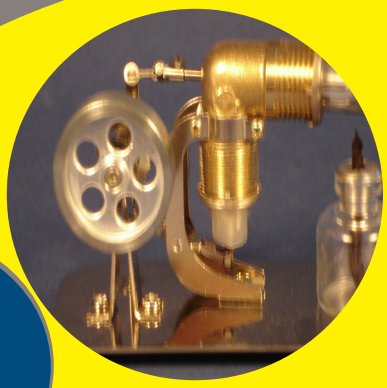
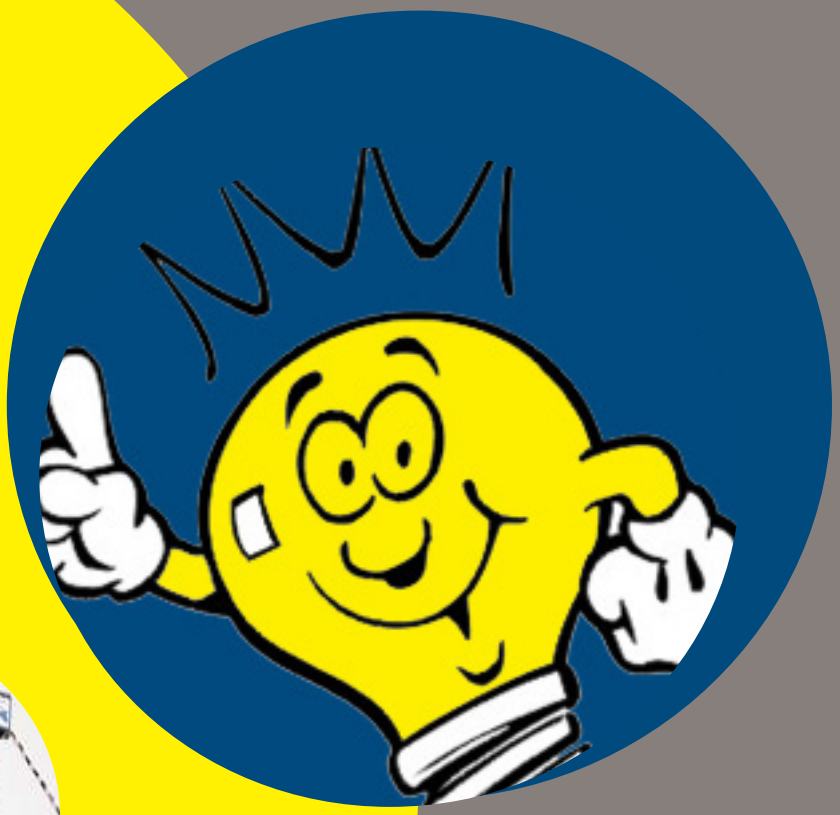
EPMagazine

History of Science and Technology





Issue No. 1,
April, 2016
ISSN 1722-6961

Year 2016
Issue 1 - April
I.S.S.N.1722-6961

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Cover of the magazine: Andra Tudor
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Editorial

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General

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14-16

Fun Pages

17-19

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EN- Editorial

Curiosity Did Not Kill The Cat

Most people that cannot call themselves scientists have trouble understanding certain notions related to this huge domain of knowledge.

However, the best way to understand science is to be… curious, to go back in time and research the people who discovered that certain scientific principle, device or concept. First of all, you have to get a clear picture of the times they lived in and of the general scientific knowledge they had within their reach. Then, you have to read the realstory; you have to look into the way they actually did it.

What happens when you look at what the discoverers were thinking about when the discoveries were made, will help you understand that they were not different from you. They were human beings, bodies and brains, and so are you.

When thinking of science, most of us think of schooled elite capable of deciphering a complex box they surround. In fact, they, we, all are threading the fields of knowledge. What we need is open eyes, eyes able to see, a sharp mind

RO- Editorial

Curioșii nu mor repede

Majoritatea celor care nu sunt oameni de știință au probleme în a înțelege anumite noțiuni legate de acest imens domeniu al cunoaşterii.

Însă, calea cea mai bună pentru a înțelege știința este aceea de a fi… curios, de a te întoarce în timp și de a-i studia în mod atent pe oamenii care au descoperit vreun principiu, mecanism sau concept științific. În primul rând, trebuie să îți faci o imagine clară a timpurilor în care aceștia au trăit și a cunoștințelor științifice generale care le stăteau la dispoziție pe atunci. Apoi, trebuie să le citești povestea; să afli cum au realizat ceea ce au realizat.

Ceea ce se va întâmpla când vei studia ce gândeau inventatorii atunci când au făcut invențiile, e că vei ajunge să înțelegi că ei nu erau diferiți de tine. Ei erau ființe umane, corpuri și creiere, la fel ca tine.

Când se gândesc la știință, majoritatea se gândesc la o elită înalt educată, capabilă să descifreze o cutie complexă pe care o înconjoară. De fapt, ei, noi, cu toții păşim pe câmpiile cunoașterii. Ne trebuie însă ochi deschiși, ochi în stare să vadă, o minte ascuțită

able to reason from cause to effect, but most of all, what is essentially needed is a little bit more curiosity.

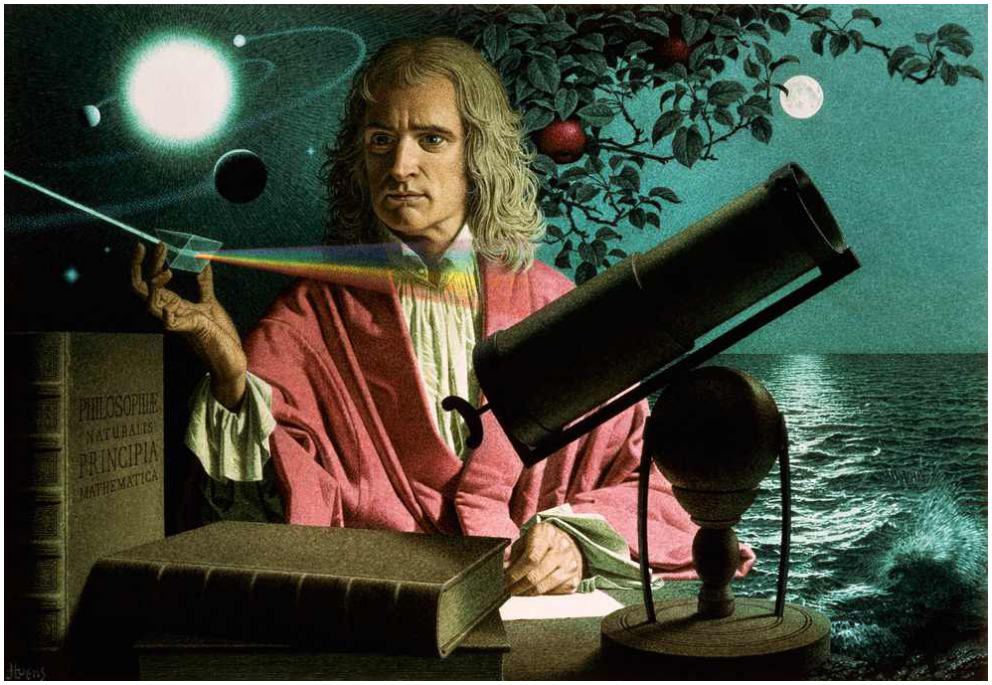
If Sir Isaac Newton had not asked himself why the apple fell down to earth, we would not know about gravity. If Archimedes of Syracuse would not have been curious to find out why the water splashed down on the floor when he entered his bathtub, there would have been no ”Eureka”. And the examples could go on and on.

It was their curiosity that changed the way the people looked at the world and that changed the world. They changed the world. And so can you dear young reader. Be curious!

capabilă să gândească de la cauză la efect, dar, mai presus de toate, lucrul esențial, este un dram de curiozitate.

Dacă Sir Isaac Newton nu s-ar fi întrebat de ce cade mărul jos, pe pământ, noi nu am fi cunoscut gravitația. Dacă Arhimede din Siracuza n-ar fi fost curios să afle de ce dădea apa pe-afară când a intrat în vană, nu s-ar fi auzit strigătul ”Evrica”. Și exemplele ar putea continua la nesfârșit.

Curiozitatea lor a fost cea care a transformat modul în care oamenii priveau lumea și asta a schimbat lumea. Ei au schimbat lumea. La fel poți să o schimbi și tu, dragul meu tânăr cititor. Fii curios!



BG- Editorial

Любопитството не уби котката

Повечето хора, които не могат да се нарекат учени имат проблеми с някои понятия, свързани с тази огромна област на знанието.

Най-добрият начин да разбереш науката е да бъдеш ... любопитен, да се върнеш във времето и да изследваш хората, които са открили някакъв научен принцип, устройство или концепция. На първо място, трябва да получите ясна представа за времето, в което са живели, и за общите научни познания, които те са имали. След това, трябва да се чете истинската история. Трябва да се вгледате в начина, по който са го направили.

Какво се случва, когато се вгледате в това, което откривателите са мислели за това, кога са направени откритията, ще ви помогне да разберете, че не са различни от вас. Те са били човешки същества, тела и мозъци, също като нас.

Когато мислят за наука, повечето от нас мислят за учения елит, способен да разшифрова сложни неща,

GR- Editorial

Η περιέργεια δε σκότωσε τη γάτα

Οι περισσότεροι άνθρωποι οι οποίοι δεν είναι επιστήμονες έχουν πρόβλημα να κατανοήσουν συγκεκριμένες έννοιες που σχετίζονται με αυτό το τεράστιο πεδίο γνώσης.

Κι όμως, ο καλύτερος τρόπος για να καταλάβει κανείς την επιστήμη είναι... να είναι περίεργος, να πάει πίσω στο χρόνο και να αναζητήσει αυτούς τους ανθρώπους που έκαναν κάποια συγκεκριμένη επιστημονική ανακάλυψη διατυπώνοντας μία αρχή, ένα νόμο ή εφευρίσκοντας μία διάταξη. Πρώτα απ' όλα πρέπει να έχεις μία καθαρή εικόνα της εποχής που έζησαν αυτοί οι άνθρωποι, αλλά και της γενικής επιστημονικής γνώσης στην οποία είχαν πρόσβαση τότε. Έπειτα πρέπει να διαβάσεις την αληθινή ιστορία, πρέπει δηλαδή να μάθεις τον τρόπο με τον οποίο έφτασαν στο αποτέλεσμα.

Το τι συμβαίνει όταν βλέπεις τι σκεφτόταν οι εφευρέτες για τις ανακαλύψεις που έκαναν, θα σε βοηθήσει να καταλάβεις ότι δεν ήταν διαφορετικοί από εσένα. Ήταν άνθρωποι με σώμα και μυαλό όπως κι εσύ.

Όταν σκεφτόμαστε την επιστήμη, οι περισσότεροι από εμάς έχουμε στο νου μας μία ακαδημαϊκή ελίτ ικανή να αποκωδικοποιήσει ένα σύνθετο

които ни заобикалят. Всъщност, те, ние, всички, вървим из полетата на знанието. Това, от което се нуждаем, е отворени очи, очи, които могат да видят, остър ум, способен да разсъждава от причина към действие, но най-вече това, което е необходимо, е малко повече любопитство.

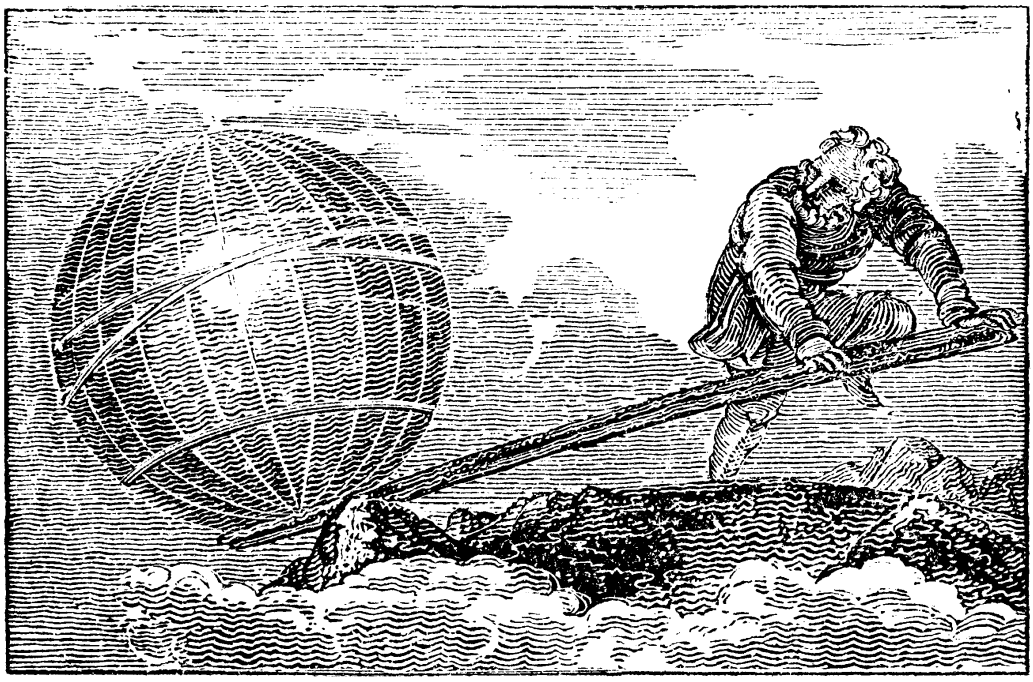
Ако сър Исак Нютон не се бе запитал защо ябълката пада на земята, нямаше да знаем за гравитацията. Ако Архимед от Сиракуза не бе любопитен да разберете защо водата плисва върху пода когато той влязъл във ваната си, нямаше да има никаква „Еврика“. И примерите можеха да продължат и нататък.

Именно любопитството им промени начина, по който хората погледнаха към света и това промени света. Те промениха света. И така, може би и вие, скъпи млади

πρόβλημα. Στην πραγματικότητα, τόσο αυτοί όσο και εμείς, όλοι μας, ανοίγουμε νέα πεδία γνώσης. Αυτό που χρειαζόμαστε είναι ανοιχτά μάτια, δηλαδή μάτια που μπορούν να δουν, ένα κοφτερό μυαλό ικανό να ερμηνεύσει την αιτία και το αποτέλεσμα, αλλά πάνω απ' όλα αυτό που ουσιαστικά χρειάζεται είναι λίγο παραπάνω περιέργεια.

Αν ο σερ Ισαάκ Νεύτων δεν αναρωτιόταν γιατί έπεσε το μήλο στη Γη, δε θα ξέραμε τίποτα για τη βαρύτητα. Αν ο Αρχιμήδης ο Συρακούσιος δεν ήταν περίεργος να ψάξει, γιατί το νερό ξεχείλισε στο πάτωμα όταν μπήκε στη μπανιέρα του, δε θα φώναζε «Εύρηκα». Και τα παραδείγματα μπορούν να συνεχιστούν.

Ήταν η περιέργειά τους που άλλαξε τον τρόπο που οι άνθρωποι έβλεπαν τον κόσμο και αυτή άλλαξε τον κόσμο. Άλλαξαν τον κόσμο. Έτσι μπορείς να κάνεις και συ νεαρέ



IT- Editorial

La curiosità non ha ucciso il gatto

Molte persone che non si possono definire scienziati hanno problemi a capire certe nozioni nel vasto campo della conoscenza scientifica.

Ad ogni modo, la via migliore per capire la Scienza è ... essere curiosi, andare indietro nel tempo trovando chi ha scoperto certi concetti, principi scientifici e dispositivi applicativi. All'inizio devi avere chiaro l'ambiente in cui essi hanno vissuto, e le conoscenze scientifiche basilari che potevano avere. Quindi, potrai capire e valutare il percorso che hanno seguito.

Conoscere e capire cosa lo scopritore sapesse e pensasse al momento della scoperta, ti aiuta a capire che non sei molto diverso da loro. Essi sono esseri umani, con corpo e cervello come i

SP- Editorial

La curiosidad no mató al gato

La mayoría de las personas que no se pueden llamar científicos tienen problemas para entender ciertas nociones relacionadas con este enorme dominio del conocimiento.

Sin embargo, la mejor manera de entender la ciencia es ser "curioso", es volver atrás en el tiempo e investigar a las personas que descubrieron ese principio científico, dispositivo o concepto. En primer lugar, hay que tener una idea clara de los tiempos en que se produjeron y en segundo lugar de los medios científicos generales de que se disponía. En ese momento, podremos leer una historia real; podremos ver en la forma real que se produjeron.

Lo que sucede cuando se mira a lo que los descubridores estaban pensando en el momento cuando los descubrimientos fueron realizados, ayudará a entender que no eran diferentes de nosotros. Eran seres humanos, cuerpos y cerebros, igual que

tuoi.

Quando si pensa alla Scienza, molti di noi pensano ad una élite specialistica capace di decifrare il mondo complesso che ci circonda; infatti essi, noi, tutti cerchiamo di semplificare la conoscenza. Ciò di cui abbiamo bisogno è aprire gli occhi per far sì che siano capaci di osservare, e una mente capace di riflettere sulla concatenazione tra causa ed effetto. Più di tutti, però, è essenziale più di curiosità.

Se Sir Isaac Newton non si fosse chiesto perché la mela cadesse a terra, non conosceremmo ancora la gravità. Se Archimede di Siracusa non avesse avuto la curiosità di trovare il motivo per cui l'acqua cadesse sul pavimento quando lui entrava nella sua tinozza da bagno, non ci sarebbe stato nessun "Eureka" … e gli esempi potrebbero continuare a lungo.

È stata la loro curiosità che ha trasformato molto profondamente il modo con cui la gente guardava il mondo. Essi hanno cambiato il Mondo! Adesso, giovane lettore, è il tuo momento: sii curioso!

nosotros.

Cuando pensamos en la ciencia, la mayoría de nosotros pensamos en una élite bien formada, capaz de descifrar todas las incógnitas que nos rodean. De hecho, ellos, nosotros, todos, estamos tratando campos de conocimiento. Lo que necesitamos son ojos abiertos, ojos capaces de ver, una mente aguda capaz de razonar desde la causa hasta el efecto, pero, sobre todo, lo que esencialmente necesitamos es un poco más de curiosidad.

Si Isaac Newton no se hubiera preguntado por qué la manzana cayó a tierra, no sabríamos acerca de la gravedad. Si Arquímedes de Siracusa no hubiera tenido curiosidad de descubrir por qué el agua salpicó el suelo cuando entró en su bañera, no habría habido un "Eureka". Y así, podríamos citar muchos más ejemplos.

Fue su curiosidad lo que cambió la forma en que la gente miraba el mundo y eso cambió el mundo. Ellos cambiaron el mundo. Así que, tu joven lector, también puedes. Por lo tanto, ¡Se curioso!

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A notable Bicentenary: Robert Stirling's Engine

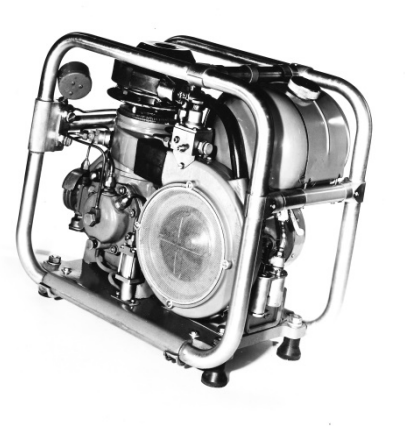

Fig. 7. Philips' Stirling engine powered electrical generator of mid 20th century that has become an icon of the resurgence of Stirling engines.

Fig. 8. The Glasgow Stirling engine model, courtesy Hunterian Museum, Glasgow

1. Modern times

Two modern investigators of the Stirling engine, Theodor Finkelstein and Allan J. Organ, were moved to say "The invention of the closed-cycle external combustion engine by Stirling in 1816 is therefore probably one of the most amazing innovations that has ever been made." . That is certainly putting it on a pedestal. It was not how the engine was seen for over a century after its invention. By 1920 it was almost a forgotten device. Another promoter of Stirling cycle machines has commented "The rebirth of the Stirling engines was due almost entirely to workers at Philips Research Laboratory in Eindhoven." Over the two decades from the end of the 1930s, Philips developed a portable machine running on paraffin (or petrol) that generated about 180 W of electricity at 220 V AC, ostensibly for running field radios and transceivers. A few hundred were produced. In 1961 they offered unsold stock to Universities for £75 (in the UK) and the illustration in Fig. 7 is the photograph accompanying the offer to my department. The reason for the offer usually quoted is that radio sets by then didn't need the amount of power that the engine offered but the offer letter states that Philips were concentrating their Stirling cycle effort on their Gas Refrigeration Machine . Whatever the cause, the Philips MP 1002CA and variants have become the icon of the modern resurgence of Stirling engines

2. Stirling Engine Models

Robert Stirling himself made at least two models of his engine. He gave one to the University of Edinburgh in the mid 1820s4 and one to the University of Glasgow in 1828 (Fig. 8). Both still exist.

