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EUROPEAN PUPILS *MAGAZINE*

History of Science and Technology

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

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

Include in your mail:

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

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

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

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

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Texts should be written in a clear language without grammatical and/or spelling mistakes in order to make sure that the reader understands what you intend to say. If you are not sure whether your work is likely to be published, consult your national referee or the Editorial Board before submitting the finished article. Have a look at the published articles in the web-editions http://epmagazine.org Priority will be given to articles which are expected to interest a broader number of readers. This may particularly be the case when the covered topic corresponds with curricula in the European Countries. In case different submitted articles cover very similar topics, the Editors will also pay attention to a balanced geographical distribution.

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

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Editorial

EDITORIAL

EN

My Experience in EPMagazine

EPMagazine is a scientific magazine founded in 2002 and written by students for other students. I joined EPM in my second year of high school.

When I was in lower secondary school I wasn't sure of the type of high school I wanted to sign in. At first I was certain about starting to attend the classical high school because I was in love with books and literature. My parents weren't as sure as I really was, so they kept looking for other schools. One day while we were eating, they told me that they had found a scientific High School that offered an afternoon course about scientific journalism. They showed me the site and all the great things this group of people achieved during years. After I saw some EPMagazine's articles I decided I would enrol in Boggio Lera high school and would attend EPMagazine activities.

Now, I've been part of this magazine for almost 2 years and I can say that is one of the hardest, challenging and beautiful experience in my entire life. In this 2 years I grew up a lot thanks to the confrontation with my colleagues and friends and, also, thanks to all the fight we have had among us.

I've started as a writer. My first article was about Darwin and the history of his Evolution Theory. At the beginning I didn't realize what being a member of EPMagazine meant. Usually people take about a month to write an article: I wrote it in one year. But then I won a contest and I had the chance to participate to my first EPMeeting. I went to Greece with the other members and I was very scared because I had to be accommodated in an unknown foreign (to me) family's house for a week. But then, when we got to know each other, we became very close. Not just with our host only, but with every Greek guy. We're still in touch and they came to Catania a few months later after we went to them.

Another wonderful aspect of the new experience at EPMagazine generally, was the language! You have the opportunity to learn or to improve in your English in a fun and useful way! This language is a very important part of our job because we use it in every kind of communications as well as in the EPMeeting, and the contributors of our Magazine have to write their articles into English, too, because they have to be understandable by everyone!

This is just one of the experiences that made me grow up in EPMagazine.

Nowadays, our Italian team is having a moment of crisis because a few of us, only, have taken his job seriously until a couple of months ago. When we realized it, it seemed to be almost too late, but right now we are all trying to be actively part of this Project and to make it bigger and greater again, even by both asking other schools and universities to join us, and by respecting our deadlines.

I think that is a very important part of our Educational Institutions and, even if it's not widely known by a lot of people, it has a great Educational-Scientific potential which could be very useful not mainly to the Institutions reputation, but to the students themselves.

In the future I'd really hope to see EPMagazine turn into a no-profit Educational-Scientific association or a traded Magazine having the same aims. Of course, we have a long way ahead, but anyway we are sure to achieve our goals, even slowly, by following each step carefully and by involving new people!

Experiența mea în cadrul EP*Magazine*

EP*Magazine* este o revistă științifică fondată în 2002 și scrisă de către elevi și studenți pentru alți elevi și studenți. M-am alăturat echipei EP*M* în anul doi de liceu.

Pe când eram elevă la gimnaziu nu prea știam la ce fel de liceu aș vrea să mă înscriu. La început, eram aproape sigură că voi frecventa un liceu teoretic, secția uman, pentru că eram îndrăgostită de cărți și literatură. Însă părinții mei nu erau la fel de siguri ca mine, așa că ei au continuat să caute alte școli. Într-o zi, în timp ce serveam masa, mi-au spus că au găsit un liceu științific care oferea după-masa cursuri de jurnalism științific. Mi-au arătat site-ul și toate lucrurile deosebite pe care acest grup de oameni le-au realizat de-a lungul anilor. După ce am parcurs câteva articole ale EP*Magazine*, m-am hotărât să mă înscriu la Liceul Boggio Lera și să particip la activitățile EP*Magazine*.

