History of Science and Technology

EPM

European Pupils Magazine

Issue 1/2021
ISSN 1722-6961

International Editorial Board

Cooperators

ES Julio Verne, Bargas, Spain
Teacher: Jesús Méndez Díaz-Ropero.

National Trade and Banking High School, Sofia, Bulgaria
Teacher: Tzvetan Kostov

I.I.S. "Gulli e Pinissi" - Acireale, Liceo Classico sede Acireale, Liceo Scientifico sede Aci Bonaccorsi
Catania, Italy
Teachers: Tarcisio Maugeri, Susanna Tricomi, *Guiseppa Tidona*

„Victor Babeș" Vational College, Bucuresti, Romania
Teacher: Crina Stefureac

George Calinescu Theoretical High School, București
Teacher: Marilena Marinescu

Iulia Hasdeu National College, București
Teacher: Elisabeta Niculescu

Gh. Asachi Technical College Iasi, Romania
Teacher: Tamara Slătineanu

I.S.S.N. 1722-6961

EPM Official Website:

http://www.epmagazine.org/

EPM Online Magazine:

http://www.epmagazine.org/issues/

EPM Greek Website:

www.epmgreece.blogspot.com

Contents

Contents

Editorial
EN

Luigi Campanella
Sapienza University of Rome
Rome, Italy

Beneficial microorganisms

EPMagazine in times of pandemics continued to approach topics related to public health and diseases, ways in which they can be fought, but some microorganisms and bacteria that co-exist with humans have scientifically proved to be beneficial.

Homo sapiens is comprised of more bacterial cells than human cells, and this number of microorganisms have co-evolved with us in such a way that we delegated many metabolic functions to our microscopic partners.

The arrival of modern world perturbators have modified the balance and caused a spread of dysbiosis and its many related disorders and civilization diseases.

It is in this context that probiotics have gained in popularity, thanks to the possibility of re-introducing lost functions.

That probiotics are good for you, is true by definition: the definition of probiotics by the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO) is “live microorganisms that, when administered in adequate amounts, confer a health benefit to the host”.

Nowadays, studies are multiplying to show that microorganisms are beneficial for a huge array of health indications, ranging from the most well-known aspects of digestive health to the fascinating area of the gut-brain axis, through the established but regulation-challenged vaginal sphere benefit, but also increasingly recognized in relation to cardiovascular health, auto-immune diseases and even have an effect on survival rates in patients with cancer.

Microorganisme benefice

EPMagazine în vremuri de pandemie a continuat să abordeze subiecte legate de sănătatea publică și boli, modalități prin care acestea pot fi prevenite sau tratate, dar s-a dovedit științific că unele microorganisme și bacterii care coexistă cu oamenii pot fi benefice.

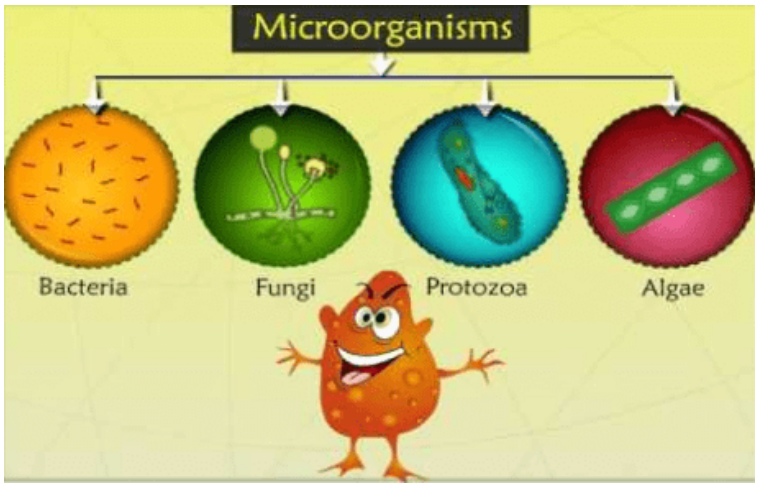
Homo sapiens este compus din mai multe celule bacteriene decât celule umane, iar acest număr de microorganisme au evoluat împreună cu noi în așa fel încât am delegat multe funcții metabolice partenerilor noștri microscopici.

Sosirea perturbatorilor lumii moderne a modificat echilibrul și a provocat o răspândire a disbiozei și a numeroaselor tulburări și boli ale civilizației asociate.

În acest context, probioticele au câștigat popularitate, datorită posibilității de a reintroduce funcțiile pierdute.

Că probioticele sunt bune pentru noi, este adevărat prin definiție: definiția probioticelor de către Organizația pentru Alimentație și Agricultură a Națiunilor Unite (FAO) și Organizația Mondială a Sănătății (OMS) este „microorganisme vii care, atunci când sunt administrate în cantități adecvate, conferă un beneficiu pentru sănătate pentru gazdă”.

În zilele noastre, studiile se înmulțesc pentru a arăta că microorganismele sunt benefice pentru o gamă largă de indicații de sănătate, variind de la cele mai cunoscute aspecte ale sănătății digestive până la mecanisme mai complicate și sisteme biologice complexe care beneficiază de prezența microorganismelor, cum ar fi sănătatea cardiovasculară, bolile autoimune și chiar un efect asupra ratelor de supraviețuire la pacienții cu cancer.



Editorial
BG

Полезни микроорганизми

EPMagazine във времена на пандемии продължи да подхожда към теми, свързани с общественото здраве и болести, начините, по които могат да се борят с тях, но някои микроорганизми и бактерии, които съществуват съвместно с хората, са научно доказали, че са полезни.

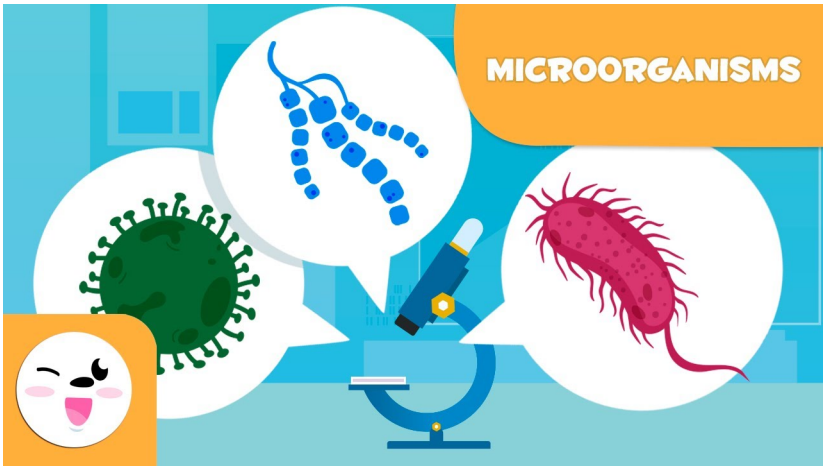
Хомо сапиенс се състои от повече бактериални клетки, отколкото човешки клетки, и този брой микроорганизми са еволюирали заедно с нас по такъв начин, че ние делегирахме много метаболитни функции на нашите микроскопични партньори.

Пристигането на съвременните световни смущения промени баланса и предизвика разпространението на дисбиозата и многобройните свързани с нея разстройства и болести на цивилизацията.

Именно в този контекст пробиотиците придобиха популярност, благодарение на възможността за повторно въвеждане на загубени функции.

Това, че пробиотиците са полезни за вас, е вярно по дефиниция: определението за пробиотици от Организацията по прехрана и земеделие на ООН (FAO) и Световната здравна организация (СЗО) е „живи микроорганизми, които, когато се прилагат в адекватни количества, придават полза за здравето на домакина“.

В днешно време проучванията се увеличават, за да покажат, че микроорганизмите са полезни за огромен набор от здравни индикации, вариращи от най-добре познатите аспекти на храносмилателното здраве до очарователната област на оста черво-мозък, през установената, но предизвикана от регулирането вагинална сфера полза, но също така все по-признати във връзка със сърдечно-съдовото здраве, автоимунните заболявания и дори имат ефект върху процента на преживяемост при пациенти с рак.



Ωφέλιμοι μικροοργανισμοί

Το EPMagazine στην περίοδο της πανδημίας συνέχισε να προσεγγίζει θέματα σχετικά με τη δημόσια υγεία και τις ασθένειες αλλά και τους τρόπους με τους οποίους μπορεί να καταπολεμηθούν. Έχει αποδειχθεί επιστημονικά ότι ορισμένοι μικροοργανισμοί και βακτήρια που συνυπάρχουν με τον άνθρωπο δρουν ευεργετικά γι' αυτόν.

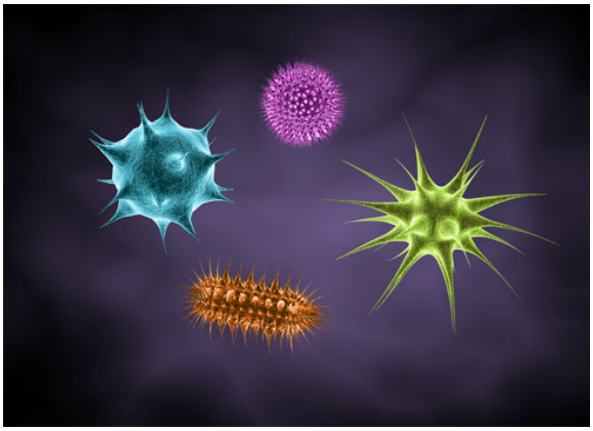
Ο Homo sapiens περιέχει περισσότερα κύτταρα βακτηρίων από ότι τα δικά του ανθρώπινα κύτταρα και αυτός ο αριθμός μικροοργανισμών έχει συνεξελιχθεί μαζί μας με τέτοιο τρόπο που αναθέτουμε πολλές μεταβολικές λειτουργίες στους μικροσκοπικούς συνεργάτες μας.

Η εμφάνιση στον σύγχρονο κόσμο απορρυθμίσεων στο βιολογικό ρολόι έχει τροποποιήσει την παραπάνω ισορροπία προκαλώντας εξάπλωση της δυσβίωσης με αποτέλεσμα διάφορες διαταραχές και ασθένειες του σύγχρονου πολιτισμού.

Σε αυτό το πλαίσιο τα προβιοτικά έχουν κερδίσει δημοτικότητα, χάρη στη δυνατότητα επαν-εισαγωγής χαμένων λειτουργιών.

Το ότι τα προβιοτικά είναι καλά για τον άνθρωπο, ισχύει εξ ορισμού: ο ορισμός των προβιοτικών από τον Οργανισμό Τροφίμων και Γεωργίας των Ηνωμένων Εθνών (FAO) και τον Παγκόσμιο Οργανισμό Υγείας (WHO) είναι «ζωντανοί μικροοργανισμοί που, όταν χορηγούνται σε επαρκείς ποσότητες, προσδίδουν όφελος για την υγεία του ξενιστή».

Σήμερα, οι μελέτες πολλαπλασιάζονται για να αποδείξουν ότι οι μικροοργανισμοί είναι ωφέλιμοι για την υγεία σε πολλές λειτουργίες του ανθρώπινου οργανισμού, από την ήδη πολύ γνωστή συνεισφορά στο πεπτικό σύστημα έως τη συναρπαστική περιοχή του άξονα εντέρου-εγκεφάλου, μέσω της καθιερωμένης αλλά αμφιβόλου ρύθμισης του κολπικού περιβάλλοντος. Όφελος επίσης αναγνωρίζεται όλο και περισσότερο σε σχέση με την καρδιαγγειακή υγεία, τα αυτοάνοσα νοσήματα όπως ακόμη και επίδραση στα ποσοστά επιβίωσης σε ασθενείς με καρκίνο.



Editorial
IT

Microorganismi benefici

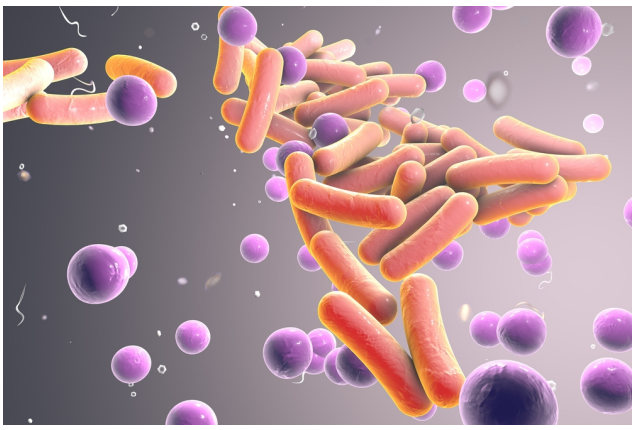
EP*Magazine*, anche in tempo di pandemia, ha continuato ad affrontare argomenti legati alla salute, alle malattie e al modo con cui esse possono essere combattute, anche se è stato provato scientificamente che alcuni microrganismi in simbiosi con l'uomo apportano dei benefici.

La specie Homo sapiens è composto da più cellule batteriche che umane e questo numero di microrganismi si è coevoluto con noi in modo tale che, nel nostro corpo, svolgono molte funzioni metaboliche.

La presenza di fattori presenti nel mondo moderno ha modificato questo delicato equilibrio e ha causato una diffusione di squilibri microbici con conseguenti disturbi e malattie.
Grazie alla possibilità di ripristinare funzioni metaboliche perdute, i probiotici hanno guadagnato molta popolarità

Che i probiotici facciano bene, è vero per definizione; infatti la definizione di probiotici da parte dell'Organizzazione delle Nazioni Unite per l'alimentazione e l'agricoltura (FAO) e dell'Organizzazione mondiale della sanità (OMS) è "*microrganismi vivi che, se somministrati in quantità adeguate, apportano un beneficio per la salute all'ospite*".

Al giorno d'oggi, gli studi si stanno moltiplicando per dimostrare che i microrganismi sono utili per una vasta gamma di indicazioni per la salute, che vanno dagli aspetti più noti come la digestione all'affascinante area di collegamento fra intestino e cervello; inoltre, incrementano il benessere cardiovascolare, delle malattie autoimmuni e hanno un'influenza sulle percentuali di sopravvivenza nei pazienti con cancro.



Microorganismo beneficiosos

En tiempos de pandemia, la revista EPM continúa acercándose a temas relacionados con la salud y las enfermedades, y los métodos para afrontarlas.

Algunas bacterias y otro microorganismos que conviven con el ser humano han demostrado ser beneficiosos.

El homo sapiens está compuesto por un mayor número de células bacterianas que de células humanas y estos microrganismos han evolucionado con nosotros de tal manera que delegamos muchas de nuestras funciones metabólicas en nuestros colegas microscópicos.

La llegada de los perturbadores del mundo moderno han modificado el equilibrio y causado una expansión de la disbiosis y de sus muchas consecuencias como los diferentes trastornos y enfermedades de nuestra civilización.

En este contexto, los probióticos han ganado popularidad gracias a la posibilidad de reintroducir funciones perdidas.

Que los probióticos son beneficiosos es algo cierto por definición: la definición dada por la FAO y la OMS es “microorganismos vivos que administrados en la cantidad adecuada confieren un beneficio saludable al receptor”.

En la actualidad, hay múltiples estudios que demuestran que los microroganismos son beneficiosos para un gran número de afecciones de salud; desde los conocidos aspectos de salud digestiva hasta el fascinante área del eje intestino-cerebro; pasando por los beneficios del área vaginal, la salud cardiovascular y de las enfermedades autoinmunes sin dejar de mencionar la mejora en tasa de supervivencia de pacientes con cáncer.

Roberto Soldà, Pasquale Fetto
IPSIA "G. Ceconi" Codroipo (UD),
Aracne Editrice

An inductive-experimental approach to learn on the oscillating reactions

1. Historical evolutionary path

The concept of reaction is perhaps what can be considered peculiar to chemistry, which distinguishes it from the other natural sciences.

With this term, in the same context of chemistry, we globally indicate a complex of observations or facts that it is good to remember: the transformation of one substance into another and the activity or material state that makes the transformation manifest and carries out . (Leonello Paoloni) [1].

Although the Belousov-Zhabotinski reaction is the best known and most studied oscillating reaction, the first evidence of homogeneous chemical oscillations in solution was reported by the American chemist W. C. Bray in 1921.

This was the first example of an "oscillating" chemical reaction. W.C. Bray already since 1916 was engaged with A. L. Caulkins in the study of the reactions concerning the oxidation of iodine to iodate ions and the reduction of iodate ions to iodine.

Bray himself, in 1917, wrote: "... shortly before the work with Caulkins ended, I observed for the first time a strange phenomenon ...". This "strange phenomenon" was the object of the article published in 1921 [2].

The observation, singular and at the same time interesting, reported by Bray was that, at certain concentrations of hydrogen peroxide and iodate and in the concentration range of H_2SO_4 between (0.055 - 0.110) N (normal solution), the oxygen that it developed did not increase gradually, but by periodic impulses.

Un approccio Induttivo - sperimentale per apprendere le reaioni oscillanti

1. Percorso storico evolutivo

Il concetto di reazione è forse ciò che può essere considerato peculiare della chimica, che la distingue dalle altre scienze naturali.

Con questo termine, nello stesso contesto della chimica, indichiamo globalmente un complesso di osservazioni o fatti che è bene ricordare: la trasformazione di una sostanza in un'altra e l'attività o stato materiale che rende manifesta e compie la trasformazione. (Leonello Paoloni) [1].

Sebbene la reazione di Belousov-Zhabotinski sia la reazione oscillante più conosciuta e studiata, la prima prova di oscillazioni chimiche omogenee in soluzione fu riportata dal chimico americano WC Bray nel 1921.

Questo è stato il primo esempio di reazione chimica "oscillante". WC. Bray già dal 1916 era impegnato con A. L. Caulkins nello studio delle reazioni riguardanti l'ossidazione dello iodio in ioni iodato e la riduzione degli ioni iodato in iodio.

Lo stesso Bray, nel 1917, scrisse: "...poco prima che il lavoro con Caulkins finisse, osservai per la prima volta uno strano fenomeno...". Questo "strano fenomeno" fu oggetto dell'articolo pubblicato nel 1921 [2].

L'osservazione, singolare e insieme interessante, riportata da Bray è stata che, a determinate concentrazioni di perossido di idrogeno e iodato e nell'intervallo di concentrazione di H_2SO_4 compreso tra 0,055 N <0,110 N, l'ossigeno che ha sviluppato produceva non aumentare gradualmente, ma con impulsi periodici.

In his article, Bray cites Lotka's works [3,4] on patterns of hypothetical consecutive reactions that led to oscillating trends of two intermediates X and Y as interesting.

As often happens, the work published by Bray did not have the due interest and later criticisms and perplexities developed on the experimental part and on considering the heterogeneous system (already since 1903 oscillations in heterogeneous systems had been observed).

In 1927 Bray, in collaboration with Liebhafsky Herman A., resumed the study of his system to deepen the kinetics of subsystems.

In 1931 Bray, Liebhafsky and Caulkins published an article also in the Journal of the American Chemical Society.

In 1933 Bray, Liebhafsky published eight articles on the kinetics of subsets of reactions:

$5H_2O_2 + I_2 \rightarrow 2IO_3^- + 2H^+ + 4H_2O$

$5H_2O_2 + 2IO_3^- + 2H^+ \rightarrow I_2 + 5O_2 + 6H_2O$

In addition to the determination of many rate constants, the most important result was that the I- ions and the oxide species had to play an important role in the reaction mechanisms.