If James Watt had personally made models of his innovative steam engine, or Niklaus Otto of the first practical internal combustion engine then they would be considered 'national treasures'. Stirling's models are becoming that. In 2015 the Glasgow model received the Institution of Mechanical Engineers (IMechE) Engineering Heritage Award.

Fig. 9 Small Stirling engine model of the γ-configuration sitting on a mug of hot water. The power piston is beneath the flywheel; the displacer is the dark object within the lower wide chamber.

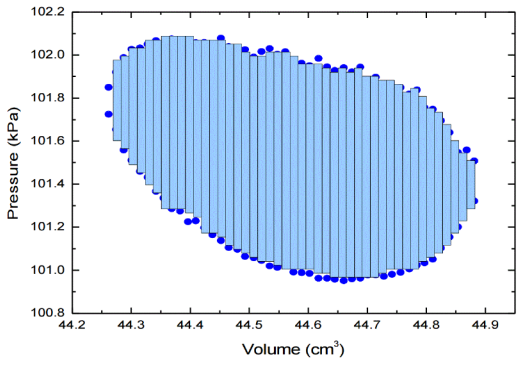

Fig. 10 Indicator diagram measured for a model similar to that in Fig. 8: courtesy Hiroko Nakahara7

William Thomson, later Lord Kelvin and one of Scotland's most famous physicists, demonstrated this model to his students for decades. It incorporates the improvement of water cooling. An entire book gives further details of both models, including plans for the model maker to replicate them5. The London Science Museum displays a sectioned copy of the Edinburgh model. Nowadays, small, modern models for sale abound on the internet. They look rather different.

The Stirling engine scales down very well, making possible small models that really work, even for small temperature differences. In fact it is scaling up Stirling engines to produce powers greater than about 10 kW that is particularly difficult. The scaling problem arises because the power an engine could produce scales as the cube of its dimensions but the surface area through which externally generated heat can be conducted into the engine increases only as the square of its dimensions.

The model shown in Fig. 9 is the so-called gamma (γ) version of the engine in which the displacer occupies a separate but directly connected chamber from the power piston. The displacer chamber is much wider than the power piston in order to transfer a reasonable amount of heat from the warm plate. The displacer stroke is correspondingly smaller.

Engines of this type are nicely described on the web, with animations6. The use of glass or Perspex for the cylinder sides helps to reduce the conduction of heat between the hot and cold reservoirs. Robert Stirling's use of a brass cylinder for the displacer in his first model explains why the Edinburgh version stopped after quite a short run.

It was undoubtedly the reason why he added a cooler to the Glasgow model. The author's version never fails to impress, for it runs for well over an hour with its base, the hot reservoir, on a mug of hot water, tea or coffee. The top plate is the cool reservoir.

It will run with the bottom plate warmed only by the heat of one's hand. Alternatively the model can be sat on a table and a cube of ice in a plastic bag (to contain the melted ice) placed on the top plate. There is no exhaust at all, no hiss of escaping steam nor throaty roar of fumes forced out into the atmosphere; just the quiet clickety-click of a few moving parts.

Toy models are fun but if a serious Stirling engine can produce electricity at say 5-10% efficiency from waste industrial hot water, then world-wide a huge amount of electricity could be generated from heat energy that is now dumped.

Models can make an excellent basis for project work, exploring how much work the engine can do and how efficient it is. Fig. 10 is an indicator diagram from a similar model to that shown in Fig. 9 determined by Hiroko Nakahara of the University of British Columbia from instrumenting his model.

It shows very well that a real Stirling engine differs substantially from the 'ideal' engine. His figures show that their engine produced 3.4 mW of power with an 'ideal' efficiency of 19%. In Nakahara's model the displacer was operated by a crank run from the same spindle as the flywheel. In the author's model (from Starpower), the piston includes a very small magnet in its base and when it nears the bottom of its travel the magnet attracts the foam displacer. This quickly moves the cool air above it to the warm plate below. As the piston rises the displacer is quickly dropped, now moving the heated air up to the piston cylinder. The displacer is no longer moving sinusoidally and this should make for a slightly more efficient engine, though it will take instrumentation to verify this.

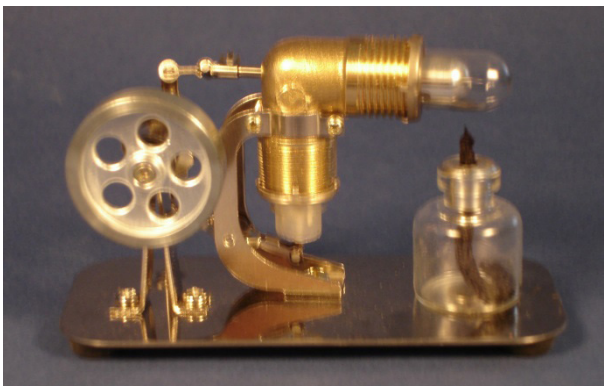

Fig. 11 Stirling engine model of the α-configuration with separate but connected cylinders containing the power piston and displacer: courtesy Allan Mills.

Fig. 11 shows a typical model of the alpha configuration of the Stirling engine in which the displacer is situated in a separate cylinder connected via piping that usually contains the regenerator. A wide variety of geometries can be found, from directly opposing cylinders, V-layout to the right-angle geometry of the model in Fig. 11. A small meths burner (on the right) heats the displacer piston and the model runs quickly for as long as the flame lasts. The enterprising amateur mechanic can make an alpha configuration version from an existing single-cylinder internal combustion engine, but replacing the ignition with a coupled displacer cylinder highlights the added mechanical complexity of the Stirling engine.

A variant of the α-version is the engine that James Stirling built for the foundry in Dundee he managed in the 1830s and in one form or another is the version that has been most commonly developed since for commercial engines that move machinery.

A modern take on the Stirling Engine

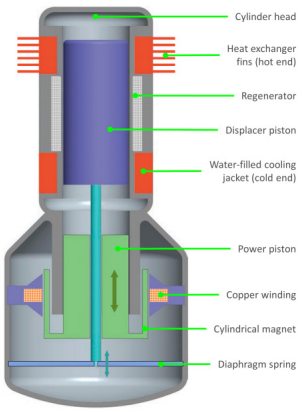

Fig. 12 Sectional view of a free-piston Stirling engine as used in the Baxi Ecogen and Viessmann micro-CHP appliances: courtesy Energy Saving Advisor8.

The free-piston Stirling engine is a development credited to William Beale in the 1960s that takes us back to the original β-configuration. Beale founded Sunpower Systems, whose website has an animation of the basic idea9. Free piston engines have no rotary parts and can be completely sealed. A version ideal as a useful electrical power generator is shown in Fig. 12. A nice piece of physics makes the operation possible. The phase angle between the displacer and the power piston can be controlled by adjusting the resonant frequency of the displacer and its attached spring. The piston is attached to a powerful magnet and the application of more basic physics results in its oscillatory motion inducing the generator's current in the enclosing coil.

High pressure helium is sealed in. There is no need for lubrication, cleaning or other regular maintenance. The whole engine is a sophisticated compound of simple ideas. The challenge is to make such devices cheap enough to generate a few kilowatts of electrical power economically.

Electricity can perform almost every function that needs power (provide transport, create heat and light, run machinery, etc.). It seems likely that the biggest role for Stirling engines in the future will be to create electricity for local use. In the late 1930s Philips did indeed begin on the right track to create the modern Stirling engine.

Robert Stirling and his Legacy

Robert Stirling moved to the Parish of Galston in Ayrshire in 1824 where he was to serve as its well respected Minister for 54 years. Retirement and a pension were not an option in the 19th century. This was close to Robert Burns country. His sons Patrick, William, Robert and James all became railway engineers: engineering was, it seems, in their genes. The fifth son,
David, became a Minister in Ayrshire. Five sons when he himself had had five sisters. Robert Stirling died at the age of 88 and is buried in Galston Parish churchyard where there is a memorial stone that was renewed in 2014 (Fig. 13). In the same year he was inducted into the Scottish Engineering Hall of Fame10, joining outstanding engineers like James Watt, Thomas Telford, J. W. Macquorn Rankine and physicists Lord Kelvin and James Clerk Maxwell.

Fig. 13 The new memorial stone in Galston cemetery: courtesy Galston Parish Church.

The Stirling engine had several advantages going for it. These included potentially better efficiency than steam engines, no valves, no cylinder exhaust, quieter running, no need for a plentiful supply of water, no risk of scalding boiler explosions with the accompanying high insurance, operation using a wide range of fuel, and more. Ideal, you might have thought, for a locomotive. Yet the fact is that the Stirling engine made little impact in the 19th century. One of the main troubles was that the high temperatures desirable for good efficiency were beyond the metallurgy of the day. Another requirement for good power output is to use very high pressure for the gas within the engine. High temperatures also create trouble for lubrication and piston rings. Stirling engines were large and heavy for the horsepower they produced. In the early years, although Robert Stirling maintained a close interest in his idea it could not have helped that he had a full-time job in quite a different field. His brother James, engineer by trade and enthusiast, seemed to bow out of developments in the 1840s. One can speculate that it was James's connections that facilitated the University of St Andrews awarding Robert Stirling a doctorate in 184011.

It is also clear in hindsight that heat engines of the Stirling type needed development on an industrial scale to become effective. Such development went into steam engines but it was individuals who tried to develop the hot-air engine. To cite one example, John Ericsson was a Swede who spent much of his almost equally long life developing similar 'caloric' engines between the 1820s and 1880s, with displacers and regenerators. He was a confident man, ambitious, excellent at raising capital and fairly prolific with his designs. He worked for much of the time in England and the United States. His ideas spawned several companies and at least three statues to him exist. In spite of all this, his engines (which were a variant on Stirling's in that they had valves) failed to displace the less efficient, noisy, potentially dangerous steam engines.

The history of air engine developments in the 19th century is a topic worth exploring12. There were hot-air engines with valves and compressed air engines. Stirling's engine was only a minor player. That, though, is history. There seems to be a feeling that the 21st century is the time of the Stirling engine. Metallurgy and lubrication are no longer insoluble problems. We shall surely hear more about Stirling engines in the coming years as their environmentally favourable credentials receive greater prominence. The web has many links to designs for small Stirling engines created by a wide spectrum of the interested, from tinkerers to NASA, some with You-Tube videos. You can also find on the web computer programs for predicting thermodynamic behaviour and efficiency, the Stirling Engine Society and other forums for enthusiasts.

3. Acknowledgements

I would like to thank Allan Mills for his encouragement to write this article and for supplying Fig.11; the archives departments of the Universities of Edinburgh and Glasgow for information on Stirling's University careers; The Hunterian Museum, Glasgow, for Fig. 8; Aberdeen City Library for access to THE ENGINEER mentioned in ref. 6.; the Energy Saving Advisor for permission to reproduce Fig. 12 and Galston Parish Church for Fig. 13.

Footnotes, including references

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(Endnotes)

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6. E.g. four different types of Stirling engine are described and nicely animated at **http://www.animatedengines.com/**; accessed 15th December 2015.

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11. Robert Stirling was awarded a Doctor of Divinity (DD) that would have enhanced his social standing. St Andrews University was the nearest university to the foundry that James Stirling managed. His father-in-law was the Professor of Logic at the University.

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A colourful World that affects our Emotions

O Lume colorată ce ne influențează emoțional

Introduction

Second after second, your eye and brain, as you look around, work together to gather information. You notice a red shiny apple nearby and decide whether you want to eat it. You look at the darkened sky and decide that it will rain today. You see the black ink written words you are now reading and sort out the meaning. In conclusion, you are being affected by colour. Is this statement true?

Fig.1.Colour in marketing

The colour of the apple you saw helps you decide its ripeness and desirability. The colour of the sky and clouds helps you know the weather. As you read the words of this article, your eyes are comfortable with the colour contrast between the black text and the background. So, perhaps without noticing it, we constantly use colour to help us process information about the world around us. But colour also has an impact on our emotions.

Advertising is nowadays the area where we can mostly identify the power of colours on our emotions. As you walk along the aisles of a store, you are surrounded by an array of packaging that is designed to catch your eye. Whether you realize it or not, advertisers carefully select colours and colour combinations to appeal to your specific desires, your gender, and your age group. Home decorators, clothing designers, and artists also know that colours can evoke emo-

Introducere

Clipă de clipă, ochiul și creierul, în timp ce priviți în jur, lucrează împreună pentru a strânge informații. Observați un măr roșu strălucitor în apropiere și hotărâți dacă vreți să-l mâncați. Priviți cerul întunecat și decideți că va ploua azi. Vedeți cuvintele scrise cu cerneală neagră pe care le citiți acum și le deduceți semnificația. În concluzie, sunteți afectat de culoare. Este adevărată această afirmație?

Culoarea mărului pe care l-ați văzut vă ajută să decideți dacă e copt și dacă-l doriți. Culoarea cerului și nori vă ajută să cunoașteți vremea. Pe măsură ce citiți cuvintele din acest articol, ochii dumneavoastră se acomodează cu contrastul de culoare dintre textul negru și fundal. Deci, fără a observa, folosim în mod constant culoarea pentru a ne ajuta să procesăm informații despre lumea din jurul nostru. Dar culoarea are și un impact asupra emoțiilor noastre.

Publicitatea este în prezent domeniul în care putem identifica în cea mai mare parte puterea culorii asupra emoțiilor noastre. Pe măsură ce vă plimbați de-a lungul culoarului unui magazin, sunteți înconjurat de o serie de ambalaje concepute pentru a vă prinde ochii. Indiferent dacă vă dați seama sau nu, agenții de publicitate selectează cu atenție culorile și combinațiile de culori pentru a face față dorințelor dumneavoastră specifice, sexului și grupului de vârstă. Decoratorii, designerii de îmbrăcăminte și artiștii știu, de asemenea, că culorile pot provoca un răspuns

tional response.

Moreover, people may interpret colours in different ways due to local culture and customs. For instance, some people in Asia associate red with good fortune and celebration, but in parts of Africa, red is the colour of mourning, while in other civilisations it denotes aggressively. In spite of their cultural inheritance, however, humans share the same emotional response to certain colours. Let us consider some colours and the way in which they can affect us.

Fig.2 Colours and emotions

emoțional.

În plus, oamenii pot interpreta culorile în moduri diferite datorită culturii și obiceiurilor locale. De exemplu, unii oameni din Asia asociază roșu cu noroc și sărbătoare, dar în unele părți ale Africii, roșu este culoarea doliului, în timp ce în alte civilizații denotă agresivitate. În ciuda moștenirii lor culturale, oamenii au același răspuns emoțional la anumite culori. Să luăm în considerare câteva culori și modul cum ne pot afecta.

Red

The red colour has very high visibility. Red has often been associated with energy, war, and danger. It is an emotionally intense colour and can enhance human metabolism, increase respiration rate, and raise blood pressure. Red is a dominating colour; red produces gravity and heightened awareness. Red can take on a variety of meaning, associated with both love and war, but the unifying factor in all meanings is a sense of importance, for example the effect of the red carpet.

Red is a colour best used cautiously. Its knack for attracting attention makes it a priceless tool for designers, but excessively it will inhibit relaxation. Lighter shades emphasize the energetic aspects of red – including youthfulness – while darker shades emphasize power, and even durability, such as a brick wall.

Roşul

Roșul are vizibilitate foarte mare. Roșul a fost adesea asociat cu energie, război și pericol. Este o culoare emoțională intensă și poate spori metabolismul uman, crește frecvența respirației și tensiunea arterială. Roșul este o culoare dominantă; roșu produce gravitate și conștientizare sporită. Roșul poate lua o varietate de semnificații, asociate atât cu iubirea, cât și cu războiul, dar factorul unificator în toate sensurile este un sentiment de importanță, de exemplu efectul covorului roșu.

Roșu este o culoare care trebuie cel mai bine sa fie folosita cu prudență. Nuanțele mai deschise subliniază aspectele energetice ale culorii - inclusiv tinerețea - în timp ce nuanțele mai întunecate subliniază puterea și chiar durabilitatea, cum ar fi un zid de cărămidă.

Green

The green colour produces a reaction opposite to that of red, for it slows metabolism and

Verdele

Verdele produce o reacție opusă celei de culoare roșie, deoarece încetinește metabolis-

produces a calming effect. Green is a restful colour and it is often associated with tranquillity. We feel relaxed when we see green gardens and hillsides.

As the bridge between stimulating warm colours (red, orange, yellow) and calming cool colours (blue, purple), it is the most balanced of colours, lending it an air of stability. It's also a popular choice as an accent or for calls-to-action because it stands out, but more softly than the warmer colours. In Western Culture, it also represents money and financial safety.

mul și produce un efect calmant. Verdele este o culoare odihnitoare și este adesea asociată cu liniștea. Ne simțim relaxați când vedem grădini verzi și dealuri.

Ca o punte între stimularea culorilor calde (roșu, portocaliu, galben) și culorile răcoroase (albastru, purpuriu), este cea mai echilibrată dintre culori, oferindu-i un aer de stabilitate. Este, de asemenea, o alegere populară ca accent sau pentru apeluri de acțiune, deoarece se evidențiază, dar mai încet decât culorile mai calde. În cultura occidentală, reprezintă și bani și siguranță financiară.

Fig.3. The red carpet effect

Blue

Itis considered to be one of the most popular colours in web design – and for good reason.

There is blue used on a lot of websites because, to sum it up, it is the colour of trust. Blue is the colour of calm and serenity, it inspires security and a feeling of safety. That is why, blue is a colour often used by banks. However the calming effects also make blue a friendly and inviting colour, which explains its adoption by Facebook and Twitter.

As if that weren't reason enough to use it, blue is also incredibly versatile; its vibrancy has more drastic effects than other colours. Light blue is the colour of water and the sky, so it generally has a refreshing and free feeling – even energizing if bright enough, but still retaining that reliable calm.

Albastrul

Albastrul este considerat a fi una dintre cele mai populare culori în designul web.

Albastrul este folosit pe o mulțime de site-uri web, deoarece este culoarea încrederii. Albastrul este culoarea calmului și a seninătății, inspiră siguranță și un sentiment de liniște. De aceea, albastrul este o culoare adesea folosită de bănci. Cu toate acestea, efectele de calmare, de asemenea, fac din albastru o culoare prietenoasă și primitoare, ceea ce explică adoptarea ei de către Facebook și Twitter.

Ca și cum acest lucru nu ar fi un motiv suficient pentru a o folosi, albastrul este, de asemenea, incredibil de versatil. Vibrația sa are efecte mai drastice decât a altor culori. Lumina albastră este culoarea apei și a cerului, astfel încât, în general, are un sentiment răcoritor și liber - chiar dacă este energizant dacă este suficient de luminos, dar păstrează încă acel calm sigur.

Purple

Associated in history with royalty, purple creates an air of luxury, even decadence. When decorating, the large use of purple is a easy way to create a sense of

Movul

Asociat în istorie cu regalitatea, movul creează un aer de lux, chiar decadență. Atunci când se decorează, utilizarea intensă a movului este o modalitate ușoară de a crea un sentiment de

elegance or high-end appeal, even if the budget is tight.

Lighter shades of purple bring to mind spring and romance, especially lavender.

Darker shades of purple add more mystery, and can even symbolize creativity. Darkening the shade will also turn the romantic elements more sensual.

Fig. 4. Lavander fields

Yellow

Yellow is a strange colour: it is often associated with happiness, but also activates the anxiety centre of the brain. Like red and orange, it's able to stimulate and vitalize – it's the colour of warning signs and taxis – but use bright yellow sparingly because of the potential negative connotations.

Lighter shades play on the happiness aspects, reminding users of summer and the sun. Darker shades, including gold, add more weight and give a sense of antiquity.

Fig. 5 Blue sky and green grass

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eleganță sau de înaltă calitate, chiar dacă bugetul este restrâns.

Nuanțele mai deschise ale movului aduc în minte primăvara și romantismul, mai ales lavanda.

Nuanțele mai închise ale acestuia adaugă un mister suplimentar și chiar pot simboliza creativitatea. Nuanțele mai închise vor face, de asemenea, ca elementele romantice să devină și mai senzuale.

Galbenul

Galbenul este o culoare ciudată: adesea este asociat cu fericirea, dar, de asemenea, activează centrul de anxietate al creierului. La fel ca și roșu și portocaliu, este capabil să stimuleze și să vitalizeze - este culoarea semnelor de avertizare și a taxiurilor - care folosesc galben strălucitor, din cauza potențialelor conotații negative.

Nuanțele mai deschise accentuează aspecte legate de fericire, amintindu-le utilizatorilor de vară și de soare. Nuanțele mai întunecate, inclusiv aurul, adaugă mai multă greutate.

Iconography

Fig.1.:http://blog.visme.co/wp-content/uploads/2015/08/color-psychology-marketing-brand-1024x590.jpg
Fig.2.:http://blog.visme.co/wp-content/uploads/2015/07/Colours-Mean-Brands1.jpg
Fig.3.:https://i.ytimg.com/vi/Z6po6SS9Uz4/maxresdefault.jpg
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Fig.5.:https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcQU-E__5omiga2g2nxgJQSnyz4aSKz40S8XaRgU-1brw5dhZPWJBpQ

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The SeaOtter's Fur

Introduction

Biomimetics is the imitation of the models, systems, and elements of nature for the purpose of solving complex human problems. The term "biomimetics" derive from Ancient Greek: βίος (bios), life, andμίμησις (mīmēsis), imitation, fromμιμεῖσθαι (mīmeisthai), to imitate, fromμῖμος (mimos), actor.