Acum, am deja doi ani de când fac parte din echipa acestei reviste și pot să spun că este una dintre cele mai grele, provocatoare și frumoase experiențe din viața mea. În acești doi ani m-am maturizat mult datorită relațiilor cu colegii și prietenii mei și, de asemenea, datorită dezbaterilor aprinse pe care le-am avut între noi.

Am început prin a scrie. Primul meu articol a fost despre Darwin și istoria Teoriei sale evoluționiste. La început nu mi-am dat seama ce înseamnă să fii membru al EP*Magazine*. De obicei oamenilor le trebuie cam o lună ca să scrie un articol: eu l-am scris într-un an. Dar apoi, am câștigat un concurs și am avut șansa să particip la prima mea întâlnire EP*M*. Am mers în Grecia cu ceilalți membri și eram foarte speriată pentru că urma să fiu cazată într-o familie străină, necunoscută mie, timp de o săptămână. Însă după aceea, când am ajuns să ne cunoaștem mai bine, am devenit foarte apropiați, nu doar cu gazda noastră, ci și cu fiecare grec din echipă. Păstrăm încă legătura și ei au venit în Catania la câteva luni după ce i-am vizitat noi.

Un alt aspect minunat al noii experiențe de la EP*Magazine* a fost limba! Ai ocazia să înveți și să-ți îmbunătățești limba într-un mod amuzant și folositor. Această limbă reprezintă o parte importantă a muncii noastre pentru că o folosim în toate tipurile de comunicare, precum și la întrunirile EP*M*; în plus, colaboratorii revistei noastre trebuie să-și scrie articolele și în limba engleză, pentru a fi înțeleși de toți! Aceasta este doar una dintre experiențele care m-au făcut să mă maturizez la EP*Magazine*. În prezent, echipa noastră italiană trece printr-un moment de criză pentru că doar puțini dintre noi au luat în serios această muncă până cu vreo două luni în urmă. Când ne-am dat seama, părea aproape prea târziu, dar acum încercăm cu toții să fim parte activă a acestui proiect, pentru a-l dezvolta mai mult din nou atât prin solicitarea altor școli și universități să ni se alăture, cât și prin respectarea termenelor noastre limită.

Cred că acesta este o parte importantă a instituțiilor noastre educative și, deși nu este cunoscută de mulți, revista are un potențial educațional-științific care poate fi util nu doar pentru reputația instituției, ci și pentru elevi. In viitor sper să văd EP*Magazine* transformat într-o asociație educativ-științifică sau într-o revistă scoasă pe piață care să aibă aceleași scopuri. Bineînțeles, în față ne stă o cale lungă, dar cumva suntem siguri că ne vom realiza scopurile, chiar dacă încet, înaintând cu grijă și implicând tot mai multe persoane!

Mi experiencia en EP*Magazine*

EP*Magazine* es una revista científica fundada en 2002 y escrita por estudiantes para estudiantes. Me uní a EP*M* en mi segundo año de instituto.

Cuando estaba en el colegio y pensaba en el futuro, no estaba segura del itinerario que iba a elegir para el instituto. Al principio, estaba segura de escoger la modalidad de letras, porque estaba enamorada de los libros y de la literatura. Mis padres no estaban realmente tan seguros como yo, por lo que seguían aconsejándome. Un día, mientras comíamos, me dijeron que habían encontrado un instituto en el que se ofrecían cursos de periodismo por la tarde. Me mostraron el sitio y todas las grandes cosas que este grupo de personas habían desarrollado durante años. Después de ver algunos artículos de EP*Magazine*, decidí que me inscribiría en la escuela secundaria Boggio Lera y asistiría a las actividades de EP*Magazine*. Ahora, he formado parte de esta revista durante casi 2 años y puedo decir que es una de las experiencias más difíciles, desafiantes y hermosas de toda mi vida. En estos 2 años crecí mucho gracias a la colaboración con mis colegas y amigos y, también, gracias a todo el esfuerzo que hemos desarrollado entre nosotros.

