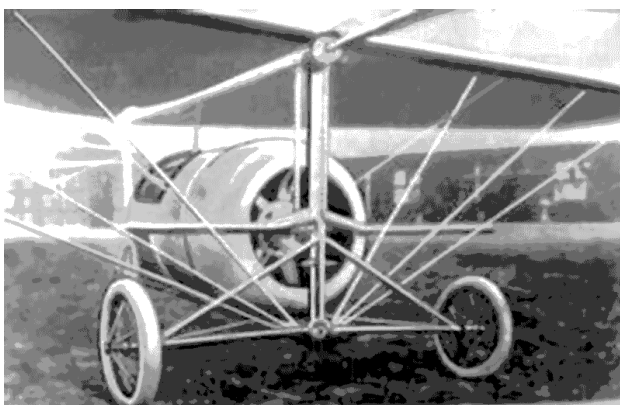


Fig. 4 Airplane "Vlaicu III"

On September 13th, he tried to fly across the Carpathians, from Bucharest to Brasov, but failed, falling with his Vlaicu II, in the field in the south of Banesti village, Prahova County. Aurel Vlaicu dies in the accident. Causes of this fatal plane crash were not unfortunately clarified so far: technical failure or heart attack.

The main additions brought by Aurel Vlaicu to aviation were the variable profile wings in flight, depending on the angle of flight and device speed, high stability in cornering and tilt of the plane, facile landing train - including

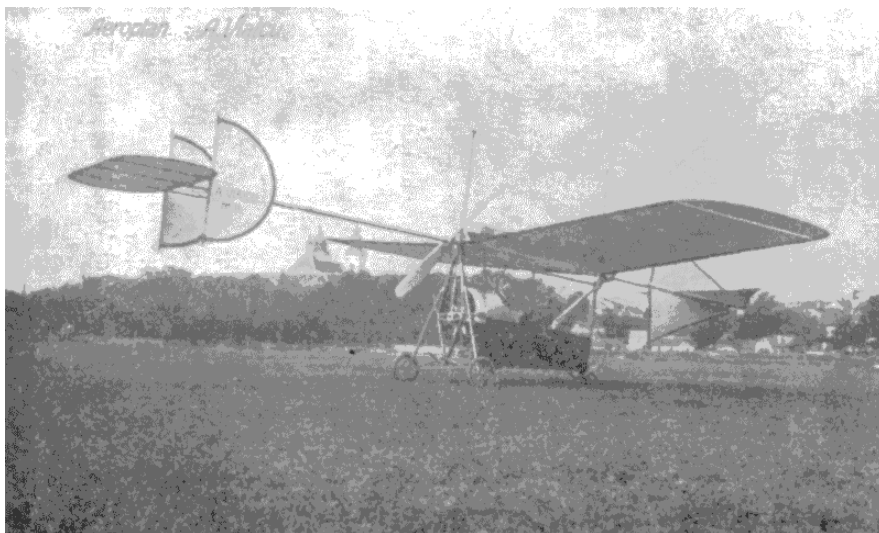


Fig. 3 Airplane "Vlaicu II"

dat de compania englezească Marconi. Acesta era construit integral din metal și poate fi considerat primul avion din lume de acest fel.

În data de 13 septembrie, încearcă să zboare peste Carpați, de la București la Brașov, dar a esuat, cazând cu aparatul Vlaicu II, pe câmpul de la sudul localității Bănești, județul Prahova. Aurel Vlaicu se stinge din viață, în urma acestui accident.

Cauzele aceluși accident aviatic mortal, din păcate nu au fost nici până în prezent elucidate: defecțiune tehnică sau atac de cord.

Principalele elemente originale aduse de Aurel Vlaicu domeniului aviației sunt: realizarea unei aripi cu profil variabil în zbor, în funcție de unghiul de zbor și viteza aparatului, stabilitatea ridicată a avionului și înclinarea la viraje, trenul de aterizare ușor - printre primele din lume cu roți independente, așezarea în tandem a elicilor prin care era crescută tracțiunea și anula cuplul de răsturnare, forma aerodinamică și construcția aproape totală din aluminiu a fuzelajului avionului A. Vlaicu III.

Pentru istoria aviației românești, și nu numai, Aurel Vlaicu a fost un pionier care a demonstrat că o minte ascuțită dublată de talent și o pregătire temeinică pot duce la descoperiri care să schimbe cursul istoriei și să sporească mandria unei națiuni.



Fig. 5, Fig. 6 Aurel Vlaicu

the world's first wheeled independent settlement in tandem propeller with increased thrust and torque reversal. For the first time the aircraft A. Vlaicu III had a fuselage made almost completely from aluminum having an aerodynamic shape.

For the history of Romanian aviation, and not only, Aurel Vlaicu was a pioneer who proved that an inquisitive mind doubled by talent and proper education can lead to discoveries that may later change the course of future and boost the pride of one nation. As William James said, "Invention, using the term most broadly, and imitation, are the two legs, so to call them, on which the human race historically has walked."



Fig. 7 Aurel Vlaicu

După spusele lui William James, "Invenția, folosind acest termen în general, și imitația, sunt cele două picioare, dacă le numim așa, pe care rasa umană merge din punct de vedere istoric."

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Anastasia Tsavidou

Experimental High School, Thessaloniki, Greece

Which element can we find in the following pictures?
Cross the letters with their corresponding numbers



A



E



B



F



C



G



D



H

- | | |
|--------------|--------------|
| 1. Calcium | 5. Copper |
| 2. Silicon | 6. Helium |
| 3. Magnesium | 7. Iron |
| 4. Platinum | 8. Aluminium |

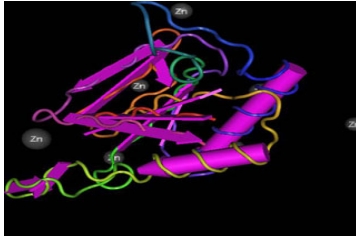
Answers

A6 B3 C1 D5 E2 F8 G4 H7

Anastasia Tsavidou

Experimental High School, Thessaloniki, Greece

Which is the science?



A



B



C



D



E



F



G



H

1. Climatology
2. Seismology
3. Geology
4. Zoology

5. Mineralogy
6. Biochemistry
7. Volcanology
8. Genetics

Answers

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

Gogu

Constantinescu

The Invention with
Outstanding Impacts
on The World War One

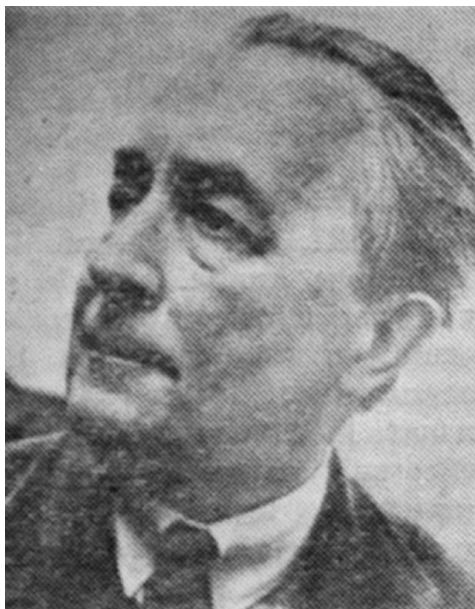
Gogu

Constantinescu

Inventia cu efecte re-
marcabile asupra Prim-
ului Razboi Mondial

Gogu Constantinescu – The Invention with Outstanding Impacts on The World War One

Science is a factor in our lives that has become so important, that we could barely imagine where the world would have arrived without its marvellous influence. Among this decisive field, many personalities have managed to leave an impressing mark on the course of history



through their ingenious and tremendously helpful inventions and discoveries. However, science and its inventions are not the only thing that held a significant ground in our civilization's past.