Living organisms have evolved well-adapted structures and materials over geological time through natural selection. Biomimetics has given rise to new technologies inspired by biological solutions at macro and nano scales. Humans have looked at nature for answers to problems throughout our existence. Nature has solved engineering problems such as self-healing abilities, environmental exposure tolerance and resistance, hydrophobicity, self-assembly, and harnessing solar energy.

Fig.1. The beaver

One astonishing exaple of applied biomimetic is the study of cold water mamals such as the sea otter or that of the sea beaver in order to find out how to produce equipment to be used in different areas that range from biology studies to wet suits for surfers.

The nature

Many aquatic mammals that live in cold waters have a thick layer of blubber under the skin to help them stay warm. The sea otter relies on another insulation method—a thick fur coat.

The fur of the sea otter is denser than that of any other mammal, with some one million hairs per square inch (155,000 per sq cm). When the otter swims, its coat traps a layer of air close to its body. That air acts as an insulator, preventing the

Blana Vidrei de Mare

Introducere

Biomimetica este imitarea modelelor, sistemelor și elementelor naturii în scopul rezolvării problemelor umane complexe. Termenul „biomimetică" derivă din greaca antică: βίος (bios), viața și μιμησις (mīmēsis), imitație, de la μιμέϊσθαι (mīmeisthai).

Organismele vii au dezvoltat structuri și materiale bine adaptate în timp geologic prin selecția naturală. Biomimetica a dat naștere unor noi tehnologii inspirate de soluții biologice la scară macro și nanometrică. Oamenii au studiat natura pentru a răspunde la probleme de-a lungul existenței noastre. Natura a rezolvat probleme de inginerie, cum ar fi abilitățile de auto-vindecare, toleranța la expunerea mediului și rezistența, hidrofobicitatea, auto-asamblarea și valorificarea energiei solare.

Una dintre cele mai uimitoare exemple de biomimetică aplicată este studiul mamiferelor de apă rece, cum ar fi vidra de mare sau cea a castorului de mare, pentru a fi în măsură să producă echipamente pentru a fi utilizate în diferite domenii care merg de la studiile de biologie la veste pentru surferi.

Natura

Multe mamifere acvatice care trăiesc în ape reci au sub piele un strat gros de grăsime, care le ajută să-și păstreze căldura corporală. Vidra de mare însă folosește altă metodă de izolare termică: o blană deasă.

Blana vidrei este mai deasă decât cea a oricărui alt mamifer, având aproximativ 155 000 de fire pe centimetru pătrat. Când vidra înoată, între fire, aproape de corp, rămâne un strat de aer. Acest strat are rol izolator, împiedicând apa rece

cold water from coming into direct contact with the animal's skin and sapping its body heat.

The immitation

Scientists believe that there is a lesson to be learned from the sea otter's fur. They have experimented with a number of artificial fur coats, varying such factors as hair length and hair spacing. The researchers have concluded that "the denser and the longer the hairs are, the dryer or the more water-repellent the hairy surface is." Put another way, sea otters can boast a truly efficient fur coat.

Fig.2. The Sea Otter

"We are particularly interested in wet suits for surfing, where the athlete moves frequently between air and water environments,' Anette (Peko) Hosoi, a professor of mechanical engineering and associate head of the department at MIT, told MIT News.

'We can control the length, spacing, andarrangement of hairs, which allows us to design textures to match certain dive speeds and maximize the wetsuit's dry region.'

Traditional wet suits are usually designed with a foamed neoprene, a stretchy synthetic rubber material, which can come in different thicknesses – the thicker the neoprene is, the warmer the suit will be.

However, while visiting Taiwan, Hosio and her team met with sporting goodsmakers who were interested in wetsuits with sustainability and asked about 'a bio-inspired solution'.

'Surfers, who go in and out of the water, want to be nimble and shed water as quickly as possible when out of the water, but retain the thermal management properties to stay

să intre în contact direct cu pielea și să reducă temperatura corpului.

Imitația

Oamenii de știință sunt de părere că pot învăța ceva studiind blana vidrei. S-au efectuat mai multe experimente cu diverse blănuri artificiale, factorii variabili fiind lungimea firului de păr și distanța dintre fire. Cercetătorii au ajuns la concluzia că „cu cât este mai deasă blana și cu cât este mai lung firul de păr, cu atât blana rămâne mai uscată, iar suprafața ei este mai hidrofugă". Simplu spus, vidra de mare se poate mândri cu o hăinuță de blană cu adevărat călduroasă.

„Suntem interesați în special de costumele pentru surfing, unde sportivul se mișcă frecvent între mediul aerian și cel al apei" - a declarat pentru MIT NewsAnette (Peko) Hosoi, profesor de inginerie mecanică și șef asociat al departamentului de la MIT.

„Putem controla lungimea, spațierea și aranjarea părului, ceea ce ne permite să proiectăm texturi pentru a se potrivi cu anumite viteze de scufundare și pentru a maximiza regiunea uscată a costumului."

„Costumele tradiționale sunt, de obicei, concepute cu un neopren spumat, un material elastic de cauciuc sintetic, care poate veni în diferite grosimi - cu cât este mai neopren, cu atât mai cald va fi costumul."

„Cu toate acestea, în timpul vizitei la Taiwan, Hosio și echipa sa s-au întâlnit cu producători de mărfuri sportive care erau interesați de costumele cu durabilitate și au cerut „o soluție inspirată din lumea biologică".

„Surferii, care intră și ies din apă, doresc să fie agili și să se scuture de apă cât mai repede posibil atunci când ies din apă, dar sa păstreze proprietățile de gestionare termică pentru a

warm when they are submerged", she said.

Conclusions

Researchers hope that their studies will lead to technological advances in the design and production of novel water-repellent textiles. This may lead some to wonder whether people who have to dive in cold waters may not be better off wearing a hairy wet suit—one similar to that of the sea otter!

Iconography:

Fig.1.:https://www.google.ro/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&cad=rja&uact=8&ved=0ahUKEwjp55qoq7XUAhUHSJoKHc2gBT4QjhwIBQ&url=http%3A%2F%2Fanimalsadda.com%2Fbeavers%2F&psig=AFQjCNGhMTzPw2JKcc34SRt7eR_lxDFkZw&ust=1497254896622838

Fig.2.:https://www.google.ro/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&cad=rja&uact=8&ved=0ahUKEwij1JLZq7XUAhWGCJoKHapoDHEQjhwIBQ&url=http%3A%2F%2Fkids.nationalgeographic.com%2Fanimals%2Fsea-otter%2F&psig=AFQjCNHgWD40MSJEUPjJ2AxTGu8sw84_cg&ust=1497254997575063

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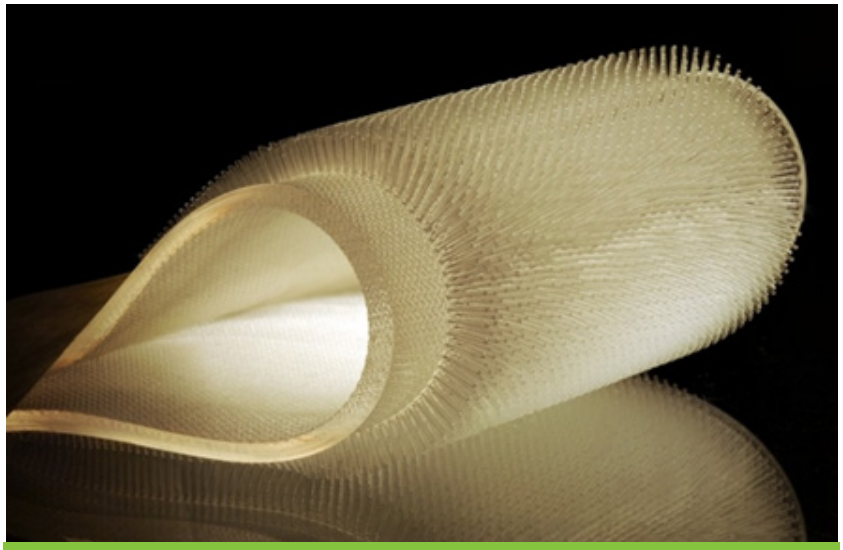

Fig.3. Beaver inspired wet suit fabric

Referred teacher: Gabriela Talabă

rămâne calde când sunt scufundati" - a spus ea.

Concluzie

Cercetătorii speră ca studiile lor să ajute la proiectarea și realizarea unor materiale textile hidrofuge mai performante. În urma acestor experimente, unii se întreabă dacă nu cumva ar fi mai bine ca scafandrii care fac scufundări în ape reci să poarte un costum umed de blană, asemănător cu cel al vidrei de mare.

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New Technology in the Kitchen

In our free time unfriendly world, eating healthy has become a problem. Scientists have invented a lot of devices to be used to make cooking healthier and easier Here is an array of the best gadgets that technology brought into our kitchens.

An excellent investment to help people cook healthy legumes and whole grains. Taking only about a quarter of the time of a regular stove-top saucepan, it is very useful for busy workers. A high-legume intake is the strongest dietary predictor of a long life span!

Your vegetables or lean meats can be char-grilled without any added oil by pressing them between non-stick ribbed cooking plates, which allow any fat to drain away in a removable tray.

Fig.1. Pressure cooker

This ageless time-saving device helps make moist and tender meals, such as casseroles, legume curries and soups with little effort. People simply set the meal in the mornings and it cooks all day without supervision.

A rice cooker is an invention that steams rice so that it is light and fluffy without adding oil or fat. Smaller rice cookers for 1-2 persons are also available. The best rice types include brown, red, basmati and Doongara.

The steamer is the original way

Tehnologie nouă în Bucătărie

În lumea ocupată lipsită de orice timp liber în care trăim, mâncarea sănătoasă a devenit o problemă. Oamenii de știință au inventat o mulțime de dispozitive care să fie folosite pentru a face ca gătitul sa fie mai sănătos și mai ușor. Iată o serie dintre cele mai bune aparaturi pe care tehnologia le aduce în bucătăriile noastre.

O investiție excelentă pentru a ajuta oamenii să gătească leguminoase sănătoase și cereale integrale. Durând doar aproximativ un sfert din timpul normal de gătire, este foarte utilă pentru muncitorii ocupați. Un aport ridicat de leguminoase este cel mai puternic indicator alimentar pentru o durată lungă de viață!

Legumele dvs. sau carnea slabă pot fi gătite fără grijă, fără adăugarea de ulei prin presarea lor între plăcile de gătit cu nervuri lipite, care permit ca orice grăsime să se scurgă într-o tavă detașabilă.

Fig. 2. Health grill

Acest dispozitiv fără vârstă vă ajută să faceți mâncăruri lichide și delicate, cum ar fi tocănițe, curry de legume și supe, depunând doar puțin efort. Se fixează mâncarea dimineața și se gătește toată ziua fără supraveghere.

Fierbătorul de orez este o invenție care fierbe orezul la aburi, astfel încât este ușor și pufos fără a adăuga ulei sau grăsime. Sunt disponibile și fierbătoare de orez mai mici pentru 1-2 persoane. Cele mai bune tipuri de orez includ orezul maro integral, cel roșu, orezul basmati și Doongara.

Aparatul care gătește cu aburi reprezintă mod-

to cook low-fat vegetables. Steamers usually come with a pot or set of pots, or they can be bought separately. For extra flavour, the vegetables can be sprinkled with lemon juice and fresh herbs, or they can be added a dollop of low-fat yoghurt rather than drowning them in oil or sour cream.

These make healthier stir-fries loaded with colourful vegetables but lean on the oil. Non-stick and titanium woks are now available, which don't require seasoning. Titanium is the premium choice, as it is an excellent heat conductor.

A salad spinner is used to spin-dry washed leaves, so they are refreshed but not soggy. A mini spinner is also available on the kitchen utensils market, which is ideal for a single person or delicate greens, such as rocket or fresh herbs and berries. It helps us enjoy dark leafy greens every day!

ul original de a găti legume cu conținut scăzut de grăsimi. Aparatul care gătește cu aburi este produs de obicei cu un vas sau set de vase sau pot fi cumpărate separat. Pentru o aromă suplimentară, legumele pot fi stropite cu suc de lămâie și ierburi proaspete, sau le poate fi adăugată o lingură mare de iaurt cu conținut scăzut de grăsime, mai degrabă decât să fie înecate în ulei sau smântână.

Acestea fac stir-fry - amestec de legume colorate - sărace în ulei. Acum există pe piață si produse care nu necesită folosirea de grăsime care sunt din materiale anti-aderente sau titan. Titanul este alegerea cea mai bună, deoarece este un excelent conductor de căldură.

Uscătorul de salată este folosit pentru a se usca prin centrifugare frunze de legume, astfel încât acestea rămân proaspete dar nu încărcate de apă. Un mini uscător de salată este de asemenea disponibil pe piața ustensilelor de bucătărie, care este ideal pentru o singură persoană sau pentru verdețuri mărunte, ierburi proaspete și fructe de pădure. Ne ajută să ne bucurăm în fiecare zi de verdeață!

Fig.3. Slow cooker

Fig.4. Rice cooker

A blender (sometimes called a liquidiser in British English) is a kitchen and laboratory appliance used to mix, purée, or emulsify food and other substances. A stationary blender consists of a blender jar with a rotating metal blade at the bottom, powered by an electric motor in the base. Some powerful models can also crush ice. The newer immersion blender configuration has a motor on top connected by a shaft to a rotating blade at the bottom, which can be used with any container.

Un blender (uneori numit lichidifiant în limba engleză britanică) este un aparat pentru bucătărie și un aparat de laborator folosit pentru amestecarea, pulverizarea sau emulsifierea alimentelor și a altor substanțe. Un blender staționar este alcătuit dintr-un vas de amestecare cu o lamă de metal rotativă la partea inferioară, alimentată de un motor electric în bază. Unele modele puternice pot zdrobi gheata. Configurația noului mixer cu imersiune are un motor conectat la partea superioară printr-un arbore, la o lamă rotativă la partea inferioară, care poate fi utilizată cu orice recipient.

Webgraphy
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Fig.2:http://brain-images.cdn.dixons.com/2/4/10892942/l_10892942_001.jpg
Fig.3.:https://images.apester.com/user-images%2Fd7%2Fd7071392a106a658c49e3d991aaa1550.jpg/600/undefined/undefined
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Fig.6.: https://img.difoosion.com/wp-content/blogs.dir/32/files/2015/06/Wok.jpg
Fig.7.:http://www.strombergs.se/media/catalog/product/cache/1/image/1000x1000/9df78eab33525d08d6e5fb8d27136e95/3/5/35135.jpg
Fig.8.: http://www.hargaplus.xyz/daftar-harga/blender-maspion

Fig.5. Steamer

Fig.6. Wok

Fig.7. Salad spinner

Fig.8. Blender

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14-16

The 3D Printing

The 3D printing is a new technology that consists of creating a three-dimensional object superimposing material layers successively. It is made with the manufacturing by addition, that contrary to the manufacturing by subtraction (taking a big piece of material and give shape to it), the object is created with a digital stencil adding dispersed material little by little.

The 3D printing is carried out in a 3D printing machine, a machine that from a design made in a computer, it can create figures with volume, that is to say, figures with height, length and width.

Every 3D printing machine creates objects by layers by an addition process. The different types of 3D printing machines differentiate because of the differences in the object's manufacturing process:

•Ink printer: is uses an ink with binder function that compacts the dust. Using the ink, we can print in different colors. Using as material the plaster (also cellulose, but it is less frequent) the obtained piece is fragile. We can harden it inecting cianocrilato or epoxi, or give it elasticity injecting elastomers.

It is faster and more economic than the other printing methods, but the result is more fragile.

•

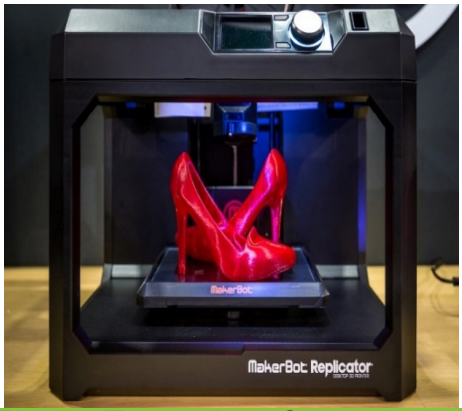

Fig.1. Example of a printing machine

Laser printer: it joins the particles of substratum (plastics or metals) with a high power

La Impresión 3D

La impresión 3D es una nueva tecnología que consiste en crear un objeto tridimensional superponiendo capas de material sucesivamente. Es realizada mediante la fabricación por adición, que al contrario de la fabricación por sustracción (coger una pieza grande de un material y luego ir dándole forma), se va creando el objeto con una plantilla digital añadiendo poco a poco material disuelto.

La impresión 3D se lleva a cabo en una impresora 3D, que es una máquina que a partir de un diseño hecho en el ordenador, es capaz de crear figuras con volumen, es decir, figuras con alto, largo y ancho.

Todas las impresoras 3D crean los objetos por capas mediante un "proceso aditivo". Los distintos tipos de impresoras 3D se distinguen por las diferencias que hay en el proceso de fabricación del objeto:

•Impresora de tinta: utiliza una tinta con función de aglomerante que compacta el polvo. Al usar tinta, se puede imprimir en varios colores. Al utilizar como material escayola (o también celulosa, pero es menos frecuente) la pieza obtenida es frágil. Se puede endurecer infiltrando cianocrilato o epoxi, o darle elasticidad introduciendo elastómeros.

Es un método más rápido y económico que los otros sistemas de impresión, pero el resultado obtenido es más frágil.

Fig.2. Printing of clothes

•Impresora láser: une las partículas de sustrato (plásticos o metales) con un láser de alta poten-

laser. These particles heat up melting with those that surround them and with the lower layer. The obtained pieces are of one color and they are very rigid. The obtained product can be polished, contrary to the ink printers.

This printing method is slower and more expensive, however, the results have a bigger resistance.

•Printer that inject polymers: it injects liquid resins cured with ultraviolet light (photopolymers with an acrylic base). It has a big precision and its surface texture is characteristic. It is not necessary to wait for the impression.

This printer was the first in injecting two materials in the same impression.

cia. Estas partículas se calientan fundiéndose con las que las rodean y con la capa inferior. Las piezas que obtenemos son de un solo color y tienen gran rigidez. El producto obtenido se puede pulir, a diferencia del de las impresoras de tinta.

Es un método más caro y lento, aunque los resultados obtenidos son más resistentes.

•Impresoras que inyectan polímeros: inyecta resinas en estado líquido curadas con luz ultravioleta (fotopolímeros con base acrílica). Tiene mucha precisión y su acabado de superficie es característico. No hay que esperar tiempo para la impresión.

Esta impresora ha sido la primera en conseguir inyectar dos materiales en la misma impresión.

Fig.3. ink printer

Fig.4. Laser printer

Materials

Most common materials

•ABS: it is the plastic that we find in electrical appliances and some toys. It resists high temperaturas and it is very hard. It is possible to paint it and it is easy to paste other pieces on it.

•PLA: it is a thermoplastic of natural origin. It has a lot of colors and its impression is faster. It doesn't send out toxic gases, contrary to the ABS.

Other materials to obtain a special texture or flexibility

Materiales:

Materiales más comunes

•ABS: es el tipo de plástico que encontramos en electrodomésticos y algunos juguetes. Resiste altas temperaturas y es muy duro. Se puede pintar sobre él y es fácil pegar en él otras piezas.

•PLA: es un termoplástico de origen natural. Tiene una gran diversidad de colores y una impresión más rápida. No emite gases tóxicos, a diferencia del ABS que sí lo hace.

Otros materiales que nos permiten obtener una textura especial o flexibilidad

•Laybrick: mixture of gypsum and plastic. The created pieces have a texture similar to the one of the rocks.

•Laywoo-D3: mixture of wood and plastic. The created objects look like wood.

•Soft PLA (flexible PLA): it is made of rubber. This material makes the impression of flexible objects possible.

•Nylon: it is more resistant and flexible tan the ABS and the PLA. It is natural, waterproof and reusable.

•Bendlay: it is flexible and transparent. It is used to make pans and bottles, so it is secure for the contact with food.