Comencé como escritora. Mi primer artículo fue sobre Darwin y la historia de su teoría de la evolución. Al principio no me di cuenta de lo que significaba ser miembro de EP*Magazine*. Por lo general, las personas tardan aproximadamente un mes en escribir un artículo: yo lo escribí en un año. Luego gané un concurso y tuve la oportunidad de participar en mi primera reunión de la revista EP*Magazine*. Fui a Grecia con los otros miembros y estaba muy asustada porque tuve que alojarme en una casa desconocida (para mí), de una familia extranjera durante una semana. Pero luego, cuando nos conocimos, nos acercamos mucho. Esto pasó no solo con nuestro anfitrión, sino también con todos los griegos. Después, continuamos en contacto y vinieron a Catania (Italia) unos meses más tarde. Otro aspecto maravilloso de la nueva experiencia en EP*Magazine* fue la mejora de otro idioma. ¡Tienes la oportunidad de aprender y mejorar tu inglés de una manera divertida y útil! Este idioma es una parte muy importante de nuestro trabajo, ya que lo usamos en todo tipo de comunicaciones, tanto en el encuentro de la EP*Magazine*, como con todos los colaboradores de nuestra Revista que tienen que escribir sus artículos en inglés para tener un lenguaje común. Esta es solo una de las experiencias que me hicieron crecer en EP*Magazine*.

Hoy en día, nuestro equipo italiano está atravesando un momento de crisis porque solo algunos de nosotros nos hemos tomado en serio el trabajo desde hace un par de meses. Cuando nos dimos cuenta, parecía que era demasiado tarde, pero en este momento todos intentamos ser parte activa de este Proyecto y hacerlo mejor y más grande de nuevo, incluso invitando a otras escuelas y universidades a que se unan a nosotros, y por supuesto respetando nuestros plazos. Creo que es una parte muy importante de nuestras instituciones educativas y, aunque la revista no sea muy conocida por mucha gente, tiene un gran potencial educativo y científico que podría ser muy útil no solo para la reputación de las instituciones, sino también para los estudiantes en sí mismos.

En el futuro, realmente espero que EP*Magazine* se convierta en una asociación científica-educativa sin fines de lucro o en una revista comercial que tenga los mismos objetivos. Por supuesto, tenemos un largo camino por delante, pero seguro que lograremos nuestros objetivos, aunque sea lentamente, dando cada paso con cuidado e intentando involucrar a nuevas personas.

Моят опит в списание EP*M*

EP*Magazine* е научно списание, създадено през 2002 г. и написано от ученици за други ученици. Присъединих се към EP*M* през втората година от средното си образование.

Когато бях в прогимназията, не бях сигурна в какъв тип гимназия исках да вляза. Първоначално бях сигурна, че ще започна да посещавам класическата гимназия, защото бях влюбена в книги и литература. Родителите ми не бяха толкова сигурни, колкото и аз, така че търсеха други училища. Един ден, докато ядяхме, ми казаха, че са намерили научна гимназия, която предлага следобеден курс за научна журналистика. Те ми показаха сайта и всички велики неща, които тази група хора са постигнали през годините. След като видях някои статии на agazine , реших, че ще се запиша в гимназия Boggio Lera и ще се включа в дейностите на списание EP*M*.