Since we can remember, this planet that we so dearly call Earth has been organised and reorganised by the wars that requested a chance at its resources and conquering of its territories.

Whichever part would be declared

Stiinta este un factor in viata noastra care a devenit atat de important, incat

abia daca ne-am putea imagine unde lumea ar fi ajuns fara deosebita ei influenta. În acest domeniu decisiv, multe personalități au reușit să lase o amprentă impresionantă pe cursul istoriei prin invențiile și descoperirile lor ingenioase si extrem de utile. Cu toate acestea, știința și invențiile sale

nu sunt singurele lucruri ce au deținut un rol semnificant în tercutul civilizației noastre.

Încă de la începuturile sale, această planetă, pe care noi o numim cu atâta drag Terra, a fost organizată si reorganizată de războaiele care solicitau o șansă la resursele sale și la cucerirea teritoriilor oferite de aceasta. Oricare parte ar fi fost declarată învingătoare, schimbările suferite de omenire erau egale in ceea ce privea esența lor.

winning, the changes humanity faced were the same in terms of essence.

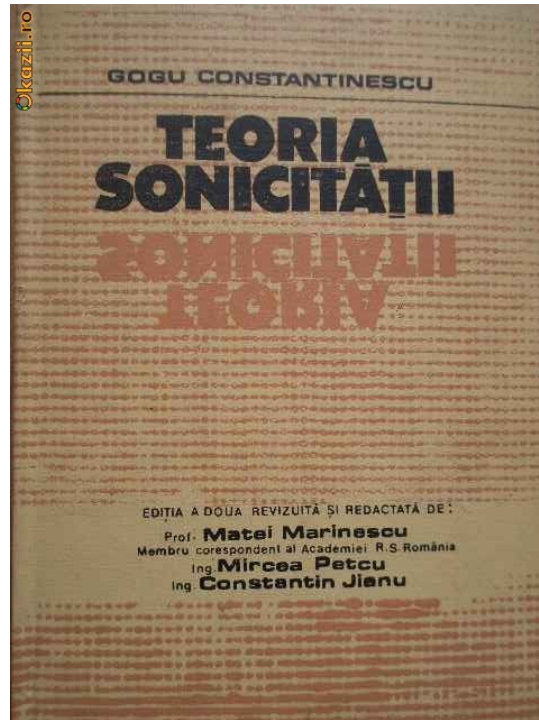
Due to his innovative efforts in the field of physics, Gogu Constantinescu became a name who would last for a long time in the history of inventions, holding a decisive role during the important events of this world.

The celebrity of the engineer was brought to him mainly by his inventions in the dramatic years of The World War I, when his help offered to the allied air force, representing the vital ingredient needed by the English Admiralty in order to gain the upper-hand in the sky battle.

After his entrance in the contest organized by the British Forces, with a view to get efficiency of the firing equipment built on planes, Constantinescu creates the mechanism named by him "Constantinescu Fire Control Gear". This gear was to make possible the shooting by machine guns through the propeller blades with a frequency synchronized with the speed of those blades. Therefore, the frequency of the shooting grew up to 1200 bullets per minute, for each of the two machine-guns mounted to the left and right of the propeller. Due to the success of the British Admiralty, the latter agreed to finance Constantinescu's researches, proceeding to the establishment of a laboratory, in which their invention would set up the basis of the physics innovations to come.

As far back as 1901, the engineer, now enjoying a world-wide recognition, planned implementing the ideas connected to a new theory, in this way Gogu elaborating the sonics theory,

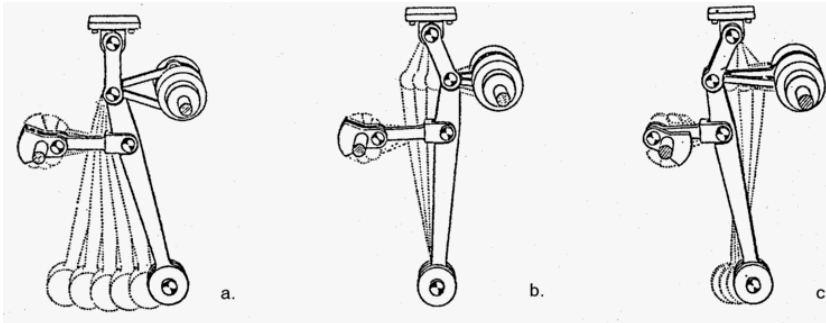
Datorită eforturilor sale inovatoare în domeniul fizicii, Gogu Constantinescu a devenit un nume ce va rămâne multă vreme în istoria invențiilor cu rol decisiv în cursul



evenimentelor importante ale acestei lumi.

Celebritatea inginerului i-a fost adusă, în mare parte, de invenția sa din anii dramaticei Primului Război Mondial, când ajutorul său acordat aviației aliate a reprezentat detaliul necesar amiralității engleze să-și capete supremația pe câmpul de luptă aerian.

După înscrierea în concursul organizat de forțele engleze pentru eficientizarea propriilor sisteme de tragere montate pe avioane, Constantinescu realizează dispozitivul numit de el "Constantinescu Fire Control Gear". Acesta făcea posibil tirul mitralierelor printre palele



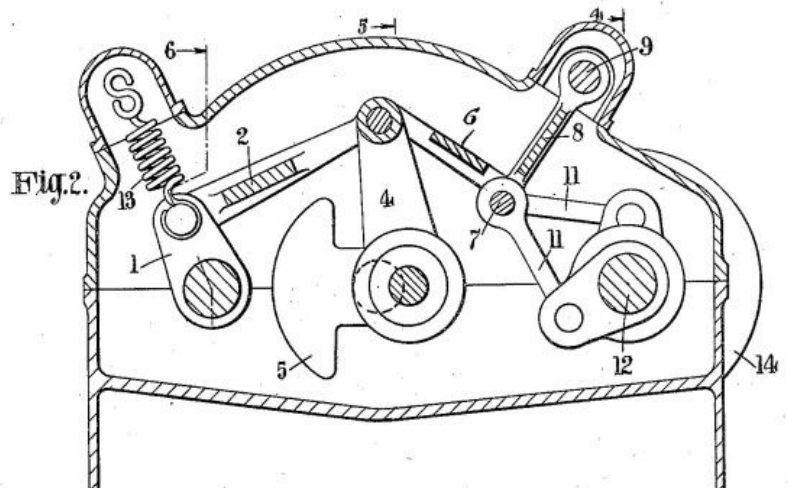
elicelor cu o frecvență acordată cu viteza de rotație a acestora. Prin urmare, ritmul de tragere a crescut la 1200 de gloanțe pe minut pentru fiecare dintre cele două mitraliere montate

leading to the creation of a new field in physics, bearing the name of the discovery, i.e. The Sonics.

Sonicity is the science of transmitting mechanical energy through vibrations. Starting from the theory of musical accords, Gogu Constantinescu managed to find the laws for transmitting the mechanical power to the distance through oscillations that propagate in continuous environments (liquid or solid) due to their elasticity. At the Romanian Academy conference of the 14th of November 1919, Gogu Constantinescu presented the multiple functioning of the sonicity in transports, energetics and petroleum drillings. He discovered that these phenomena had their analogies not only with the properties of sound waves and the laws of harmony, but also with AC electrical circuits. Prototypes of rock drills working on the percussion system and polyphase rotary systems were already being demonstrated by 1913. As soon as

la stînga și la dreapta elicei. În urma succesului amiralității engleze, aceasta a fost de acord cu finanțarea cercetărilor lui Constantinescu prin amenajarea unui laborator, în care inventatorul urmează să pună bazele următoarei inovații aduse fizicii.