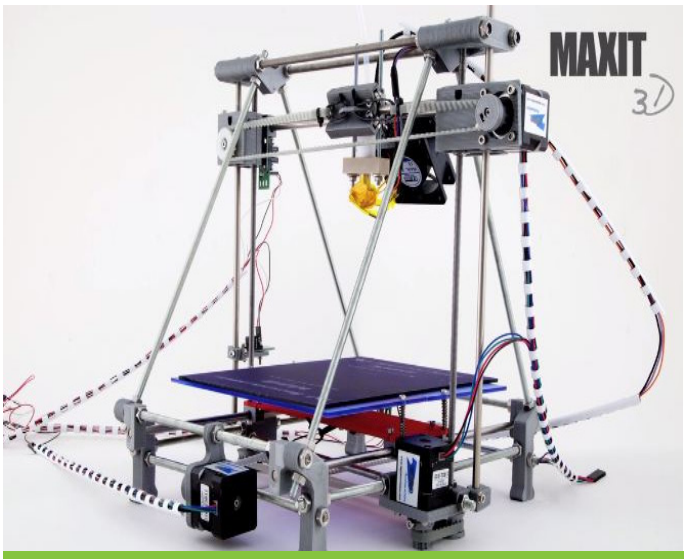

Fig.5. Printer that injects polymers

Uses

In medicine

The use of 3D printing machines is very advanced. It is used in:

•Prosthesis: at the beginning it was only used in odontology and, nowadays, it is used to make other implants of prosthesis too. One of the advantages is that children that need prosthesis can change them without wasting a lot of money when they grow.

•Transplant: nowadays, a tissue similar to the human tissue has been printed, some bones of the cranium to reconstruct a face and a vertebra to replace one with cancer.

•Laybrick: mezcla de yeso y plástico. Las piezas creadas tienen una textura similar a la de la piedra.

•Laywoo-D3: mezcla de madera y plástico. Los objetos se ven como de madera.

•Soft PLA (flexible PLA): es de goma. Permite la impresión de objetos flexibles.

•Nylon: es más resistente y flexible que el ABS y el PLA. Es natural, resistente al agua y reutilizable.

•Bendlay: es flexible y trasparente. Se usa para hacer recipientes y botellas, pues es seguro para el contacto con la comida.

Usos:

En medicina

El uso de las impresoras 3D en este campo está muy avanzado. Se emplea en:

•Prótesis: al principio sólo se utilizaba en la odontología y ahora se usa también para realizar otros implantes de prótesis. Una de las ventajas de estas prótesis, es que los niños que las necesitan según van creciendo pueden ir cambiando su prótesis sin que cueste una gran cantidad de dinero.

•Trasplantes: hoy en día, ya se ha impreso un material parecido al tejido humano, algunos de los huesos del cráneo para reconstruir un rostro y una vértebra para sustituir a una con un tumor maligno.


Fig.6. Roll of ABS


Fig.7. Roll of PLA

•Organs: to print, alive cells are used. It is one of the biggest objectives that we want to reach, being the biggest of them the heart impression. Some miniature prototypes have been done.

•Others:

-Escoliosis: is a desviation of the spine. When the curve passes a certain number of degrees, is necessary to wear a corset. The printed corset is more adapted to the person and more comfortable.

-To print sonographies.

-To replace an arm sling.

•Órganos: como material para imprimir se utilizan células vivas. Es uno de los grandes objetivos que se quieren alcanzar, siendo el mayor de ellos la impresión del corazón. Se han realizado algunos prototipos en miniatura.

•Otros:

-Escoliosis: es una desviación de la columna vertebral. Cuando la curva supera unos determinados grados, se debe usar un corsé. Se puede imprimir un corsé mejor adaptado a la persona y que resulta más cómodo.

-Se usa para imprimir ecografías.

-Como sustitución de la escayola.

Fig.8. Prosthesis of a child

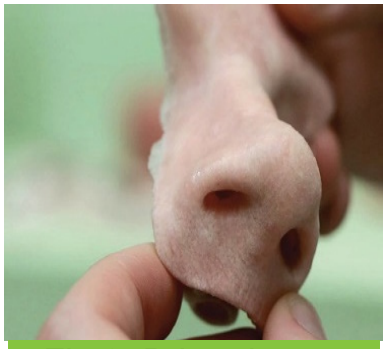

Fig.9. Printed nose

In automotion: creation of prototypes of vehicles.

In the space: NASA and ESA are working to create components and tools that can be printed directly into space to save weight and space.

In the industry: impression of clothes, trainers…

In the diet: manufacture of chocolate cake, pizza bases…

Finally, 3D printing has the advantages that created objects can be customized and that in the future it will have multiple applications.

The disadvantages are that, currently, it is an expensive method and the process is slow. Because of that, 3D printing machines aren't used at home yet.

En automoción: creación de prototipos de vehículos.

En el espacio: la NASA y la ESA están trabajando para poder crear componentes y herramientas que se puedan imprimir directamente en el espacio para ahorrar peso y espacio.

En la industria: impresión de ropa, zapatillas de deporte…

En la alimentación: fabricación de tartas de chocolate, bases de pizzas…

Finalmente, la impresión 3D tiene las ventajas de que los objetos creados pueden ser personalizados y que en el futuro tendrá múltiples aplicaciones.

Las desventajas son que actualmente es un método caro y el proceso es lento, por eso todavía no se usan las impresoras 3D en casa.

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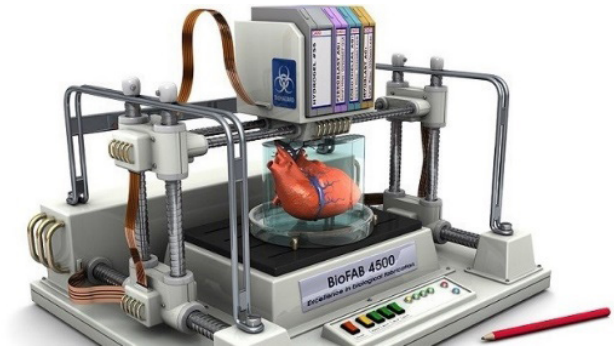

Fig.10. Printed nose

Iconography:
Picture 1: http://3dmakers.com.mx/wp-content/uploads/2016/07/como-funciona-una-impresora-3d.jpg
Picture 2: http://bsdi.es/wp-content/uploads/2016/11/3d-760x675.jpg
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Picture 6: http://tn.cdn.neox.es/thumbs/fotos/1087x1024_3/1881-rollo-abs.jpg
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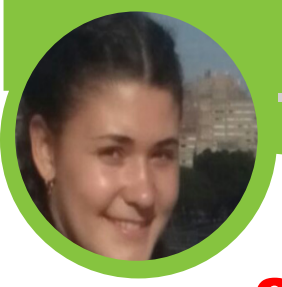
Picture 11: http://monicadeprit.com/wp-content/uploads/2016/02/2A.jpg

Fig. 11. Printed arm sling

Referred teacher: Ángel Delgado-Aguilera Muñoz



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3D Glasses

Introduction

The 3D glasses are glasses that allow people to see in three dimensions certain two-dimensional images.

Stereoscopy is a technique capable of collecting three-dimensional visual information and creating the illusion of seeing more deeply through a stereographic image.

The history of glasses and stereoscopy is very interesting, since these two are closely related using most of the advances of one subject in the other immediately, although not always the stereoscopy covers a spectrum bigger than the one of the 3D glasses.

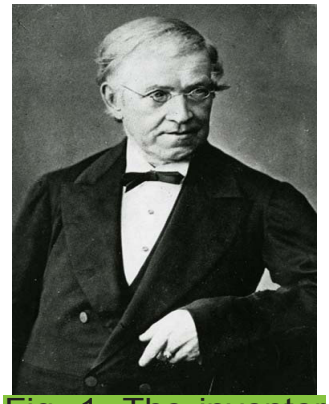

Fig. 1. The inventor Charles Wheatstone

The most important events of stereoscopy of the 3D glasses are:

•In 1838, a British scientist named Charles Wheatstone was the first creator to create the illusion of 3D through two images.

•In 1853, a German named Willhelm Rollmann published an article called "Two New Stereoscopic Methods," where the method of anaglyphs, a new type of 3D glasses, is first written.

•In 1970, Stephen Gibson discovers the system called, "Deep Vision". This system is based on red-cyan anaglyphs. This system will be the most used because it can reproduce skin colour and other colours

Las Gafas 3D

Introducción

Las gafas 3D son gafas que permiten ver en tres dimensiones en ciertas imágenes bidimensionales.

La estereoscopia es cualquier técnica capaz de recoger información visual tridimensional y crear la ilusión de ver con más profundidad mediante una imagen estereográfica.

La historia de las gafas y de la estereoscopia es muy interesante, ya que estas dos están muy relacionadas usándose la mayoría de los avances de una materia en la otra inmediatamente, aunque no siempre ya que la estereoscopia cubre un espectro más grande que el de las gafas 3D.

Fig. 2. A stereoscope

Los acontecimientos más importantes de la estereoscopia de las gafas 3D son:

•En 1838, un científico británico llamado Charles Wheatstone fue el creador del primer estereoscopio que permitía crear la ilusión de 3D a través de dos imágenes.

•En 1853, un alemán llamado Willhelm Rollmann publicó un artículo llamado "Dos nuevos métodos estereoscópicos", donde se escribe por primera vez el método de los anaglíficos, es decir, un nuevo tipo de gafas 3D.

•En 1970, Stephen Gibson descubre el sistema llamado, "Deep Vision" que significa visión profunda. Este sistema se basa en anaglíficos rojo-cyan. Este sistema será el más utilizado debido a que se puede reproducir el color de la piel y otros

better than red-blue or red-green.

3D types of glasses

The 3D glasses can be classified into two initial groups that would be passive glasses and active glasses.

The passive group consists of anaglyphic glasses, polarized glasses and pulfrich glasses. The group of the active ones forms the glasses of obstruction.

The glasses are divided in this way because it depends on whether they have something that makes them dynamic or not.

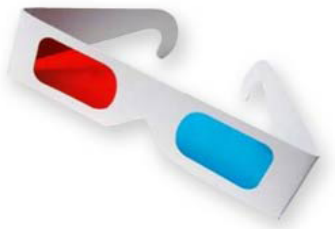

Fig. 3. 3D glasses

To know more in depth each type of glasses, here you will find a brief description:

-The 3D anaglyphic glasses are the best known 3D glasses and are the ones that are currently used.

-Polarized 3D glasses are the second most popular or used and in recent years have been used in theatres and in amusement parks versus the anaglyphs.

Fig.5. 3D anaglyphic glasses

-The 3D Pulfrich glasses (named for astronomer Carl Pulfrich) are based on the fact that our human brain processes to see more easily an image with light than another without light.

-The glasses have a transparent the best 3D glasses today. The lenses are turned off or activated depending on the content that is intended for each eye.

colores mejor que el rojo-azul o rojo-verde.

Tipos 3D de gafas

Las gafas 3D pueden se pueden clasificar en dos grupos iniciales que serian las gafas pasivas y las gafas activas.

El grupo de las pasivas lo forman las gafas anáglifas o anaglíficas, las gafas polarizadas y las gafas Pulfrich. El grupo de las activas lo forman las gafas de obturación.

Las gafas se dividen de esta manera porque depende de si disponen de algún elemento que las hace dinámicas o no.

Fig. 4. An illusion of depth

Para conocer con más profundidad cada tipo de gafas, aquí encontraras una breve descripción:

•Las gafas anaglíficas son las gafas 3D más conocidas y son las que se usan actualmente.

•Las gafas 3D polarizadas son las segundas más populares o utilizadas y en los últimos años se han utilizado en los cines y en parques de atracciones frente a las anaglíficas.

Fig. 6. Polarized glasses

•Las gafas de Pulfrich se basan en que nuestro cerebro humano procesa con más facilidad una imagen con luz que otra sin luz. Las gafas tienen una lente transparente y otra más oscura.

•Las gafas de obturación, para mucha gente, son consideradas las mejores gafas 3D de la actualidad. Los lentes, se apagan o se activan dependiendo del contenido que va destinado para cada ojo.

What are 3D glasses glasses used for?

3D glasses are for watching movies. These glasses help make the film more realistic, where at a moment you think that you are really in the movie, this allows us to live a video game, such as Avatar, Temple Run, etc. They attract people's attention. In horror movies or thriller, the movie is a thousand times scarier with the 3D glasses than without them, this can terrify the person who is watching this type of films.

Fig.7. 3D Pulfrich glasses

When you are watching a 3D movie and you want to remove your glasses out of curiosity you will be able to see, when watching the screen, two desynchronized images, with blue and red colours or a grayscale out of phase. Putting on the glasses, we enter a new world of 360 degrees. As you turn your head in all directions, up, down, sideways, you discover the content that is in that area.

When you watch the movies, you get the impression that the characters are coming out of the screen, you even think you can touch them.

Most people have probably thought of keeping the 3D glasses after watching a movie. Although it sounds absurd, there are some glasses that serve to watch the television at home, also depending on the type of screen. When you have the opportunity, try this "experiment".

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www.gafas3d.com/historia-de-las-gafas-3d/
https://www.ocu.org/tecnologia/.../gafas-3d-que-son-y-como-funcionan561344

¿Para qué sirven?

Las gafas 3D sirven para ver películas. Estas gafas ayudan a que la película sea más realista, donde en un momento creas que verdaderamente estas tu metido dentro de la película, esto nos permite vivir un videojuego, como por ejemplo Avatar, Temple Run, etc.... Captan más la atención del público. En las películas de terror o thriller, la película da mil veces más miedo con las gafas 3D que sin ellas, esto puede aterrorizar mucho a la persona que está viendo este tipo de películas.

Fig. 8. Glasses of Obturation

Cuando estás viendo una película en 3D y se te ocurre quitarte las gafas por curiosidad podrás apreciar, al mirar la pantalla, dos imágenes desincronizadas, con colores azul y rojo o una escala de grises desfasados. Al ponernos las gafas, entramos en un nuevo mundo de 360 grados. Al ir girando la cabeza en todas las direcciones, arriba, abajo, hacia los lados, descubrimos el contenido que se encuentre en esa zona.

Al ver las películas, te da la impresión de que los personajes atraviesan o salen de la pantalla, incluso crees que puedes tocarlos.

A la mayoría de las personas, seguramente, se les haya pasado por la cabeza, quedarse con las gafas 3D después de ver una película. Aunque parezca absurdo, hay algunas gafas que si sirven para ver la televisión en casa, dependiendo también del tipo de pantalla. Cuando tengas la oportunidad intenta este "experimento".

Iconography

Fig.1:https://estudiosdelafisica.wordpress.com/2015/04/02/charles-wheatstone/
Fig. 2: https://es.wikipedia.org/wiki/Estereoscopio
Fig.3:http://articulo.mercadolibre.com.ar/MLA-616178174-lentes-3d-gafas-anaglificas-anteojos-anaglifos-3d-_JM
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Fig. 5: https://www.laneros.com/temas/gafas-3d-anaglificas.158948/
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Fig.8:http://www.capital.com.pa/2011-%C2%BFle-diremos-adios-a-las-gafas-3d/
Fig.12:http://www.jotdown.es/2011/05/tres-dimensiones-contra-cuatro-paredes/
Fig.9:http://es.globedia.com/la-television-en-tres-dimensiones
Fig.10http://facilidades-m-art.blogspot.com.es/2014/02/dibujos-en-tres-dimensiones.html

Fig. 10. Three-dimensional drawing

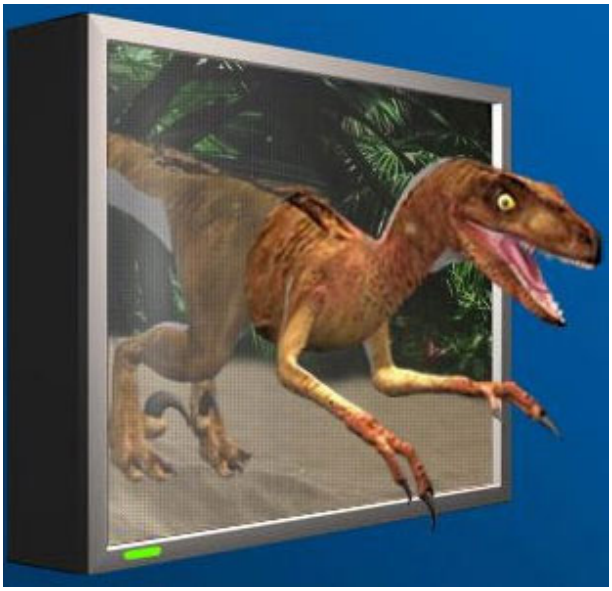

Fig. 9. Three-dimensional image

Fig. 11. Desynchronized images

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Adrian - Daniel Baku
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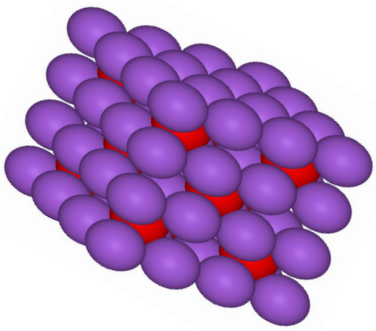
Mircea Cristea Technical College of Brasov

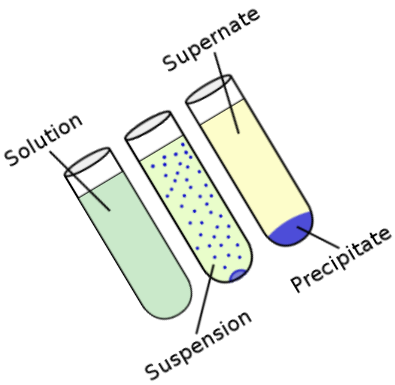
CAN YOU GUESS? WHAT COULD IT BE?

Q: Did you hear oxygen went on a date with potassium?
A: It went OK

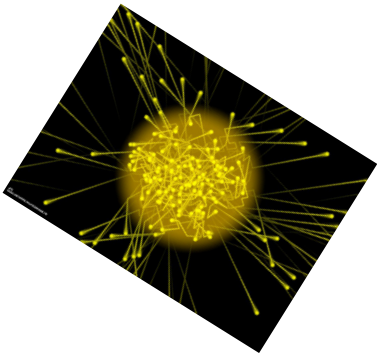


If the Silver Surfer and Iron Man team up, they'd be alloys.

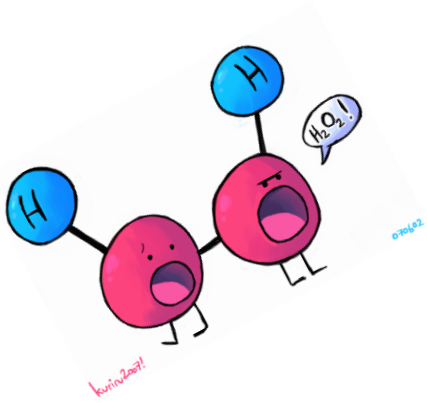
If you're not part of the solution, you're part of the precipitate.



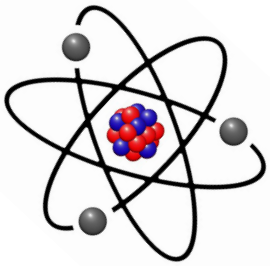
A photon checks into a hotel and is asked if he needs any help with his luggage. He says, „No, I'm traveling light."



Two chemists go into a bar. The first one says „I think I'll have an H_2O." The second one says „I think I'll have an H_2O too" — and he died.



Q: Why can you never trust atoms?
A: They make up everything!

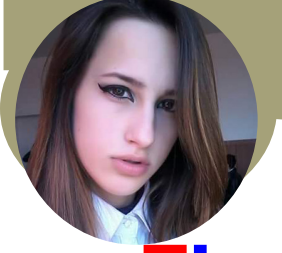


I had to make these bad chemistry jokes because all the good ones Argon.

Why throw it away?

Plastic bottles are known to be one of the most common pollutant of the environment!
Why not re-use them?
Here are some suggestions

Referred teacher: Monica Cotfas



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The second Brain

Al doilea Creier

Motto: "All disease begins in the gut." -Hippocrates

How many brains do we have? If we answer "one," our teachers tell us that we are correct. Yet, there are other nervous systems in your body.

One network of neurons is so extensive that some scientists have referred to it as a "second brain." It is the enteric nervous system (ENS) and is located, not in our head, but mostly in our belly.

In order that the body transform food into fuel, it uses an enormous amount of coordination and effort. Hence, it is fitting that the brain is designed to delegate, as it were, most digestive control to the ENS.

While much simpler than the brain, the ENS is immensely complex. In humans, it is made up of an estimated 200 to 600 million neurons. This complex network of neurons is built into the digestive system. Scientists believe that if the function of the ENS were to take place in the brain, the

Moto: „Orice boală începe în intestine" -Hippocrates

Câte creiere avem? Dacă răspundem „unu", profesorii noștri ne spun că avem perfectă dreptate. Totuși, avem și alte sisteme nervoase.

Unul dintre acestea, o vastă rețea de neuroni, a fost denumit de unii dintre oamenii de știință „al doilea creier". Este vorba de sistemul nervos enteric (SNE), localizat nu la nivelul capului, ci al abdomenului.

Pentru ca organismul să transforme hrana în combustibil, îi sunt necesare mult efort și o bună coordonare. Prin urmare, creierul i-a delegat, ca să zicem așa, sistemului nervos enteric cea mai mare parte a controlului asupra digestiei.