Сега вече почти две години съм част от това списание и мога да кажа, че това е едно от най-трудните, предизвикателни и красиви преживявания в целия ми живот. През тези 2 години изразнах много благодарение на сътрудничеството с моите колеги и приятели, а също и благодарение на цялата борба, която имахме пред нас. Започнах като писател. Първата ми статия беше за Дарвин и историята на неговата теория за еволюцията. В началото не осъзнавах какво е да си член на EP*Magazine*. Обикновено на хората отнема около месец, за да напишат статия: Написах я за една година. Но след това спечелих конкурс и имах възможност да участвам в първата ми среща на EP*M* . Отидох в Гърция с другите членове и бях много уплашен, защото трябваше да бъда настанен в непозната чужда (за мен) къща в продължение на една седмица. Но тогава, когато се запознахме, станахме много близки. Не само с нашия домакин, но и с всеки грък. Все още сме в контакт и дойдоха в Катания няколко месеца по-късно, след като отидохме при тях.Друг прекрасен аспект на новия опит в EP*Magazine* беше езикът! Имате възможност да научите или да усъвършенствате на английския си език по забавен и полезен начин! Този език е много важна част от нашата работа, защото го използваме във всякакъв вид комуникации, както и в срещите на EP*M*, а участниците в нашето списание трябва да пишат своите статии и на английски, защото те трябва да бъдат разбираеми за всеки!Това е само едно от преживяванията, които ме накараха да порасна в EP*Magazine*.Днес нашият италиански екип изживява момент на криза, защото само няколко от нас са приели работата му сериозно допреди няколко месеца. Когато го осъзнахме, изглеждаше вече твърде късно, но сега всички се опитваме активно да участваме в този проект и да го направим все по-голям и по-голям, дори като помолим и други училища и университети да се присъединят към нас и при спазване на нашите срокове.Мисля, че това е много важна част от нашите образователни институции и дори ако не е широко позната от много хора, тя има голям образователен и научен потенциал, който може да бъде много полезен не само на репутацията на институциите, но и на учениците.

В бъдеще наистина ще се надявам да видя EP*Magazine* да се превърне в нестопанска образователно-научна асоциация или търгувано списание със същите цели. Разбира се, пред нас ни предстои дълъг път, но все пак със сигурност ще постигнем целите си, дори бавно, като следваме всяка стъпка внимателно и като включим нови хора!

Η εμπειρία μου στο Περιοδικό EP*M*

Το Περιοδικό EP*M* είναι ένα επιστημονικό περιοδικό που ιδρύθηκε το 2002 και γράφτηκε από μαθητές για μαθητές. Μπήκα στην ομάδα του EP*M* στη Δευτέρα γυμνασίου. Όταν ήμουν στο Γυμνάσιο δεν ήμουν σίγουρη για τον τύπο του Λυκείου που θα ήθελα να ακολουθήσω.

Αρχικά ήμουν σίγουρη ότι έπρεπε να παρακολουθήσω το κλασικό Λύκειο γιατί ήμουν ερωτευμένη με τα βιβλία και τη λογοτεχνία. Οι γονείς μου δεν ήταν τόσο σίγουροι όσο ήμουν εγώ πραγματικά, οπότε συνέχισαν να αναζητούν και άλλα σχολεία. Μια μέρα ενώ τρώγαμε, μου είπαν ότι βρήκαν ένα Λύκειο θετικών επιστημών που προσέφερε απογευματινό μάθημα για την επιστημονική δημοσιογραφία. Μου έδειξαν την ιστοσελίδα και όλα τα σπουδαία πράγματα που πέτυχε αυτή η ομάδα ανθρώπων κατά τη διάρκεια των τελευταίων ετών. Αφού είδα κάποια άρθρα του Περιοδικού EP*M* αποφάσισα να εγγραφώ στο Λύκειο Boggio Lera και να παρακολουθήσω τις δραστηριότητες του Περιοδικού EP*M*.