In 1951 Peard and Cullis published an article in which it was admitted that the oscillations of the Bray system did indeed occur.

The mechanism of the Bray-Liebhafsky reaction was explained in detail by Sharma and Noyes in 1976.

In 1950 the chemist Boris Pavlovich Belousov, to simulate the Krebs cycle in a test tube, thought of using bromate ions in an acid environment as oxidants and the metal ion Ce (IV) as a catalyst for the oxidation of citric acid.

Nel suo articolo, Bray cita interessanti i lavori di Lotka [3,4] sui modelli di ipotetiche reazioni consecutive che hanno portato a tendenze oscillanti di due intermedi X e Y.

Come spesso accade, il lavoro pubblicato da Bray non ha avuto il dovuto interesse e successivamente si sono sviluppate critiche e perplessità sulla parte sperimentale e sulla considerazione del sistema eterogeneo (già dal 1903 si erano osservate oscillazioni in sistemi eterogenei).

Nel 1927 Bray, in collaborazione con Liebhafsky Herman A., riprese lo studio del suo sistema per approfondire la cinetica dei sottosistemi.

Nel 1931 Bray, Liebhafsky e Caulkins pubblicarono un articolo anche sul Journal of American Chemical Society.

Nel 1933 Bray, Liebhafsky pubblicò otto articoli sulla cinetica dei sottoinsiemi di reazioni:

$5H_2O_2 + I_2 \rightarrow 2IO_3^- + 2H^+ + 4H_2O$

$5H_2O_2 + 2IO_3^- + 2H^+ \rightarrow I_2 + 5O_2 + 6H_2O$

Oltre alla determinazione di molte costanti di velocità, il risultato più importante è stato che gli ioni I e le specie di ossido dovevano svolgere un ruolo importante nei meccanismi di reazione.

Nel 1951 Peard e Cullis pubblicarono un articolo in cui si ammetteva che le oscillazioni del sistema Bray erano effettivamente avvenute.

Il meccanismo della reazione di Bray-Liebhafsky è stato spiegato in dettaglio da Sharma e Noyes nel 1976.

Nel 1950 il chimico Boris Pavlovich Belousov, per simulare in provetta il ciclo di Krebs, pensò di utilizzare ioni bromato in ambiente acido come ossidanti e lo ione metallico Ce (IV) come catalizzatore per l'ossidazione dell'acido citrico.

The chemical simulation of the Krebs cycle carried out by Belousov, that is an aqueous solution of citric acid with the addition of an acidified solution of potassium bromate as an oxidizing agent and containing ceric ions, intensely colored in yellow, as catalysts, became colorless and returned to become yellow periodically.

The phenomenon continued for more than an hour (at room temperature) while the CO_2 was developing. This clearly showed that the concentration of the Ce (IV) ions (as well as that of the colorless Ce (III) ions) varied periodically over time. As for Bray, also for Belousov the phenomenon was nothing short of "extravagant".

Belousov continued to study the phenomenon and at the suggestion of his colleague Safronov he replaced the ceric ions with the iron-phenanthroline complex, which functioned better both as a catalyst and as an indicator of oscillations: the reduced form of the complex (ferroin, Fe $(phen)_3^{2+}$) is red, the oxidized one (ferrin, Fe $(phen)_3^{3+}$) is blue.

Belousov sent his first detailed article to a *Russian magazine* in 1951, at the age of fifty-seven, which rejected it. The editor of the magazine wrote him that his "supposed discovery" was practically impossible because "in contrast to the existing theory". his work even more detailed and rich can be imagined to the publisher receiving yet another refusal.

Belousov, very enraged, decided not to publish anything anymore. In 1961 Anatol M. Zhabotinsky at the suggestion of Simon E. Schnoll (his professor) became interested in oscillating chemical reactions and in particular in the "recipe" that Schnoll knew to be Belousov's.

Zhabotinsky in early 1962, after discussing the results of his work with Schnoll, decided to send the manuscript to Belousov. The two never met while Zhabotinsky had urged him several times.

In his correspondence, Belousov sent Zhabotinsky a copy of the little book he had printed in 1959 by the Medical Institute.

La simulazione chimica del ciclo di Krebs effettuata da Belousov, ovvero una soluzione acquosa di acido citrico con l'aggiunta di una soluzione acidificata di bromato di potassio come agente ossidante e contenente ioni cerico, intensamente colorati di giallo, come catalizzatori, divenne incolore e tornato a diventare giallo periodicamente.

Il fenomeno è proseguito per più di un'ora (a temperatura ambiente) mentre si sviluppava la CO_2. Ciò ha mostrato chiaramente che la concentrazione degli ioni Ce (IV) (così come quella degli ioni Ce (III) incolori) variava periodicamente nel tempo. Come per Bray, anche per Belousov il fenomeno è stato a dir poco "stravagante".

Belousov continuò a studiare il fenomeno e su suggerimento del collega Safronov sostituì gli ioni cerico con il complesso ferro-fenantrolina, che funzionava meglio sia come catalizzatore che come indicatore delle oscillazioni: la forma ridotta del complesso (ferroina, Fe $(phen)_3^{2+}$) è rosso, quello ossidato (ferrin, Fe $(phen)_3^{3+}$) è blu.

Belousov inviò il suo primo articolo dettagliato a una rivista russa nel 1951, all'età di cinquantasette anni, che lo rifiutò. Il direttore della rivista gli scrisse che la sua "presunta scoperta" era praticamente impossibile perché "contraria alla teoria esistente". il suo lavoro ancora più dettagliato e ricco può essere immaginato all'editore che riceve l'ennesimo rifiuto.

Belousov, molto infuriato, decise di non pubblicare più nulla. Nel 1961 Anatol M. Zhabotinsky su suggerimento di Simon E. Schnoll (il suo professore) si interessò alle reazioni chimiche oscillanti e in particolare alla "ricetta" che Schnoll sapeva essere di Belousov.

Zhabotinsky all'inizio del 1962, dopo aver discusso i risultati del suo lavoro con Schnoll, decise di inviare il manoscritto a Belousov. I due non si incontrarono mai mentre Zhabotinsky lo aveva sollecitato più volte.

Nella sua corrispondenza, Belousov ha inviato a Zhabotinsky una copia del libricino che aveva stampato nel 1959 dall'Istituto di medicina.

Zhabotinsky, regarding the rejection of Belousov's articles, argues that, at the time, chemists believed that oscillating behaviors in homogeneous systems were in contradiction with the II Principle of Thermodynamics, while biophysicists "were unaware of this" and therefore did not no difficulty in accepting his article in one of their magazines.

Much research was conducted on oscillating systems and published results; after the Congress on Biological and Biochemical Oscillators, held in Prague in 1968 in which Zhabotinsky and his colleagues, but not Belousov, participated. This fact caused the name "Zhabotinsky reaction" commonly used in Western scientific literature to be changed, only after a few years, to "Belousov Zhabotinsky reaction" (commonly, BZ reaction). Unfortunately, Belousov died in 1973 without having enjoyed the recognition of his main discovery.

Ilya Prigogine and collaborators were the first in the late 1960s to recognize that the classical interpretation requires not only that systems be isolated, but also that they are close to their state of equilibrium. For isolated systems close to equilibrium, therefore, oscillating behaviors are not possible, while for systems far from equilibrium these behaviors are possible. In fact, the zero variation of entropy caused by the periodic variations in the concentrations of the intermediates is more than compensated by the increase in entropy due to other processes occurring at the same time and therefore the total variation of entropy of the isolated system is always positive, as required by the II Principle of Thermodynamics.

In this brief and incomplete historical reconstruction concerning oscillating reactions one cannot but remember Enzo Tiezzi and, wanting to identify a relevant general aspect of his thought, we believe we must refer to his great ability to observe and explain, in theoretical terms, the behavior of complex dynamic systems.

Zhabotinsky, in merito al rigetto degli articoli di Belousov, sostiene che, all'epoca, i chimici ritenevano che i comportamenti oscillanti in sistemi omogenei fossero in contraddizione con il II Principio della Termodinamica, mentre i biofisici "non ne erano a conoscenza" e quindi non ebbero difficoltà ad accettare il suo articolo in una delle loro riviste.

Molte ricerche sono state condotte su sistemi oscillanti e risultati pubblicati; dopo il Congresso sugli oscillatori biologici e biochimici, tenutosi a Praga nel 1968 a cui parteciparono Zhabotinsky e i suoi colleghi, ma non Belousov. Questo fatto fece sì che il nome "reazione di Zhabotinsky" comunemente usato nella letteratura scientifica occidentale fosse cambiato, solo dopo pochi anni, in "reazione di Belousov Zhabotinsky" (comunemente, reazione di BZ). Sfortunatamente, Belousov morì nel 1973 senza aver goduto del riconoscimento di la sua principale scoperta.

Ilya Prigogine e collaboratori furono i primi alla fine degli anni '60 a riconoscere che l'interpretazione classica richiede non solo che i sistemi siano isolati, ma anche che siano vicini al loro stato di equilibrio. Per sistemi isolati prossimi all'equilibrio, quindi, non sono possibili comportamenti oscillanti, mentre per sistemi lontani dall'equilibrio questi comportamenti sono possibili. Infatti la variazione nulla di entropia causata dalle variazioni periodiche delle concentrazioni degli intermedi è più che compensata dall'aumento di entropia dovuto ad altri processi che si verificano contemporaneamente e quindi la variazione totale di entropia del sistema isolato è sempre positivo, come richiesto dal II Principio della Termodinamica.

In questa breve e incompleta ricostruzione storica di reazioni oscillanti non si può non ricordare Enzo Tiezzi e, volendo individuare un aspetto generale rilevante del suo pensiero, riteniamo di doversi riferire alla sua grande capacità di osservare e spiegare, in termini teorici, il comportamento di sistemi dinamici complessi.

An accurate and detailed scientific discussion on recent developments in the evolutionary sciences and the epistemology of science is collected in the volume "Towards an Evolutionary Physics", which takes up the path already undertaken by Prigogine.

Fig. 1. Boris Belousov (1893-1970)

Prigogine has defined these systems as dissipative structures for the ability to organize themselves in coherent forms and maintain them over time. These properties are due to two essential and necessary characteristics. The first is that a dissipative system is an open system, that is, in relation to the external environment with which it activates exchanges of energy and matter. The second is that a dissipative structure is a complex system with a coherent overall configuration and capable of adapting to stresses induced by the surrounding environment and self-organizing [5].

Fig. 2. Anathol Zhabotinsky (1938-2008)

A mechanism of the Belousov-Zhabotinsky reaction which satisfactorily accounts for the oscillations of intermediates and catalysts was proposed in 1972 by R.J. Field, E. Körös and R.M. Noyes [6], for the bromate system in an acid / malonic acid environment catalyzed by the couple.

Towards the end of the 1980s a method was developed for the systematic identification of oscillating chemical systems: today many "families" of chemical oscillators are known [7]. Therefore, from 1970 until today, research on oscillating reactions has multiplied in an impressive way, to the point that extensive reviews are periodically published that keep researchers updated on the "state of the art" in this field.

Le ricerche scientifiche di Enzo Tiezzi (Siena 1938-2010) hanno spaziato dallo studio in laboratorio di alcune particolari reazioni chimiche oscillanti, alla visione sistemica delle reti di processo negli organismi viventi, negli ecosistemi, nei sistemi economici e sociali. Un'accurata e dettagliata discussione scientifica sui recenti sviluppi delle scienze evoluzionistiche e dell'epistemologia della scienza è raccolta nel volume "Verso una fisica evolutiva", che riprende il percorso già intrapreso da Prigogine.

Prigogine ha definito questi sistemi come strutture dissipative per la capacità di organizzarsi in forme coerenti e mantenerle nel tempo. Queste proprietà sono dovute a due caratteristiche essenziali e necessarie. La prima è che un sistema dissipativo è un sistema aperto, cioè in relazione all'ambiente esterno con il quale attiva scambi di energia e di materia. La seconda è che una struttura dissipativa è un sistema complesso con una configurazione complessiva coerente e capace di adattarsi alle sollecitazioni indotte dall'ambiente circostante e di auto-organizzarsi [5].

Un meccanismo della reazione Belousov-Zhabotinsky che spiega in modo soddisfacente le oscillazioni di intermedi e catalizzatori è stato proposto nel 1972 da R.J. Field, E. Körös e R.M. Noyes [6], per il sistema bromato in ambiente acido/ malonico catalizzato dalla coppia

Verso la fine degli anni '80 è stato sviluppato un metodo per l'identificazione sistematica di sistemi chimici oscillanti: oggi si conoscono molte "famiglie" di oscillatori chimici [7]. Pertanto, dal 1970 ad oggi, la ricerca sulle reazioni oscillanti si è moltiplicata in modo impressionante, al punto che periodicamente

It is clear that the oscillating phenomena in biochemical systems are certainly the most complicated to interpret in terms of reaction mechanisms, as numerous intermediates are involved, including many radical species, which are difficult to identify. However, it should be recognized that studies on oscillating biochemical systems preceded and favored research on relatively simpler chemical systems. Perhaps this was the reason that about fifty years passed before chemists and physicists seriously dealt with these phenomena.

2. The oscillating chemical reactions

In chemistry, one of the complex and at the same time fascinating phenomena is represented by oscillating reactions. The oscillating chemical systems, under certain conditions, manifest a series of behaviors ranging from aperiodic oscillations, to multi-stability, to the formation of spatial "waves" of concentration up to the "chaotic" trend.

The kinetics of oscillating chemical systems is governed by non-linear equations and in the reaction mechanism there are autocatalytic and self-inhibiting stages, and that such systems can be under the same experimental conditions in two different almost stable stationary stages. On the other hand, the chemical systems to manifest oscillating behaviors must be far from their equilibrium state.

The advantage of oscillating chemical systems compared to complex physical systems (e.g. atmospheric systems), not very predictable and not reproducible, derives from the fact that in a chemical reaction the "perturbation" that causes the phenomena (e.g. concentration), can be reproduce with sufficient accuracy at least when the reaction is carried out in a beaker.

Oscillating reactions are truly spectacular phenomena, in which periodic variations in

vengono pubblicate ampie revisioni che tengono aggiornati i ricercatori sullo "stato dell'arte" in questo campo.

È chiaro che i fenomeni oscillanti nei sistemi biochimici sono sicuramente i più complicati da interpretare in termini di meccanismi di reazione, in quanto sono coinvolti numerosi intermedi, tra cui molte specie radicaliche, di difficile identificazione. Tuttavia, va riconosciuto che gli studi sui sistemi biochimici oscillanti hanno preceduto e favorito la ricerca su sistemi chimici relativamente più semplici. Forse questo fu il motivo per cui trascorsero circa cinquant'anni prima che chimici e fisici si occupassero seriamente di questi fenomeni.

2. Le reazioni chimiche oscillanti

In chimica, uno dei fenomeni complessi e allo stesso tempo affascinanti è rappresentato dalle reazioni oscillanti. I sistemi chimici oscillanti, in determinate condizioni, manifestano una serie di comportamenti che vanno dalle oscillazioni aperiodiche, alla multistabilità, alla formazione di "onde" spaziali di concentrazione fino all'andamento "caotico".

La cinetica dei sistemi chimici oscillanti è governata da equazioni non lineari e nel meccanismo di reazione ci sono stadi autocatalitici e autoinibitori e che tali sistemi possono trovarsi nelle stesse condizioni sperimentali in due diversi stadi stazionari quasi stabili. D'altra parte, i sistemi chimici per manifestare comportamenti oscillanti devono essere lontani dal loro stato di equilibrio.

Il vantaggio dei sistemi chimici oscillanti rispetto ai sistemi fisici complessi (es. sistemi atmosferici), poco prevedibili e non riproducibili, deriva dal fatto che in una reazione chimica la "perturbazione" che provoca i fenomeni (es. concentrazione), può essere riprodotta con sufficiente accuratezza almeno quando la reazione viene condotta in un becher.

Le reazioni oscillanti sono fenomeni davvero spettacolari, in cui si osservano variazioni

time and also in space of the concentrations of intermediates and catalysts are observed, they are well-known examples of complex phenomena and are the basis of one of the processes at the cellular and subcellular level, such as glycolysis, respiration and replication of DNA strands.

Oscillating reactions are very interesting for teaching, as some experiments on oscillating reactions can also be proposed in an elementary course of chemistry because, in addition to being truly spectacular phenomena, they are examples of reactions that occur with a localized decrease in entropy of the system more than compensated by the increase in the entropy of the environment. Like other physical and chemical transformations that tend to occur spontaneously based on the increase in overall entropy [1].

But, the explaining such reactions to high school students is problematic, because no acceptable explanation may appear to be possible unless students have acquired sufficient knowledge of both physical chemistry and mathematics.

However, the three conditions necessary for the oscillatory behavior of any chemical system (including oscillating reactions) according to Noyes' interpretation [2] can be learned by high school students using an appropriate learning path based on an inductive-experimental approach.

This approach consists of experiments, similar to those proposed several years ago by K. Yoshikawa et al. [3)], but not with a pair of expensive Ag / AgCl electrodes, but with low-cost materials and instrumentation readily available in any type of school.

periodiche nel tempo e anche nello spazio delle concentrazioni di intermedi e catalizzatori, sono esempi ben noti di fenomeni complessi e sono alla base di uno dei processi a livello cellulare e subcellulare livello, come la glicolisi, la respirazione e la replicazione dei filamenti di DNA.

Le reazioni oscillanti sono molto interessanti per l'insegnamento, in quanto alcuni esperimenti sulle reazioni oscillanti possono essere proposti anche in un corso elementare di chimica perché, oltre ad essere fenomeni veramente spettacolari, sono esempi di reazioni che si verificano con una diminuzione localizzata dell'entropia del sistema più che compensato dall'aumento dell'entropia dell'ambiente. Come altre trasformazioni fisiche e chimiche che tendono a verificarsi spontaneamente in base all'aumento dell'entropia complessiva [1].

Ma la spiegazione di tali reazioni agli studenti delle scuole superiori è problematica, perché nessuna spiegazione accettabile può sembrare possibile a meno che gli studenti non abbiano acquisito una conoscenza sufficiente sia della chimica fisica che della matematica.

Tuttavia, le tre condizioni necessarie per il comportamento oscillatorio di qualsiasi sistema chimico (comprese le reazioni oscillanti) secondo l'interpretazione di Noyes [2] possono essere apprese anche dagli studenti delle scuole superiori utilizzando un percorso di apprendimento appropriato basato su un approccio induttivo-sperimentale.

Questo approccio consiste in esperimenti, simili a quelli proposti diversi anni fa da K. Yoshikawa et al. [3], ma non con una coppia di costosi elettrodi Ag/AgCl, ma con materiali e strumentazione a basso costo facilmente reperibili in qualsiasi tipo di scuola.

3. Educational itinerary

A) The three conditions for oscillating behavior of the oscillating reactions

Given that, in a basic chemistry course, is absolutely excluded the possibility of considering the reaction mechanism, you can still engage young pupils in a deepening personal work led by an appropriate card to do "discover" the three conditions necessary for the oscillating behavior of any chemical system, as follow:

1- The conditions far from equilibrium,
2-The presence of a feedback process,
3- The existence of two possible states, almost stable stationary.

In the experiments, students observe the different behavior of two concentration cells set up in two different ways.