Deși mult mai simplu decât creierul, SNE este extrem de complex. La om, el este alcătuit din 200-600 de milioane de neuroni. Această rețea complicată de neuroni intră în alcătuirea sistemului digestiv. Oamenii de știință cred că, dacă funcțiile SNE ar fi

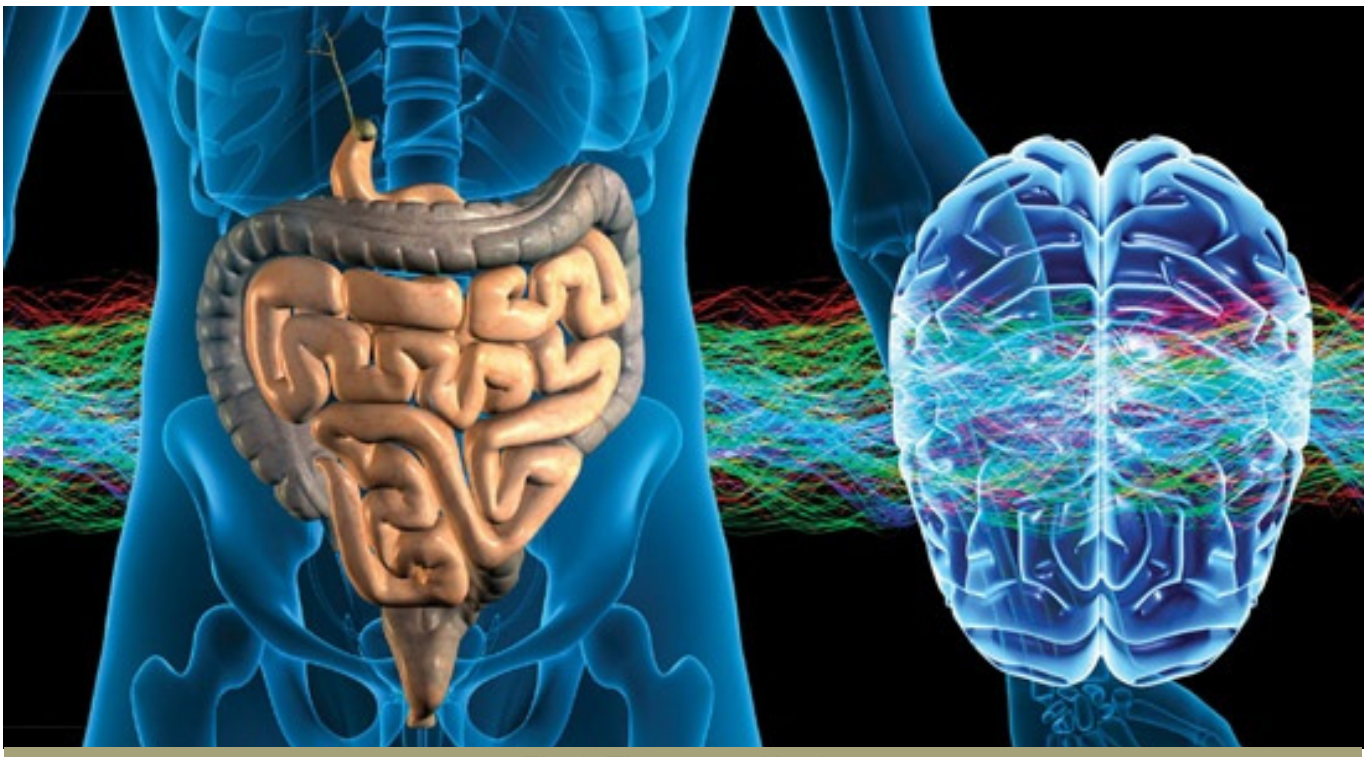

Fig.1. The second brain

needed nerves would be too thick. According to the book „The Second Brain" by Michael Gershon, it is thus both safer and more convenient to let the digestive system look after itself", as Michael Gershon states in his book entitled the Second Brain.

Food digestion requires a variety of very precise chemical mixtures produced at the right times and delivered to the right locations. Professor Gary Maweaptly describes the digestive system as "a chemical workshop." The sophistication of this chemical operation is mind-boggling. For instance, the intestinal wall is lined with specialized cells that act as chemical detectors, or taste receptors, identifying chemicals present in the food you eat. This data helps the ENS enlist the right digestive enzymes to break the food down into particles that the body can absorb. Also, the ENS plays a vital role in monitoring the acidity and other chemical properties of food particles and in adjusting the digestive enzymes accordingly.

îndeplinite de creier, nervii necesari ar fi prea groși?. „Prin urmare, e mai sigur și mai convenabil ca sistemul digestiv să-și poarte singur de grijă", se arată în cartea The SecondBrain a lui Michael Gershon.

Digestia alimentelor necesită un anumit amestec chimic, produs în anumite momente și trimis spre anumite locații. Dr. Gary Mawe, descrie sistemul digestiv drept „un laborator de chimie". Complexitatea acestei activități chimice este incredibilă. De exemplu, pereții intestinali sunt căptușiți cu celule specializate care acționează ca niște detectori chimici, sau receptori gustativi, care identifică substanțele chimice prezente în alimentele consumate. Aceste informații ajută SNE să comande eliberarea enzimelor digestive necesare pentru descompunerea alimentelor în particule pe care organismul le poate absorbi. În plus, SNE joacă un rol esențial în monitorizarea acidității și a altor proprietăți chimice ale particulelor alimentare și în alegerea enzimelor digestive potrivite.

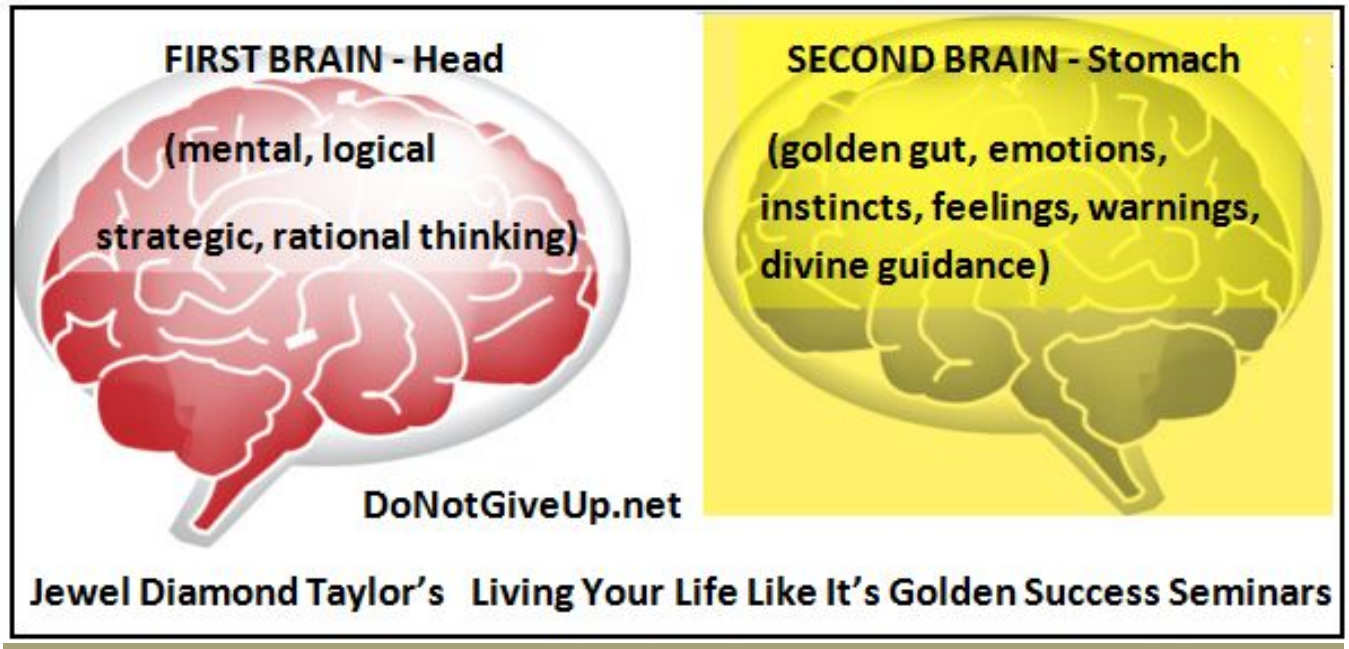

Fig.2. The two brains

Think of the digestive tract as a factory line managed mostly by the ENS. Your "second brain" moves food through the digestive system by directing the muscles along the wall of the digestive tract to contract. The ENS varies the strength and frequency of these muscle contractions as needed to make the system func-

Să ne imaginăm tractul digestiv ca o linie de producție controlată în mare parte de SNE. „Al doilea creier" al nostru asigură deplasarea alimentelor prin tubul digestiv transmițând impulsuri musculaturii care se contractă. SNE modifică intensitatea și frecvența acestor contracții musculare pentru a face ca sistemul să funcționeze la fel

tion like a line of convey or belts.

The ENS also supervises safety functions. The food you swallow is likely to contain potentially harmful bacteria. It is no wonder that about 70 to 80 percent of your body'slymphocyte cells—a vital component of your immune defense system—are housed inside your belly! If you ingest high levels of harmful organisms, the ENS protects the body by triggering powerful contractions that expel most of the toxic matter through vomiting or diarrhea.

While the ENS seems to function independently of the brain, these two nerve centers engage in constant communication. For example, the ENS plays a role in the regulation of hormones that tell the brain when you should eat and how much you should eat. ENS nerve cells signal the brain when you are full and may possibly trigger nausea if you eat too much.

Even before reading this article, you may have suspected that there is a communication link between your digestive tract and your brain. Have you noticed, for instance, that eating some fatty foods seems to improve your mood? Research suggests that this happens when your ENS sends 'happy signals' to your brain, starting a chain reaction that makes you feel better. This may explain why people tend to eat so-called comfort food when feeling stressed. Scientists are exploring the possibility of artificially stimulating the ENS as a treatment for depression.

Another example of communication between the brain and the digestive system is what has been described as having butterflies in one's stomach. This feeling may be the result of the ENS diverting blood away from the stomach when the brain experiences tension or stress. Nausea can be another result, as during stress the brain triggers the ENS to change the gut's normal contractions. According to experts, this brain-gut connection might also be the basis for so-called gut instincts.

Conclusions

While the ENS may generate such gut feelings, it cannot think for you or direct your decisions. In other words, the ENS is not really a brain. It cannot help you to compose a song, balance your bank account, or do your homework. Still, this marvellous system con-

ca o bandă transportoare.

SNE supraveghează și siguranța procesului. Alimentele pe care le înghițim pot conține bacterii periculoase. Nu este de mirare că 70-80% din limfocite (componente esențiale ale sistemului imunitar) sunt localizate la nivelul abdomenului. Dacă ingerăm mari cantități de organisme dăunătoare, SNE ne protejează declanșând contracții puternice pentru a expulza cea mai mare parte a materiei toxice prin vărsături sau diaree.

Deși SNE pare să funcționeze independent de creier, între cele două sisteme nervoase există o comunicare permanentă. De exemplu, SNE joacă un rol important în reglarea hormonilor care îi spun creierului când și cât să mâncăm. Neuronii SNE anunță creierul când suntem sătui și, în cazul în care am mâncat prea mult, poate declanșa starea de greață.

Ați bănuit, probabil, și înainte de citirea acestui articol că tractul digestiv și creierul comunică între ele. Ați observat, de pildă, că dispoziția vi se îmbunătățește după ce ați consumat anumite alimente? Cercetările dezvăluie că exact asta se întâmplă când SNE transmite „semnale de fericire" creierului, declanșând o reacție în lanț care ne face să ne simțim mai bine. Așa se explică de ce, când se simt stresați, oamenii tind să mănânce alimente care le creează o stare de bine. Cercetătorii analizează posibilitatea de a stimula pe cale artificială SNE ca tratament pentru depresie.

Mai există o dovadă că sistemul digestiv și creierul comunică: senzația de „fluturi în stomac". Această senzație apare, probabil, când creierul percepe o stare de tensiune sau de stres, iar SNE redirecționează sângele de la stomac spre alte zone. Pot apărea și stări de greață întrucât, în timpul stresului, creierul determină SNE să modifice contracțiile normale ale intestinelor. Potrivit specialiștilor, această legătură creier-intestine ar putea fi explicația așa-numitului instinct visceral.

Concluzii

Deși poate genera sentimente instinctive, SNE nu poate gândi în locul nostru, nici nu poate dicta ce decizii să luăm. Cu alte cuvinte, SNE nu e un creier în adevăratul sens al cuvântului. Nu ne ajută să compunem un cântec, să ne gestionăm banii sau să ne facem temele. Totuși, acest sis-

tinues to amaze scientists for its complexity—much of it perhaps still undiscovered. So the next time you are about to eat a meal, pause and think about all the monitoring, data processing, coordination, and communication that is about to take place in your digestive system!

tem continuă să-i uimească pe oamenii de știință prin complexitatea lui, în mare parte rămasă încă nedescoperită. Prin urmare, data viitoare, înainte de a mânca ceva, gândiți-vă la toate procesele de monitorizare, de evaluare a informațiilor, de coordonare și de comunicare ce urmează să aibă loc în sistemul digestiv!

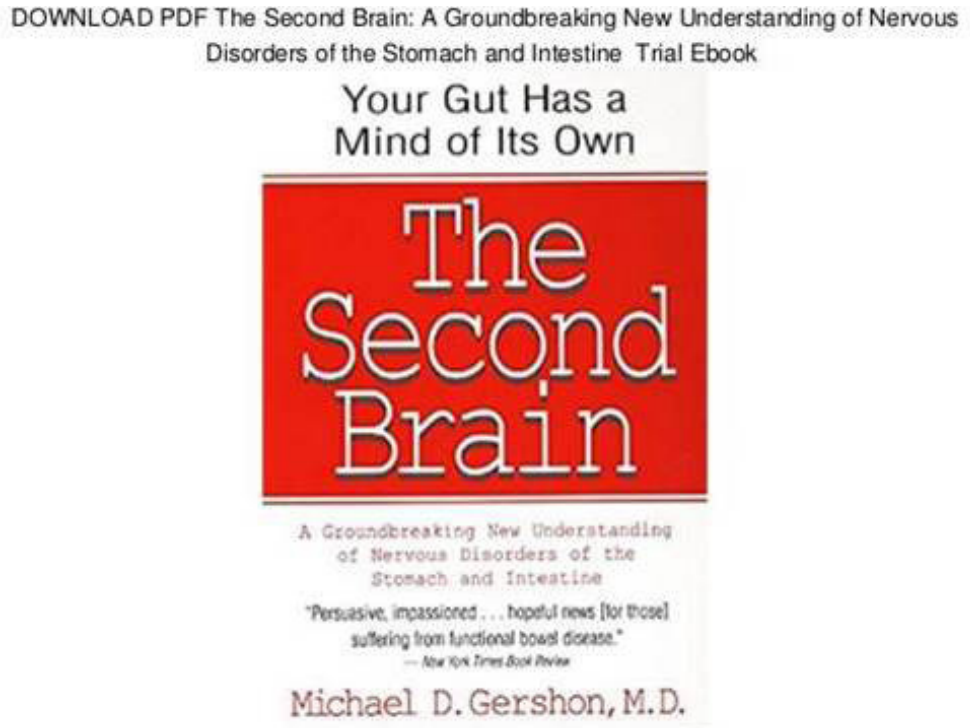

Fig.3. "The second brain" book cover by Michael D.Gershon

Iconography

Fig.1.:https://www.google.ro/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&cad=rja&uact=8&ved=0ahUKEwiJuob6sLXUAhUCIpoKHdMGCKgQjhwIBQ&url=http%3A%2F%2Fwww.huffingtonpost.com%2Frichard-e-cytowic%2Fthe-pit-in-your-stomach-i_b_14419714.html&psig=AFQjCNFWwt0txN4iOvAadotUcLA4E4YN3A&ust=1497256407855286

Fig.2.: https://jeweldiamondtaylor.files.wordpress.com/2012/10/second-brain.jpg

Fig.3.:https://image.slidesharecdn.com/downloadpdfthesecond-170405143230/95/download-pdf-the-second-brain-a-groundbreaking-new-understanding-of-nervous-disorders-of-the-stomach-and-intestine-trial-ebook-1-638.jpg?cb=1491402764

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EVOLUTION OF CIRCULATORY SYSTEM

Introduction

Since the very the beginning of life, all living organisms felt the need for gas exchange with the outside, eliminating at the same timetheir waste products. Over the years organisms have developed a system capable of transporting such substances even if at first it was not complete. In the years more complex organisms neededa more complex and efficient system. This system needed something letting the fluid flow and carrythe substances to perform its function: this is the heart.

EVOLUZIONE DEL SISTEMA CIRCOLATORIO

Introduzione

Sin dall'inizio della vita tutti gli organismi viventi hanno sentito il bisogno di scambiare gas con l'esterno e di eliminare le sostanze di rifiuto. Quindi, c'è bisogno di un sistema che trasporti queste sostanze. Nel corso degli anni gli organismi hanno avuto uno sviluppo di questo sistema, anche se nei primi organismi era incompleto. Successivamente, organismi più complessi hanno sentito il bisogno di un sistema più complesso ed efficiente. Questo sistema ha bisogno di qualcosa che permetta al fluido di scorrere ed entrare in contatto con tutte le cellule dell'organismo e quindi di adempiere alla sua funzione: questo è il cuore.

Fig. 1. Evolution of the organisms

Aim

The aim of this article is to explain the evolution theory of the circulatory system, in fact over the years it has changed a lot up to the present days.

Obiettivi

L'obiettivo di questo articolo è spiegare come si è evoluto il sistema circolatorio, in quanto quest'ultimo ha subito molti cambiamenti nel corso degli anni, sino ad arrivare ad oggi.

Fig. 2. The life in the sea

Method

The method to follow is surfing the internet, reading magazines and extracts from books,and if possible interviewing some scientists. Such information will makegetting to results and comments possible.

Metodo

Il metodo è eseguire ricerche su internet, riviste, libri e intervistare scienziati, se possibile. Tutte le informazioni che si riescono a raccogliere contribuiscono a formulare i risultati e rilasciare commenti.

Results

The first circulatory system appears in organisms with coelom (body cavity full of liquid bounded by the mesoderm). The body organization of cnidarians such as jellyfish and corals, and flatworms, as planarians, allows them not to have a system that distributes the substances to all the cells.In fact, in cnidarians all the cells are in contact with the outside world and so they exchange the substances directly. In flatworms a cavity which crosses the whole body allows all cells to be in contact with the outside, and then to exchange substances directly. Arthropods (such as some crustaceans and molluscs) are equipped with an open circulatory system, in which the blood does not always remains inside the blood vessels, but exits and enters into direct con-

Risultati

Il primo sistema circolatorio appare negli organismi provvisti di coeloma (cavità del corpo piena di liquido delimitata dal mesoderma). L'organizzazione corporea di cnidari come meduse e coralli e di vermi piatti, come planaria, gli permette di non avere bisogno di un sistema che distribuisca le sostanze a tutte le cellule. Infatti, negli cnidari tutte le cellule sono in contatto con il mondo esterno e scambiano direttamente le sostanze. Nei lombrichi una cavità che attraversa tutto il corpo permette a tutte le cellule di essere in contatto con l'esterno e quindi di scambiare sostanze direttamente. Gli artropodi (come alcuni crostacei e molluschi) sono dotati di un sistema circolatorio aperto in cui il sangue non sempre rimane all'interno dei vasi sanguigni, ma esce e

tact with the organs. While many vertebrates (such as annelids) have a closed circulatory system, in which the blood, formed by corpuscles and the liquid mass, does not come into direct contact with the organs. Indeed, at the capillary level, formed only by thin muscle bundles, the blood comes out in a controlled manner. In vertebrates this system is also called cardiovascular system, because it is made of blood vessels and an organ that acts as a pump.These vessels are divided into arteries, veins and capillaries:

•The arteries go from the heart to the body's periphery

•The veins go from the body's periphery to the heart.

•The capillaries may be venous or arterial and are smaller than arteries and veins.

The vertebrates can have 3 types of circulatory system:

•The fishes have a simple but complete circulation. The heart consists of two cavities, an atrium and a ventricle, and venous blood does not come into contact with arterial.

• Amphibians have a dual circulation but incomplete, in fact, the heart is formed by four cavities, two atria and two ventricles, but the venous blood is mixed with arterial blood.

• Finally, thanks to the evolution, it has come to a double and complete circulation, present in mammals and birds, in which the venous blood does not come into contact with arterial blood.

In addition, the reptiles have a dual circulation, even if it is incomplete because of an interatrial hole.Arteries have thicker walls because they have to withstand greater pressure due to heart that pushes the blood to send it throughout the body, while the veins have to withstand a lower pressure and consequence have less thick walls.Also the heart cells need to exchange substances and then there is a movement that allows this.