Σήμερα, κλίνω δύο χρόνια σχεδόν, που είμαι μέλος του περιοδικού και μπορώ να πω ότι είναι μια από τις πιο δύσκολες και όμορφες εμπειρίες της ζωής μου, αλλά και μία πρόκληση για μένα. Σε αυτά τα δύο χρόνια αισθάνομαι ότι «μεγάλωσα» πολύ χάρη στην αντιπαράθεση με τους συναδέλφους και τους φίλους μου και, επίσης, χάρη σε όλη τη συνεργασία που είχαμε μεταξύ μας. Άρχισα ως συγγραφέας. Το πρώτο μου άρθρο αφορούσε τον Δαρβίνο και την ιστορία της Θεωρίας του για την Εξέλιξη. Στην αρχή δεν συνειδητοποίησα τι σήμαινε να είμαι μέλος του Περιοδικού EP*M*. Συνήθως οι άνθρωποι χρειάζονται περίπου ένα μήνα για να γράψουν ένα άρθρο: εγώ το έγραψα σε ένα χρόνο. Κέρδισα όμως έναν διαγωνισμό και είχα την ευκαιρία να συμμετάσχω για πρώτη φορά στη συνάντηση για το EP*M*. Πήγα στην Ελλάδα μαζί με τα υπόλοιπα μέλη και ήμουν πολύ φοβισμένη, γιατί έπρεπε να φιλοξενηθώ στο σπίτι μιας άγνωστης, ξένης οικογένειας για μια εβδομάδα. Όταν γνωριστήκαμε με το κορίτσι που με φιλοξενούσε, ήρθαμε πολύ κοντά, τόσο με αυτήν αλλά και με τους άλλους Έλληνες. Ήρθαν στην Κατάνια λίγους μήνες αργότερα, αφότου πήγαμε εμείς. Ακόμη και σήμερα έχουμε επικοινωνία. Μια άλλη υπέροχη εμπειρία στο Περιοδικό EP*M*, ήταν η χρήση της αγγλικής γλώσσας! Έχεις την ευκαιρία να μάθεις ή να βελτιώσεις τα αγγλικά σου με ένα διασκεδαστικό και χρήσιμο τρόπο! Η αγγλική γλώσσα είναι ένα πολύ σημαντικό κομμάτι της δουλειάς μας, γιατί την χρησιμοποιούμε σε κάθε είδους επικοινωνία, καθώς και στις συναντήσεις για το περιοδικό, ενώ οι συγγραφείς του περιοδικού μας πρέπει να γράψουν τα άρθρα τους και στα αγγλικά, ώστε να είναι κατανοητά από όλους! Αυτή είναι μόνο μία από τις εμπειρίες, που με βοήθησε να «μεγαλώσω» στο Περιοδικό EP*M*. Αυτόν τον καιρό, η Ιταλική ομάδα περνάει μια περίοδο κρίσης, επειδή μόνο μερικοί από εμάς έχουν πάρει τη δουλειά τους στα σοβαρά τους τελευταίους μήνες. Όταν το συνειδητοποιήσαμε, φάνηκε να είναι πολύ αργά, αλλά από δω και πέρα όλοι προσπαθούμε να είμαστε ενεργά μέλη αυτού του πρότζεκτ και να το ξανακάνουμε όλο και καλύτερο, μένοντας συνεπείς στις υποχρεώσεις μας. Επιπλέον ζητάμε και από άλλα σχολεία και πανεπιστήμια να συμμετάσχουν στο περιοδικό μας. Πιστεύω ότι αυτή η έκδοση του περιοδικού είναι μία πολύ σημαντική δραστηριότητα των Εκπαιδευτικών Ιδρυμάτων μας και, αν και δεν είναι ευρέως γνωστή σε πολλούς ανθρώπους, έχει μία σπουδαία εκπαιδευτική και επιστημονική προοπτική που θα μπορούσε να είναι πολύ χρήσιμη όχι μόνο για τη φήμη των σχολείων, αλλά για τους ίδιους τους μαθητές.

Στο μέλλον θα ήθελα πραγματικά να δω το Περιοδικό EP*M* να μετατραπεί σε μη κερδοσκοπική εκπαιδευτική-επιστημονική ένωση ή σε ένα εμπορικό περιοδικό που θα έχει τους ίδιους στόχους. Φυσικά, έχουμε πολύ δρόμο μπροστά, αλλά ούτως ή άλλως είμαστε σίγουροι ότι θα επιτύχουμε τους στόχους μας, έστω και σε ένα βάθος χρόνου, κάνοντας προσεκτικά βήματα και εμπλέκοντας νέους ανθρώπους!

La Mia Esperienza ad EP*Magazine*

EP*Magazine* è una rivista scientifica fondata nel 2002, scritta da studenti e rivolta a studenti. Sono entrata a far parte di EP*M* nel mio secondo anno di scuola superiore.

Quando frequentavo la scuola media, non avevo le idee chiare sul tipo di scuola superiore da scegliere. Ero abbastanza sicura dell'idea di andare al Liceo Classico perché amavo i libri e la letteratura in generale. I miei genitori però, non erano convinti quanto lo ero io, quindi hanno continuato a cercare altre scuole più adatte alle mie capacità.