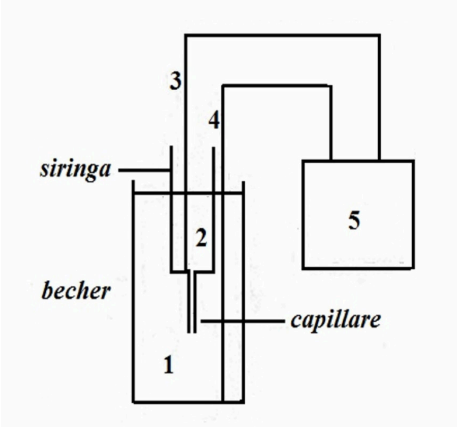


Fig. 3. Schematic representation of the experimental apparatus for the salt-water oscillator

The diagram of the cell is the following:
Cu / H2O // saturated CuSO4 / Cu

The "normal" cell is set up as usual, while the other cell "peculiar" is set up as shown in Figure 1 and following the procedure described below.

Materials and reagents

- distilled water
- two foils of Cu of dimensions approximately 0.5 cm x 10 cm, cleaned with sandpaper, washed and rinsed with H2O
- CuSO 4.5H2O, readily available at garden shops or the like
- 125 mL beaker or glass jar (h about 12 cm, diameter 10 cm)
- some 10 mL plastic syringes with spout and center needle
- strip of plastic or cardboard, with a hole of diameter corresponding to that of used syringe, for supporting it and for resting on the edges of the beaker or the glass jar

3. Itinerario didattico

A) Le tre condizioni per il comportamento oscillante delle reazioni oscillanti

Posto che, in un corso di chimica di base, è assolutamente esclusa la possibilità di considerare il meccanismo di reazione, si possono comunque impegnare i giovani allievi in un lavoro personale di approfondimento guidato da un'apposita scheda per far "scoprire" le tre condizioni necessarie al comportamento oscillante di qualsiasi sistema chimico., ovvero:

1- le condizioni lontane dall'equilibrio,
2- la presenza di un processo di feedback,
3- l'esistenza di due possibili stati stazionari quasi stabili.

Negli esperimenti gli studenti osservano il diverso comportamento di due cellule di concentrazione impostate in due modi diversi.

Lo schema della cella è il seguente:
Cu / H_2O // $CuSO_4$ saturo / Cu

La cella "normale" viene impostata come di consueto, mentre l'altra cella "peculiare" viene impostata come mostrato in Figura 1 e seguendo la procedura seguente.

Materiali e reagenti

- acqua distillata
- Due fogli di Cu di dimensioni circa 0,5 cm x 10 cm, puliti con carta vetrata, lavati e risciacquati con H_2O
- $CuSO_4$.$5H_2O$, facilmente reperibile nei negozi di giardinaggio o simili
- Becher o vasetto in vetro da 125 mL (h circa 12 cm, diametro 10 cm)
- Siringhe di plastica da 10 mL con beccuccio e ago centrale
- Striscia di plastica o cartone, con un foro di diametro corrispondente a quello di siringa usata, per sostenerla e per

- metering nozzle for liquid materials available from shops dental
- PVC or glass capillary (diameter about 1 mm and lenght about 1cm)
- a syringe, in which the spout (after removing the needle) is stuck a nozzle or an capillary glass or PVC
- Digital meter, used as a millivoltmeter.

Method and Description

✓ It is prepared, at room temperature, a saturated solution of CuSO4 .5H2O.

✓ Fixed the syringe (with the nozzle or capillary) into the support strip, pour in the syringe about 10 mL of the first saturated solution, then stops it sending spill the liquid.

✓ At this point is rolled the syringe, by means of the corresponding support, on the beaker.

✓ Finally in a beaker is poured a volume of H2O such that the layer becomes approximately equal to that of the solution in the syringe, as shown in Figure1.

✓ Uncorked the syringe, place in the two receptacles, the Cu foils previously connected to the appropriate sockets of a digital meter (or a mVmeter).

✓ Because of the imbalance of hydrostatic pressure, the saturated solution begins to flow downward through the nozzle (or capillary); there is then a pause and then the water of the beaker begins to go upward through the nozzle (or capillary) starting the phenomenon of feedback.

✓ And so it begins and repeats an oscillating behavior that persists until it reaches the equality of the concentrations of the solutions in the two containers.

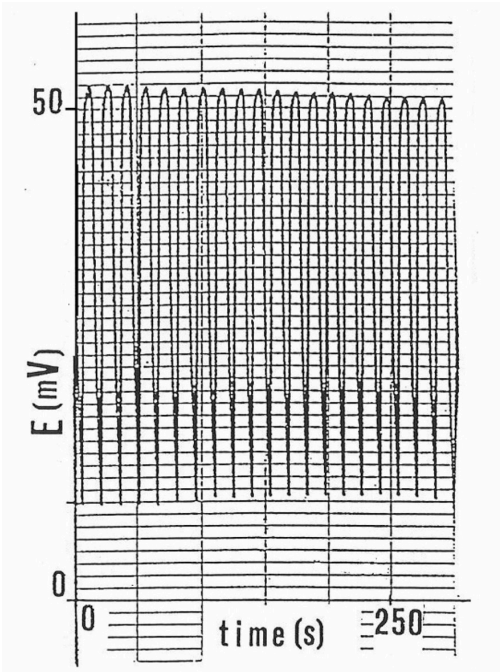


Fig. 4. Oscillating behavior of the oscillating system

appoggiarla sui bordi del becher o della barattolo di vetro

- Ugello dosatore per materiali liquidi reperibile nei negozi dentistici
- Capillare in PVC o vetro (diametro circa 1 mm e lunghezza circa 1 cm)
- Una siringa, in cui il beccuccio (dopo aver rimosso l'ago) è bloccato un ugello o un vetro capillare o PVC
- Contatore digitale utilizzato come millivoltmetro.

Metodo e descrizione

✓ Si prepara, a temperatura ambiente, una soluzione satura di $CuSO_4 . 5H_2O$.

✓ Fissare la siringa (con beccuccio o capillare) nella striscia di supporto, versare nella siringa circa 10 mL della prima soluzione satura, quindi interromperla facendo fuoriuscire il liquido.

✓ A questo punto si fa rotolare la siringa, tramite l'apposito supporto, sul becher.

✓ Infine in un becher viene versato un volume di H_2O tale che lo strato diventi approssimativamente uguale a quello della soluzione nella siringa, come mostrato in Figura 3.

✓ Stappare la siringa, riporre nei due recipienti le lamine di Cu precedentemente collegate alle apposite prese di un misuratore digitale (o mVmetro).

✓ A causa dello squilibrio della pressione idrostatica, la soluzione satura inizia a fluire verso il basso attraverso l'ugello (o capillare); c'è poi una pausa e poi l'acqua del becher inizia a salire verso l'alto attraverso l'ugello (o capillare) dando inizio al fenomeno del feedback.

✓ E così inizia e ripete un comportamento oscillante che persiste fino a raggiungere l'uguaglianza delle concentrazioni delle soluzioni nei due contenitori.

✓ By monitoring the voltage difference of the “normal” cell and the “peculiar” cell, the boys look easily the "linear" behavior of the "normal" cell and the "strange" behavior of the “peculiar” cell.

In Figure 4 it is shown the potentiometric registration of the potential difference of the “peculiar” cell, but the oscillations are clearly visible even without potentiometric recorder.

In this way, in the discussion relating to the students comments, it is explained quite easily the three conditions for the behavior oscillatory also of oscillating reactions.

B) Careful study of the meaning of the assertion: "From chaos to order " and “self-organization” in the case of oscillating reactions

Step 1.
At this stage, first of all the teacher should check the effective mastery, by the students, of the thermodynamic concepts on the topic: "Why do reactions take place?" .

In particular, it is very important that the students have understood that "a physical or chemical change can have a tendency to occur spontaneously even with a localized decrease of the disorder (= increase in order), even if this is apparently contrary to the second law of thermodynamics.

That is to say that, in this case, the tendency of the transformation to occur is permitted by the favorable energy factor (equivalent, as it is known, to a favorable increase of environmental disorder) which allows for an increase *total* disorder.

In this regard, it is useful to reexamine in detail, if necessary, some well known transformations.

✓ Monitorando la differenza di tensione della cella “normale” e della cella “peculiare”, i ragazzi osservano facilmente il comportamento “lineare” della cella “normale” e il comportamento “strano” della cella “peculiare”.

In Figura 4 è mostrata la registrazione potenziometrica della differenza di potenziale della cella “peculiare”, ma le oscillazioni sono ben visibili anche senza registratore potenziometrico.

In questo modo, nella discussione relativa ai commenti degli studenti, si spiegano abbastanza facilmente le tre condizioni per il comportamento oscillatorio anche delle reazioni oscillanti.

B) Studio attento del significato dell'affermazione: "Dal caos all'ordine" e "auto-organizzazione" nel caso di reazioni oscillanti

Passo 1)
In questa fase il docente dovrebbe innanzitutto verificare l'effettiva padronanza, da parte degli studenti, dei concetti termodinamici sull'argomento: "Perché si verificano le reazioni?" .

In particolare, è molto importante che gli studenti abbiano compreso che "a il cambiamento fisico o chimico può avere la tendenza a manifestarsi spontaneamente anche con un decremento localizzato del disordine (= aumento nell'ordine) «anche se questo è apparentemente contrario al secondo principio della termodinamica.

Vale a dire che, in questo caso, la tendenza a verificarsi della trasformazione è consentita dal fattore energetico favorevole (equivalente, come è noto, ad un aumento favorevole del disordine ambientale) che consente un aumento
disordine totale.

A questo proposito è utile riesaminare nel dettaglio, se necessario, alcune trasformazioni ben note.

For example:

H_2O (l) = H_2O (s)

2 H_2 (g) + O_2 (g) = 2 H_2O (g),

emphasizing that, in these transformations, we can say that " chaos becomes order " ("from chaos to order") because, in the transition from reagents to products, switching from one initial state of greater disorder to a final state of minor disorder.

Step 2.
Starting from the observations of students, it is noted that the visible results of rhythmic changes of different colors, which take place within the time intervals well defined, in the experiments relating to oscillating reactions, can be explained by the phrase from the reacting mixture of chaos becomes order, since even in this case the decrease of the reagent system disorder is more than compensated by an increase of environmental disorder.

And, to interpret this strange behavior, it can be assumed that the substance which reacts has the properties to define the spatial and temporal conditions of its development, giving order and organization as the reaction proceeds, ie self-organizing.

4. Conclusions

Oscillating reactions are among the most fascinating chemical reactions. It was concluded, with satisfaction, that misconceptions in the use of the term equilibrium were full of meanings present in students well before the discussion of chemical equilibrium.
On the one hand, the students have therefore acquired the awareness of how, in the situation of equilibrium, both the products and the reactants are present. On the other hand, they have shown that they are able to formulate predictions about the evolution of a system towards the situation of chemical equilibrium, applying a model that related the speed of direct and inverse reactions and the concentrations of the species present.

Per esempio:

H_2O (l) = H_2O (s)

2 H_2 (g) + O_2 (g) = 2 H_2O (g)

sottolineando che, in queste trasformazioni, si può dire che "il caos diventa ordine" ("dal caos all'ordine") perché, nel passaggio dai reagenti ai prodotti, si passa da uno stato iniziale di maggiore disordine ad uno stato finale di minore disordine.

Passo 2)
Partendo dalle osservazioni degli studenti, si rileva che i risultati visibili dei cambiamenti ritmici di diversi colori, che avvengono entro intervalli di tempo ben definiti, negli esperimenti relativi alle reazioni oscillanti, possono essere spiegati dalla frase dalla miscela reattiva di il caos diventa ordine, poiché anche in questo caso la diminuzione del disordine del sistema reagente è più che compensata da un aumento del disordine ambientale.

E, per interpretare questo strano comportamento, si può presumere che la sostanza che reagisce abbia le proprietà di definire le condizioni spaziali e temporali del suo sviluppo, dando ordine e organizzazione man mano che la reazione procede, cioè auto-organizzandosi.

4. Conclusioni

Le reazioni oscillanti sono tra le reazioni chimiche più affascinanti. Si è concluso, con soddisfazione, che le misconcezioni nell'uso del termine equilibrio, era carico di significati presenti negli allievi ben prima della trattazione dell'equilibrio chimico.

Da un lato gli allievi hanno quindi acquisito la consapevolezza di come, nella situazione di equilibrio, siano presenti sia i prodotti che i reagenti. Dall'altro lato hanno mostrato di essere in grado di formulare delle previsioni circa l'evoluzione di un sistema verso la situazione di equilibrio chimico, applicando un modello che metteva in relazione le velocità delle reazioni diretta e inversa e le concentrazioni delle specie presenti.

Acknowledgments

We are grateful to proff. Maria De Nobili and Renzo Bortolomeazzi of the University of Udine for their suggestions regarding this article.

Bibliography

[1] L. Paoloni. *Nuova Didattica della Chimica,* Società Chimica Italiana. Roma 2005.
[2] W.C. Bray, *J. Am. Chem. Soc*., **43**, 95 (1920)
[3] A.J. Lotka, *J. Phys. Chem*., **14,** 271 (1910)
[4] A.J. Lotka, J. Am. Chem. Soc., **42**, 1595 (1920)
[5] https://www.ecodynamics.unisi.it/enzo-tiezzi/
[6] R.J. Field, E. Körös and R.M. Noyes, *J. Am. Chem. Soc*., **94**, 8649 (1972)
[7] I.R. Epstein, *Chem. Eng. News*, **65**, 24 (1987)
[8]. Nicolis, G .; Prigogine, I., *Self-Organization in Nonequilibrium Systems-From Dissipative Structures to Order Through Fluctuations;* Wiley: New York, 1977.
[9] Noyes, R.M..A Simple Explanation of the Salt-Water Oscillator*, J. Chem. Educ*. 1989**, 66**, 207-209.
[10] Yoshikawa, K .; Nakata, S .; Yamanaka M; Waki, T. Amusement with a salt-Water Oscillator*; J. Chem. Educ*. 1989**, 66***,* 205-207.

Iconography

Fig.1: 1: https://en.wikipedia.org/wiki/Boris_Belousov_(chemist)#/media/File:Boris_Pavlovich_Belousov_2.jpg
Fig. 2: https://dbpedia.org/page/Anatol_Zhabotinsky
Fig. 3, Fig. 4: author

Ringraziamenti

Ringraziamo il prof. Maria De Nobili e Renzo Bortolomeazzi dell'Università di Udine per i loro suggerimenti a questo articolo.

Bibliografia

[1] L. Paoloni. *Nuova Didattica della Chimica,* Società Chimica Italiana. Roma 2005.
[2] W.C. Bray, *J. Am. Chem. Soc*., **43**, 95 (1920)
[3] A.J. Lotka, *J. Phys. Chem*., **14,** 271 (1910)
[4] A.J. Lotka, J. Am. Chem. Soc., **42**, 1595 (1920)
[5] https://www.ecodynamics.unisi.it/enzo-tiezzi/
[6] R.J. Field, E. Körös and R.M. Noyes, *J. Am. Chem. Soc*., **94**, 8649 (1972)
[7] I.R. Epstein, *Chem. Eng. News*, **65**, 24 (1987)
[8]. Nicolis, G .; Prigogine, I., *Self-Organization in Nonequilibrium Systems-From Dissipative Structures to Order Through Fluctuations;* Wiley: New York, 1977.
[9] Noyes, R.M..A Simple Explanation of the Salt-Water Oscillator*, J. Chem. Educ*. 1989**, 66**, 207-209.
[10] Yoshikawa, K .; Nakata, S .; Yamanaka M; Waki, T. Amusement with a salt-Water Oscillator*;*
J. Chem. Educ. 1989**, 66***,* 205-207.

Didascalia

Fig. 1: https://en.wikipedia.org/wiki/Boris_Belousov_(chemist)#/media/File:Boris_Pavlovich_Belousov_2.jpg
Fig. 2: Fig. 2. https://dbpedia.org/page/Anatol_Zhabotinsky
Fig. 3, Fig. 4: author

Eftychia Lantzou, Iliana Papadopoulou

Experimental Junior High School of the University of Macedonia,
Thessaloniki, Greece

A research about the impact of lockdown on students

Results of the research

There has been more than one year since humanity experiences an unprecedented situation due the coronavirus pandemic. Strict measures have been taken from the governments to face this health crisis. Social distancing, mandatory wearing of masks, national or local lockdowns. These circumstances have almost shut down the world economy. It is expected that all these measures have affected people, who began to live under stress conditions, which in turn resulted to many health and psychological problems.

It is sensible that students around the world were found in front of a difficult situation, as well. The above thoughts urged us to make a questionnaire, which tries to investigate the impact of coronavirus crisis in their life. The research was carried out in April 2021.

535 answers were given by students between 13 and 19 years old from seven countries (Greece, Italy, Romania, Bulgaria, Spain, Portugal and Turkey). A little more than the half answers were given from females.

The first three questions referred to the age, the gender and the school of the participants.

Here are the next questions and the results retrieved from the given answers.

Question 4. How long have you been in lockdown continuously?

a. Less than 3 months
b. Between 3 and 5 months
c. More than 5 months

Most students had been in lockdown continuously between 3 and 5 months, others more than 5 months and a few have been less than 3 months. We noticed that many participants did not count the days they were going to school as a lockdown period, even the country or the local region was actually in lockdown.

Question 5. How often do you leave home, except when going to school?

a. More than once a day
b. Only once per day
c. 2-3 times per week
d. 2-3 times per month

Almost half of the students were leaving home 2-3 times a week.

Question 6. While being at home, you spend most of your time…

a. studying
b. playing board games
c. surfing or chatting on the internet
d. watching TV

During lockdown the majority of the students spent most of their time chatting or surfing on the Internet, others studying and only a few watching TV or playing board games.

Question 7. What have you missed most during lockdown?
a. my friends
b. my relatives
c. going out
d. sports activities
As expected, most students missed their friends during lockdown.

Question 8. What are you going to do when we return back to normal life?
a. meet my friends
b. go on vacation
c. go shopping
d. all of the above

Returning to normal life, they wished to meet their friends, go on vacation and shopping. This means that sociability is very important for young people.

Question 9. The lockdown helped you
a. spend more time with your family
b. do things that previously you didn't have time to do
c. relax more
d. discover a talent you didn't know you had

In this question it seems that we have a tie between the relaxation the lockdown offered and the chance to try things that the teenagers did not have time to do before. From that we can conclude that teenagers, though not all of them, which is completely sensible, but a large percentage, could find good things to do during lockdown, which means that they are not pessimists.

Question 10. What feelings has the lockdown created to you?
a. sadness
b. anger
c. happiness
d. Fear
The lockdown created a mix of feelings not only to students but to all the people. The predominant feeling was sadness during the lockdown. Others answered that they felt angry and less scared or happy. As it was expected this situation yielded bad feelings.

Question 11. How did the lockdown affect your studies?
a. It didn't affect my studies at all
b. It affected my studies because I couldn't focus
c. It affected my studies because I couldn't understand lessons during online classes.
d. It affected my studies rather positively

About the effects the lockdown had to teenager's studies, most teenagers said that the lockdown had not positively affected their studies since they could not focus. Others said that they couldn't understand a lot of things due to the online classes. Less said that lockdown didn't affect their studies and even less that it did affect their studies but in a positive manner!