Încă din 1901, inginerul, acum recunoscut pe plan mondial, avea în plan punerea în practică a ideilor legate de o nouă teorie, acesta a elaborând, astfel, teoria sonicității, lucru care a



Gogu Constantinescu founded the theory of sonicity, he used it to

condus la crearea unui nou domeniu în fizică, purtând numele descoperirii, sonicitatea.

Sonicitatea este știința transmiterii energiei mecanice prin intermediul vibrațiilor. Având ca punct de plecare teoria acordurilor muzicale, Gogu Constantinescu a găsit legile pentru

provide the world with inventions such as the sonic engine, the sonic pump and sonic hammer.

An important aspect of his work was the fact that he promoted the usage of reinforced concrete. Because of the disastrous results of the method among various parts of Europe, succeeding was a tough task. Those unfortunate results are exemplified by the Celestial Globe bridge at the Universal Exhibition in Paris, in 1900 and the Black Bear hotel from Basle, 1903. Gogu Constantinescu built, however, the first reinforced concrete bridge with sleepers (a structural member on or near the ground that supports weight) in



Romania and fortified the dome of the Parliament Palace in Bucharest, constructions that have defied the passing of the years to this very day.

Moreover, Constantinescu managed to demonstrate a theory which had not been accepted by the physics textbooks at that time, a theory which upheld the compression of fluids as being possible. Since it requires a great amount of pressure to accomplish a little compression, solids and water were

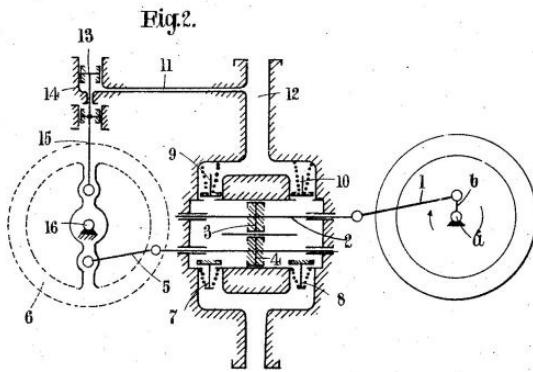
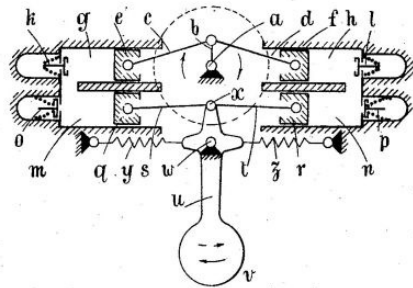
transmiterea puterii mecanice la distanță prin oscilațiile care se propagă în medii constante (lichide sau solide), datorită elasticității lor. La conferința de la Academia Română

din data de 14 noiembrie 1919, Gogu Constantinescu a prezentat multiplele moduri de funcționare ale sonicității în domeniul transportului, al energiei și al forajelor petoliere. A descoperit că aceste fenomene își aveau analogiile nu numai în proprietățile undelor sonore și ale legilor armonice, dar și în circuitele de curent alternativ. Prototipuri ale forajelor de roci funcționând pe planul sistemului de percuție, precum și sisteme rotative polifazate erau deja demonstrate în 1913. Îndată ce Constantinescu a fundat teoria sonicității, el a folosit-o pentru a-i oferi lumii invenții precum motorul sonic, pompa sonica și ciocanul sonic.

Un aspect important al muncii sale a fost acela de al promovării utilizării betonului armat. Din cauza numeroaselor rezultate dezastruoase ale acestei metode în varii zone ale Europei, o reușita a inventatorului era o datorie greu de îndeplinit. Aceste rezultate nefericite sunt exemplificate de podul Celestial Globe de la Expoziția Universală din Paris din 1900 și hotelul Black bear din Basle din 1903. Gogu Constantinescu a construit, în ciuda acestor elemente descurajatoare, primul pod de beton armat cu traverse drepte din România, a consolidat cupola Palatului Parlamentului, lucrări care dăinuie și azi.

Totodată, Gogu Constantinescu a

referred to as being incompressible. Still, matter is composed of a collection of atoms and, in actuality, are relatively far apart, therefore the matter is mostly empty space. Even though the forces

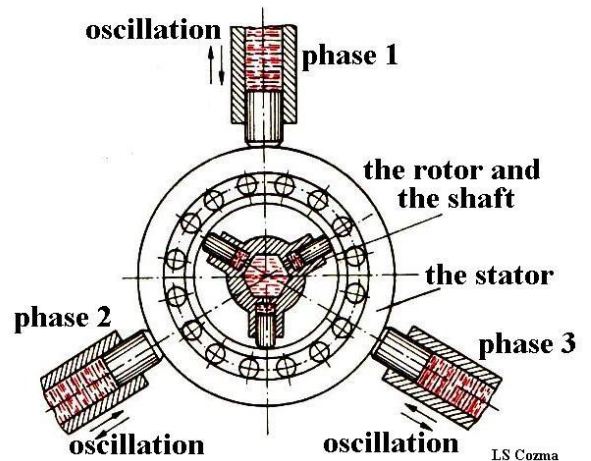


between the molecules cause their resistance against being pressed together, they can still be, as demonstrated by the Romanian scientist.

Among his achievements, Gogu holds the title of the first scientist to plan and build the "Gogu Constantinescu Torque Converter", which he claimed to be a device that could be universally applied in industry, motor vehicles, railway locomotives, ships, military tanks and agricultural tractors. His idea was to produce a low cost one hundred guinea "peoples' car" which would travel 100 miles on one gallon of petrol at the most commonly used road speeds of 30 to 40 miles per hour. George

reusit să demonstreze o teorie care nu era acceptată de către manualele de fizică și care susținea compresia lichidelor ca fiind posibilă. Din moment ce este nevoie de cantitate mare de presiune pentru a obține puțină compresie, corpurile solide și apa erau considerate ca fiind incompresibile. Totuși, materia este alcătuită din atomi și, în realitate, aceștia sunt relativ depărtați unul de celălalt, astfel materia putând fi văzută, în mare parte, ca spațiu gol. Chiar dacă forțele dintre

Sonic asynchronous three-phased engine with radial pistons



molecule provoacă o rezistență împotriva compresiei lor, acest lucru nu este imposibil, cum afirma și demonstrația savantului român.

Printre succesele sale, Gogu deține titlul primului om de știință care să planuiască și să construiască Converterul Gogu Constantinescu, prima cutie de viteze automată, dispozitiv considerat de el ca fiind aplicabil în mod universal atât în industrie, vehicule cu motor, locomotive feroviare, nave maritime, tancuri militare, cât și în privința

arrived at this figure after conducting a comprehensive survey of average car road speeds and designed his car to benefit the most people, rather than a car of higher speed which would only benefit a minority. Therefore he used a cheap 500 cc single cylinder two stroke air cooled engine together with his Torque Converter transmission which would eliminate the conventional gear box and clutch.

Implementing the new theory in the numerous inventions determined the British Army to request the engineer to cooperate thereto without delay. The British Army supported him in his work to create the sonar. The new device was also successfully used by the English, a fact that brought to the Romanian the granting in 1965 of the title of Doctor Honoris Causa of the Politechnical University in Bucharest and the membership of the Romanian Academy.

Gogu Constantinescu died even in the same year when official recognition was granted to him. As a result of a life entirely dedicated to science, he left behind his fruitful work, which managed to significantly influence history. Gogu Constantinescu is a Romanian who belongs to history.