Un giorno, mentre stavamo pranzando, mi hanno detto di aver trovato un liceo a indirizzo scientifico che offriva un corso pomeridiano di giornalismo. Mi hanno mostrato il sito web con tutte le incredibili iniziative che questo gruppo di persone aveva svolto negli anni. Dopo aver letto alcuni articoli di EP*Magazine* ho deciso di iscrivermi al liceo Boggio Lera e di partecipare alle attività della rivista.

Ora faccio parte di EP*M* da almeno due anni e posso dire che questa è una delle esperienze più stimolanti e belle della mia vita, perché mi hanno permesso di crescere affrontando e superando i miei limiti. In due anni sono cresciuta un sacco anche grazie al confronto con i miei colleghi e amici, e soprattutto grazie agli ostacoli che insieme abbiamo superato nel tempo.

Ho cominciato come scrittrice, il mio primo articolo riguardava Darwin e la storia della sua teoria dell'Evoluzione. All'inizio non sapevo cosa significasse essere un membro di EP*M*, di solito ci vuole più o meno un mese per scrivere un articolo: io l'ho scritto in un anno.

Allora ho vinto un concorso ed ho avuto la possibilità di partecipare al mio primo EPMeeting. Sono andata in Grecia con i miei compagni, veramente preoccupata perché sarei dovuta stare in una famiglia ospitante per una settimana, ma poi quando ci siamo conosciuti abbiamo legato molto, non solo con la famiglia che mi ospitava, ma praticamente con ogni persona che stava lì. Siamo ancora in contatto e sono venuti qui a Catania qualche mese dopo.

Un altro aspetto magnifico dell'esperienza di EP*M* riguarda le competenze linguistiche! Si ha l'opportunità di migliorare il proprio inglese unendo l'utile al dilettevole. L'inglese è una lingua davvero importante per il nostro lavoro perché lo utilizziamo in ogni tipo di comunicazione e anche durante gli EPMeeting, tra l'altro i nostri articoli devono essere scritti, o tradotti, in inglese in modo tale che siano comprensibili da chiunque li legga nel mondo!

Questa era solo una delle esperienze di EP*Magazine* che mi ha permesso di crescere.

In questo periodo, il nostro team italiano sta affrontando un momento di crisi dovuto al fatto che non tutti nel gruppo hanno preso seriamente il progetto e hanno deciso di andarsene qualche mese fa. Nonostante ciò, anche se sembrava troppo tardi, stiamo mantenendo vivo il progetto partecipando attivamente in modo da farlo tornare al suo stato originale, anche chiedendo aiuto ad altre scuole e università.

Penso che EP*M* sia una parte molto importante del mio percorso formativo e, anche se non è conosciuto da molte persone, possiede grandi potenzialità per quanto riguarda l'educazione scientifica e potrebbe essere veramente utile per tutti gli studenti. In futuro spero veramente di vedere EP*M* diventare un'associazione Educativa-Scientifica No-Profit, o un giornale con gli stessi obiettivi. Ovviamente abbiamo ancora tanta strada da fare, ma in ogni caso siamo sicuri di raggiungere i nostri obiettivi, anche se lentamente, un passo alla volta e facendo conoscere il progetto a nuove persone!

Meine Erfahrung mit EP*Magazine*

EPMagazine ist ein 2002 gegründetes wissenschaftliches Magazin, das von Studenten geschrieben wurde und sich an Studenten richtet.

Ich bin in meinem zweiten Schuljahr zu EPM gekommen. Als ich in der Mittelschule war, hatte ich keine klare Vorstellung davon, welche Art von Schule ich wählen sollte. Ich war mir ziemlich sicher, dass ich auf das klassische Gymnasium gehen sollte, weil ich Bücher und Literatur im Allgemeinen liebte. Aber meine Eltern waren nicht so zuversichtlich wie ich, deshalb suchten sie immer wieder nach geeigneten Schulen. Eines Tages, als wir zu Mittag aßen, erzählten sie mir, dass sie ein wissenschaftliches Gymnasium gefunden hatten, das einen Nachmittagskurs in wissenschaftlichem Journalismus anbot. Sie zeigten mir die Website mit all den unglaublichen Dingen, die in diesem Kurs im Laufe der Jahre stattgefunden hatten.