Question 12. Did you have more free time during lockdown? If you did, did you make good use of it? (For example, expand your interests)
a. No, I didn't have free time

b. Yes, I had free time but I didn't make good use of it
c. Yes, I had free time and I made good use of it

Regarding the free time, some of them said that during lockdown they didn't have free time. Nevertheless, more of them had free time. With a little difference, the opinion that they had free time but they didn't make good use of it prevails over the opinion that they had free time and they made good use of it. These answers outline that lockdown did help students relax more (as we said previously), however not all of them used their time in a productive way.

Question 13. Finally, after experiencing lockdown, what are your thoughts?
a. Human freedom is valuable
b. Many things in life can change suddenly
c. World cooperation may have good results for humanity
d. Social life is more than essential for humans

At last, concerning the thoughts the lockdown has left to the students they said that the lockdown helped them understand that many things in life can change suddenly. Others said that social life is super important for people, human freedom is more that essential and fewer that world cooperation is useful. From all these thoughts we can come to the conclusion that even though lockdown is really a bad situation, youngsters believe that lockdown gave us an important message.

In conclusion, we can say that young people experienced an unprecedented situation, which led to social loneliness, since they lost physical contact of their friends, they missed their social environment (their school) and they also missed their sport or cultural activities. Normal education was replaced by online learning in a virtual classroom. This fact changed the education dramatically, with many problems arising at that time. Perhaps all the above affected youngster's growth enhancing social distancing and, in some cases, even their mental health. Some scientists believe that we are in front of a new hybrid model of education, which will emerge in the post coronavirus era.

https://www.bu.edu/sph/news/articles/2022/how-to-keep-schools-open-during-covid/

Coordinator: Nikolaos Georgolios

Maria Dimitriadou

Experimental Junior High School
of the University of Macedonia

Thessaloniki, Greece

Smallpox - The Discovery of Vaccines and the Conquest of America

Smallpox (*Variola vera*) was an infectious disease caused by the variola virus (a member of the Orthopoxvirus family). It was one of the most devastating diseases known to humanity and caused millions of deaths before it was eradicated. It is believed to have existed for at least 3000 years. The last case was diagnosed in October 1977, and the World Health Organization (WHO) certified the global eradication of the disease in 1980. (fig1)

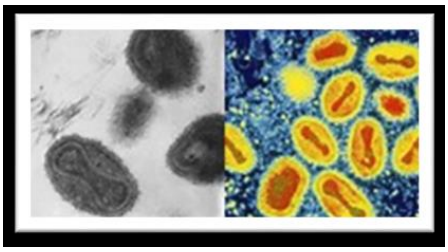


Fig. 1. Smallpox viruses

1. THE DISEASE – TRANSMISSION AND SYMPTOMS

Smallpox was an infectious disease caused by one of two virus variants, Variola major and Variola minor. Variola major was the severe and most common form, with a more extensive rash and higher fever and had a high death rate of about 30%. Variola minor was a less common presentation, causing a less severe disease, typically discrete smallpox. The risk of death after contracting the disease was about 30%, with higher rates among babies. Often those who survived had extensive scarring of their skin, and some were left blind.

Transmission occurred through inhalation of airborne Variola virus, usually droplets expressed from the oral, nasal, or pharyngeal mucosa of an infected person. It was transmitted from one person to another primarily through prolonged face-to-face contact with an infected person, usually within a distance of 1.8 m, but could also be spread through direct contact with infected bodily fluids or contaminated objects, such

ΕΥΛΟΓΙΑ - Η ΑΝΑΚΑΛΥΨΗ ΤΩΝ ΕΜΒΟΛΙΩΝ ΚΑΙ Η ΚΑΤΑΚΤΗΣΗ ΤΗΣ ΑΜΕΡΙΚΗΣ

Η ευλογιά (Variola vera) ήταν μία λοιμώδης νόσος που οφείλονταν στον ιό της ευλογιάς, (οικογένεια των orthopoxvirus). Ήταν μία από τις πιο καταστροφικές νόσους που γνώρισε η ανθρωπότητα και οδήγησε σε εκατομμύρια θανάτους, πριν εκριζωθεί. Πιστεύεται ότι υπήρχε για τουλάχιστον 3000 χρόνια. Η τελευταία περίπτωση διαγνώσθηκε τον Οκτώβριο του 1977 και ο Παγκόσμιος Οργανισμός Υγείας (ΠΟΥ) επιβεβαίωσε την παγκόσμια εκρίζωση της νόσου το 1980. (Εικ1)

1. Η ΝΟΣΟΣ – ΜΕΤΑΔΟΣΗ ΚΑΙ ΣΥΜΠΤΩΜΑΤΑ

Η ευλογιά ήταν μία λοιμώδης νόσος που οφειλόταν σε δύο στελέχη του ιού της ευλογιάς, τους Variola major και Variola minor. Ο Variola major ήταν ο σοβαρότερος και πιο κοινός τύπος, που εκδηλωνόταν με πιο εκτεταμένο εξάνθημα και υψηλότερο πυρετό και παρουσίαζε υψηλή θνησιμότητα, περίπου 30% των περιπτώσεων. Ο Variola minor ήταν πιο σπάνιος και οδηγούσε σε πιο ήπια νόσηση. Η πιθανότητα θανάτου μετά από λοίμωξη ανερχόταν στο 30%, με μεγαλύτερη θνησιμότητα στα βρέφη. Αυτοί που ανάρρωναν, είχαν συχνά εκτεταμένες δερματικές βλάβες και ουλές και κάποιοι κατέληγαν τυφλοί.

Η μετάδοση της νόσου γινόταν με την εισπνοή αερομεταφερόμενων σωματιδίων που περιείχαν τον ιό, συνήθως σταγονιδίων από τον στοματικό, ρινικό ή φαρυγγικό βλεννογόνο μολυσμένων ατόμων. Μεταδιδόταν από άνθρωπο σε άνθρωπο κυρίως μετά από παρατεταμένη κοντινή επαφή, συνήθως σε απόσταση μικρότερη των 1,8 μέτρων, αλλά μπορούσε να μεταδοθεί και με άμεση επαφή με

as bedding or clothing. Rarely, smallpox was spread by virus carried in the air in enclosed settings such as buildings, buses, and trains.

The initial symptoms of the disease included fever and vomiting. This was followed by the formation of ulcers in the mouth and a skin rash. Over a number of days the skin rash turned into characteristic fluid-filled blisters with a dent in the center. The bumps then scabbed over and fell off, leaving scars. The disease was spread between people or via contaminated objects. Prevention was achieved mainly through the smallpox vaccine. Once the disease had developed, certain antiviral medication may have helped. (fig2)

Fig. 2. Two boys were exposed to smallpox.. One was vaccinated, the other was not

Treatment of smallpox is primarily supportive, such as wound care and infection control, fluid therapy, and possible ventilator assistance. People with semi-confluent and confluent types of smallpox may have therapeutic issues similar to patients with extensive skin burns. Smallpox vaccination within three days of exposure will prevent or significantly lessen the severity of smallpox symptoms in the vast majority of people. Vaccination four to seven days after exposure can offer some protection from the disease or may modify the severity of the disease.

2. THE SMALLPOX VACCINE – THE DISCOVERY OF VACCINES

Smallpox was widespread in the 18th century, and occasional outbreaks of special intensity resulted in a very high death rate.

μολυσματικά σωματικά υγρά ή αντικείμενα, όπως κλινοσκεπάσματα και ρουχισμός. Σπάνια, η ευλογιά μπορούσε να μεταδοθεί και μέσω του αέρα σε κλειστούς χώρους όπως κτίρια, λεωφορεία και τραίνα.

Τα αρχικά συμπτώματα της νόσου περιελάμβαναν πυρετό και εμετό. Ακολουθούσε η εμφάνιση εξελκώσεων στο στόμα και του δερματικού εξανθήματος. Μετά από μερικές ημέρες, το εξάνθημα εξελισσόταν σε χαρακτηριστικές φυσαλίδες με πυκνό κέντρο. Εξελίσσονταν σε φλύκταινες και οζίδια που αποκολλούνταν και αποπίπτανε, σχηματίζοντας ουλές. Η νόσος διασπείρονταν από άνθρωπο σε άνθρωπο και μέσω αντικειμένων. Η πρόληψη επιτυγχάνονταν μέσω εμβολιασμού. Από την σιγμή που η νόσος εμφανιζόταν, υπήρχαν κάποια αντιικά φάρμακα που μπορούσαν να βοηθήσουν.(εικ2)

Η θεραπεία της ευλογιάς είναι κυρίως υποστηρικτική, όπως περιποίηση των δερματικών βλαβών και έλεγχο της επιμόλυνσής τους, υγρά και πιθανώς αναπνευστική υποστήριξη. Ασθενείς με συρρέουσες δερματικές βλάβες πιθανόν να χρειάζονται θεραπευτικές αγωγές αντίστοιχες με αυτές που λαμβάνουν ασθενείς με εκτεταμένα εγκαύματα. Ο εμβολιασμός μέσα σε τρεις μέρες από την έκθεση στον ιό της ευλογιάς, μπορεί να προλάβει τη λοίμωξη ή να μειώσει σημαντικά την βαρύτητα των συμπτωμάτων της ευλογιάς στην συντριπτική πλειοψηφία των ανθρώπων. Ο εμβολιασμός τέσσερις με εφτά ημέρες από την έκθεση στον ιό προσφέρει μερική προστασία από τη νόσο ή μπορεί να τροποποιήσει τη βαρύτητα αυτής.

2. ΤΟ ΕΜΒΟΛΙΟ ΤΗΣ ΕΥΛΟΓΙΑΣ – Η ΑΝΑΚΑΛΥΨΗ ΤΩΝ ΕΜΒΟΛΙΩΝ

Η ευλογιά η οποία παρουσίαζε παγκόσμια διασπορά τον 18ο αιώνα και περιστασιακές επιδημικές εξάρσεις, προκάλεσε μεγάλο

The disease, a leading cause of death at the time (18th century), respected no social class, and disfigurement was not uncommon in patients who recovered. The only means of combating smallpox was a primitive form of vaccination called variolation (inoculation)—intentionally infecting a healthy person with the “matter” taken from a patient sick with a mild attack of the disease. The practice, which originated in China and India, was based on two distinct concepts: first, that one attack of smallpox effectively protected against any subsequent attack and, second, that a person deliberately infected with a mild case of the disease would safely acquire such protection. It was, in present-day terminology, an “elective” infection—i.e., one given to a person in good health. It was already a standard practice, but involved serious risks. Unfortunately, the transmitted disease did not always remain mild, and mortality sometimes occurred. Furthermore, the inoculated person could transfer the disease to those around him and thus act as a focus of infection. (fig3)

Fig. 3. Smallpox vaccine

The smallpox vaccine, created by Edward Jenner in 1796, was the first successful vaccine to be developed.

Edward Jenner (1749 - 1823) was born on 17 May 1749 in Berkeley, Gloucestershire, England as the eighth of nine children. His father, the Reverend Stephen Jenner, was the vicar of Berkeley.

Fig. 4. Edward Jenner - oil painting

In the late 18th century, while still a medical student, Jenner made a stunning observation concerning women engaged in the collection

αριθμό θανάτων. Η νόσος, κυρίαρχη αιτία θανάτου την εποχή αυτή (18ος αιώνας), δεν διαχώριζε κοινωνικές τάξεις και οι δυσμορφίες δεν ήταν σπάνιες στους ασθενείς που είχαν αναρρώσει από την νόσο. Ο μόνος τρόπος να αντιμετωπιστεί η νόσος ήταν μία πρωτόγονη μορφή εμβολιασμού που ονομαζόταν “variolation” (inoculation), δηλαδή η εσκεμμένη μόλυνση ενός υγιούς ατόμου με υλικό που είχε παρθεί από ελαφρώς πάσχοντα από την νόσο. Η πρακτική αυτή, η οποία προήλθε από την Κίνα και την Ινδία, βασιζόταν σε δύο διακριτά σενάρια: πρώτον ότι η προσβολή από την νόσο προστάτευε επαρκώς από οποιαδήποτε επόμενη μόλυνση και δεύτερον όποιος ηθελημένα προσβαλλόταν από ήπια μορφή της νόσου, θα αποκτούσε με ασφάλεια αυτή την προστασία. Ήταν, αυτό που με σύγχρονους όρους αποκαλούμε εκλεκτική μόλυνση – δηλαδή αυτή που εφαρμόζεται σε υγιή άτομα και αποτελούσε συνήθη πρακτική, όμως περιείχε και σοβαρούς κινδύνους. Δυστυχώς, η μεταδιδόμενη ασθένεια δεν παρέμενε πάντοτε ήπια και οδηγούσε κάποιες φορές σε θάνατο. Επιπλέον, ο «εμβολιασμένος» άνθρωπος μπορούσε να μεταδώσει την νόσο σε άλλους ανθρώπους με τους οποίους ερχόταν σε επαφή. (εικ3)

Το εμβόλιο της ευλογιάς παρασκευάστηκε από τον Edward Jenner το 1796 και ήταν το πρώτο επιτυχημένο εμβόλιο που παρασκευάστηκε.

Edward Jenner (1749 - 1823) γεννήθηκε στις 17 Μαΐου 1749 στο Berkeley, Gloucestershire, της Αγγλίας και ήταν το όγδοο από εννέα αδέρφια. Ο πατέρας του, ο αιδεσιμότατος Stephen Jenner, ήταν εφημέριος στο Berkeley.

Στα τέλη του 18ου αιώνα, και ενώ φοιτούσε ακόμα στην ιατρική σχολή, ο Jenner έκανε μια εντυπωσιακή

of milk from cows. Cows infected with cowpox transmitted the disease to these women. The disease manifested itself as a series of pustules on the hands and forearms, but those women were immune to the smallpox epidemics that regularly attacked the residents of his parish. Unlike smallpox, which caused severe skin eruptions and dangerous fevers in humans, cowpox led to few ill symptoms in these women. Pondering this phenomenon, Jenner concluded that cowpox not only protected against smallpox but could be transmitted from one person to another as a deliberate mechanism of protection.

The story of the great breakthrough is well known. In May 1796 Jenner found a young dairymaid, Sarah Nelmes, who had fresh cowpox lesions on her hand. On May 14, using matter from Sarah's lesions, he inoculated an eight-year-old boy, James Phipps, who had never had smallpox. Phipps became slightly ill over the course of the next 9 days but was well on the 10th. Six weeks later, on July 1, Jenner exposed the boy to smallpox matter this time, but Phipps did not develop the infection, then or on 20 subsequent exposures to the dreaded disease. No disease developed; protection was complete. The vaccine was a success.

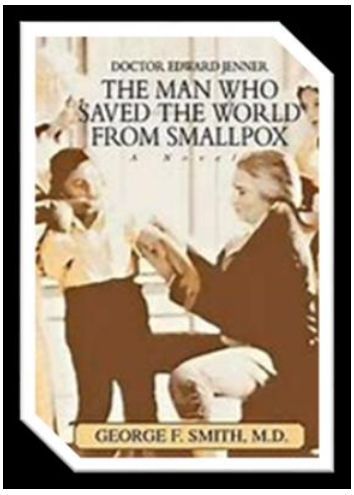


Fig. 5. The Man Who Saved the World from Smallpox, Novel's Paperback - October 12, 2004

παρατήρηση που αφορούσε τις γυναίκες που ασχολούνταν με τη συλλογή γάλακτος από αγελάδες. Οι αγελάδες που μολύνονταν από δαμαλίτιδα, μετέδιδαν τη νόσο στις γυναίκες αυτές. Η νόσος χαρακτηριζόταν από την παρουσία φλυκταινών στις παλάμες και τα αντιβράχια, όμως οι γυναίκες αυτές ήταν άνοσες στις επιδημίες ευλογιάς που προσέβαλαν συχνά τους κατοίκους της ενορίας. Αντίθετα με την ευλογιά, η οποία παρουσίαζε σοβαρές δερματικές βλάβες και επικίνδυνα υψηλό πυρετό στους ανθρώπους, η δαμαλίτιδα προκαλούσε ήπια συμπτώματα. Ο μύθος λέει ότι ο Jenner άκουσε για πρώτη φορά αυτό το φαινόμενο, όταν άκουσε μια γαλακτοκόμο να καυχάται ότι «εγώ, δεν πρόκειται ποτέ να νοσήσω από ευλογιά γιατί είχα δαμαλίτιδα. Δεν πρόκειται ποτέ να αποκτήσω ένα άσχημο και στιγματισμένο πρόσωπο».

Η ιστορία της σπουδαίας ανακάλυψης είναι γνωστή. Τον Μάιο του 1796, ο Jenner βρήκε μία νεαρή αγρότισσα, την Sarah Nelmes, η οποία είχε πρόσφατες δερματικές βλάβες από δαμαλίτιδα στα χέρια της. Στις 14 Μαΐου, χρησιμοποίησε υλικό από τις βλάβες της Sarah και εμβολίασε με αυτό τον οχτάχρονο James Phipps, ο οποίος δεν είχε νοσήσει ποτέ από ευλογιά. Ο Philpps αρρώστησε ελαφρά τις επόμενες 9 μέρες, αλλά την 10η ήταν καλά. Έξι εβδομάδες μετά, την 1η Ιουλίου, ο Jenner εμβολίασε το αγόρι με υλικό ευλογιάς αυτή την φορά, αλλά ο Philpps δεν νόσησε, ούτε σε αυτήν, ούτε και στις υπόλοιπες είκοσι μεταγενέστερες εκθέσεις στη νόσο. Δεν εμφάνισε λοίμωξη- η

Fig. 6. Dr. Jenner's first vaccination, 14 May 1796

Between 1796 and 1798, Jenner collected 23 cases of people infected or inoculated with the cowpox virus. In a 1798 report (" Inquiry into the Causes and Effects of the Variolae Vaccinae, A Disease Discovered in Some of the Western Counties of England"), which Jenner published at his own expense, he concluded "that the cowpox protects the human constitution from the infection of smallpox." It was a groundbreaking conclusion that set the fields of immunology, vaccine therapy, and preventive health in motion.

Doctors all over Europe soon adopted Jenner's innovative technique, leading to a drastic decline in new sufferers of the

Fig. 7. Smallpox vaccination,1853

devastating disease. The beauty of Jenner's newer method of vaccinating with the cowpox virus was that it was not only effective—it also had far fewer side effects and was much safer.

Vaccination became widely accepted and gradually replaced the practice of variolation (it is the technique of exposing a healthy person to harmful material from a person suffering from smallpox). Thus, at some point in the 1800s (the precise time remains

προστασία είχε επιτευχθεί. Το εμβόλιο ήταν επιτυχές

Από το 1796 έως το 1798, ο Jenner συγκέντρωσε άλλες 23 περιπτώσεις ασθενών που μολύνθηκαν ή εμβολιάστηκαν με τον ιό της δαμαλίτιδας. Το 1798, ο Jenner, δημοσίευσε, με δικά του έξοδα, την έρευνά του με τίτλο «Έρευνα επί των αιτίων και των αποτελεσμάτων της ευλογιάς, μία νόσος που ανακαλύφθηκε στις Δυτικές επαρχίες της Αγγλίας», στην οποία κατέληγε ότι « η δαμαλίτιδα προστατεύει τον άνθρωπο από την ευλογιά». Ήταν ένα πρωτοποριακό συμπέρασμα, το οποίο έθετε τις βάσεις για την ανάπτυξη της ανοσολογίας, των εμβολιασμών και της προληπτικής ιατρικής.