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<http://www.rri.ro/arh-art.shtml?>

tractoarelor agricole. Ideea sa era de a produce o mașină a poporului nu foarte scumpă, care ar fi putut călători aproximativ 160 kilometri cu un consum de numai 3-4 litri de petrol la cele mai utilizate viteze de 50-70 km/h. Gogu a ajuns la aceste rezultate numerice în urma realizării unui sondaj al vitezelor medii de circulație și și-a proiectat mașina astfel încât să îi aducă beneficii majorității populației, decât să poată circula cu o viteză mai mare, însă sa fie disponibilă doar unei minorități privilegiate. Astfel, el a folosit un monocilindru ieftin, cu o răcire a aerului în doi timpi și o capacitate de 0.5 litri, alături de cutia de viteze automată, care vor elimina convenționala cutie de viteze și ambreajul.

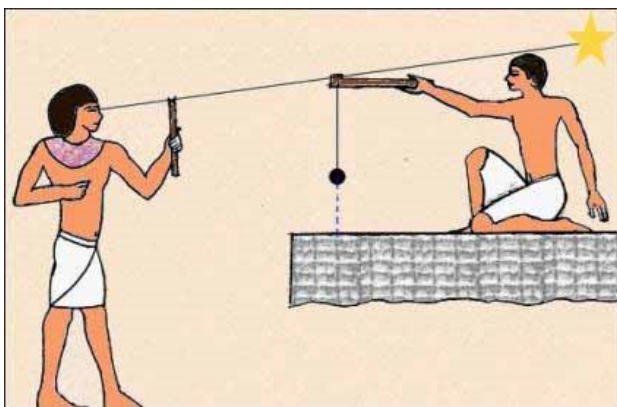
Aplicând noua teorie în numeroase invenții precum motorul sonic, pompa sonică și ciocanul sonic, solicitarea inventatorului de către armata britanică nu întârzie să apară, aceștia susținându-l în crearea sonarului. Noul dispozitiv a fost, de asemenea, folosit cu succes de englezi, aducându-i românului, în anul 1965, titlul de Doctor Honoris Causa al Universității Politehnice din București și membru al Academiei Române.

În urma unei vieți dedicate științei, Gogu Constantinescu se stinge din viață în același an în care recunoașterea oficială i-a fost oferită, lăsând în urmă rodul muncii sale, care a reușit să influențeze într-un mod semnificativ istoria.



Astronomy: from its origins to the Copernican

Nowadays the studies and discoveries in astronomy are endless. It's hard to remain well behind because the knowledge and tools that scientists use are very advanced. From the scientific dossier and from international magazines we hear more and more news about the discoveries and studies made recently; we hear about robots sent to other planets like Curiosity, the rover (vehicle that can be transported to other planets or satellites thanks to a lander and that feeds on itself by means of solar panels) launched by NASA 25 November 2011 from the launch site Cape Canaveral Air Force Station in Florida and landed on Mars August 6, 2012 at 7:31. It allows to the researchers to make discoveries related to the presence or absence of life on that planet thanks to the discovery of water and rocks on the planet. But now other ambitious researches are in progress and they have as an object of study: supernovae (to trace the origins of the universe), Earth-like planets, the Sun, planets made entirely (or almost all) of water, presence of multiple universes that are touching... so we could go on forever in this list but we naturally wonder how did man



Astronomia: dalle origini alla rivoluzione copernicana

Ai giorni nostri gli studi e le scoperte fatte in campo astronomico sono innumerevoli. E' difficile starvi dietro perchè le conoscenze e le strumentazioni di cui gli scienziati si avvalgono sono molto avanzate. Dai dossier scientifici, dalle riviste internazionali ci giungono sempre più spesso notizie relative alle scoperte e agli studi fatti di recente; sentiamo parlare di robot inviati su altri pianeti tipo Curiosity, il rover (veicolo che può essere trasportato in altri pianeti o satelliti grazie all'uso di un lander e che si autoalimenta



per mezzo dei pannelli solari) lanciato dalla NASA il 25 novembre 2011 dalla base di lancio Cape Canaveral Air Force Station, in Florida ed atterrato sul suolo di Marte il 6 agosto 2012 alle ore 7:31. Esso sta permettendo agli studiosi di fare delle scoperte legate alla presenza o meno di vita grazie al ritrovamento di acqua e di rocce sul pianeta. Ma attualmente sono in corso anche altre ambiziose ricerche che hanno come oggetto

get to this point, or it would be better to ask where it started and how it has moved on.



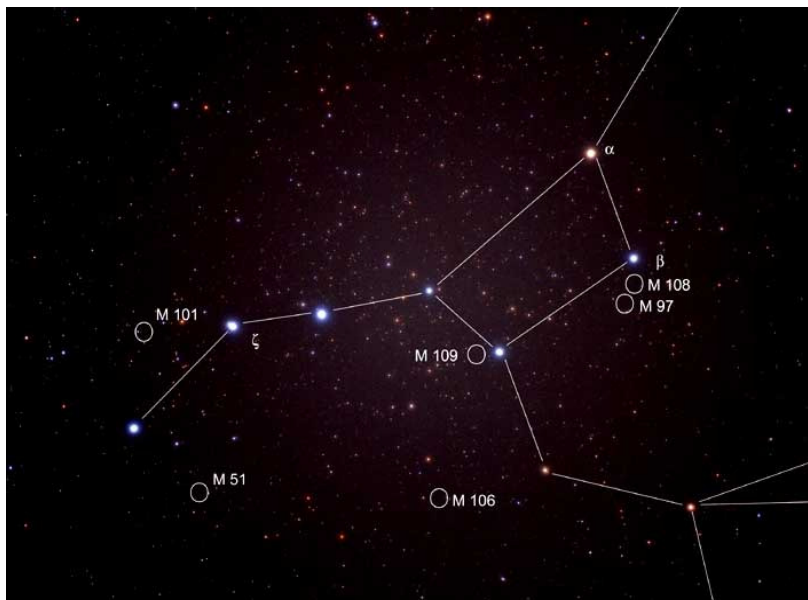
This question is apparently simple, however, we can say that astronomy has ancient origins. In fact, the megalithic constructions of the Neolithic period, according to some scholars, have an array as such to that of the stars or the seasonal cycles of the Sun. You think that even Stonehenge ("stone wall"), in the south of England, was an ancient astronomical observatory; its axis was constructed so as to be oriented in the direction of dawn in the summer solstice. These structures date back to about 10,000 years ago, but we could go even further, such as 50,000 years ago as evidenced by a cult related to the constellation Ursa Major. First, it is important to understand what has driven mankind to observe and understand the processes that govern the world around us. The first men had a strong interest, a great curiosity about his surroundings and then by necessity as by forecasting of astronomical events could mark time and carry out their activities in relation to this.