Conclusion

In conclusion the organisms have adapted in the better way. We are the result of this evo-

entra in contatto diretto con gli organi. Mentre molti vertebrati (come gli anelidi) hanno un sistema circolatorio chiuso, in cui il sangue, formato dai corpuscoli e dalla massa liquida, non entra in contatto diretto con gli organi. Infatti, a livello capillare, formati solo da sottili fasci muscolari, il sangue esce in modo controllato. Nei vertebrati questo sistema è anche chiamato sistema cardiovascolare, perché è costituito da vasi sanguigni e da un organo che funge da pompa. Queste vasi sono suddivisi in arterie, vene e capillari:

•Le arterie vanno dal cuore alla periferia del corpo

•Le vene vanno dalla periferia del corpo al cuore.

•I capillari possono essere venosi o arteriosi e sono più piccoli delle arterie e delle vene.

I vertebrati possono avere 3 tipi di sistema circolatorio:

•I pesci hanno una circolazione semplice ma completa. Il cuore è costituito da due cavità, un atrio e un ventricolo, e il sangue venoso non entra in contatto con l'arteria.

Gli anfibi hanno una doppia circolazione, ma incompleti, infatti il cuore è formato da quattro cavità, due atri e due ventricoli, ma il sangue venoso è mescolato con il sangue arterioso.

Infine, grazie all'evoluzione, si è giunti a una circolazione doppia e completa, presente nei mammiferi e negli uccelli, in cui il sangue venoso non entra in contatto con il sangue arterioso.

In aggiunta, i rettili hanno una doppia circolazione, anche se è incompleta a causa di un foro interatriale. Le arterie hanno pareti più spesse perché devono sopportare una maggiore pressione dovuta al cuore che spinge il sangue per mandarlo in tutto il corpo, mentre le vene devono sopportare una pressione più bassa e, di conseguenza, hanno pareti meno spesse. Anche le cellule del cuore hanno bisogno di scambiare sostanze e poi c'è un movimento che lo permette.

Conclusioni

In conclusione gli organismi si sono adattati nel migliore dei modi. Siamo il risultato di ques-

lution even if it may not be the point of arrival. First organisms were adapted to the environment and now we are adapted to environment.

ta evoluzione anche se non può essere il punto di arrivo. I primi organismi sono stati adattati all'ambiente e adesso siamo adatti all'ambiente.

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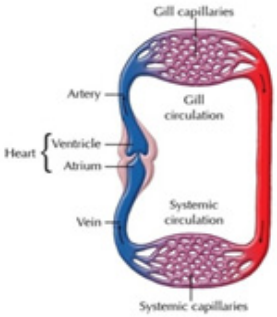

Fig. 3. Circulation in the amphibians

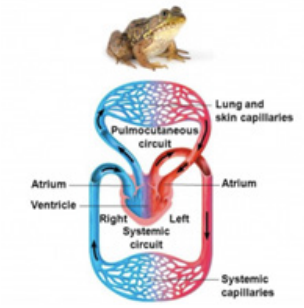

Fig. 4. Circulation in the amphibians

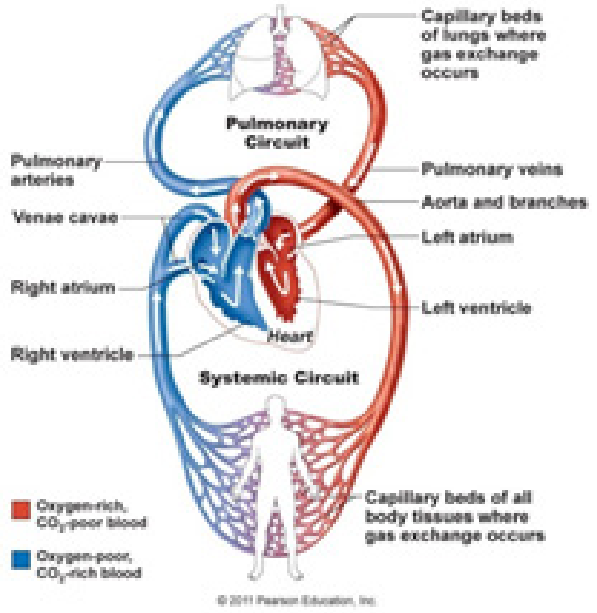

Fig. 5. Circulation in the mammals and in the birds

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X-Rays

Introduction

X-rays are a form of electromagnetic radiation, as are radio waves, visible light, ultraviolet radiation and microwaves. Electromagnetic radiation is created when an atomic particle, such as an electron, is accelerated by an electric field, causing it to move.

EM radiation is transmitted in waves or particles at different wavelengths or frequencies. This broad range of wavelengths is known as the electromagnetic spectrum. The EM spectrum is presented in increasing proportion function of the wavelength and decreasing order of energy and frequency. The common EM radiations main types are: radio waves, microwaves , infrared (IR) , visible light , Ultraviolet (UV) , X-rays and gamma rays .

X-rays are divided into two types: soft X-rays and hard X-rays. Soft X-rays

Razele X

Introducere

Razele X sunt o forma de radiație electromagnetică, precum sunt și undele radio, lumina vizibilă, razele ultraviloete și microundele. Radiația electromagnetică este creată atunci când o particulă atomică, precum electronul, este accelerată și electrizată, aceasta mișcându-se.

Radiația electromagnetică este transmisă prin unde sau particule aflate la lungimi de undă și frecvențe diferite. Această varietate mare de unde este cunoscută drept spectrul electromagnetic. Spectrul undelor electromagnetice este reprezentat în ordine crescătoare în funcţie de lungimea de undă şi în ordine descrescătoare a energiei şi frecvenţei. Există șapte tipuri principale de radiații electromagnetice: unde radio, microundele, raze infraroșii, lumina vizibilă, raze ultraviolete (UV), raze X și raze Gamma.

Razele X sunt de două tipuri: raze X slabe și raze X puternice. Razele X slabe poartă

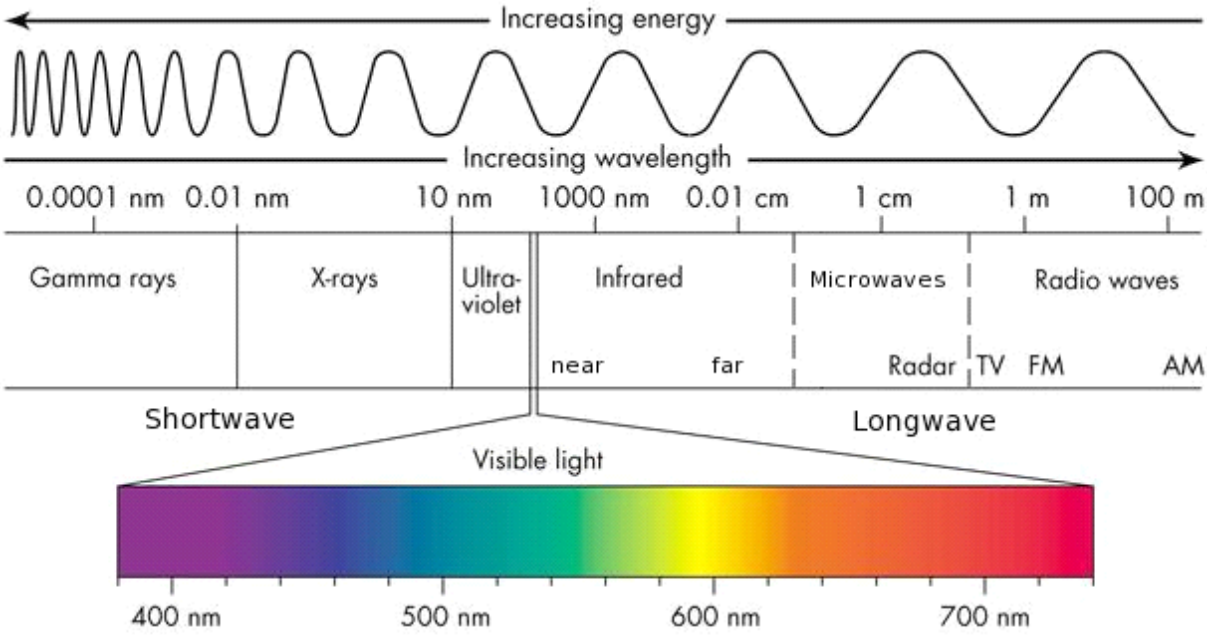

Fig 1. The Electromagnetic radiation spectrum

carry far less energy than hard X-rays and are more easily absorbed by air and other mediums. Hard X-rays are the ones used by doctors and scientists to look at bone fractures or to investigate the atomic-level properties of a solid material.

History and development

X-rays, originally named Roentgen rays, were discovered in 1895 by Wilhelm Conrad Roentgen (1845-1923) , who was a professor at Wuerzburg University in Germany. Wilhelm Roentgen discovered x-rays by accident while working with cathode ray-streams of electrons in vacuum tubes.

He had prepared a glass cathode ray tube completely covered with black cardboard , and noticed that even though the cardboard completely covered the tube , a glow still appeared on the fluorescent screen several feet away.

mult mai puțină energie decât cele puternice, fiind cu ușurință absorbite de aer și de alte medii. Razele X puternice sunt cele folosite în medicină pentru a observa fracturi ale oaselor. Oamenii de ştiinţă folosesc razele X pentru a investiga proprietățile materialelor la nivel atomic.

Istoricul razelor X

Razele X, original numite razele Roentgen, au fost descoperite în anul 1895 de către Wilhelm Conrad Roentgen (1845-1923), profesor de la Universitatea Wuerzburg din Germania. Roentgen a descoperit razele X din întâmplare în timp ce lucra cu razele catodice - fluxuri de electroni în tuburi în vid.

El a pregătit un tub catodic din sticlă acoperit complet cu o bucată de carton negru, și a observat că în ciuda faptului că tubul era complet acoperit în carton, o strălucire a apărut pe ecranul fosforescent aflat la câțiva metri

Fig.2. The two brains

He concluded that a new type of ray was being emitted from the tube.

Roentgen also discovered that the ray could pass trough human tissue , but not trough bones or metal objects.One of Roetgen's

distanță. El a dedus că un nou tip de rază sau radiație era emisă din tub.

De asemenea, Roentgen a descoperit și faptul că raza putea să treacă prin țesutul moale al corpului uman, dar nu și prin oase și obiecte metalice. Unul din primele experi-

first experiments was a film of the hand of his wife , Bertha. In june 1866 , only 6 months after Roentgen announced his discovery , X-rays were being used by battle-field physicians to locate bullets in wounded soliders.

mente făcute de Roentgen cu razele X a fost un film făcut mâinii soției sale, Bertha. În iunie 1866, la numai șase luni după ce Roentgen și-a făcut publică descoperirea, razele X au fost folosite de către fizicienii de pe câmpul de luptă pentru a localiza gloanțele în soldații răniți.

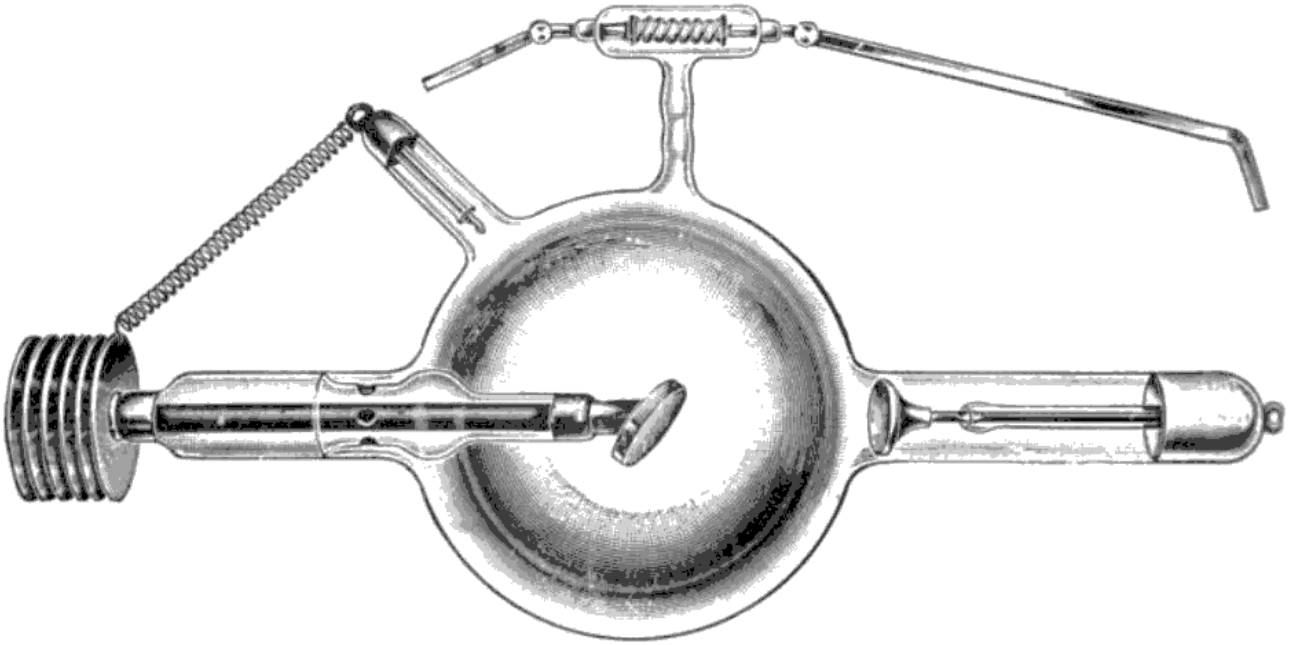

Fig.3. Crookes X-ray tube from 1900's

Whilhelm C. Roentgen quickly gained recognition for his discovery and was awarded with the Nobel prize in 1901.Whilhelm C. Roentgen got the Nobel prize in recognition of his extraordinary discovery of the remarkable rays subsequently named after him.

Until 1913, X-rays were used little outside the fields of medicine and dentistry, because they were not x-ray tubes powerful enough to sustand high voltages required to produce rays of satisfactory penetrating power for other purposes. That changed after 1920 when the first high vacuum X-ray tubes were made, which were capable of operating with energies up to 100,000 volts.

Over time, industrial radiography kept developing and in 1922 a 200,000 volt x-ray tube had been created that allowed radiographs of thick steel parts in a reasonable amount of time.

Whilhelm C. Roentgen a câştigat recunoştinţa pentru descoperirea sa și a primit premiul Nobel in anul 1901. a primit premiul Nobel pentru extraordinara sa descoperire a remarcabilelor raze care ulterior i-au purtat numele.

Până în anul 1913, razele X erau folosite în mică măsură în afara domeniilor medicină și stomatologie, deoarece nu existau tuburi de raze X suficient de puternice, de înaltă tensiune, astfel încât razele să aibă o putere de penetrare a obiectelor destul de mare încât să permită uzul razelor X și în alte domenii. Acest lucru s-a schimbat, după anii 1920, când s-au creat tuburi de raze X de mare putere, capabile să opereze cu tensiuni de ordinul 100,000 de volți.

În timp, radiografia industrială a continuat să se dezvolte, iar în anul 1922 un tub de raze X de 200,000 de volți a fost construit pentru a permite radiografierea unor părți groase de oțel într-un interval rezonabil de timp.

In 1931, General Electric Company developed 1 MV (106 V) x-ray generators and in the same year, the American Society of Mechanical Engineers (ASME) permitted X-ray analysis of fusion welded pressure vessels, fact that further opened the door to industrial acceptance and use.

Today's X-ray appliances

X-rays are used today in multiple fields of work, like medicine, astronomy and aviation. High amounts of x-rays are capable of destroying sick cells of the human body. Their effects can be utilized in curing cancer, by focusing powerful beams of x-rays onto tumor cells, obliterating them. Also, satellites with X-ray detectors are used to make precise measurements. Some astronomical phenomena, such as black holes emit X-ray radiations which allow scientists to make X-ray radiographies of the object which help for a better understanding of these little known phenomena.

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În anul 1931, compania General Electric a fabricat generatoare de raze X de 1 MV (106 V), iar în același an Societatea Americană a Inginerilor Mecanici (ASME) a permis și aprobat examinarea cu raze X a recipienţilor sudaţi, fapt care a dus la utilizarea industrială a razelor X .

Aplicații de astăzi ale razelor X

Razele X sunt folosite azi într-o multitudine de domenii, ca medicină, astronomie și aviația. Cantități mari de raze X sunt capabile să distrugă celulele bolnave ale corpului uman. Proprietățile lor pot fi utilizate în vindecarea cancerului, prin concentrarea unor raze X de intensitate puternică asupra celulelor canceroase, distrugându-le. De asemenea, sateliții cu detectoare de raze X sunt folosiți pentru a face măsurători precise. Obiecte astronomice precum găurile negre emit radiații de raze X ceea ce permite oamenilor de știință să facă o radiografie a obiectelelor, fiind capabili astfel să înțeleagă mai bine fenomenele din univers.

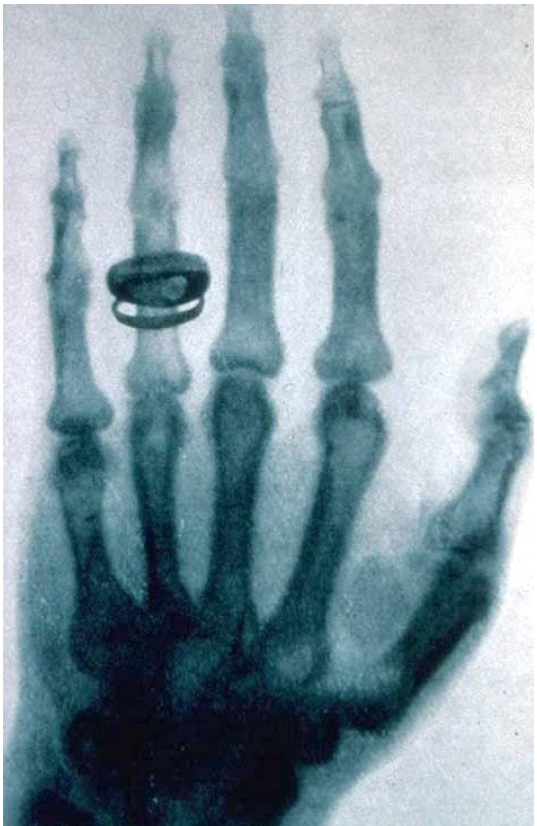

Fig.4. The X-ray of Bertha Roentgen's left hand

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History of Street Lighting

تاريخ أضواء الشوارع

1. Introduction

Street light is a raised source of light on the edge of a road or path. Modern lamps may also have light-sensitive photocells that activate automatically when light is or is not needed, such as at dusk, dawn, or the onset of dark weather. This function in older lighting systems could have been performed with the aid of a solar dial. Many street light systems are being connected underground instead of wiring from one utility post to another [1].


Fig. 1. The lamp lighter in Brest, Belarus (October 15, 2011)

The earliest lamps required that a lamplighter tour the town at dusk, lighting each of the lamps. According to some sources, illumination was ordered in London in 1417 by Sir Henry Barton, Mayor of London though there is no firm evidence this. (Fig. 1) [2]

In 1524, Paris house owners were required to have lanterns with candles lit in front of their houses at night, but the law was often ignored. Following the invention of lanterns with glass windows, which greatly improved the quantity of light, in 1594 the police of Paris took charge of installing lanterns in each city neighborhood.

1.المقدمة

أيضا ضوئية ضوئية حساسة للضوء التي تنشط تلقائيا عندما يكون الضوء أو ال حاجة الغسق، الفجر، أو بداية المظلم. هذه الطقس الوظيفة في أنظمة الإضاءة القديمة يمكن أن تكون قد تنفذ بمساعدة قرص شمسي. يتم توصيل العديد من أنظمة ضوء الشوارع تحت الأرض بدل من الأسلاك من وظيفة واحدة إلى آخر. [1]

أول المصابيح المطلوبة أن جولة لامبليتر في المدينة عند الغسق، إضاءة كل من المصابيح. وفقا لبعض المصادر، أمر أمر الإضاءة في لندن في عام 1417 من قبل السير هنري بارتون، عمدة لندن على الرغم من عدم وجود دليل ثابت على ذلك. (الشكل 1) [2]

في عام 1524، كان مطلوبا من أصحاب المنازل في باريس أن يكون الفوانيس مع الشموع مضاءة أمام منازلهم في الليل، ولكن القانون غالبا ما يتم تجاهلها. بعد اختراع الفوانيس مع النوافذ الزجاجية، مما أدى إلى تحسين كبير في كمية الضوء، في 1594 الشرطة في باريس تولى مسؤولية تركيب الفوانيس في كل حي المدينة.

2. Different technologies of street light

Link-boy

A link-boy was a boy who carried a flaming torch to light the way for pedestrians at night. Link-boys were common in London in the days before street lighting. The linkboy's fee was commonly one farthing, and the torch was often made from burning pitch and tow (Fig. 2).