Ο ιατρικός κόσμος από όλη την Ευρώπη σύντομα υιοθέτησε την πρωτοποριακή τεχνική του Jenner, γεγονός που οδήγησε στην δραστική μείωση των νέων περιπτώσεων της δραματικής αυτής νόσου. Η

Fig. 8. Cartoon against vaccination

ομορφιά της νέας αυτής μεθόδου εμβολιασμού με τον ιό της δαμαλίτιδας οφειλόταν όχι μόνο στην αποτελεσματικότητά της αλλά και στο γεγονός ότι παρουσίαζε πολύ λιγότερες ανεπιθύμητες ενέργειες και ήταν περισσότερο ασφαλής.

Ο εμβολιασμός έτυχε ευρείας αποδοχής και προοδευτικά αντικατέστησε την πρακτική του variolation (είναι η τεχνική έκθεσης ενός υγιούς ατόμου σε υλικό βλάβης ατόμου που νοσεί από ευλογιά). Έτσι, κατά τον 19ο αιώνα (ο ακριβής χρόνος δεν είναι γνωστός), το υλικό που χρησιμοποιούνταν για την

unclear), the material used to make the smallpox vaccine changed from smallpox material to cowpox material.

παρασκευή του εμβολίου της ευλογιάς άλλαξε από υλικό από νοσούντα από ευλογιά σε υλικό από νοσούντα από δαμαλίτιδα.

Jenner's vaccination soon became the major means of preventing smallpox around the

Ο εμβολιασμός του Jenner έγινε σύντομα η κύρια μέθοδος πρόληψης της ευλογιάς ανά τον κόσμο. Το 1801, ο πρόεδρος Thomas

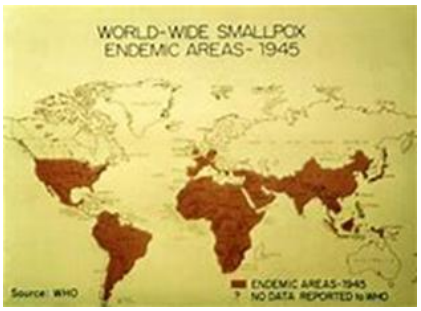


Fig. 9. The Spread of Smallpox - 1945

Fig. 10. The Spread of Smallpox - 1966

world. In 1801 President Thomas Jefferson declared smallpox vaccination one of the nation's first public health priorities. A few years later, he instructed the explorers Meriwether Lewis and William Clark to take doses of smallpox vaccine on their expedition to the Pacific.

Jefferson κήρυξε τον εμβολιασμό κατά της ευλογιάς ως πρώτιστη προτεραιότητα για την την διαφύλαξη της δημόσιας υγείας. Λίγα χρόνια αργότερα, συμβούλεψε τους εξερευνητές Meriwether Lewis και William Clark να προμηθευτούν με δόσεις του εμβολίου για τις εξερευνητικές τους εκστρατείες στον Ειρηνικό Ωκεανό.

In the 20th century, Louis Jean Pasteur formulated the microbiological etiology of communicable diseases and developed the technique of culturing germs in the laboratory. These cultures provided the remains of dead germs or germs with reduced pathogenicity which were used as vaccines. In honor of Jenner, Pasteur named the preventive vaccine for smallpox "vaccine" (vaccination), from the Latin word "vacca" (vaccinia - cow).

Ο Λ. Παστέρ, στον 20ο αιώνα, διατύπωσε τη μικροβιολογική αιτιολογία των μεταδοτικών ασθενειών και ανέπτυξε την τεχνική της καλλιέργειας των μικροβίων στο εργαστήριο. Από τις καλλιέργειες αυτές μικρόβια (νεκρά ή ζωντανά) με ελαττωμένη παθογονικότητα χρησιμοποιήθηκαν ως εμβόλια. Ο Παστέρ, προς τιμήν του Τζέννερ, ονόμασε τον προληπτικό εμβολιασμό για την ευλογιά «vaccine» (δαμαλισμό), από τη λατινική λέξη «vacca» (δάμαλις - αγελάδα).

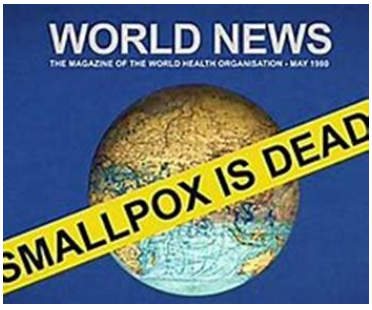


Fig. 11. The announcement of its eradication

The World Health Organization launched an intensified plan to eradicate smallpox in 1967. Widespread immunization and surveillance were conducted around the world for several years. The

Ο ΠΟΥ ξεκίνησε ένα εντατικό πρόγραμμα εξάλειψης της ευλογιάς το 1967. Μαζικοί εμβολιασμοί σε συνδυασμό με επιτήρηση της νόσου εφαρμόστηκαν παγκοσμίως

last known natural case was in Somalia in 1977. In 1980 WHO declared smallpox eradicated – the only infectious disease to achieve this distinction. This remains among the most notable and profound public health successes in history.

για αρκετά χρόνια. Η τελευταία γνωστή φυσική λοίμωξη καταγράφηκε στη Σομαλία το 1977. Το 1980, ο ΠΟΥ εξήγγειλε την εκρίζωση της νόσου- η μόνη λοιμώδης νόσος που κατέκτησε αυτόν τον στόχο. Παραμένει η πιο αξιομνημόνευτη και σημαντική επιτυχία στην ιστορία της δημόσιας υγείας.

3. THE HISTORY OF THE DISEASE - THE CONQUEST OF AMERICA

Fig. 12. The Mummy of Ramses

The origin of smallpox is unknown; however, the earliest evidence of the disease dates back to the 3rd century BCE in Egyptian mummies. The disease historically occurred in outbreaks. In 18th-century Europe, it is estimated that 400,000 people died from the disease per year, and that one-third of all cases of blindness were due to smallpox. Smallpox is estimated to have killed up to 300 million people in the 20th century and around 500 million people in the last 100 years of its existence, as well as six monarchs. As recently as 1967, 15 million cases were recorded a year. (fig12)

The term "smallpox" was first used in Britain in the early 16th century to distinguish the disease from syphilis, which was then known as the "great pox". Other historical names for the disease are: speckled monster, and red plague.

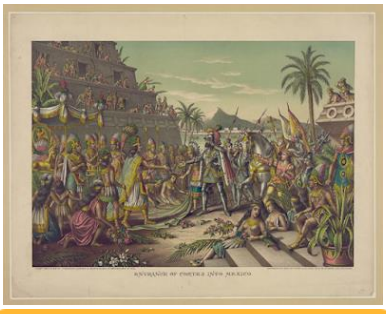


Fig. 13. Hertan Cortes meeting with Montezuma

3. Η ΙΣΤΟΡΙΑ ΤΗΣ ΝΟΣΟΥ – Η ΚΑΤΑΚΤΗΣΗ ΤΗΣ ΑΜΕΡΙΚΗΣ

Η προέλευση της ευλογιάς είναι άγνωστη: παρόλα αυτά, οι πρώτες ενδείξεις της νόσου σε αιγυπτιακές μούμιες, χρονολογούνται κατά τον 3ο π.Χ. αιώνα. Αυτή η νόσος ιστορικά παρουσιαζότανε με εξάρσεις. Τον 18ο αι. στην Ευρώπη εκτιμάται ότι πέθαιναν περίπου 400.000 άνθρωποι το χρόνο από τη νόσο και το 1/3 των τυφλών οφείλονταν στην ευλογιά. Η ευλογιά εκτιμάται ότι έχει σκοτώσει 300.000.000 ανθρώπους τον 20ο αιώνα και περίπου 500.000.000 ανθρώπους τα τελευταία 100 χρόνια της ύπαρξής της, ανάμεσά τους και έξι μονάρχες. Μέχρι το 1967, αναφέρονταν 15.000.000 περιπτώσεις της νόσου το χρόνο. (εικ12)

Ο όρος ευλογιά «smallpox» πρωτοχρησιμοποιήθηκε στη Βρετανία στις αρχές του 16ου αιώνα, προκειμένου να τη διαχωρίσει από τη σύφιλη, η οποία ήτανε γνωστή ως μεγάλη πανώλη «great pox».

Fig. 14. Smallpox and the conquest of Mexico

Άλλα ιστορικά ονόματα της νόσου είναι: διάστικτο τέρας και κόκκινη πανούκλα.

Many great encounters in world history, including Cortés's clash with the Aztec empire, had less to do with weaponry, tactics and strategy than with the ravages of disease.

Smallpox was an unknown disease not only in Mexico, but in all the Americas, before the arrival of Europeans. It was introduced to Mexican lands (1520) by the Spanish and played a significant role in the downfall of the Aztec Empire. During the colonial period, there were major epidemic outbreaks, which decimated the common population.

The Aztecs were not the only indigenous people to suffer from the introduction of European diseases. In addition to North America's native populations, the Mayan and Incan civilizations were also nearly wiped out by smallpox.

Furthermore, it had a huge impact on both Europe and the native populations. Not only was the Spanish conquest made considerably easier by scores of natives being struck down with smallpox but the social and cultural impact of such a large percentage of a population dying had profound effects.

Combined with Spanish attempts to wipe out native religious practices, customs and beliefs, aspects of Aztec, Incan and native culture disappeared in a remarkably short period of time, replaced by a new hybrid culture – Catholicism tinted with vestiges of indigenous cultures.

Whilst there have been epidemics with higher overall death tolls in more recent history, the combined death toll of these epidemics in the Americas is thought to have killed roughly 90% of the native population in less than 100 years, making it one of the deadliest outbreaks in history.

Πολλές σημαντικές συμπλοκές της παγκόσμιας ιστορίας, περιλαμβανομένης και της σύγκρουσης του Κορτές με την αυτοκρατορία των Αζτέκων, είχαν να κάνουν λιγότερο με εξοπλισμό τακτική ή στρατηγική και περισσότερο με την επίπτωση της νόσου.

Η ευλογιά ήταν άγνωστη ασθένεια, όχι μόνο στο Μεξικό, αλλά και σε ολόκληρη την Αμερική, πριν από την άφιξη των Ευρωπαίων. Εισήχθη στο Μεξικό το 1520 από τους Ισπανούς και έπαιξε σημαντικό ρόλο στην πτώση της αυτοκρατορίας των Αζτέκων. Κατά την διάρκεια της αποικιοκρατίας, ξέσπασαν μεγάλες επιδημίες, οι οποίες αποδεκάτισαν τον γηγενή πληθυσμό.

Οι Αζτέκοι δεν ήταν ο μόνος εγχώριος πληθυσμός που υπέφερε από την εμφάνιση ευρωπαϊκών ασθενειών. Οι γηγενείς πληθυσμοί του αμερικανικού νότου, μαζί με τους Μάγιας και τους Ίνκας σχεδόν εξαφανίστηκαν από την ευλογιά.

Επιπλέον, είχε τεράστια επίπτωση τόσο στους Ευρωπαίους όσο και στους ντόπιους. Δεν έκανε μόνο πολύ πιο εύκολη την κατάκτηση των περιοχών από τους Ισπανούς, αλλά είχε και σημαντική κοινωνική και πολιτιστική επίπτωση, λόγω του αποδεκατισμού των ντόπιων.

Σε συνδυασμό με τις προσπάθειες των Ισπανών να αλλάξουν τις θρησκευτικές πρακτικές, τα ήθη, τα έθιμα και τις πεποιθήσεις των ντόπιων, ο εγχώριος πολιτισμός εξαφανίστηκε σε σημαντικά μικρό χρονικό διάστημα και αντικαταστάθηκε από έναν νέο υβριδικό πολιτισμό-καθολικισμού με λίγα στοιχεία των ιθαγενών πολιτισμών.

Παρόλο που υπήρχαν επιδημίες με περισσότερους συνολικά θανάτους στην πρόσφατη ιστορία, ο συνολικός αριθμός θανάτων από αυτές τις επιδημίες στην Αμερική, υπολογίζεται ότι έχει σκοτώσει περίπου το 90% του εγχώριου πληθυσμού σε λιγότερο από εκατό χρόνια, καθιστώντας τες τις πιο θανατηφόρες στην ιστορία.

The ability of smallpox to incapacitate and decimate populations made it an attractive agent for biological warfare. In the 18th century, the British tried to infect Native American populations. During World War II, British, American, Japanese and Soviet teams all investigated the possibility of producing a biological weapon based on smallpox. (fig15)

Fig. 15..Massasoit and his warriors

Nations that suppose they can secure themselves strictly through investments in military spending should study history – time and time again the course of events has been definitively altered by disease outbreaks. Microbes too small to be seen by the bare eye can render ineffectual even the mightiest machinery of war.

To sum up, the history of mankind has shown that viruses can be extremely harmful. The latest example is the pandemic of SARS-COV-19, which has had a profound impact on our lives. Vaccination is the only safe and effective way to overcome this difficult situation and the successful eradication of the smallpox thanks to widespread vaccination gives us hope for the future.

Η ικανότητα της ευλογιάς να εξασθενεί και να εξαλείφει πληθυσμούς, την κατέστησε ελκυστικό παράγοντα για βιολογικό πόλεμο. Τον 18ο αιώνα, οι Βρετανοί προσπάθησαν να μολύνουνε τους ιθαγενείς της Αμερικής. Κατά τη διάρκεια του δεύτερου παγκόσμιου πολέμου, Βρετανικές, Αμερικανικές, Ιαπωνικές και Σοβιετικές ομάδες επιστημόνων ερευνούσαν την πιθανότητα παρασκευής βιολογικών όπλων που βασίζονταν στον ιό την ευλογιάς. (εικ15)

Έθνη τα οποία θεωρούμε ότι μπορούν να προστατευτούν μέσω στρατιωτικών επενδύσεων πρέπει να μελετήσουν την ιστορία – κατά περιόδους επιδημικές εξάρσεις αλλάζουν όλα τα δεδομένα. Τα μικρόβια μπορεί να είναι πολύ μικρά για να τα βλέπουμε με γυμνό μάτι, αλλά μπορούν να είναι πιο καταστροφικά από την πιο εξελιγμένη στρατιωτική μηχανή.

Εν κατακλείδι, οι ιοί, καθ' όλη τη διάρκεια της ιστορίας του ανθρώπινου είδους, απέδειξαν ότι μπορούν να είναι εξαιρετικά επιβλαβείς. Το τελευταίο παράδειγμα αποτελεί η πανδημία SARS-COV-19, η οποία έχει μια τεράστια επίπτωση στις ζωές μας. Ο εμβολιασμός είναι ο μόνος ασφαλής και αποτελεσματικός τρόπος για να ξεπεραστεί αυτή η δύσκολη κατάσταση και η επιτυχία του εμβολιασμού κατά της ευλογιάς μας δίνει ελπίδα για το μέλλον.

Coordinator: Marilena Zarftzian

BIBLIOGRAPHY

- https://www.cdc.gov/smallpox/history/history.html (Page last reviewed: February 20, 2021 Content source: Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), Division of High-Consequence Pathogens and Pathology (DHCPP))
- https://www.who.int/health-topics/smallpox
- https://en.wikipedia.org/wiki/Smallpox
- https://en.wikipedia.org/wiki/Edward_Jenner
- https://www.history.com/this-day-in-history/jenner-tests-smallpox-vaccine
- https://www.britannica.com/biography/Edward-Jenner
- https://www.historyhit.com/europeans-smallpox-and-the-americas/
- ADAMANTIADOU S., GEORGATOU S., GIAPITZAKIS H., LAKKA L., NOTARAS D. FLORENTIN N., CHATZIGEORGIOU G., CHANTIKONTI O., (2012): "Biology Genikis Paideias, G lykeiou". Ed. ITYE, Diophantos, p. 159.

Samoilă Denise-Alexandra,
Samoilă Theodor-Ștefan
Colegiul Național "Iulia Hașdeu",
Bucharest, Romania

Endangered animals and plants

1. Introduction

We all know that today's wildlife is a victim of pollution and global warming. Although scientists are investing in the revival of some species which disappeared a long time ago, I believe that we should support the species of animals and plants that still exist, instead.

This article is intended to highlight several plant and animal species that are affected by pollution, wildfires, global warming and are on the verge of extinction. I think that the planet's population needs to understand the real danger caused by the interruption of the food chain, and fight for saving and maintaining the endangered species.

2. What is the cause of the extinction of some species of animals and plants on Earth?

Endangered animals are species in danger of extinction due to several factors. So far, more than 3,000 endangered species have been detected as being in danger, an increase compared to previous years. Many countries already have laws that protect such animals like banning hunting or the development of agricultural land which causes the destruction of natural habitats.

Fig. 1. Pollution

Habitat destruction by human activities is the primary cause of the extinction of some plant and animal species. As living things evolve, they adapt to specific habitats, which provides them with the optimal living conditions they need.

Animale și plante pe cale de dispariție

1. Introducere

Cu toții știm că fauna și flora de astăzi sunt victimele poluării și ale încălzirii globale. Deși oamenii de știință investesc în revigorarea unor specii de mult pierdute, eu cred că este mai important să luptăm în susținerea speciilor de animale și plante care încă mai există.

Articolul propune evidențierea câtorva specii de plante și animale care sunt afectate de poluare, incendii, încălzirea globală și sunt pe cale de dispariție. Cred că populația Terrei trebuie să înțeleagă pericolul provocat de întreruperea lanțului trofic și să lupte pentru salvarea și menținerea speciilor aflate în primejdie.

2. Care este cauza dispariției unor specii de animale pe Pamânt?

Animalele pe cale de dispariție sunt speciile care sunt în pericol de a dispărea de pe pământ, datorită mai multor factori. Până acum au fost detectate peste 3000 de specii ce sunt în pericol de a nu mai exista, în creștere față de anii trecuți. Multe țări au deja legi prin care se protejează animale de acest fel precum interzicerea vânatului sau a dezvoltării terenurilor agricole care distrug habitatele naturale.

Distrugerea habitatelor prin activitățile umane este cauza primară a dispariției unor specii de plante și animale. Pe măsură ce viețuitoarele evoluează, ele se adaptează unor habitate specifice, care le asigură condițiile optime de

Pollution (Fig. 1), the drainage of swamps (Fig. 2) deforestation (Fig. 3), urbanization, and the construction of roads lead to the destruction or

Fig. 2. Swamp Drainage

fragmentation of these habitats. Thus, the species lose contact with other populations, causing a reduction in genetic diversity and making adaptation to changing climatic conditions more difficult. In some cases, the fragmented habitat becomes too small to support a large population.

In the last 400 years, the world's commercial exploitation of animals for food and other products has grown significantly. Many species of whales have become extinct after being simply slaughtered for oil and meat. Another conclusive example is the black African rhinocero which is widely killed for its horn, valued as a medicine and as an aphrodisiac. Whole families of cacti and orchids are also threatened with extinction due to their irrational collection.

Acclimatized species introduced to a new ecosystem have often caused the decline of native species. In 1959, British settlers introduced Nile perch to Lake Victoria in East Africa. This predatory fish has drastically reduced native fish populations and has caused the extinction of no less than 200 endemic species that feed on algae. Thus, the aquatic vegetation in Lake Victoria has grown too much and the natural balance has been disturbed irreversibly to this day.