Let's start by saying that all the civilizations that have shown interest in the observation of the heavens were united by the fact that they considered this not only as something to discover and study but also to venerate. When we talk about worship, we can not forget the Egyptian civilization, because of the God Ra (identified with the Sun) or pre-Columbian civilizations, famous for the construction of temples and pyramids dedicated to the gods of the sky. But it would be simplistic to think that the astronomical

di studio: le supernove (per risalire alle origini dell'universo); pianeti simili alla Terra; il Sole; pianeti costituiti interamente (o quasi) da acqua; presenza di più universi che si toccano...insomma potremmo proseguire all'infinito nel fare quest'elenco eppure viene spontaneo chiedersi come ha fatto l'uomo ad arrivare a questo punto, o sarebbe meglio chiedersi da dove è partito e in che modo è andato avanti. Questa domanda è apparentemente semplice comunque possiamo dire che l'astronomia ha origini antichissime. Basti pensare che le costruzioni megalitiche del Neolitico, secondo alcuni studiosi, presentano un allineamento tale e quale a quello delle stelle o ai cicli stagionali del Sole. Si pensa addirittura che lo Stonehenge ("recinto in pietra"), nel sud dell'Inghilterra, fosse un antico osservatorio astronomico; il suo asse era costruito in modo da essere orientato in direzione dell'alba nei solstizi estivi. Queste strutture risalgono a circa 10000 anni fa ma potremmo spingerci ancora più in là, tipo 50000 anni fa come dimostra un culto legato alla costellazione dell'Orsa Maggiore. Innanzitutto è importante capire cosa ha spinto il genere umano ad osservare e comprendere i processi che regolano il mondo circostante. L'uomo prima di tutto ha nutrito un forte interesse, una grande curiosità verso ciò che lo circonda e poi anche per necessità dato che grazie alla previsione di eventi astronomici era in grado di scandire il tempo e svolgere le proprie attività in funzione di questo.

Cominciamo col dire che tutte le civiltà del passato che hanno mostrato interesse nell'osservazione della volta celeste sono state accomunate dal fatto che consideravano questa non solo come qualcosa da scoprire e studiare ma addirittura da venerare. Quando si parla di culto non si può non fare riferimento alla civiltà egizia, per via del Dio Ra (identificato con il Sole) o alle civiltà precolombiane, celebri per la costruzione di templi e piramidi dedicati agli dei del cielo. Ma sarebbe riduttivo pensare che le conoscenze astronomiche delle civiltà antiche fossero legate semplicemente alla religione. Sebbene, infatti, queste civiltà siano cronologicamente molto lontane rispetto ai nostri tempi, esse vantano delle

knowledge of the ancient civilizations were simply related to religion. Indeed, although these civilizations are chronologically very far compared to our times, they have the knowledge and cultures very refined. The civilization to which we refer are those of the Chinese, the Mayans, the Incas, the Aztecs, the Assyrians, the Babylonians and Egyptians.



Starting from the Chinese civilization, we can say that this is famous for records of the astronomical observations from 2000 to C. and for the development of a lunisolar calendar. Other civilizations which reached the highest level in the astronomical knowledge were pre-Columbian ones whose discoveries gave no contribution to other civilizations since remained isolated until the discovery of the American continent. Suffice it to say that these people were able to predict the period of the eclipse, the cycle of the seasons, the solstices and equinoxes. Evidence of knowledge of this level are certainly the temples, built in points perfectly aligned with the sun, and the famous Mayan calendar particularly complex and composed by three cycles.

The Assyrians and Babylonians made very big steps (disciple of Pythagoras). His theory was accepted, however, until the time of Plato through a philosophical argument that the Earth, at the center of the universe, could only be spherical

conoscenze e delle culture molto raffinate. Le civiltà cui facciamo riferimento sono quelle dei Cinesi, dei Maya, degli Inca, degli Aztechi, degli Assiri, dei Babilonesi e degli Egizi.

Partendo dalla civiltà cinese, possiamo dire che questa è celebre per la documentazione relativa alle osservazioni astronomiche a partire dal 2000 a. C. e per l'elaborazione di un

calendario lunisolare. Altre civiltà che raggiunsero un alto livello nelle conoscenze astronomiche furono quelle precolombiane le cui scoperte non diedero alcun contributo alle altre civiltà dal momento che rimasero isolate fino alla scoperta del continente americano. Basti pensare che questi popoli erano in grado di prevedere il periodo delle eclissi, il ciclo delle stagioni, i solstizi e gli equinozi. Testimonianze di conoscenze di tale livello sono sicuramente i templi, costruiti in punti perfettamente allineati con il

Sole e il celebre calendario maya particolarmente complesso e costituito da tre cicli.

Gli Assiri e i Babilonesi fecero dei passi da giganti se consideriamo ciò che sono riusciti a comprendere in rapporto al periodo storico e al fatto che si servivano della mera vista. Essi intuirono il moto apparente dei pianeti grazie alla sola posizione di alcune stelle prese come riferimento. Notarono che la Luna descriveva delle fasi ben precise e anche che la Terra, il Sole e la Luna occupavano periodicamente la stessa posizione. Infine, furono i primi a dividere il giorno in 24 ore con la differenza che per queste popolazioni il giorno cominciava la sera.

Per quanto riguarda gli Egiziani, sappiamo che la loro vita e le loro attività erano legate al fiume Nilo, che dava luogo a delle alluvioni periodiche. Essi si accorsero che l'inizio di queste ultime coincideva con il momento in cui si alzava in cielo la stella Sirio (o Sopdet, come fu denominata dagli stessi Egizi). Anche questo popolo elaborò diversi calendari, tra i quali l'ultimo, che prevedeva un ciclo di 25 anni, era talmente

because the sphere is the most perfect form for a body.

The sphericity of the Earth was further accredited by Aristotle, who pointed out that shadow that Earth casts on the moon has circular contours.

After speaking of shape, let's focus attention now on the size of our planet. The first measurement is due to Eratosthenes of Cyrene. What is surprising is the incredible precision of its measurement taking into account that he used only the math. To determine such measures this scholar considered two cities, Alexandria and Syene, located on the same meridian but with different latitude (remember moreover that he was the first to divide the Earth into meridians and parallels). Doing a proportion, Eratosthenes obtained the angle of latitude, knowing the distance between the two cities and taking into account that the solar rays arriving parallel to the Earth's surface. So he obtained the length of the circumference of the earth, which was mistaken for defects of only 600 km (In fact, today's result is of 40000 while his was of 39 400) and the diameter (12629 km, less of only about 113 km with respect to the extent today accepted).

We have to wait a long time before the heliocentric theory is accepted. As you can see we talked of accepting because the man had long realized that it was the earth revolved around the sun and not the opposite. Unfortunately, this theory was not easily accepted because it meant the collapse of all the evidence on which the man had relied for centuries.

In the fourth century. a. C. various Greek philosophers (including first of all Aristarchus) had advanced the heliocentric theory that the planets revolved around the Sun and the latter around the Earth. This hypothesis was not understood then and the heliocentric theory ended up prevailing, supported by Hippar-

preciso che fu preso in considerazione non solo da Tolomeo nel II sec. d. C. ma anche ai tempi di Copernico. Inoltre gli Egizi si servivano della posizione delle stelle per scandire le ore della giornata: mentre per le ore diurne erano impiegate le meridiane, per quelle notturne osservavano la posizione di 24 stelle, prima, di 36, in seguito.

Come abbiamo visto, già i popoli del passato avevano un bagaglio di conoscenze a dir poco incredibile. E pensare che si servivano della sola

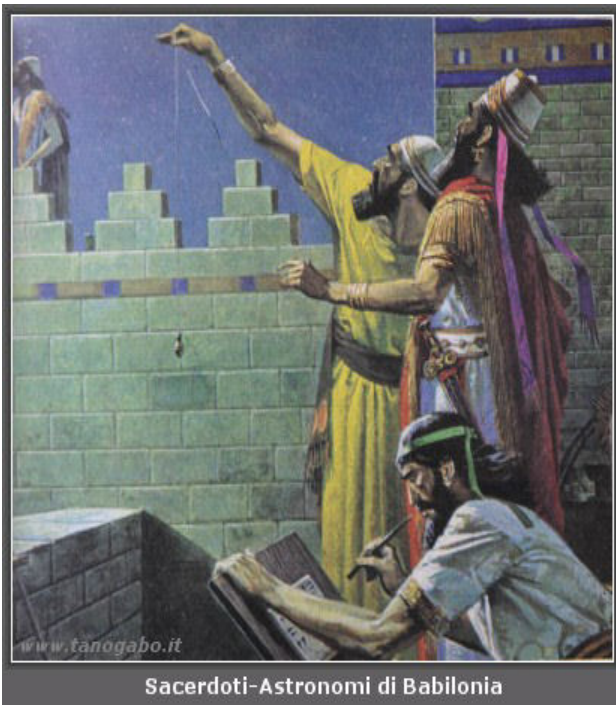


vista! In questo excursus dell'astronomia sorge spontaneo chiedersi come l'uomo abbia compreso che la Terra fosse sferica, dapprima, e come sia giunto alla concezione eliocentrica in seguito.