Farola Fernandina

Farola Fernandina is a traditional design of street light which remains popular in Spain. Essentially, it is a neo-classical French gas lamp

2.أنواع مختلفة من اضواء الشوارع

1-لينك-بوي

وكان صبي الارتباط صبيا يحمل شعلة المشتعلة لإضاءة الطريق للمشاة ليلا. كان لينكبويس شائعا في لندن في الأيام التي سبقت إضاءة الشوارع. وكانت رسوم لينكبوي عادة شيء واحد، وكان الشعلة في كثير من الأحيان من حرق الملعب و السحب. (الصورة 2)

2-فارولا فرناندينا

فارولا فرناندينا هو التصميم التقليدي لضوء الشارع الذي لا يزال رائعا في إسبانيا. أساسا هو النمط الكلاسيكي الفرنسي الغاز مصباح الطراز التي يرجع

style dating from the late 18-th century. It may be either a wall-bracket or standard lamp (Fig. 3).

تاريخها إلى أواخر القرن 18. قد يكون إما قوس الجدار أو مصباح القياسية. (الشكل 3)

Arc Lamp

An arc lamp is a lamp that produces light by an electric arc. The carbon arc light, which consists of an arc between carbon electrodes in air, invented by Humphry Davy in the first decade of the 1800s, was the first practical electric light (Fig.4) [3].

3-مصباح قوس

مصباح القوس هو مصباح قوس ينتج الضوء بواسطة قوس كهربائي. وكان ضوء قوس الكربون، الذي يتكون من قوس بين أقطاب الكربون في الهواء، التي اخترعها همفري ديفي في العقد الأول من 1800، أول ضوء كهربائي عملي. (الشكل 4) [3]

Fig. 2. Cupid as a Link Boy, Sir Joshua Reynolds, c. 1771

Incandescent light

Incandescent lamp is an electric light with a wire filament heated to such a high temperature that it glows with visible light (incandescence). The filament, heated by passing an electric current through it, is protected from oxidation with a glass or quartz bulb that is filled with inert gas or evacuated (Fig. 5).

4-ضوء ساطع

مصباح ساطع هو ضوء كهربائي مع خيوط الأسلاك تسخينها إلى مثل درجة حرارة عالية أنه يضيء مع الضوء المرئي (إنكاندسانس). فالخيوط، التي يتم تسخينها عن طريق تمرير تيار كهربائي من خلالها، محمية من الأكسدة مع زجاج أو لمبة كوارتز مليئة بالغاز الخامل أو يتم إجلائها. (الشكل 5)

3. Why did they start using gas lamp?

Oil lamps were not too effective in lighting of larger areas like streets and houses it was necessary to come up with a more appropriate solution.

Engineers found it more efficient, cheaper and a brighter way to light up the streets than anything in they had did in the past. Even today they use kerosene to light certain tourist streets around the world (Fig. 6).

William Murdoch illuminated his house with the first gas lamp there were tries to make streets safer and more comfortable at night by using any kind of artificial light. In 1417, Mayor of London gave an order for citizens to put lights on the streets on the winter nights and Paris had a law since 1524 that all the houses that face the streets must have light in windows so people can see. [4]

Fig. 3. A Farola Fernandina in Aranjuez

3. متى كان أول ضوء الشارع العام مع الغاز؟

ظهرت أول إنارة عامة في الشوارع مع الغاز في مول مال، لندن في 28 يناير 1807 من قبل فريدريك ألبرت وينسور.

لم تكن المصابيح النفطية فعالة جدا في البرق في مناطق أكبر مثل الشوارع والمنازل كان من الضروري التوصل إلى حل أكثر ملاءمة. وجد المهندسون أنه أكثر كفاءة وأرخص وأكثر إشراقا لإضاءة الشوارع أكثر من أي شيء كان قد فعلوه في الماضي. حتى اليوم يستخدمون الكيروسين لإضاءة بعض الشوارع السياحية في جميع أنحاء العالم. (الشكل 6)

يضيء وليام مردوخ منزله مع مصباح الغاز الأول كان يحاول جعل الشوارع أكثر أمنا وأكثر راحة في الليل باستخدام أي نوع من الضوء الاصطناعي. في عام 1417، أصدر عمدة لندن أمرا للمواطنين بإلقاء الضوء على الشوارع في ليالي الشتاء، وكان لدى باريس قانون منذ عام 1524 أن جميع المنازل التي تواجه الشوارع يجب أن يكون لها ضوء في النوافذ حتى يتمكن الناس من رؤية. [4]

4. Modern lights

Today, street lighting commonly uses high-intensity discharge lamps, such lamps provide the greatest amount of photonic illumination for the least consumption of electricity. However, white light sources have been shown to double driver peripheral vision and improve driver brake reaction time by at least 25%; to enable pedestrians to better detect pavement trip hazards. Two national standards now allow for variation in illuminance when using lamps of different spectra. In Australia, HPS (high pressure sodium lamps) lamp performance needs to be reduced by a minimum value of 75%. In the UK, illuminances are reduced with higher values S/P ratio (Fig. 7) [5].

New street lighting technologies, such as LED or induction lights, emit a white light that provides high levels of scotopic lumens allowing street lights with lower wattages and lower photonic lumens to replace existing street lights.

Fig. 4. Carbon arc street light located near Victoria Park

4.أضواء الحديثة

اليوم، إضاءة الشوارع عادة ما تستخدم مصابيح التفريغ عالية الكثافة، توفر هذه المصابيح أكبر قدر من الإضاءة الضوئية لأقل استهلاك الكهرباء. ومع ذلك، فقد تبين أن مصادر الضوء الأبيض إلى ضعف الرؤية الطرفية السائق وتحسين وقت رد فعل الفرامل السائق بنسبة 25٪ على الأقل. لتمكين المشاة من الكشف عن مخاطر رحلة الرصيف بشكل أفضل ويسمح معياران وطنيان الآن بالتغيير في الإنارة عند استخدام مصابيح من أطياف مختلفة. في أستراليا، هس (ارتفاع ضغط الصوديوم مصابيح) الأداء يحتاج إلى تخفيض بنسبة الحد الأدنى من 75٪. في المملكة المتحدة، يتم تقليل الإنارة مع قيم أعلى نسبة . (الشكل 7) [5]

إن تكنولوجيات إضاءة الشوارع الجديدة، مثل مصابيح ليد أو الحث، تنبعث من الضوء الأبيض الذي يوفر مستويات عالية من شمعة سكوتوبيك تسمح بأضواء الشوارع مع انخفاض القوة الكهربائية وانخفاض شمعة ضوئية لاستبدال أضواء الشوارع الموجودة.

5. Advantages and disadvantages of street lights in nowadays.

Advantages:

-The main purpose of night time lighting is for safety benefits:

- Less accidents on the road and on the street
- Less chances for muggings, assaults, and robberies
- Having the ability to explore at night is more of an option
- It keeps animals away from streets and roads
- Safer for drivers at night

Disadvantages:

-Though there are definitely more advantages to having street lights there are of course always

Fig. 5. The 24M Cup-light in New York City

5.مزايا وعيوب أضواء الشوارع في الوقت الحاضر

الغرض الرئيسي من الإضاءة الليل هو لفوائد السلامة:

- أقل الحوادث على الطريق وفي الشارع.
- أقل فرص للمطاردات، الاعتداءات، والسرقة.
- وجود القدرة على استكشاف الليل هو أكثر من خيار.
- أنها تحافظ على الحيوانات بعيدا عن الشوارع والطرق.
- أكثر أمانا للسائقين في الليل.

سلبيات:

- على الرغم من أن هناك بالتأكيد المزيد من المزايا لوجود أضواء الشوارع هناك بالطبع المساوئ دائما إلى كل شيء، مثل:

disadvantages to everything, like:

oSome of the street lights can cause pollution

oMore electricity is being used

oIt can be expensive to repair or replace damaged lights

Fig. 6. German Gas Lamp

بعض من أضواء الشوارع يمكن أن يسبب التلوث.

ويجري استخدام المزيد من الكهرباء.

يمكن أن تكون مكلفة للإصلاح أو استبدال الأضرار التالفة.

6. Conclusions

Street lights have gone from boys carrying torches to modern day electricity powering them. They have gone through many different advances in their day and age to the now most "efficient" way.

Until new, advances come into play. Overall, the need for street lamps has never diminished. It has been and will be the same until further technology is developed. Even though there are small disadvantages, we need them in our daily lives.

6- الخلاصة

وقد ذهبت أضواء الشوارع من الأولاد تحمل المشاعل إلى الكهرباء في العصر الحديث الطاقة لهم. لقد مرت العديد من التقدم المختلفة في يومهم وعمرهم إلى الطريقة الأكثر فعالية "الآن".

وإلى أن يتم تحقيق تقدم جديد، وعموما فإن الحاجة لمصابيح الشوارع لم تنخفض أبدا. والحاجة إليها ستكون وستظل هي نفسها إلى أن يتم تطوير المزيد من التكنولوجيا. على الرغم من أن هناك عيوب صغيرة، ونحن في حاجة إليها في حياتنا اليومية.

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Iconography

Fig.1.https://en.wikipedia.org/wiki/Lamplighter#/media/File:Brest_lamplighter.jpg

Fig.2.http://twonerdyhistorygirls.blogspot.ro/2010/12/link-boys-as-cupid.html

Fig. 3.https://en.wikipedia.org/wiki/Street_light#/media/File:Aranjuez_FarolaFernandina.jpg

Fig. 4.https://albertaonrecord.ca/is-ccg-2998

Fig. 5.http://www.kbrhorse.net/streetlights/westinghouse_cuplight.html

Fig. 6.https://www.etsy.com/listing/156614678/vintage-gas-lantern-german-gas-lamp

Fig. 7.https://en.wikipedia.org/wiki/Street_light#/media/File:Na-light.jpg

Fig. 7. A sodium vapor light

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Promoters of Electric Lighting - Michael Faraday and Thomas Edison

1. Introduction

Electric lighting has a history of over 150 years. First of all, it was necessary to develop the sources that would provide a continuous supply of electric energy. After inventing the voltaic pile by Alessandro Volta (1745-1827), only after the years 1820-1840 scientists discovered that electric energy can be obtained through the transformation of the mechanic energy. One of the promoters of electricity is Michael Faraday, being followed by many famous scientists which developed and improved the electric lighting technology.

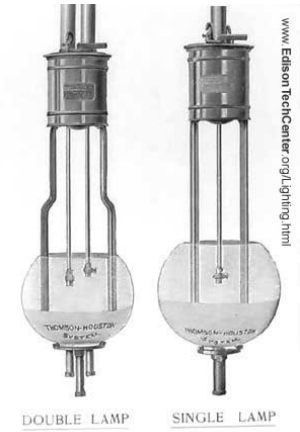

Fig. 1. Electric discharge lamps

The paper analyses the evolution of electric lighting from the introduction of the discharge lamps to the incandescent lamps, and the contribution brought by the great experimenter Michael Faraday (1791-1867) and the famous inventor Thomas Edison (1847-1931) to the development of the electric lighting.

2. Electric discharge lamps

The first electric light source has been the electric discharge lamp, named also arc lamp. The carbon arc lamp was the first widely-used type of electric light source and the first commercially successful form of electric lamp. The light is produced by the spark developed by the electric arc established through the air between two rods (electrodes). The electrodes must have a gap in between of the right size: if the gap is too big than the arc will flicker more or may go out, if the gap is to narrow than it will produce less light.

Promotori ai Iluminatului Electric - Michael Faraday şi Thomas Edison

1. Introducere

Iluminatul electric are o istorie de peste 150 ani. In primul rând, a fost necesar să se dezvolte sursele care să asigure o sursă continuă de energie electrică. După inventarea pilei voltaice de către Alessandro Volta (1745-1827), numai dupăîn anii 1820-1840 oamenii de ştiinţă au descoperit că energia electrică poate fi obţinută prin transformarea energiei mecanice. Unul din promotorii electricităţii este Michael Faraday, fiind urmat de multi alti faimoşi oameni de ştiinţă care au dezvoltat şi îmbunătăţit tehnologia iluminatului electric.

Lucrarea analizează evoluţia iluminatului electric de la introducerea lampilor cu arc la lămpile cu incandescenţă şi contribuţiile aduse de marele experimentator Michael Faraday (1791-1867) şi faimosul inventator Thomas Edison (1847-1931) la dezvoltatea iluminatului electric.

2. Lămpile cu descărcare electrică

Prima sursă de lumină electrică a fost lampa cu descărcare electrică, denumită şi lampa cu arc. Lampa cu arc cu electrozi de carbon a fost primul tip de sursă de lumină electrică utilizată pe scară largă şi prima lampă electrică cu succes comercial. Lumina este produsă de scâanteia dezvoltată de arcul electric stabilit în aer între două tije (electrozi). Electrozii trebuie să se afle la o anumită distanţă unul de celalat: dacă distanţa este prea mare, atunci arcul va pâlpâi sau se va stinge, iar dacă distanţa este prea mică, atunci arcul va produce mai puţină lumină.

The first type of material for lamp electrodes was carbon, named charcoal (made from wood). When an electric current passes from one of the carbon electrode to the other electrode, an electric arc is produced between the rods, and the carbon is vaporized in the high temperature of the arc (around 3600oC). The carbon vapors are highly luminous, and this is why the rods are made of carbon.

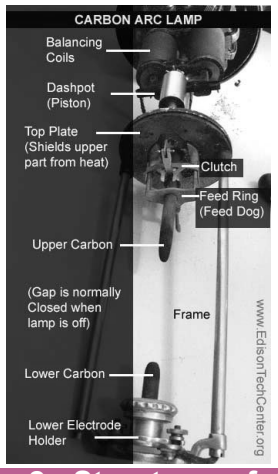

Fig. 2. Structure of the arc lamp with carbon rod control

Most of the experiments on arc lamps occurred in Europe during the pre-1870s period. First arc lamps had a simple structure, with fix electrodes (Fig. 1).

A disadvantage of the carbon arc lamp is that the rods of carbon are burned away over time, and the carbon rods had to be replaced after a short period of time. In time, the arc lamp structure became more complex, adding different systems for control and advancing of the rods for maintaining the arc consistence (Fig. 2).

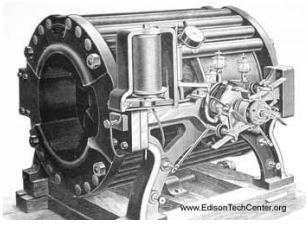

Fig. 3. A Farola Fernandina in Aranjuez

The main reason why arc lamps were not on the streets until that time was because of the lack of a reliable source (dynamo) to produce DC current. Prior to 1870 most people used batteries to power the arc lamp, batteries which were not reliable, very expensive, and had a short life.

Starting with 1856, generators of direct current (dynamos) have been developed by Werner Siebens (1856), Zénobe Théophil Gramme (1871) and Elihu Thomson (1880) (Fig. 3).

In only a few years many inventors had unique dynamo designs of their own, and it took a short time to adapt the dynamo to work with arc light systems. Finally the arc light was ready for commercial sales.

Primul tip de material pentru electrozi a fost carbonul, numit cărbune (obţinut din lemn). Când un curent electric trece de la un electrod de carbon la celalalt electrod, un arc electric se produce între tije şi carbonul se vaporizează datorită temperaturii ridicate a arcului (aprox. 3600oC). Vaporii de carbon sunt foarte luminoşi, acesta fiind motivul pentru care electrozii sunt fabricaţi din carbon.

Cele mai multe experimente cu lămpile cu arc au avut loc in Europa, înainte de anii 1870. Prima lampă cu arc avea o structură simplă, cu electrozii ficşi (Fig. 1).

Un dezavantaj al lampii cu arc cu electrozi de carbon este că tijele de carbon se consumă în timp astfel că acestea trebuie înlocuite după o scurtă perioadă de timp. Cu timpul, structura lămpii cu arc a devenit din ce în ce mai complexă, fiind adăugate diferite sisteme de control şi de înaintare a electrozilor, pentru a menţine consistenţa arcul electric (Fig. 2).

Principalul motiv pentru care, mult timp, lampile cu arc nu au fost folosite pentru iluminatul străzilor a fost lipsa unei surse fiabile (dinam) care să producă curent electric continuu. Până în jurul anilor 1870 majoritatea oamenilor foloseau baterii pentru alimentarea lămpilor, baterii care nu erau fiabile, erau extrem de scumpe şi aveau durata de viaţă scurtă.

Începând cu anul 1856 au fost dezvoltate generatoare de curent continuu (dinamuri) de către Werner Siebens (1856), Zénobe Théophil Gramme (1871) şi Elihu Thomson (1880) (Fig. 3).

În numai căţiva ani mulţi inventatori aveau deja noi propuneri de generatoare electrice de tip dinam, şi a luat puţin timp pentru a face ca dinamul sa fie utilizat pentru alimentarea cu energie electrică a sistemele de iluminat cu arc electric. In final, lampa cu arc a fost pregătită pentru punere în vânzare.

3. Michael Faraday experiments

The possibility of the arc lighting, in which a brilliant light is emitted by an electric spark between two electrodes, was observed by the Englishman Humphry Davy (1778-1829). According to the US Department of Energy: "Davy demonstrated the first incandescent light to the Royal Institute in Great Britain, using a bank of batteries and two charcoal rods".

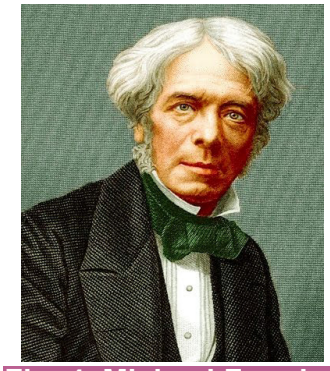

Fig. 4. Michael Faraday, 1860

Feeling the need to offer all his time to science, Michael Faraday (Fig. 4) participated in numerous lectures given by the chemist Humphry Davy and craved to work at the Royal Institute of Great Britain, where Sir Davy was leading the scientific activity. Thus, he gathered in a 380 pages notebook all the information he accumulated through the lectures he took part in and send it to the man that he was about to become a disciple for. In 1813 Faraday was employed at the Royal Institute and started helping Davy with his work (Fig. 5).

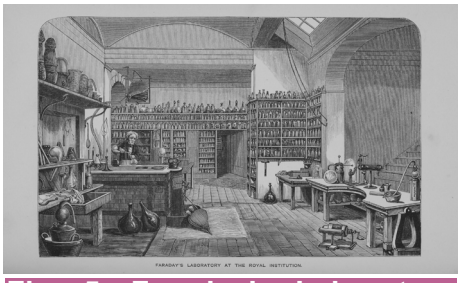

Fig. 5. Faraday's Laboratory at the Royal Institution (1870 engraving)

Good experimenter, in 1858, English physicist and chemist Michael Faraday devised the first steam-powered electric generator. This generator supplied a large carbon-arc lamp for the South Foreland Lighthouse, but the carbon-arc lamp was so bright and required so much power that it was never widely used. The developed system was limited to large installations such as lighthouses, train stations, and department stores.

Under the supervision of Faraday himself, Alliance dynamos were installed in two English lighthouses. The first electric arc searchlight cast a beam out over the sea from South Foreland lighthouse, December 8, 1858. Three and a half years later, the second searchlight was in operation in Dungeness. Unforeseen flaws in the machine's design caused frequent accidents to machine tenders and to the equipment itself, and the world's

3. Experimentele lui Michael Faraday

Posibilitatea iluminatului cu arc electric, prin care o lumina strălicitoare este emisă de scânteia electrică produsă intre doi electrozi, a fost subliniată de englezul Humphry Davy (1778-1829). Conform Departamentului de Energie al Statelor Unite: "Davy a demonstrat Institutului Regal din Marea Britanie prima lumină incandescentă, folosind baterii şi două tije de cărbune".

Simţind nevoia să ofere tot timpul său ştiinţei, Michael Faraday (Fig. 4) a participat la numeroase prelegeri ţinute de chimistul Humphry Davy şi dorea să lucreze la Institutul Regal din Marea Britanie, unde Davy conducea activitatea ştiintifică. Astfel, el a adunat într-un caiet de 380 pagini toată informaţia acumulată din prelegerile la care a luat parte şi l-a trimis celui căruia urma să îi fie ucenic. In 1813 Faraday a început să lucreze la Institutul Regal şi să îl sprijine pe Davy cu munca sa (Fig. 5).

Bun experimentator, în 1858 fizicianul si chimistul Michael Faraday a conceput primul generator electric actionat de o turbină cu aburi. Acest generator alimenta o lampa imensă cu arc cu electrozi de carbon pentru Farul South Foreland, însă lampa era atât de luminoasă şi avea nevoie de atat de multă energie încât nu a ajuns niciodată să fie folosită pe scara larga. Sistemul dezvoltat a fost aplicat limitat la instalaţiile de iluminat faruri, gări şi magazine mari.

Sub supravegherea lui Faraday, dinamuri tip Alliance au fost instalate în două faruri din Anglia. Primul alimenta sistemul reflector cu arc electric din farul South Foreland care a luminat prima data deasupra mării pe 8 Decembrie 1858. Trei ani şi jumătate mai târziu, cel de-al doilea a fost pus în funcţiune in Dungeness. Defectelr neprevăzute în proiectul maşinii au cauzat accidente frecvente îngrijitorilor şi echipamentului în sine, iar bucuria

enjoyment of electricity as a means of illumination was postponed several years.

Faraday left for all his successors a mirror of all the research and experiments he has done (Fig. 5) in the journal entitled "Experimental Researches in Electricity (1821-1855)". This helped many discover and develop the things we use today in our everyday life.