Another major cause that has led and is still leading to a drastical reduction of the fauna and flora is environmental pollution. Various toxic chemicals have become more widespread in the food chain in ecosystems.

viață de care au nevoie. Poluarea (Fig. 1), drenarea mlaștinilor (Fig. 2), defrișarea pădurilor (Fig. 3), urbanizarea și construcția de drumuri

Fig. 3. Deforestation

cauzează distrugerea sau deteriorarea acestor medii de viață. Astfel, speciile pierd contactul cu celelalte populații, reducându-se astfel diversitatea genetică și adaptându-se mai greu la condițiile climatice schimbătoare. În unele cazuri, habitatul fragmentat devine o zonă prea restrânsă pentru a suporta o populație mare.

În ultimii 400 de ani, exploatarea comercială mondială a animalelor pentru hrană și alte produse a crescut simțitor. Multe specii de balene au ajuns în pragul dispariției după ce au fost pur și simplu măcelarite pentru ulei și carne. Un alt exemplu este rinocerul negru african, ucis pe scară largă pentru cornul său, care este prețuit ca medicament și afrodisiac. De asemenea, familii întregi de cactuși și orhidei sunt amenințate cu dispariția din cauza culegerii lor irațională.

Speciile aclimatizate introduse unui nou ecosistem au cauzat, de multe ori, declinul speciilor native. în 1959, coloniștii britanici au introdus bibanul de Nil în lacul Victoria din Africa de Est. Acest pește de pradă a redus drastic populațiile native de pești și a cauzat dispariția a nu mai puțin de 200 de specii endemice care se hrăneau cu alge. Astfel, vegetația acvatică din lacul Victoria a crescut extrem de mult și echilibrul natural a fost dereglat.

O altă cauză majoră care a dus și duce la diminuarea drastică a faunei și florei este poluarea mediului. Diferite chimicale toxice s-au răspândit tot mai mult în circuitul hranei în cadrul

Water pollution and its high temperatures have wiped out many endemic fish species. Acid rains destroyed 118 million m3 of timber in Europe by the end of the twentieth century. Chemical spills have long affected the ocean floor as well.

WE MUST PROTECT THE FOREST AND NOT DESTROY IT!

Shooting, trapping, forcing or attacking animals are crucial and illegal practices in many parts of the world. Capturing animals for the sole purpose of human entertainment can lead to the extinction of this species. Do not participate in activities such as: circuses, zoos, safari hunting, aquariums and theme parks. All these activities have a serious impact on animal life.

Fig. 4. Protect forests

A major factor influencing the decline in the number of specimens of a particular species is the excessive deforestation and the destruction of protected areas by poaching. Thousands of rare animal species are on the verge of extinction due to the fact that they are hunted or no longer have the necessary plant source (for animals) to feed on, as these plants have also been destroyed by humans.

One of the biggest threats to animal species is the deterioration and loss of their natural habitat. By protecting the habitats in which animals live, we protect their lives and the life of the planet. Food, shelter, and a clean breeding ground are essential for survival. The development, exploitation of forests, drilling of natural resources lead to a massive destruction of habitats. For example, when you go to buy a house, think about the direct impact on the environment. Help protect parks (large and small), shelters, forests, and other open spaces in your community. Don't support the destruction of nature through complex construction or mining.

ecosistemelor. Poluarea apei și temperaturile ridicate ale acesteia au făcut să dispară numeroase specii de pești endemici. Ploile acide au distrus, până la sfarșitul secolului al XX-lea, 118 de milioane m^3 de material lemnos în Europa. De asemenea, deversările chimice au afectat pentru mult timp și fundul oceanic.

TREBUIE SĂ PROTEJĂM PĂDUREA ȘI SĂ NU O DISTRUGEM!

Împușcarea, prinderea, forțarea sau atacarea animalelor sunt practici cruciale și ilegale în multe părți ale lumii. Capturarea animalelor în scopul exclusiv al distracției umane poate duce la dispariția acestei specii. Nu participați la activități precum: circuri, grădini zoologice, vânătoare de safari, acvarii și parcuri tematice. Toate aceste activități au un impact grav asupra vieții animalelor.

Un factor principal ce influențează scăderea numărului de exemplare dintr-o specie anume este defrișarea excesivă și distrugerea ariilor protejate prin braconaj. Mii de specii de animale rare sunt pe cale de dispariție din cauza faptului că sunt vânate sau nu mai au sursa necesară de plante (pentru animale) pentru a se hrăni, deoarece plantele respective au fost distruse tot de om.

Una dintre cele mai mari amenințări pentru speciile de animale este deteriorarea și pierderea habitatului lor natural. Prin protejarea locurilor unde trăiesc animalele, le protejăm viețile și viața planetei. Alimentele, un loc de adăpost și un spațiu curat de reproducere sunt esențiale pentru supraviețuire. Dezvoltarea, exploatarea pădurilor, perforarea resurselor naturale conduc la o distrugere masivă a habitatelor. De exemplu, atunci când mergi să cumperi o casă, gândește-te la impactul direct asupra mediului. Ajutați la protejarea parcurilor (mari și mici), a

Don't buy products whose products have been subconsciously taken down from natural ecosystems, such as the tropical jungle.

It is very important to reduce our carbon footprint (which causes climate change) and in doing so, we can work on improving our habits and our dynamic life. This is not a dramatic change, we are talking about small restructurings of our daily life, which do not really affect our day, but which affect the future of animals and therefore our own. Everything is a cycle an can have an effect on other scales. For example, instead of using your car for anything and everything, use public transportation, biking, or just walking! Undoubtedly, there are distances where the car is not really needed.

Fig. 5. Be the change poster

One of the worst consequences is when exotic species begin to feed on native species or compete with them for the same type of food. The most destructive effects have taken place on the islands: the introduction of insects, mice, pigs, or other creatures has led to the extinction of hundreds of species in the last five centuries.

3. Some endangered animals

Some endangered animals are: turtles, blue whales, jaguars, tigers, sea otters, black goats, panda bears, Iberian lynx, Danube falcons, curly pelicans, wolves, minks, blind fish, trout, cod, smelt. Other animals that have already disappeared are: the monk seal (1972), the bearded vulture (bearded eagle) in 1938, the European beaver (sheep) in 1823, the steppe marmot (bumblebee) in 1800, the Mongolian wild donkey (column) in 1700, the horse wild European (1700), saiga antelope (1900), and elk (1978).

The tortoise (Fig. 6) is a Testudine reptile characterized by a cartilaginous shell that acts as a shield. The oldest turtles date back 220 million

adăposturilor, a pădurilor și a altor spații deschise din comunitatea ta. Nu susține distrugerea naturii prin construcții complexe sau exploatări miniere. Nu cumpăra produse ale căror produse au fost scăzute subconștient din ecosistemele naturale, cum ar fi, de exemplu, jungla tropicală .

Este foarte important să reducem amprenta de carbon (care provoacă schimbările climatice) pentru a îmbunătăți obiceiurile noastre și dinamica vieții noastre. Aceasta nu este o schimbare dramatică, vorbim despre mici restructurări ale vieții noastre de zi cu zi, care nu ne afectează cu adevărat, dar care afectează viitorul naturii. Totul este un ciclu care are efect asupra altor scale. De exemplu, în loc să folosiți mașina pentru orice și pentru orice, folosiți mijloace de transport în comun, biciclete sau doar plimbare! Fără îndoială, există distanțe în care mașina nu este cu adevărat necesară.

O gravă consecință este atunci când speciile exotice încep să se hrănească cu cele native sau când concurează cu acestea pentru același tip de hrană. Cele mai distructive efecte au avut loc pe insule: introducerea insectelor, a șoarecilor, a porcilor sau a altor vietăți au dus la dispariția a sute de specii în ultimele cinci secole.

3. Unele animale pe cale de dispariție

Câteva animale pe cale de dispariție sunt: broască țestoasă, balena albastră, jaguarul, tigru, vidra de mare, capra neagră, ursul panda, râsul iberic, șoimul dunărean, pelicanul creț, lupul, nurca, pestele cega, păstruga, morunul șilostrița. Alte animale care deja au dispărut sunt: foca călugar, (1972), zăganul (vulturul cu barbă) în 1938, castorul european (brebul) în 1823, marmota de stepă (bobacul) în 1800, măgarul sălbatic mongol

years, making turtles some of the oldest reptile species in the world. Some of them are extinct, but many of them still exist; some are on the verge of extinction.

Fig. 6. The tortoise

The blue whale (Fig. 7) is the largest mammal that has ever lived. It is all the more surprising that out of the multitude of species offered by the ocean asfood, it feeds on one of the smallest plants, plankton. Even though they hunt in deep waters, the whale is obligated to get to the surface for breathing. In 1930-1931, 30,000 blue whales were killed. Since then, the herd has gradually recovered, however, today only 2,000 blue whales still live. Influential organizations are trying to protect the blue whales and are even succeeding.

The jaguar (Fig. 8) is a mammal belonging to the Felidae family. It is one of the four large cats of the genus "Panthera" along with lion, tiger and leopard. The jaguar is the third largest cat after the tiger and lion. The habitat of a jaguar extends from Mexico to Paraguay and northern Argentina, but it has also been seen occasionally in the southwestern regions of USA. Jaguars that live in tropical forests are usually darker in color and smaller than those that live in open spaces. It is believed that this is due to the fact that there are fewer herbivores in the forests to feed on.

Fig. 7. The blue whale

Sea otters (Fig. 9) are a carnivorous marine mammal of the mustelid family, a close relative of common otters. It is spread on both coasts of the North Pacific Ocean. The typical mass of adult sea otters varies between 14 and 45 kg, making

(colunul) în 1700, calul sălbatic european (1700), antilopa saiga (1900) și elanul (1978).

Țestoasa (Fig. 6) este o reptilă din ordinul Testudines caracterizată de o carapace cartilaginoasă care acționează ca un scut. Cele mai vechi exemplare de țestoase datează de acum 220 milioane de ani, astfel țestoasele sunt unele dintre cele mai bătrâne specii de reptile din lume. Unele dintre acestea sunt extincte, însă multe dintre ele încă mai există; unele sunt pe cale de dispariție.

Balena albastră (Fig. 7) este cel mai mare mamifer care a trăit vreodată. Este cu atât mai surprinzător cu cât din multitudinea speciilor oferite hrană de către ocean, aceasta se hrănește cu una dintre cele mai mici plante, planctonul .Chiar dacă vânează în apele adânci, balena este obligată să iasă la suprafață pentru a lua aer. În 1930-1931 au fost ucise 30.000 de balene albastre. Cu toate acestea, astăzi trăiesc numai 2.000 de balene albastre. Organizații influente încearcă să protejeze balenele albastre și reușesc.

Jaguarul (Fig. 8) este un mamifer ce aparține familiei Felidae. Este una dintre cele patru feline mari din genul "Panthera" alături de leu, tigru și leopard. Jaguarul este a treia cea mai mare felina după tigru și leu. Habitatul unui jaguar se întinde din Mexic pană în Paraguay și nordul Argentinei, însă acesta a fost văzut ocazional și în părțile de sud-vest ale SUA. Jaguarii care trăiesc în pădurile tropicale sunt de obicei mai închiși la culoare și mai mici decat cei care trăiesc în spații deschise. Se crede că acest fapt se datoreaza faptului că în păduri se

them the heaviest animals in the weasel family, but at the same time one of the smallest marine mammals. Unlike other animals in this group, sea otters move very little along the shore, and although they can move on land, they spend most of the day in the water. The numbers for the species before 1741 was estimated at 300,000 individuals, but from that year until 1911 it was intensely hunted, as a result of which it fell to only 2,000.

Fig. 8. The jaguar

The black goat (Fig. 10) is an animal protected by law in our country, it is one of the most valuable species belonging to the fauna in Romania. Considered the true pearl of the mountains, the black goat can be found on the ridges of the mountain massifs: Rodnei, Fagaras, Retezat, Piatra Craiului, Ciucas, Parang, Ceahlau, Bucegi and more recently in the Tisitei Gorges reservation in Vrancea. The places where it lives are difficult to reach the tourist but not for it, the black goat being an animal with great agility and a perfect balance that can quickly and easily cross very high, rocky and steep areas even if they are covered with snow. Black goats live in small groups, while older males prefer solitude. In the autumn, however, they gather in large groups, remaining all winter under the protection of an older specimen, aware of the dangers.

Fig. 9. Sea otter

The giant panda (Fig. 11) species lives only in captivity, mostly in China, and only 27 in the rest of the world. It is a carnivorous animal, but nevertheless, its diet is made up of 99% bamboo. Their numbers are growing due to the special programs adopted by China to protect the species. Even with this, the International Union for Conservation of Nature is still skeptical about excluding this species from the list of endangered animals.

gasesc mai puține ierbivore cu care sa se hraneasca.

Vidra de mare (Fig. 9) este un mamifer marin carnivor din familia mustelidelor, rudă apropiată a vidrelor obișnuite. Este răspândită pe ambele coaste ale Oceanului Pacific de Nord. Masa tipică a vidrelor de mare adulte variază între 14 și 45 kg, fiind astfel cele mai grele animale dintre mustelide, dar, în același timp, unul dintre cele mai mici mamifere marine. Spre deosebire de alte animale din acest grup, vidrele de mare înaintează foarte puțin pe țărm și, cu toate că se pot deplasa pe uscat, își petrec cea mai mare parte a zilei în apă. Efectivul dinainte de 1741 al speciei era estimat la 150–300.000 de indivizi, dar din acel an și până în 1911, vidra a fost intens vânată, efectivul ajungaând la circa 2.000.

Capra neagră (Fig. 10) este un animal protejat de către lege în țara noastră, este una dintre cele mai valoroase specii aparținând faunei din România. Considerată adevărata perlă a munților, capra neagră poate fi întâlnită pe crestele masivilor muntoși: Rodnei, Făgăraș, Retezat, Piatra Craiului, Ciucaș, Parâng, Ceahlău, Bucegi și mai nou în rezervația Cheile Tisitei din Vrancea. Locurile în care trăiește sunt greu accesibile turistului însă nu și pentru ea, capra neagră fiind un animal cu deosebită agilitate și un echilibru desăvârșit ce poate străbate cu rapiditate și ușurință zonele foarte înalte, stâncoase și deosebit de abrupte chiar dacă sunt acoperite de zăpadă. Caprele negre trăiesc în grupuri mici, în timp ce masculii bătrâni preferă singurătatea. Toamna însă, ele se strâng în grupuri mari, rămânând toată iarnă sub ocrotirea câte unui exemplar mai bătrân, cunoscător al primejdiilor.

Specia de **panda gigant** (Fig. 11) trăiește doar în captivitate, majoritatea în China, și doar 27 de

4. What is the cause of endangered plants?

More than 19,000 species of plants around the globe are classified as endangered. Thousands of other species are on the verge of extinction each year before biologists can identify them.

Fig. 10. The black goat

The main causes of plant species extinction are: habitat destruction, commercial exploitation (plant collection) and pollution. Of these causes, habitat destruction and pollution are the biggest threats to these species. Many conservation measures are needed to ensure that these species do not become extinct in the near future.

In order to be able to save endangered plants, we should not pick them, because they wither and can no longer grow. At the same time, we should not throw away garbage irresponsibly, because they can kill them. Another solution would be to stop cutting down forests, because that's where most plants live and also grow.

5. Some endangered plants

The motley tulip (Fig. 12) grows in the area of the Călimani Mountains, Cheile Turzii, in Mureş and Olt counties, but also in Banat. It is one of the species protected by law, since the 1980s in Romania. Its flower does not last more than 7 days, the motley tulip being one of the rare plants here.

The baobab (Fig. 13) is found in equatorial Africa and India, but also in large areas of Madagascar. However, it is becoming more and

exemplare în restul lumii. Este un animal carnivor, însă cu toate acestea, alimentația lui este alcătuită în proporție de 99% din bambus. Numărul lor este in crestere, datorită programelor speciale adoptate de China pentru protejarea speciei. Chiar și așa, Uniunea Internațională pentru Conservarea Naturii este încă sceptică cu privire la excluderea acestei specii din lista de animale pe cale de dispariție.

4. Care este cauza plantelor pe cale de dispariție?

Peste 19.000 de specii de plante de pe Glob sunt clasificate ca fiind pe cale de dispariţie. Alte câteva mii de speciii ajung în pragul dispariţiei în fiecare an înainte ca biologii să le poată identifica.

Fig. 11. The giant panda

Principalele cauze ale dispariţiei speciilor de plante sunt: distrugerea habitatelor, exploatarea comercială (colectarea de plante) şi poluarea. Dintre aceste cauze, distrugerea habitatelor şi poluarea reprezintă cele mai mari ameninţări pentru aceste specii. Sunt necesare multe măsuri de conservare pentru a se asigura ca aceste specii nu vor dispărea în viitorul apropiat.

Pentru a putea salva plantele pe cale de dispariție ar trebui să nu le mai rupem, deoarece acestea se ofilesc și nu pot să se mai dezvolte. Totodată, dacă dorim să salvăm aceste plante ar trebui să nu mai aruncăm deșeurile menajere pe jos, pentru că acestea le pot omorî. Altă soluție ar fi să nu mai tăiem pădurile, pentru că acesta este locul în care majoritatea plantelor trăiesc.

5. Unele plante pe cale de dispariție

more threatened. The baobab does not have leaves three quarters of a year, accumulating water in the trunk. People are building their homes on its base. The tree is also known for its delicious fruits, which we can eat. Due to its shape, it also got the name of "Upside-down tree".

Chilean pine (Fig. 14), this strange conifer that belongs to the dense forests of Chile, is considered to be ancient, a living fossil. Its leaves are triangular and sharp, and the tree also produces cones. It is seen as the national tree of the state of Chile. Its branches are reminiscent of monkey tails, being a tree often cultivated all over the world.

This unique **Sarracenia oreophila** (Fig. 15) is on the verge of extinction. It is a plant from South Carolina and Georgia, as well as from the southern regions of the United States, but plant populations are threatened, which makes them very likely to become extinct if not properly protected. There are several types of such plants, some brightly colored, but all apply the same methods of attracting and catching insects.

Fig. 12. The motley tulip

The cork tree (Fig. 16) is a type of oak, very endangered due to the production of cork for wine bottles. It is estimated that the forests made up of these trees will disappear in the next ten years because of the wine industry. These trees are truly charming.

Fig. 13. The baobab

The dragon tree is more than 2000 years old. It includes over 40 different species, many of

Laleaua Pestriţă (Fig. 12) creşte în zona Munţilor Călimani şi a Cheilor Turzii, judeţele Mureş şi Olt şi în Banat. Aceasta este una din speciile ocrotite în România, încă din 1980. Floarea acesteia nu ţine mai mult de 7 zile, Laleaua Pestriţă numărându-se printre plantele rare din România.

Baobabul (Fig. 13) se găsește în Africa ecuatorială și în India, dar și în regiuni întinse din Madagascar. Totuși, acesta începe sa fie tot mai amenințat. Baobabul nu are frunze trei sferturi din an, acumulând apă în trunchi. Oamenii își construiesc case în baza sa. Copacul este cunoscut și pentru fructele sale delicioase, pe care le putem consuma. Datorită formei sale, a căpătat și denumirea de „Copacul cu susul în jos”.