Furono i Greci coloro che cominciarono a porsi il problema circa la forma e le dimensioni del nostro pianeta.

I primi greci ritenevano che la Terra fosse piatta. Infatti si pensava che fosse costituita da un disco circolare attorno al quale scorreva continuamente il fiume Oceano e al di sopra vi era, invece, la conca emisferica del cielo. Tale concezione appare evidente nelle opere di Omero e fu universalmente accettata fino al VI sec. a. C. Per quanto concerne gli astri e i pianeti, essi credevano peraltro che dopo aver compiuto il loro percorso nel cielo, si immergessero nel fiume Oceano.

I primi dubbi sorsero, però, quando ci si accorse che alcune stelle, non visibili dalla Grecia, lo erano perfettamente dall'Egitto. Già in questa fase si cominciò a pensare che la Terra, in realtà, presentasse qualche



Sacerdoti-Astronomi di Babilonia

chus, Aristotle, Ptolemy and socket universally considered certain until the Renaissance, the time when Copernicus with his theory will create a revolution.



For the men of the past was available only as an investigative tool to the naked eye, but they also made use of rudimentary tools such as, for example, the merket, the auction of Archimedes or the armillary sphere.

The first instrument was used by the Egyptians to identify the position of the stars.

The auction of Archimedes consisted of a wooden shaft used to determine the angular distance of the solar disk.

curvatura proprio come fece per primo Anassimandro, il quale affermò che la Terra fosse cilindrica.

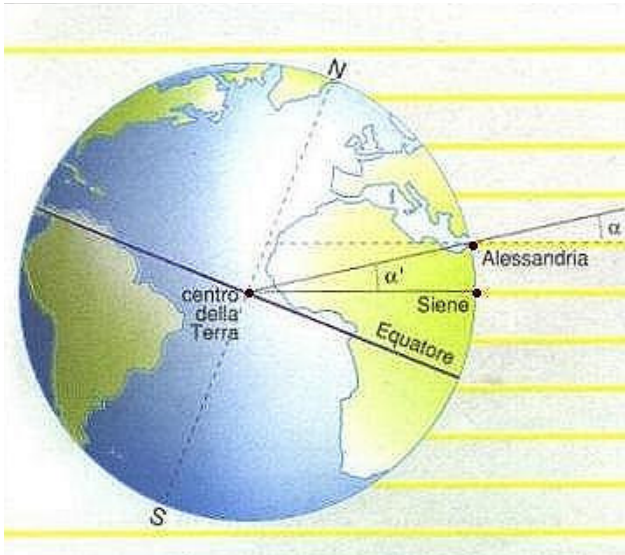
Si giunse alla concezione sferica della Terra solo grazie al filosofo Parmenide (discepolo di Pitagora). La sua teoria però fu accettata solo ai tempi di Platone grazie ad un'argomentazione filosofica secondo cui la Terra, posta al centro dell'universo, poteva essere solo sferica dal momento che la sfera è la forma più perfetta per un corpo.

La sfericità del nostro pianeta fu ulteriormente accreditata da Aristotele che fece notare che l'ombra che la Terra proietta sulla Luna ha dei contorni circolari.

Dopo aver parlato della forma, focalizziamo ora l'attenzione sulle dimensioni del nostro pianeta. La prima misurazione si deve ad Eratostene di Cirene. Ciò che sorprende è l'incredibile precisione della sua misurazione tenendo conto che si serviva solo di calcoli matematici. Per determinare tali misure lo studioso prese in considerazione due città, Alessandria e Siene, situate sullo stesso meridiano ma con latitudine differente (ricordiamo per di più che egli fu il primo a dividere la Terra in meridiani e paralleli). Eratostene facendo una proporzione ricavò l'angolo di latitudine, nota la distanza tra le due città e tenendo conto che i raggi solari giungono paralleli sulla superficie terrestre. Così ottenne la lunghezza della circonferenza terrestre, la quale si sbagliava per difetto di soli 600 km (infatti il risultato odierno è di 40000 mentre il suo era di 39400) e la misura del diametro (12629 km, inferiore di soli 113 km circa rispetto alla misura oggi accettata).

Passerà molto tempo prima che sia accettata la teoria eliocentrica. Come si può notare si è parlato di accettare perchè l'uomo già da tempo aveva intuito che era la Terra a ruotare attorno al Sole e non il contrario. Purtroppo questa teoria non fu facilmente accettata perchè comportava il crollo di tutte le certezze su cui l'uomo aveva fatto leva per secoli.

Nel IV sec. a. C. circa vari filosofi greci (tra i quali primo tra tutti Aristarco) avevano avanzato



Finally the Greeks were resorted to the use of the armillary sphere (invented by Eratosthenes in 255 BC.) Which was a reproduction of the celestial sphere in which we find the equator, the ecliptic, meridians and parallels.

Iconography

http://www.ukizero.com/wp-content/uploads/2012/05/calendar_maya1.jpg
<http://www.aranciomeccanico.it/alexandria/eratostene/erat.JPG>
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la teoria eliocentrica con i pianeti che ruotavano attorno al Sole e quest'ultimo attorno alla Terra. Questa ipotesi non fu compresa allora e finì col prevalere la teoria eliocentrica, sostenuta da Ipparco, Aristotele, Tolomeo e presa ritenuta universalmente certa fino al Rinascimento, epoca in cui Copernico con la sua teoria darà vita ad una vera e propria rivoluzione.

Gli uomini del passato avevano a disposizione come unico strumento di indagine l'occhio nudo; tuttavia si avvalevano anche di strumenti rudimentali quali, per esempio, il merket, l'asta di Archimede o le armille.

Il primo strumento era utilizzato presso gli Egizi per individuare la posizione degli astri.

L'asta di Archimede consisteva in un'asta di legno impiegata per determinare la distanza angolare del disco solare.

Infine i Greci facevano ricorso all'uso della sfera armillare (inventata da Eratostene nel 255 a. C.) che consisteva in una riproduzione della sfera celeste in cui ritroviamo l'equatore, l'ellittica, meridiani e paralleli.

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Evolution (part 3)

Arguments Against Evolution

Evolution is NOT what created life on earth because:

- Religion/God
- Alternative Theories
- Creationism
- Errors in the theory of evolution
- Other Arguments Against Evolution

Religion/God

Without doubt the largest contributor to the disbelief of evolution is caused by religion. The reason for this is due to how influential religion is, and more so, how it has been. Religion is/has been the cornerstone for many peoples lifestyles for centuries, and has split off into many different varieties, having a huge impact across the world. Christianity has been a social norm for thousands of years, and the power of it and the church was immeasurable, so much so that those who went against it would be punished, whether this be socially, or physically.