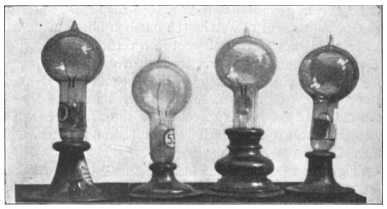

Fig. 6. Thomas Edison's carbon filament incandescent lamps, early 1880s

omenirii pentru folosirea electricităţii pentru iluminat a fost amânată mai mulţi ani.

Faraday a lăsat tuturor succesorilor săi o oglindă a tuturor cercetărilor şi experimentelor făcute de el (Fig. 5) în jurnalul intitulat "Cercetăari Experimentale în Electricitate (1821-1855)". Insemnările lui au ajutat pe mulţi savanţi să descopere şi să dezvolte lucrurile pe care noi le folosim azi în viata de zi cu zi.

4. Incandescent lamps

The incandescent lamp was the second form of electric light source to be developed for commercial use after the carbon arc lamp. It is the second most used lamp in the world today behind fluorescent lamps. The traditional incandescent bulb is not just a light source but has become a symbol of innovation.

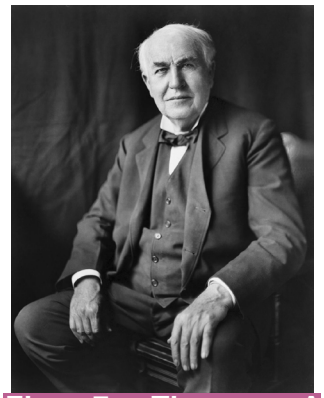

Fig. 7. Thomas A Edison, in 1922

Incandescent bulbs (Fig. 6) work by sending electric current through a resistive material which is heating to the incandescence, radiating light. Typically materials will glow before reaching a melting point. Most materials will glow a dull red colour when they reach around 525o Celsius. But, most materials will catch fire or melt and can not make a good filament.

Filaments are made from materials that have a high melting point. Tungsten can reach up to 3422oC before it melts. This is a higher temperature than any lamp will reach (except the carbon arc lamp which gets to 3500oC). Other materials have made good filaments or parts of filaments including tantalum, molybdenum, and carbon.

Early inventors knew that making a vacuum in a bulb would help reduce blackening and lengthen bulb life, the challenge was to develop ways to better create a vacuum. Heinrich Geissler was one of the early physicists to develop a good pump

4. Lămpile incandescente

Lampa cu incandescenţă a fost a doua formă de sursa de lumina electrică, dezvoltată pentru uz comercial, după lampa cu arc şi electrozi de carbon. Este a doua cea mai utilizată lampă din lume, după lămpile fluorescente. Becul incandescent traditional nu este doar o sursa de lumină, ci a devenit un simbol al inovatiei.

Iluminatul cu becuri incandescente (Fig. 6) se bazeează pe trecerea unui curent electric printr-un material rezistiv care se incălzeste la incandescenţă, iradiind lumină. In mod normal, materialele vor străluci înainte de a atinge punctul de topire. Cele mai multe materiale vor străluci rosu mat când ajung la aproximativ 525oCelsius. Dar, majoritatea materialelor nu pot fi filamente bune deoarece se aprind sau se topesc.

Filamentele sunt confecţionate din materiale care au punctul de topire ridicat. Wolframul poate atinge 3422oC înainte de a se topi. Aceasta este temperatura cea mai înaltă pe care o lampă o poate atinge (exceptând lampa cu arc cu electrozi de carbon care poate ajunge 3500oC). Alte materiale precum tantalul, molybdenul şi carbon pot fi filamente bune sau părţi ale filamentelor.

Primii inventatori au descoperit că prin crearea de condiţii de vid în bec se poate reduce oxidarea şi arderea filamentului, provocarea era să se dezvolte căi mai bune de a crea vid. Heinrich Geissler era unul din fizicienii care au dezvoltat o pompa de vid si un sistem potrivit. Totuşi, inventatori-

and system. Still, early bulb inventors 1802-1879 lacked a system good enough.

5. Thomas Edison

Thomas Edison (Fig. 7) began research on the incandescent light bulb in 1878, obtaining his first patent entitled "Improvement in Electric Lights".

Edison's lamp would consist of a filament housed in a glass vacuum bulb. Edison was trying to come up with a high resistance system that would require far less electrical power than was used for the arc lamps. This could eventually mean small electric lights suitable for home use.

His experiments involved the fabrication and testing of many different metal filaments, including platinum, which was very difficult to work with and prone to being weakened by heating and oxygen attack. Due to that, Edison resorted to a carbon-based, high-resistance, filament. One year later, in October 1879, Edison successfully tested a filament that burned for 13.5 hours, obtaining the patent for it in January 1880 and continuing to improve his design .

Thomas Edison received over 1000 U.S. patents, the most issued to any individual, while over 200 of these are about lighting and incandescent lamps. However, he does own one patent concerning the arc lamps: "Electric arc light". No. 263,138. Patented August 22, 1882.

During the 1880's, the electrical industry was rapidly growing. In this context, being sponsored by the Franklin Institute, the International Electrical Exhibition was held in Philadelphia between September 2nd and October 11th, 1884. The exhibits emphasized the production and application of electricity and methods of measurement which had strong educational implications. The exhibition brought the notice that the world emerged into a new era in which electric light and power would eventually affect every aspect of the personal and industrial activity.

During the Electrical Exhibition, the American Institute of Electrical Engineers (AIEE) held its first technical meeting at the Franklin Institute on October 7-8, where ten papers

lot lămpilor din perioada 1802-1879 le lipsea un sistem suficient de bun de iluminat.

5. Thomas Edison

Thomas Edison (Fig. 7) şi-a început cercetarea asupra becului cu incandescenţă în anul 1878, înregistrând primul său brevet, intitulat "Imbunătăţire în domeniul luminii electrice".

Lampa lui Edison se compune dintr-un filament integrat într-un recipient de sticlă vidat. Edison încerca să creeze un sistem care să necesite mult mai puţină energie electrică decât cel folosit de lămpile cu arc. Prin aceasta, pot fi create surse de lumina electrica de mică putere, potrivite pentru uz casnic.

Experimentele sale au presupus fabricarea şi testarea a multe filamente din diferite metale, incluzând platina, un element cu care era foarte dificil de lucrat si predispus la deteriorare în contact cu căldura şi acţiunea oxigenului. Din acest motiv, Edison s-a îndreptat către un filament de carbon, de mare rezistenţă. Un an mai târziu, în octombrie 1879, Edison a testat cu succes un nou filament care a functionat 13,5 ore, obţinând pentru acesta brevetul în ianuarie 1880 şi pentru care a continuat să îmbunătăţească proiectarea.

Thomas Edison a înregistrat peste 1000 de brevete în Statelor Unite, cele mai multe brevete acordate vreodată unei singure persoane. Dintre acestea, 200 sunt cu privire la lămpile incandescente şi la sisteme de iluminat. Edison deţine şi un brevet referitor la lămpile cu arc: „Iluminatul cu arc electric", Nr. 263.138, brevetat la data de 22 august, 1882.

În anii 1880, industria electrotehnică s-a dezvoltat rapid. In acest context, fiind sponsorizată de Franklin Institute, in Philadelphia s-a desfăşurat Expoziţia Electrică Internationala, în perioada 2 septembrie – 11 octombrie 1884. Exponatele au pus în evidenţă producţia şi aplicaţiile electricităţii şi metodele de măsurare care au avut implicaţii educaţionale puternice. Expoziţia a adus cu sine semnalul că lumea intra într-o nouă eră, în care lumina electrică şi energia vor influenţa, în cele din urmă fiecare aspect al activităţilor personale şi industriale.

În perioada Expoziţiei Electrice, Institutul American al Inginerilor Electricieni (AIEE) a susţinut prima întâlnire tehnică la Franklin Institute pe data de 7-8 octombrie 1884, unde zece lucrări au

were presented with vigorous discussion, out of which the first one presented is the most significant. Entitled “Notes on Phenomena in Incandescent Lamps” by Prof. Houston, it described experiments undertaken with Edison’s lamp with filament.

6. Conclusions

Michael Faraday and Thomas Edison had a great contribution in the creation of the electric light, and in time the need of improvement encouraged other scientists to adapt their work until today’s final variant of electric light.

Carbon arc lamps represented a main step in lighting technology. While they phased out during the 20th century, the incandescent light bulb took their place, representing a turning point in the social life and industry until the 21st century.

In present, these lamps are still being used in some areas. Reactivating the discharge lamp industry, the Xenon Short-Arc lamp (invented between 1940-1950) is commercially used as a film projector lamp.

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Webgraphy

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2.http://edisontechcenter.org/ArcLamps.html
3.http://www.eti.kit.edu/english/1390.php
4.https://www.britannica.com/biography/Michael-Faraday

fost prezentate într-o dezbatere aprinsă, din care prima prezentată a fost cea mai importantă. Lucrarea profesorului Houston, intitulată “Observaţii asupra fenomenelor lămpilor incandescente”, descria experimentele desfăşurate cu lampa cu filament a lui Edison.

6. Concluzii

Michael Faraday şi Thomas Edison au contribuit într-o importantă măsură la introducerea iluminatului electric, iar munca lor a încurajat alţi cercetători să propună noi variante de surse de lumină electrică, folosite azi.

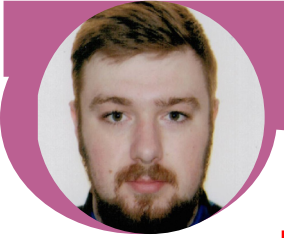
Lămpile cu arc şi electrozi de carbon au reprezentat un pas important în tehnologia iluminatului electric. In timp ce acestea ieşeau din uz în secolul al XX-lea, becul incandescent le-a luat locul, marcând un moment istoric ce avea să schimbe viaţa socială şi industria până in secolul al-XXI-lea.

În prezent, aceste lămpi se folosesc încă în anumite zone. Readucând la viaţă industria lămpilor cu descărcare, lampa Xenon Short-Arc (inventată în anii 1940-1950) este folosită in scopuri comerciale, drept lampa pentru proiector de film.

Iconography

Fig. 1: http://edisontechcenter.org/lighting/ThArcLampsDbleS300.jpg
Fig. 2: http://edisontechcenter.org/lighting/arclamps/ArcLampLabelParts.jpg
Fig. 3: http://edisontechcenter.org/lighting/ThmsnFirstCommDyn350.jpg
Fig. 4: http://1.bp.blogspot.com/-MZy9hk5i_qs/T6DPZk80O1I/AAAAAAAAB4c/uEFI_WmrWYY/s1600/Michael%2BFaraday%2B%2BPhoto.jpg
Fig. 5: https://en.wikipedia.org/wiki/Michael_Faraday#/media/File:Faraday_Laboratory_1870_Plate_RGNb10333198.05.tif
Fig. 6: https://en.wikipedia.org/wiki/Incandescent_light_bulb#/media/File:Edison_incandescent_lights.jpg
Fig. 7: https://upload.wikimedia.org/wikipedia/commons/9/9d/Thomas_Edison2.jpg

Referred teacher: Elena Helerea



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History of Technology of Lviv (Part I)

Історія Технологій Львова (Частина І)

1. Introduction

Lviv is an administrative center in western Ukraine with more than a millennium of history as a settlement, and over seven centuries as a city. Prior to the creation of the modern state of Ukraine (Fig. 1), Lviv had been part of numerous states and empires, including, under the name Lwów, Poland and later the Polish-Lithuanian Commonwealth, under the name Lemberg, the Austrian and later Austro-Hungarian Empires, the short-lived West Ukrainian People's Republic after World War I, Poland again, and the Soviet Union. In addition, both the Swedes and the Ottoman Turks made unsuccessful attempts to conquer the city.

Lviv was founded in 1256 by King Daniel of Galicia in the Ruthenian principality

1. Вступ

Львів є адміністративним центром Західної України з більш ніж тисячоліттям історії, як поселення і протягом семи століть, як місто. До створення сучасної держави України, Львів був частиною багатьох держав і імперій, в тому числі, під назвою «Lwów» Польський і пізніше Речі Посполитої під назвою Лемберг, австрійський, а потім Австро-Угорської імперії, недовговічна Захід Українська Народна Республіка після Першої світової війни, Польський знову, і Радянського Союзу. Крім того шведи і турки робили безуспішні спроби захоплення міста.

Львів був заснований в 1256 році королем Данилом Галицьким (Зобр. 1) з князівства

Fig. 1. Monument of King Danylo Halytskyi

of Halych-Volhynia and named in honour of his son Lev. The toponym may best be translated into English as Leo's lands or Leo's City (hence the Latin name Leopolis) [1].

Галицько-Волинського і названий на честь його сина Лева. Топонім найкраще може бути переведений на англійську мову, як землі Лео або місто Лева (звідси латинська назва Leopolis) [1].

Fig. 2. Structure of the arc lamp with carbon rod control

Fig. 3. The overlap of the Poltva river in an underground reservoir

2. The Poltva River

River of all rivers in the Lviv region is Poltva. It is a tributary of several major waterways, including the Western Bug and Goryn. Also Poltva passes through the Lviv city and the southern part of Roztochya. At this moment the river runs underground (Fig. 2), its stone walls surround only sewage collector [2].

Poltva river with many tributaries flowed freely through the streets to the middle of the XIX century. However, most of the wastewater produced in the city to the river, which turned into an open sewer collector (Fig. 3). Because of the shortcomings of the existing system of channels and frequent spread of odor sewer system needed restructuring and therefore the magistrate decided to make the overlap of the river in an underground reservoir.

2. Річка Полтва

Річкою всіх річок у Львівській області є Полтва. Вона є притокою декількох великих водних шляхів, в тому числі Західного Бугу і Горині. Також Полтва проходить через місто Львів і південну частину Розточчя. На даний момент річка проходить під землею (Зобр. 2), її оточують кам'яні стіни каналізаційного колектора [2].

Полтва з багатьма притоками вільно текли по вулицях до середини XIX століття. Проте, велика частина стічних вод проводиться в місті до річки, яка перетворилася у відкритий каналізаційний колектор (Зобр. 3). Через недоліки існуючої системи каналів й запах каналізації, суддя вирішив зробити перекриття річки в підземному резервуарі.

3. The architecture of the Lviv city

Lviv - a city that combined in a antiquity and modernity. Here you can find Gothic and Baroque, Rococo and Empire, Renaissance and Romanesque, modern eclecticism and constructivism. The architecture of the city influenced by Austro-Hungarian Empire and Poland (Fig. 4, Fig. 5, Fig. 6).

3. Архітектура Львова

Львів - це місто, що об'єднало давнину і сучасність. Тут ви можете знайти готику і бароко, рококо та ампір, ренесанс і романс, сучасну еклектику і конструктивізм. Архітектура міста виробилась під впливом Австро-Угорської імперії та Польщі (Зобр. 4, Зобр. 5, Зобр. 6).

4. The world's first kerosene lamp

In 1853 Jan Zeh and Ignacy Łukasiewicz extracted in Ukraine kerosene and manufactured

4. Перша у світі гасова лампа

У 1853 році Ян Зех і Ігнатій Лукасевич (Зобр. 7) видобувають в Україні гас і виготовляють

the world's first kerosene lamp. They soon began mass production in Vienna and the United States. Technology development and its use of oil extraction intensified global significance materials (Fig. 7).

In the second half of the XIX century in eastern Galicia beginning to produce oil. At the beginning of the XX century there was mined 5% of the global volume of liquid fuel [1].

5. Clock tower

Like London, Moscow and a select few other global cities, Lviv has its very own distinctive clock by which local time has been measured for centuries. Today's distinctive clock tower is the work of a 19th century Habsburg administration but is in the same spot as numerous other Lviv city clocks

першу у світі гасову лампу. Незабаром вони почали масове виробництво в Відні і США. Розробка технології та її використання видобутку нафти активізували глобальне значення матеріалів (Fig. 7).

У другій половині XIX століття у східній Галичині почали виробляти гас. На початку XX століття там було сформовано близько 5% світових запасів рідкого топлива.

5. Вежа Годинник

Як Лондон, Москва і інші великі міста, Львів має свій власний годинник, який вимірював місцевий час протягом багатьох століть. Перша згадка про вежу з годинником на Ринковій площі

Fig. 4. Rynok square

down the ages. The first mention of a clock tower in Lviv's Rynok Square is in 1404, when city documents list the names of a number of clock keepers and locksmiths charged with maintaining the city clock. Miraculously, during the ruinous 1527 fire which destroyed much of medieval Lviv, the city's clock tower remained virtually undamaged, but it was not so lucky forty years later, burning down in another inferno.

The city hall and clock tower (Fig. 8), as we

Львова в 1404 році. Дивом, під час згубної пожежі в 1527р, яка знищила більшу частину середньовічного Львова, вежа з годинником міста залишилися практично неушкодженою, але це не так пощастило, сорок років по тому вона згоріла в іншій пожежі.

Міська ратуша і вежа з годинником (Зобр.

Fig. 5. Lviv Theatre of Opera and Ballet

know them today, actually date back to 1851, when the city's Habsburg administrators decided to do away with the old administrative buildings and erect a whole new structure. The new clock mechanism was manufactured in Austria at a factory on the outskirts of Vienna, and continues to work to this day, making it one of the oldest functioning public timepieces in the world. The clock face is 2.7 meters in diameter, while the little hand of the clock itself measures 1.5 meters (Fig. 9) [3].

In more recent times Lviv's clock tower has become more closely associated with the growth of a Ukrainian national awakening over the past thirty years.

The clock tower was one of the first public buildings to fly the yellow and blue Ukrainian flag during the swing away from strict state control over protest movements which came at the tail end of the perestroika era. At the time flying the Ukrainian flag was still technically an offence, and the clock tower gained an iconic status as the most prominent spot for a flag in the entire city [3]

8), як ми знали їх сьогодні насправді походить з 1851 року, коли адміністратори міста Габсбурги вирішили позбутися від старих адміністративних будівель і звести цілу нову структуру. Новий механізм годинника був виготовлений в Австрії на заводі на околиці Відня, і продовжує працювати досі, що робить його одним з найстаріших діючих громадських хронометрів в світі. Циферблат становить 2,7 метра в діаметрі, а маленька стрілка самого годинника має 1,5 метра (Зобр. 9) [3].

Останнім часом історія баштового годинника Львів стала більш тісно пов'язана з ростом українського національного пробудження протягом останніх тридцяти років.

Вежа з годинником була одна з перших громадських будівель, над якою замайорів жовтий і синій прапор України під час замаху проти суворого державного контролю над рухами протесту, які прийшли в кінці перебудови епохи. У той час вивішувати український прапор було правопорушенням й баштовий годинник отримав культовий статус, як найбільш чільне місце для прапора у всьому місті. [3]

6. Conclusions

Lviv is the city with a rich medieval history. City of napping lions and legends, city of temples and museums, city of architectural masterpieces and artistic geniuses, city of theaters and thematic cafes.

In a trip in Lviv you can see surprising beauty of medieval houses, admire the grandeur of Opera and „Zhorzh", touch historical walls and defensive shafts, listen the melodious bells of Lviv's churches, collate a clock time with old chronometers on the Lviv's towers. Walk by the medieval streets paved by paving stones. This paving stones which were retaken a hundreds of times rubbed the soles of kings and beggars, sages and clowns, benefactors and to the thieves. And today a numerous tourists take pictures of this paving stones and Lvivian ladies suffer from it, beating their heels shoes. Drink a cup of scented coffee, enjoy a beer from an old brewery, buy a present – unique product of Lviv's masters in memory about Lviv.

6. Висновки

Львів - це місто середньовічної історії. Місто дрімаючих левів і легенд, місто храмів і музеїв, місто архітектурних шедеврів і художніх геніїв, місто театрів і тематичних кафе.

У мандрівці по Львову ви можете побачити дивовижну красу середньовічних будинків, помилуватися величчю опери і «Жоржа», помацати історичні мури і оборонні вали, слухати мелодійні дзвони церков Львова, звіряти час годинника зі старими хронометрами на львівських вежах. Прогуляйтесь по середньовічних вулицях викладених бруківкою. Ця бруківка, перекладувана сотні раз, стирала підошви королів і жебраків, мудреців і блазнів, благодійників і злодіїв. І сьогодні численні туристи фотографують цю бруківку і багато львівських панянок страждають від неї, збиваючи каблуки своїх черевичків. Випийте чашку ароматної кави, насолодіться пивом зі старої пивоварні, купіть подарунок - унікальний продукт майстрів Львова на згадку про Львів.

Fig. 6. Church of Saints Olga and Elizabeth

Fig. 7. Monument of Jan Zeh and Ignacy Łukasiewicz

You must visit the Lviv to better feel the atmosphere of this city. So welcome!

Ви повинні відвідати Львів, щоб краще відчути атмосферу цього міста. Так що ласкаво просимо!

Fig. 6. Church of Saints Olga and Elizabeth

Fig. 9. The mechanism of tower's clock

Referred teacher: Elena Helerea

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