Pinul chilian (Fig. 14), acest conifer ciudat care aparține pădurilor dense din Chile, este considerat a fi antic, fiind o fosilă vie. Frunzele sale sunt triunghiulare și ascuțite, copacul producând și conuri. Acesta este văzut ca fiind copacul național al statului Chile. Crengile sale aduc aminte de cozile de maimuță, fiind un copac cultivat des în toată lumea.

Sarracenia oreophila (Fig. 15), aceasta unică plantă se află pe cale de dispariție. Este o plantă din Carolina de Sud si Georgia, precum și din regiunile sudice ale Statelor Unite ale Americii, însă populațiile de plante sunt amenințate, lucru care le face foarte posibile să dispară, dacă nu sunt protejate cum se cuvine. Există mai multe tipuri de astfel de plante, unele colorate luminos, dar toate aplică aceleași metode de a atrage și de a captura insecte.

which are cultivated worldwide. Some of them are moderately small. The dragon tree belongs to the African continent, although some species can be found in other areas.

Fig. 14. The Chilean Pine

Hart's-tongue fern (Fig. 17) is a species of fern with large, shiny leaves, spear-shaped, arranged in rosettes, used in folk medicine. It grows in the shade, preferring beech forests, in high hilly areas, as well as in the mountains. In the plains it appears much less often. For therapeutic purposes, the leaves harvested with petiole are used, which contain enzymes, tannins and vitamins. The astringent, diaphoretic and diuretic qualities, long known in folk medicine, have been confirmed by modern scientific research. Due to its effects, the infusion of Hart's-tongue fern leaves is recommended in diarrhea, fever and low diuresis. In traditional Romanian medicine, Hart's-tongue fern is still used internally in lung diseases, against cough.

Fig. 15. Sarracenia oreophila

6. Conclusions

The situations presented are only the consequences of pollution, wildfires in Australia, Amazon, Greece, excessive hunting and fishing, expansion of living spaces, global warming and non-compliance with harvest bans, the picking of protected plants.
The methods that could improve the situation of endangered plant and animal species are extremely diverse, and already a part of the population applies them.

- Avoiding plastic products and replace them with biodegradable ones (wood, paper);
- Using diversified product recycling;
- Decreasing excessive consumption of food,

Arborele de plută (Fig. 16) este un tip de stejar, foarte amenințat din cauza producției de plută pentru sticlele de vin. Se estimeaza că padurile alcătuite din acești arbori vor dispărea în urmatorii zece ani din cauza industriei vinurilor. Acești copaci sunt cu adevărat fermecători.

Dragonierul are o vechime mai mare de 2000 de ani. Include peste 40 de specii diferite, multe dintre ele fiind cultivate în toată lumea. Unele dintre ele au dimensiuni moderat de mici. Dragonierul aparține continentului african, deși anumite specii se pot găsi și în alte zone.

Năvalnicul (Fig. 17) este o specie de ferigă cu frunze mari, lucitoare, în formă de lance, dispuse în rozete, folosită în medicină populară. Crește la umbră, preferând pădurile de fag, zonele colinare înalte, precum și munții. La câmpie apare mult mai rar. În scop terapeutic se folosesc frunzele recoltate cu tot cu pețiol, care conțin enzime, tanin și vitamine. Calitățile astringente, diaforetice și diuretice, cunoscute de mult timp de medicina populară, au fost confirmate de cercetările științifice moderne. Datorită efectelor sale, infuzia din frunze de năvalnic se recomandă în diaree, febră și diureza scăzută. În medicina tradițională românească, năvalnicul se mai folosește intern în bolile de plămâni, împotriva tusei.

6. Concluzii

Situațiile prezentate sunt doar consecințele poluării , ale incendiilor de vegetație din Australia, Amazon , Grecia), ale vânatului și pescuitului escesiv, ale extinderii spațiilor de locuit, ale încălzirii globale și ale nerespectării interdicțiilor de culegere și rupere a plantelor protejate.

Fig. 16. Th dragon tree

Fig. 17. Hart's-tongue fern

beverages, cosmetics, etc;
- Sanitation of natural spaces, areas in which creatures develop (beach, sea, river, riverbed, forests);
- Imposing high fines on those who pollute, hunt, fish outside the accepted periods;
- The education of children from an early age in the spirit of environmental protection;
- Reducing water waste.

Metodele care ar putea îmbunătăți situația speciilor de plante și animale aflate în primejdie sunt extrem de diverse și deja o parte din populație le aplică.

- Evitarea produselor de plastic și înlocuirea lor cu cele biodegradabil(lemn, hârtie);
- Reciclarea diversificată a produselor;
- Scăderea consumului exagerat de alimente, băuturi, cosmetice etc;
- Igenizarea spațiilor naturale, arealele în care se dezvoltă vietățile (pljă, mare, râul, albia râului, păduri);

Coordinator: Elisabeta Niculescu

Webology:
https://www.libertatea.ro/lifestyle/specii-de-animale-pe-cale-de-disparitie-din-romania-si-din-lume-3864924
https://www.greennews.ro/article/top-10-animale-pe-cale-de-disparitie-din-cauza-incalzirii-globale
https://www.slideshare.net/TiuAni/plante-si-animale-pe-cale-de-disparitie
https://baby.unica.ro/animale-pe-cale-de-disparitie-2236421.html

Iconography:
Fig. 1: https://www.punctul.ro/muresenii-afectati-mai-mult-de-poluarea-din-alte-tari/
Fig. 2: azetanord-vest.ro/2020/03/mlastina-ecedea-si-ocupatiile-traditionale-una-dintre-cele-mai-mari-zone-umede-dintre-cele-mai-mari-zone-umede-din-europa
Fig. 3: https://www.capital.ro/dezastru-in-rom
ania-raportul-inventarului-forestier-national-arata-cifre-socante-cat-lemn-se-taie-in-romania.html
Fig. 4: https://www.youtube.com/watch?v=uC6CvYxQCwc
Fig. 5: https://bestquotehd.blogspot.com
Fig. 6, Fig.7, Fig. 8, Fig. 9, Fig. 10, Fig. 11, Fig. 12, Fig. 13, Fig. 14, Fig. 15, Fig. 16, Fig. 17:
https://prezi.com/p/8eavmyyj6tin/plante-si-animale-pe-cale-de-disparitie/

Iliana Papadopoulou
Experimental Junior High school
of the University of Macedonia,
Neapoli, Thessaloniki

Wordsearch

Find the 10 hidden school subjects (horizontally, vertically, diagonally)

C	O	M	P	U	T	E	R	S	M	C	A	F	A
B	H	O	K	N	I	S	M	L	U	J	N	M	Z
G	B	S	T	X	D	F	B	O	W	R	C	U	L
O	I	V	H	T	R	E	H	F	N	X	I	S	I
M	O	S	I	L	A	N	G	U	A	G	E	I	B
L	L	A	S	L	F	C	U	Q	Q	I	N	C	W
U	O	G	T	I	W	S	Z	T	T	Q	T	R	F
V	G	E	O	G	R	A	P	H	Y	P	G	H	O
E	Y	J	R	A	J	O	E	P	S	H	R	X	N
D	P	F	Y	W	R	G	M	F	P	V	E	B	E
R	K	B	O	Q	A	T	L	D	L	R	E	M	Q
W	L	V	H	Y	L	M	A	T	H	S	K	L	V
E	N	G	L	I	S	H	O	E	M	K	V	I	U
P	Z	U	M	S	Q	G	L	I	O	J	Q	O	P

Key:
Horizontal: COMPUTERS, LANGUAGE, GEOGRAPHY, MATHS, ENGLISH
Vertical: BIOLOGY, HISTORY, ANCIENTGREEK, MUSIC
Diagonally: ART

Coordinator: Nikolaos Georgolios

Eftychia Lantzou
Experimental Junior High School
of the University of Macedonia,
Neapoli, Thessaloniki

Wordsearch

Find 8 things you have inside your school bag

A	Z	B	X	N	C	M	V	A	G	S	H	S
B	P	E	N	Q	R	W	L	K	F	J	D	C
G	E	J	L	R	N	Y	U	I	O	P	T	I
S	N	B	W	N	G	O	T	F	V	E	K	S
Y	C	N	B	F	A	A	T	A	L	D	E	S
E	I	C	O	K	U	S	D	E	J	V	E	O
J	L	I	O	Y	R	B	D	G	B	X	R	R
G	I	C	K	R	U	B	B	E	R	O	Y	S
U	Y	D	K	E	J	F	Z	B	O	R	O	J
O	J	W	R	J	D	U	W	H	K	R	S	K
X	R	W	A	T	E	R	K	S	D	B	Y	D
S	E	Y	P	E	N	C	I	L	C	A	S	E
H	H	R	T	A	S	D	R	G	M	F	U	O

Key:
PENCIL, PEN, BOOK, RUBBER, NOTEBOOK, SCISSORS, WATER, PENCILCASE

Coordinator: Nikolaos Georgolios

Maria-Mavreya Kokola

The 2nd Model High School of Athens, Greece

Galileo Galilei - "and yet, it moves..."

Some may know him as a physicist and philosopher, others as a mathematician and astronomer and others as an advocate of the Copernican theory of Heliocentrism. He was the first man who utilized the telescope consistently for astronomical observations, discovered the four satellites of Jupiter, but also the first sunspots, without skipping to write down their movements. And his name? Galileo Galilei.

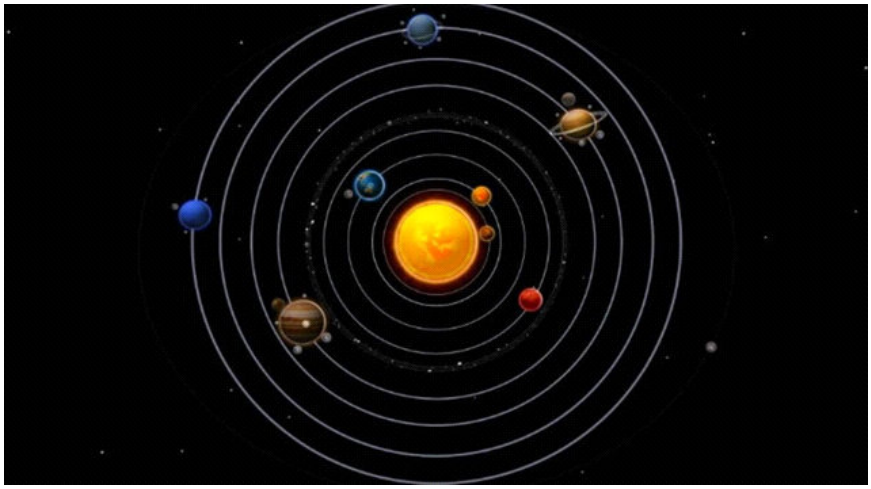


Fig. 1 The heliocentric model of the universe

Galileo was a fanatic supporter of the Heliocentric model that Nicolaus Copernicus had suggested in his work "De revolutionibus orbium coelestium". In other words, he believed (unlike Ptolemaeus) that the Sun, rather than Earth, is in the center of the universe. In particular, the presentation of his theory is propounded in his book "Dialogo sopra i due massimi sistemi del mondo tolemaico e copernicano", which was published in 1632. In English, it can be

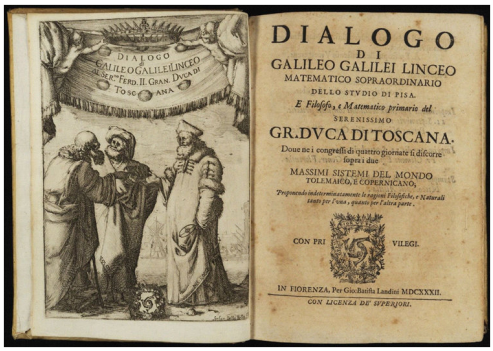


Fig. 2. The Publication of "Dialogo Sopra i" "

Γαλιλαίος: *και όμως γυρίζει...*

Κάποιοι ίσως να τον γνωρίζουν σαν φυσικό και φιλόσοφο, άλλοι σαν μαθηματικό και αστρονόμο και άλλοι σαν υποστηρικτή της Κοπερνίκειας θεωρίας για το ηλιοκεντρικό μοντέλο του σύμπαντος. Ήταν ο πρώτος ο οποίος χρησιμοποίησε συστηματικά το τηλεσκόπιο για αστρονομικές παρατηρήσεις, ανακάλυψε τους τέσσερις δορυφόρους του Δία αλλά και τις πρώτες ηλιακές κηλίδες, χωρίς να παραλείψει να καταγράψει και τις κινήσεις τους. Το όνομα αυτού; Γαλιλαίος Γαλιλέι.

Ο Γαλιλαίος ήταν φανατικός υποστηρικτής του ηλιοκεντρικού μοντέλου που είχε προτείνει ο Κοπέρνικος στο έργο του «De revolutionibus orbium coelestium». Με άλλα λόγια, πίστευε (σε αντίθεση με τον Πτολεμαίο) ότι στο κέντρο του σύμπαντος δε βρίσκεται η Γη αλλά ο Ήλιος. Μάλιστα, η παρουσίαση της ηλιοκεντρικής του θεωρίας διατυπώνεται στο έργο του "Dialogo sopra i due massimi sistemi del mondo tolemaico e copernicano" (που μεταφράζεται στα ελληνικά ως «Διάλογος περί των μεγίστων συστημάτων του πτολεμαϊκού και

translated as “Dialogue concerning the two Chief World systems”. Suffice it to say that the Catholic Church did not let him “get away” with it. But, let’s take the story from the beginning…

Galileo had always been supporting Copernicus and his perception of the universe’s structure. However, it was impossible for such a revolutionary idea not to encounter any reactions from the people. Nevertheless, Galileo was extremely stubborn. He humiliated everyone who dared to disagree with the beliefs that he used to preach. Gradually, his opinion was accepted with honour. In 1611 he went to the Vatican and Pope Urban VIII encouraged him to continue his studies, without contrasting him in any way. Now, while having the permission of the Pope, Galileo kept expressing his perceptions freely, not knowing what the future held for him…

Fig. 3. Galileo Galilei

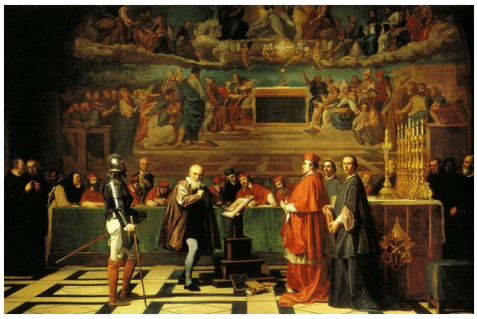


Fig. 4. Galileo Galilei and the Roman Catholic Inquisition

The first denunciation against him was brought onto the table on 6th of March 1616 with the Index Librorum Prohibitorum. More particularly, the main indictment was the breach of this Index. He was called to Rome under the Pope’s order. There, the cardinal Bellarmine informed him that the Church has run out of patience. But the story does not end here. On 26th of February 1616, the official decision of the Vatican was published, which characterized Galileo’s theory as “foolish, extreme and exceptionally heretical”. What did they do about it? They forced him to abandon, as well as stop teaching and discussing his deeply held conceptions! Scared as he was, he promised to abide. He was set free and in this way he avoided further conflicts, the hazard of censorship, as well as the banning of his precious books.

του κοπερνίκειου κόσμου»), το οποίο εκδόθηκε το 1632. Φυσικά, η Καθολική Εκκλησία δεν τον άφησε να «ξεφύγει» με αυτό. Αλλά ας πάρουμε την ιστορία από την αρχή…

Ο Γαλιλαίος ανέκαθεν υποστήριζε τον Κοπέρνικο και τις αντιλήψεις του για τη δομή του σύμπαντος. Αξιοσημείωτο όμως είναι ότι μια τόσο επαναστατική για την εποχή ιδέα ήταν αδύνατο να μη συναντήσει αντιδράσεις από τον λαό. Παρόλα αυτά, ο Γαλιλαίος ήταν «αγύριστο κεφάλι». Γελοιοποιούσε όποιον διαφωνούσε με τις απόψεις τις οποίες διατυμπάνιζε. Σταδιακά, οι θεωρίες του έγιναν αποδεκτές με τιμές. Το 1611 πήγε στο Βατικανό και ο Πάπας Ουρβανός Η’ τον ενθάρρυνε να συνεχίσει τις μελέτες του, δίχως να εναντιωθεί με κανένα τρόπο. Τώρα πια, έχοντας και την άδεια του Πάπα, ο Γαλιλαίος συνέχιζε να εκφράζει ελεύθερα τις απόψεις του, χωρίς να γνωρίζει τι θα ακολουθούσε στη συνέχεια…

Η πρώτη κατηγορία εναντίον του “έπεσε” στο τραπέζι στις 6 Μαρτίου του 1616 λόγω της αθέτησης του Διατάγματος του Καταλόγου των Απαγορευμένων (Index Librorum Prohibitorum). Κλήθηκε στη Ρώμη κατόπιν διαταγής του Πάπα και εκεί ο καρδινάλιος Μπελαρμίν τον ενημέρωσε ότι η υπομονή της Εκκλησίας είχε εξαντληθεί. Αλλά η ιστορία δεν τελειώνει εδώ. Στις 26 Φεβρουαρίου του 1616 εκδόθηκε η επίσημη απόφαση του Βατικανού, η οποία χαρακτήριζε τη θεωρία του Γαλιλαίου ως «ανόητη, υπερβολική και άκρως αιρετική». Τι έκαναν για αυτό; Του επέβαλαν να εγκαταλείψει τόσο την άποψή του, όσο και να σταματήσει να τη διδάσκει και να τη συζητά! Φοβισμένος, υποσχέθηκε να υπακούσει. Αφέθηκε ελεύθερος και έτσι απέφυγε επιπλέον συγκρούσεις, τον κίνδυνο της λογοκρισίας αλλά και την απαγόρευση των πολύτιμων βιβλίων του.

Ακολούθησε τεράστιος γραφειοκρατικός αγώνας αλλά είχε τη στήριξη των υποστηρικτών του και των πνευματικών ανθρώπων της εποχής έτσι

A huge bureaucratic fight followed, but he had the support of his fans and of the spiritual people of his time, so as to convince of the validity of the Copernican dogma. The years passed, his friend cardinal Bellarmine, who had encouraged him to continue his studies, became the Pope and in 1632 the "Dialogue" was published. It is worth mentioning that the publication of the book was made with the confirmation of both the Inquisition and the Holy See. Everything great then…or perhaps not? Since the book was published, everything ought to have been great. Unfortunately, things did not go this way.