'Reconstruction' of the Piltdown skull by J.H. McGregor (1914)

The above image shows mapping based on religion upon a global scale, from looking at the key, it is quite clear that Christianity is the most dominant belief, which con-

firms the above point. Notice there is no part on the key stating areas of no belief, or atheism, this is because of how large of an impact religion has upon a community, a country is commonly a predominant religion, or racially (and therefore religiously) diverse, showing how much of a minority non-religious people are [14]

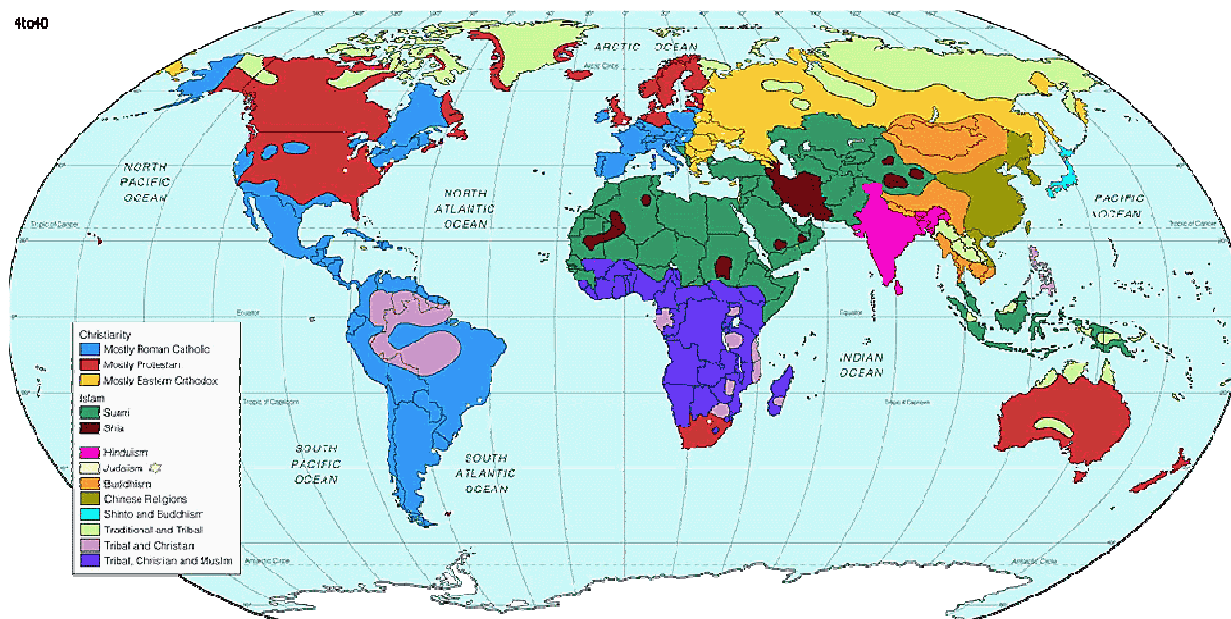
The theory of evolution quite clearly goes against god, and questions his existence; therefore it is going against the church. Due to the immense influence of the church, many people did not, and still do not believe that the theory of evolution is correct, some American states even refuse to teach it! This shows how much of an impact religion has had, and still has.

Since evolution, and the current scientific mindset of people nowadays, religion is extremely threatened by evolution, as it explains the entire history of life, as opposed to creationism. It is due to this threat that religion uses what influential power it has over people to disregard evolution, and many people follow this endlessly.

This is not particularly a reason or argument as to how or why evolution is wrong, nor a way to disprove it, this falls under the category of 'Creationism' later on. However it does show how and why people will disregard evolution, and will attempt to find ways of disproving it. This is due to it being such a great threat to the religious community, and this regards a huge proportion of the population.

Alternative Theories

There are other theories as to how man came to be, the most notable one being creationism (of which will be explained more in depth later in its own section), however there are lesser known and disregarded theories that challenge the theory of evolution; these



include: Lamarckian Inheritance, Punctuated Evolution, Intelligent Design, and more. Most of these have been disproved, although they still have a – granted, small – impact on the population, and on evolution [2]

The first theory being Lamarckian Inheritance, which simply broadcasts the idea that a species will come across small changes over time to benefit upcoming generations, however unlike evolution, these changes are environmental, as opposed to natural selection/survival of the fittest [2]

The best example of this (shown by the image to the left) would be of a giraffe, as it strains the muscles in its neck to attain apples from a tree above them, their necks will gradually grow larger, and this will then be passed on to its young, gradually increasing in neck size as each generation goes on. Though the basic idea of this theory may be correct, it would happen by the process of natural selection instead. Rather than the giraffe ‘stretching’ its neck and passing that on to its young, the giraffes with naturally longer necks are more likely to survive, as they are more capable of obtaining food, therefore the gene that allows their neck to be long, will be passed down generation upon generation, until they get where they are today... as opposed to ‘training’ their neck. A good way of explaining why Lamarckian Inheritance doesn’t

work, is by saying that a husband and wife are body builders, with perfectly built and toned muscles, they then decide to have a child, however when it is born, it doesn’t have perfectly sculpted muscles; why? Because children do not inherit characteristics this way, they may however grow up to be a bodybuilder just do to the environmental factor of growing up with them [2]

This theory, along with the others listed, have all been disproved, however still remain in the minds of a small proportion of the population, these theories may be swatted away by the superior theory of evolution, but nothing is to say that evolution in itself may be wrong, and these theories could be correct, however it’s the influential factor, and scientific evidence that defends evolutions spot as the globally accepted theory of how man came to be [2]

Creationism

Creationism is Evolution’s nemesis; both theories contradict each other entirely, and Creationism is commonly followed by Christians, however this may not always be the case. Creationism is a belief that life on earth, was simply designed, and placed upon it by a superior entity, otherwise referred to as God, as opposed to evolving from com-

plex genes. There are different types of creationism, however the most common is Christian Creationism, taking the bible quite literally, to use as a mantel for there beliefs. Some of these beliefs consist of: the earth being between 6000 and 10,000 years old, that everything on the earth was 'created' by this superior entity known as god in 6 days, and that death is caused by the death of Adam and Eve. [3]

These, and many other creationist beliefs go against the theory of evolution, for example the idea that the earth is between 6000 and 10,000 years old, if true, would make the fossil record completely redundant as many of these are believed to be millions of years old!

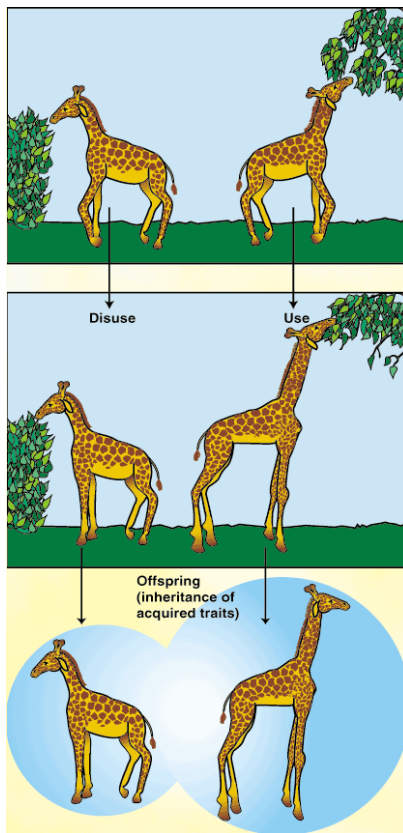
Despite there being no solid proof of creationism, it is still a plausible theory, mainly for the fact of how influential it has been on many individuals, claiming that they have 'spoke to god', no matter how unlikely this may be, it is still a very strong belief, and still a possible cause of life on earth [3]