In spite of the fact that the "Dialogue concerning the two Chief World systems" was published, Galileo made a fatal mistake: he dared to ridicule the Pope of Rome in his work. More specifically, a character of his work, who expresses the Pope's point of view, is presented as a funny man, who mixes up his words and is a little bit clumsy. On the other hand, Copernicus in "De revolutionibus orbium coelestium", highlighted that he was not referring to an absolute description of the universe, but, instead, the Heliocentric model was just simpler and easier to use as far as calculations were concerned. He actually dedicated his work to the Pope Paul III. Galileo did not do a similar thing. Once again, he visited Rome in order to be judged. They threatened him with tortures and he "confessed" that the "Dialogue" was undoubtedly a clear "advocate" of the Heliocentric system. Sometime later, on 22nd of June 1633, Galileo was officially declared as heretic, according to the court's verdict. The Inquisition sentenced him to public prison, but, due to his age, he was allowed to be confined to his home. Apparently, his book was banned. It is surprising that it was not until 1992 that his reputation was finally restored by the Pope John Paul II, that is, almost three and a half centuries after his punishment. Galileo might have been sentenced, but on his leaving the Inquisition he left everyone speechless with his phrase "And yet it moves…"

ώστε να πείσει για την εγκυρότητα του Κοπερνίκειου δόγματος. Τα χρόνια πέρασαν, ο φίλος του καρδινάλιος Μπελαρμίν, ο οποίος τον είχε ενθαρρύνει να συνεχίσει τις μελέτες, έγινε Πάπας και το 1632 εκδόθηκε ο «Διάλογος». Αξίζει να σημειωθεί ότι η έκδοση του βιβλίου έγινε με την άδεια τόσο της Αγίας Έδρας όσο και της Ιεράς Εξέτασης. Όλα καλά λοιπόν…ή μήπως όχι; Εφόσον εκδόθηκε το βιβλίο, θα έπρεπε να πάνε όλα καλά. Δυστυχώς όμως, τα πράγματα δεν έγιναν έτσι.

Παρά το γεγονός ότι εκδόθηκε ο «Διάλογος περί των μεγίστων συστημάτων του πτολεμαϊκού και του κοπερνίκειου κόσμου», ο Γαλιλαίος έκανε ένα μοιραίο λάθος: τόλμησε να γελοιοποιήσει τον Πάπα της Ρώμης στο έργο του. Συγκεκριμένα, ένας χαρακτήρας του έργου ο οποίος είναι και αυτός που εκφράζει τις απόψεις του Πάπα, παρουσιάζεται να μπερδεύει συνεχώς τα λόγια του και να είναι λίγο απρόσεκτος. Αντιθέτως, ο Κοπέρνικος στο "De revolutionibus orbium coelestium" τόνισε ότι δεν επρόκειτο για μια απόλυτη περιγραφή του σύμπαντος αλλά το ηλιοκεντρικό μοντέλο ήταν πιο απλό και πιο εύχρηστο σε επίπεδο υπολογισμών. Μάλιστα ο Κοπέρνικος αφιέρωσε το έργο του αυτό στον Πάπα Παύλο Γ'. Ο Γαλιλαίος, δεν έκανε κάτι παρόμοιο. Πήγε για ακόμη μια φορά στη Ρώμη έτσι ώστε να δικαστεί. Τον απείλησαν με βασανιστήρια και εκείνος ¨ομολόγησε" ότι ο «Διάλογος» είναι αναμφίβολα μια ξεκάθαρη υποστήριξη του ηλιοκεντρικού συστήματος. Λίγο καιρό μετά, στις 22 Ιουνίου του 1633, ο Γαλιλαίος ήταν και επισήμως αιρετικός, σύμφωνα με την απόφαση του δικαστηρίου. Η Ιερά Εξέταση τον καταδίκασε σε δημόσια φυλάκιση αλλά λόγω της προχωρημένης ηλικίας του, του επέτρεψαν να ασκήσει την ποινή με κατ' οίκον περιορισμό. Επακόλουθα απαγορεύτηκε η κυκλοφορία του βιβλίου του. Εντυπωσιακό είναι το γεγονός ότι η μνήμη του Γαλιλαίου αποκαταστάθηκε μόλις το 1992 από τον Πάπα Ιωάννη Παύλο Β', δηλαδή τρεισήμισι αιώνες μετά την εκδίκαση της υπόθεσής του και της καταδίκης των απόψεών του. Πάντως, μπορεί ο Γαλιλαίος να καταδικάστηκε αλλά αποχωρώντας από την Ιερά Εξέταση αποστόμωσε τους πάντες με τη φράση «Και όμως γυρίζει…»

Coordinator: Gerassi Dimitra

Ioana Borșan
Transilvania University of Brașov
Faculty of Materials Science and Engineering
Materials Engineering, PhD student
ioana.borsan@unitbv.ro

Brasov Science Museum Creativity and Innovation

1. Introduction

Brașov' Science Museum is the place where the theoretical description of scientific theories come to life through interactive exhibits. Inspired by the great science centers of Europe, the unique exhibits provide answers to even the most unexpected questions:

- Why do magnets attract each other?
- Can a body levitate?
- How many kilograms do humans weight on the other planets from the Solar System?
- How were movies and cartoons created in the past?
- What visual shapes does the sound have?

In this article, we will describe a few interactive modules that you will find in the museum's collection. We will analyze what their impact is on the visitors. Also, you will discover the answer to the question: Do the used methods succeed in promoting science and technology among young people?

2. About the Brașov Science Museum

Being a new concept, the Interactive Science Museum from Brașov contains a series of interactive exhibits, which practically exemplify the physics, astronomy, biology and mathematics theories. Within the museum there are new experiments that are less common in other science centers form Europe, such as:

- Magnetic levitron, which exemplifies magnetic levitation and the operation system of MagLev trains,
- The Solar System platform, on which visitors can weight themselves to find out how many kilograms they would have on each planet,
- The tornado simulator, with which visitors discover exactly how a tornado is formed.

In the following, we will briefly present some exhibits and the areas in which we find the exemplified phenomena in our daily lives.

Muzeul de Științe Brașov Creativitate și Inovație

1. Introducere

Muzeul de Științe Brașov este locul în care descrierea teoretică a teoriilor științifice prind viață prin exponatele interactive. Fiind inspirat din marile centre de știință din Europa, exponatele unice conferă răspunsuri până și celor mai neașteptate întrebări:

- De ce se atrag magneții?
- Un corp poate să leviteze?
- Ce greutate au oamenii pe celelalte planete din Sistemul Solar?
- Cum se făceau pe vremuri filmele?
- Ce forme vizuale are sunetul?

În acest articol, vom descrie unele din modulele interactive existente în colecţia muzeului. Vom analiza care este impactul acestora asupra vizitatorilor. De asemenea, vom răspunde la întrebarea: prin metodele folosite se reușește să se promoveze ştiința şi tehnologia în rândul tinerilor?

2. Despre Muzeul de Științe Brașov

Fiind un concept nou, Muzeul interactiv de Științe de la Brașov conține o serie de exponate interactive, care exemplifică practic teoriile din fizică, astronomie, biologie și matematică. În cadrul muzeului există noi experimente care se întâlnesc mai rar în muzeele de tehnică și știință din Europa, cum sunt sunt:

- Levitronul magnetic, care exemplifică levitația magnetică și principiul de funcționare al trenurilor MagLev,
- Platforma Sistemului Solar, pe care vizitatorii se pot cântări pentru a afla câte kilograme ar avea pe fiecare planetă,
- Simulatorul de tornade, cu care vizitatorii descoperă principiul de formare a acestor fenomene meteorologice.

În continuare, vom prezenta succint, câteva exponate și domeniile în care regăsim aceste fenomene în viața noastră de zi cu zi.

The Levitron

The Levitron is the electromagnetic levitation platform (Fig. 1), which describes the operation principle of *MagLev* trains.

Levitronul

Levitronul este platforma electromagnetică de levitație (Fig. 1), care descrie principiul de funcționare al trenurilor *MagLev*.

Fig. 1. The magnetic levitron

MagLev is known as the transportation system developed by the Japanese at the end of the last century, but history presents this technology differently. The magnetic levitation system was first created by Hermann Kemper [1] in Germany. His research began in 1922 and was completed with the obtained patent in 1934.
Transrapid was the first magnetic levitation train to carry passengers at a conference in Hamburg in 1979. In Germany, the *MagLev* train was put into operation in 1984, unlike Japan, which inaugurated the magnetic levitation transport only in 2003 [1].

MagLev este cunoscut ca fiind sistemul de transport dezvoltat de japonezi, la finalul secolului trecut, însă istoria ne prezintă altfel tehnologia aceasta. Sistemul de levitație magnetică a fost pentru prima dată creat de către Hermann Kemper [1]. Cercetarea lui a început în anul 1922 și a fost finalizată odată cu obținerea brevetului în anul 1934.

Transrapid a fost primul tren cu levitație magnetică, care a transportat călători, cu ocazia unei conferințe ce a avut loc în Hamburg, în anul 1979. În Germania, trenul *MagLev* a fost dat în folosință în 1984, spre deosebire de Japonia, care a inaugurat abia în 2003 transportul prin levitație magnetică [1].

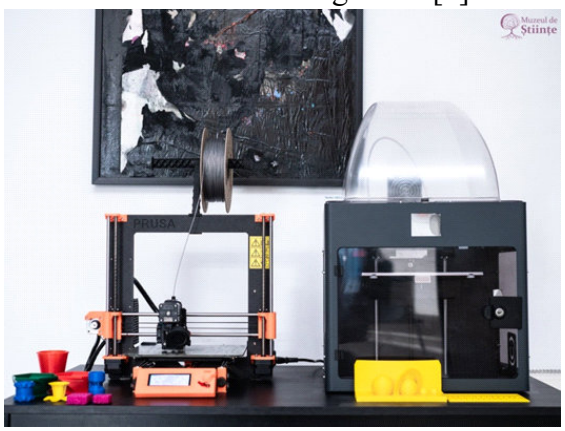


Fig. 2. 3 D printers from BSM

3D printers

The 3D printers in the museum (Fig. 2) exemplify how different kind of objects can be obtained by precise material deposition.

Additive manufacturing technology is extremely versatile, being present in various fields, such as automotive, medicine, aerospace, biology, research, interior decoration, gastronomy, fashion and more. 3D printing was invented in Japan in 1980.
Until 2005, the 3D printers were protected by the patent, so the technology could not be replicated in other areas. With the expiration of the patent, technological developers have extended the application of additive manufacturing in the fields of interest, depending on the segment in which these promoters of science, carried out their professional activity [2].

The life of bees

Today's technology plays an extremely important role in our daily lives. It significantly improves our lives, helping us to become more productive. However, an extremely high percentage of newly created technologies have their roots in nature and in the scientific theories developed in Antiquity. We look at helicopters and drones as they developed by monitoring dragonfly activity. Moreover, airplanes have on the inside honeycomb (Fig.3)
structures, which, although they are extremely light, they can support great weights and are
quite difficult to destroy. The honeycomb structures were developed in thousands of years by
bees, in order to occupy all the space provided, while storing significant quantities of honey.
Thus, the bees managed to support 3 kg of honey in a wax honeycomb that weighs only 200
gr. (Fig. 4).

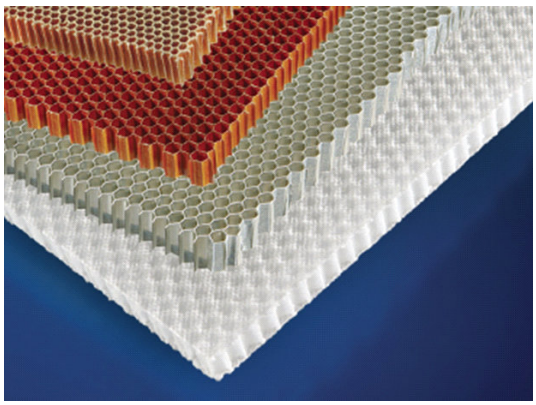


Fig. 3. Industrial honeycomb for aircraft

Imprimantele 3D

Imprimantele 3D din cadrul muzeului (Fig. 2) exemplifică modul de obține de obiecte prin depuneri precise de material.

Tehnologia de fabricație aditivă este extrem de versatilă, fiind întâlnită în varii domenii, precum: automobile, medicină, construcții aerospațiale, biologie, cercetare, decorațiuni interioare, gastronomie, modă și multe altele. Imprimarea 3D a fost inventată în Japonia, în anul 1980.

Până în anul 2005 a fost protejată de brevet, astfel că tehnologia nu a putut fi replicată în mai multe domenii. Odată cu expirarea brevetului, dezvoltatorii tehnologici au extins aplicarea principiului de fabricare aditivă în domeniile de interes, în funcție de segmentul în care acesti promotori ai științei, își desfășurau activitatea profesională [2].

Viata albinelor

Tehnologia de astăzi joacă un rol extrem de important în viața noastră de zi cu zi. Ne îmbunătățește semnificativ viața, ajutându-ne să devenim mai productivi. Cu toate acestea, un procent extrem de mare din tehnologiile create recent, au rădăcini în natură și în teoriile științifice dezvoltate în Antichitate. Privim elicopterele și dronele cum s-au dezvoltat monitorizând activitatea libelulelor. De asemenea, avioanele sunt compuse din structuri de tip fagure (Fig. 3), structuri care cu toate că sunt extrem de ușoare, pot susține greutăți semnificative, fiind totodată destul de greu de distrus. Structura fagure a fost dezvoltată în mii de ani, de către albine, astfel încât să ocupe tot spațiul pus la dispoziție, depozitând în același timp cantități semnificative de miere. Astfel, albinele au reușit ca într-un fagure de ceară care cântărește doar 200 gr, să depoziteze aproximativ 3 kg de miere (Fig. 4).

Fig. 4. Children discovering the life of bees

The Sextant

From Antiquity, starting with Pythagoras and Archimedes, people have made many innovations in the fields of construction, installations, machines. The interactive exhibits contain a small part of the principles used in the fields listed above, which were created by scientists, over 2500 years before o.e. You will discover the connection with nowadays technologies.
In the museum you will find the first marine "GPS", the sextant (Fig. 5) which gives an overview of what celestial navigation means and how sailors, since the 1700s, have been able to navigate on the sea by simply measuring the distance between the horizon and the sun, the north star or other constellations.

Sextantul

Din Antichitate, începând cu Pitagora și Arhimede, oamenii au realizat numeroase inovații în domeniile construcțiilor, instalațiilor, mașinilor. În modulele interactive expuse se regăsește o mică parte din principiile utilizate în domenile eumerate anterior, care au fost create de către oamenii de știință începând cu peste 2500 de ani înaintea e.n. Veți descoperii legătura cu cu tehnologiile actuale.

În muzeu se regăsește primul „GPS” marin, sextantul (Fig. 5) care realizează o imagine de ansamblu a ceea ce înseamnă navigația celestă și cum reușeau marinarii, încă din anii 1700, să se orienteze pe mare, prin simpla măsurare a distanței dintre orizont și soare, steaua nordului sau alte constelații.

Fig. 5. The sextant

3. The role and impact of the Museum on the community

Albert Einstein said, "You have to learn the rules of the game and then you have to play better than everyone else." In the current context, the game can be seen as technological development and its rules are in fact the roots of physics, mathematics and everything that involves the development of an invention. Subsequently, once the foundation is stable, the useful invention will certainly be a success, being applied as needed.
Brasov' Science Museum contains and presents information through interactive exhibits, that are meant to stimulate creativity and imagination among young people, in order to discover their passion in childhood, in order to follow it later on

3. Rolul şi impactul Muzeului asupra comunității

Albert Einstein spunea „Trebuie să înveți regulile jocului și apoi trebuie să joci mai bine ca toată lumea.” În contextul actual, jocul poate fi privit ca dezvoltarea tehnologică iar regulile lui sunt de fapt rădăciniile fizicii, matematicii și tot ceea ce implică dezvoltarea unei invenții. Ulterior, după ce fundația este stabilă, invenția utilă va fi cu siguranță un succes, fiind aplicată după necesități.

Muzeul de Științe cuprinde și prezintă informații prin exponatele interactive, astfel încât să fie stimulată creativitatea și imaginația în rândul tinerilor, cu scopul de a își descoperi pasiunea de mici, pe care să o urmeze în viață. Se spune că pasiunile unei persoane sunt descoperite de către

in their life. It is said that a person's passions are discovered by a person between the ages 7 to 13, depending on the experiences to which he is exposed.
Every month, more than 200 children are visiting us, accompanied either by their parents or by their teachers. They all have a unique experience, through which they manage to discover the beauty of science. The happiest moment is when we hear the children's reactions: “How interesting it is to look at the microscope! From now on, I want to become a doctor or a biologist. " Another child, while cuddling the robot, said: “Mom, I don't want a pet at home anymore, I want a robot. I want to learn more about technology ”(Fig. 6).
Children are not the only ones being surprised by the phenomena discovered. Visitors of all ages exclaim, "Wow, I didn't think that's how the centrifugal force works!", "How is our weight so different from one planet to another? Why is this happenng? ”, “I’ve heard about the 3D printer, but I thought it was something for the future, I wouldn’t have thought that this technology is used in so many fields already.”

aceasta de la vârsta de 7 la 13, în funcție de experiențele la care este expus.

Lunar, peste 200 de copii trec pragul, însoțiți fie de către părinți, fie de către profesori. Cu toții au parte de o experiență unică, prin care reușesc să descopere frumusețea științei. Cel mai îmbucurător lucru este când auzim reacțiile copiilor: „Ce interesant este să te uiti la microscop! De acum, vreau să mă fac doctor sau biolog.”. Alt copil, în timp ce mângâie robotul din dotare, spune: „Mami, nu mai vreau un animal de companie acasa, vreau un roboțel. Vreau să învăț mai mult despre tehnologie” (Fig. 6).

Copiii nu sunt singuri surprinși de fenomenele descoperite. Vizitatorii de toate vârstele exclamă: „Wow, nu am crezut că exact așa funcționează forța centrifugă!”, „ Cum? Atât de mult diferă greutatea noastră de pe o planetă pe alta? De ce?”, „Am auzit de imprimanta 3D, dar am crezut că e ceva ce se va realiza în viitorul îndepărtat, nu aș fi crezut că se folosește această tehnologie în atât de multe domenii.”

Fig. 6. Enthusiastic visitors of Brasov Science Museum

4. Conclusions

Interactive, non-formal education is essential for the development of critical, healthy and empathetic thinking.
By visiting the museum, you will discover and interact with scientific phenomena and technologies from the past, present and future, thorugh most diverse and fun experiences so
that you can identify, understand the origins of science and how you could use existing principles to innovate in the desired fields.
In addition to all the creativity and imagination that are stimulated, the time spent with us is
extremely fun and helps to disconnect from everyday life and open new horizons of understanding.

4. Concluzii

Educația interactivă, nonformală este esențială în vederea dezvoltării gândirii critice, sănătoase și empatice.
Prin vizitarea muzeului, reușim să creăm experiențe interactive diverse și distractive, prin care se descoperă fenomenele științifice și tehnologiile din trecut, prezent și viitor, astfel încât vizitatorii să se identifice, să înțeleagă proveniența științei și cum ar putea folosii principiile deja existente pentru inovarea domeniilor dorite.
Pe lângă toată creativitatea și imaginația care sunt stimulate, timpul petrecut la noi este extrem de distractiv și ajută la deconectarea de la cotidian și deschiderea noilor orizonturi de înțelegere.

Coordinator: Elena Helerea

Webology

[1] https://www.maglevboard.net/en/about/in-memoriam/372-hermann-kemper
[2] https://www.bcn3d.com/the-history-of-3d-printing-when-was-3d-printing-invented/

Iconography
Fig.1, Fig.2, Fig.4, Fig.5, Fig.6 - the images are part of the archive of the Brașov Science Museum.
Fig. 3. https://rumaniamilitary.wordpress.com/tag/fabrica-de-avioane-craiova/

History of Science and Technology

EPM