Errors in the theory of Evolution

The theory of evolution was first observed, and commonly refers to, the gradual change in fossils over a long period of time. Fossil records are the backbone of the theory of evolution; it is the apparent 'proof'. However this 'proof' has been found to have some mistakes, such as missing links which would make the fossil records completely worthless. [4]

One was the fossil record can be disproved is through fossils from the prehistoric ages, the time that dinosaurs roamed the earth. Through intensive testing and research, fossils of a T-Rex have been found to be around 65 million years old, with plenty of supposedly conclusive evidence to back it up. However one recent discovery goes against the carbon dating of the T-Rex's fossils. A biologist named Mary Schweitzer eventually found that within the thigh bone of a T-Rex were soft tissue-including blood vessels. Over time and large amounts of research, there was also found to be haemoglobin, which-if

the bone really was 65 million years old-should have disintegrated. This completely disproves the use of carbon dating to find the



age of fossils, creating a large dent in the fossil records. There have been numerous related discoveries since, even including frozen mammoths, still with flesh and skin attached; this makes it near impossible for evolutionists to deny [4]

Many evolutionary ideas have also been found to be

wrong, such as:

The Neanderthal (left [25]); these were supposedly another species of human, and inferior one that became extinct due to natural selection, however the bones that had been studied to lead to the belief of this weaker, inferior species, have been found to just be regular human bones with some form of a deflection causing the bone to weaken, such as rickets [4]

Despite this, there has been a very recent discovery of a 44,000 year old jawbone (below[33]) that is once believed to be that of a Neanderthal, and that it is evidence that we homo-sapiens lived alongside Neanderthals. We know this thanks to radiocarbon tests, we may have originally been around 7000 years under the actual age, but this difference would suggest that Neanderthals were already living in Europe before us Homo-sapiens arrived. A second radiocarbon scan was performed on fossil milk teeth of

these Neanderthals, suggesting that they were 45,000 years old. These results would suggest that the anatomy of modern-day humans were inhabitants of Europe thousands of years earlier than previously thought. These alterations in the original theory make it more likely that we humans lived alongside Neanderthals [33]

Pitdown man (right [26]); this was also believed to be another species branched off from humans, much like the Neanderthal. However this again was disproved, after further research the skull of what was apparently the Pitdown man, was found to be a combination of a child's skull, and an orangutan's jaw. This belittles the amount of evidence of human evolution even further [4]



Nebraska Man; The belief of another species of human was initiated by the discovery of a tooth in Nebraska, what was extraordinary, and frankly ridiculous, was that the entire lifestyle and looks of this supposed Nebraska Man, was based entirely around a single tooth! Firstly this would be an unreliable way to determine the lifestyle of an unknown species, and secondly, over time a skull that fit the tooth was discovered... it was the skull of a pig, thus demeaning any other idea of human evolution [4]

All of these false discoveries simply prove that not all fossil records are entirely reliable, and some parts of the theory are prone to mistakes, even the most influential and be-

lieved discoveries may also prove to be incorrect, a perfect example of this would be of another supposed human ancestor, named 'Lucy'. 'Lucy' was universally accepted to be the true ancestor of man, the missing link between man and ape, and since its discovery, many believed they had the answer to mans evolutionary missing link [4]

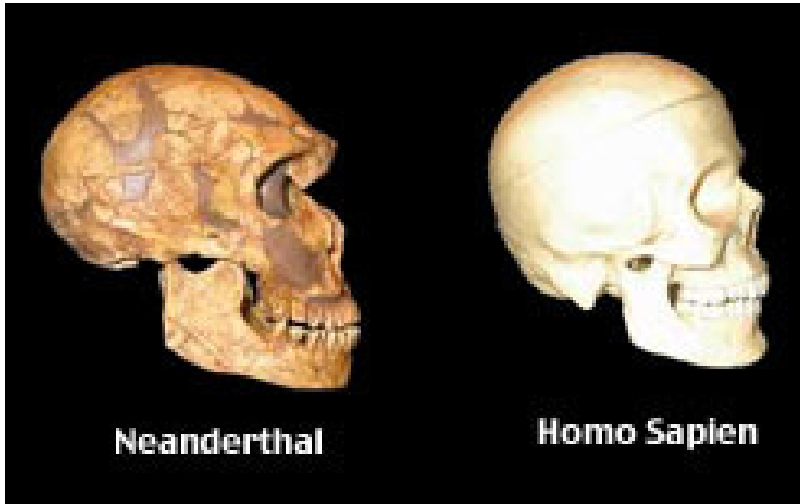
Lucy (Skull, right [27]) was alike a humanoid, although was also alike a chimp, this type of being was called Australopithecus, however even this was disproved, and hesitantly at best. After further study of the bones, it was found that they were that of a chimpanzee, supposed 'Lucy footprints', were proved to be those of modern man, and lastly a fossil of a skull was discovered in Kenya, suggesting even more human-like features than Lucy, giving more evidence that Lucy is in-fact a chimpanzee, and also leaving a huge gap in the theory of man's origin, widening the distance between the missing link. Therefore even the most revolutionary and influential discoveries cant be trusted, as they are just theory, as is evolution [4]

Other Arguments Against Evolution

Another argument against evolution is through the mathematical terms of probability. Alongside the currently known biological facts, the odds of evolution occurring through nothing other than chance are little to none. Despite the length of time of existence, mathematically, evolution is still considered to be impossible due to how slim the chance is of a species gaining some kind of benefit through random mutations. The more that we learn about our complex biological world, is comes surprising to some that evolutionists still believe in evolution occurring by chance over a period of time, and others believe that the "intelligent design" model, based upon a Divine Creator, makes much more sense.

To expand on this, the DNA possessed by any living organism consists of the information required to form its individual characteristics that would be passed up-

on generations, or perhaps mutated. Due to its intricate detail, the amount the genetics can change through mutation is limited; this is to avoid sterilisation or death. This would then suggest that the genetic code can not, and will not undergo any dramatic changes of muta-



tion, this further slims the chances of evolution occurring at the rate it supposedly has done.

Furthermore, there is no conclusive evidence of a genetic code that allows DNA to gradually change their molecular codes, nullifying the possibility of mutations gradually changing organisms into others over time. This means that organisms have a 'limit' to how much they are capable of mutating, or at least this is what is suggested by the given evidence. As a result, despite how much time you may spend watching the evolutionary process of the mouse, you will never see it undergo mutations to turn it into, say an elephant, as this limit to mutations makes it near impossible for drastic mutations to successively and consistently benefit the species to such a point it evolves into another [28]

Evaluation and opinion

My own personal view on evolution is that it did create the diversity of life on earth; this is for a small accumulation of reasons. First of all, there is a large amount of evidence to strengthen the foundation of the theory with numerous different ways of explain-

ing and proving it, these include using of looking at the fossil records, the evolution of DNA, the evolution of MRSA, and through observations upon embryology. Furthermore there is little evidence against evolution, despite the thought that evolution is mathematically im-

probable, it has been allowed to occur over billions of years, and it can't be any less likely than an unexplained superior entity simple creating life himself out of nothing. Despite there being gaps in the fossil records that supposedly hinder evolution, to me, this only strengthens it. This is due to the fact that evidence for evolution through the fossil records is already very strong and reliable, but the idea that the vast majority of fossils are

yet to be discovered suggests that we are capable of attaining even more evidence to back up the theory of evolution even further. To close my reasoning, the belief of the alternate theory of creationism has been the dominant belief of existence for thousands of years, whereas scientific evidence has only recently been able to accumulate for around a hundred or so years. If given more time to further research evolution we can almost guarantee that we will discover something that can indefinitely prove evolution. I am completely adamant about my opinion and believe evolution entirely, as opposed to the even lesser explained theory of creationism.



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