Nachdem ich einige EPMagazine-Artikel gelesen hatte, entschied ich mich, mich am Boggio-Lera-Gymnasium in Catania anzumelden und an den Aktivitäten des EPMagazin-Kurses teilzunehmen. Jetzt bin ich seit mindestens zwei Jahren Teil von EPM und ich kann sagen, dass es eine der anregendsten und schönsten Erfahrungen meines Lebens ist, weil sie es mir ermöglicht haben, zu wachsen, indem ich mich meinen Grenzen gestellt und sie überwunden habe. In zwei Jahren bin ich dank des Vergleichs mit meinen Kollegen und Freunden und vor allem dank der Hindernisse, die wir im Laufe der Zeit gemeinsam überwunden haben, sehr gewachsen.

Ich habe als Autor angefangen, mein erster Artikel befasste sich mit Darwin und der Geschichte seiner Evolutionstheorie. Anfangs wusste ich nicht, was es heißt, ein EPM-Mitglied zu sein, normalerweise dauert es ungefähr einen Monat, um einen Artikel zu schreiben: Ich habe ihn in einem Jahr geschrieben.

Aber dann habe ich einen Wettbewerb gewonnen und konnte an meinem ersten EPMeeting teilnehmen. Ich ging mit meinen Kollegen nach Griechenland und war sehr besorgt, weil ich eigentlich eine Woche in einer Gastfamilie hätte sein sollen, aber als wir uns dann trafen, waren wir nicht nur in der Gastfamilie, sondern mit den anderen EPMagazin-Teilnehmern zusammen. Wir sind immer noch in Kontakt und viele kamen einige Monate später nach Catania.

Ein weiterer großer Aspekt der EPM-Erfahrung sind Sprachkenntnisse! Man hat die Möglichkeit, Englisch zu verbessern, indem man Geschäftliches mit Vergnügen verbindet. Englisch ist eine wirklich wichtige Sprache für unsere Arbeit, da wir sie in jeder Art von Kommunikation und auch während des EPMeetings verwenden. Unter anderem müssen unsere Artikel entweder auf Englisch erstellt oder aber ins Englische übersetzt werden, damit sie weltweit für alle verständlich sind.

Dies war nur eine der Erfahrungen im EPMagazin-Kurs, die es mir ermöglichten, zu wachsen. Momentan steckt unser italienisches Team in einer Krise, da nicht jeder in der Gruppe das Projekt ernst nahm und sich vor einigen Monaten entschloss, das Unternehmen zu verlassen. Obwohl es zu spät zu sein schien, halten wir das Projekt am Leben, indem wir uns aktiv daran beteiligen, damit es wieder in seinen ursprünglichen Zustand zurückkehrt, und bitten auch andere Schulen und Universitäten um Hilfe.

Ich denke, dass EPM ein sehr wichtiger Teil meines Bildungsweges ist und, auch wenn es vielen Menschen nicht bekannt ist, ein großes Potenzial für den naturwissenschaftlichen Unterricht hat und für alle Studenten wirklich nützlich sein könnte. Ich hoffe sehr, dass das EPMagazin in Zukunft ein gemeinnütziger pädagogisch-wissenschaftlicher Verein oder eine Zeitschrift mit denselben Zielen wird.

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FOUR HUNDRED YEARS OLD SOLOVETSKY ISLANDS MONASTERY'S CANALS SYSTEM AND ITS INFLUENCE ON THE ISLANDS' ENVIRONMENT: A UNIQUE EXAMPLE OF FAVORABLE CHANGES DUE TO THE LONG PERIOD AMELIORATION

(RESULTS OF ARCHIVAL AND FIELD RESEARCH)

Introduction.

In Russia monasteries and convents have arisen in the Eleventh Century and acted not only as the religious centers, but also as centers of cultural and educational development. They compiled historical chronicles (летописи [letopisi]), stored huge collections of manuscripts and books. In the XIV-XVII century monasteries began to play an important role in development and Christianization of the North of Russia. A number of the most known monasteries had been founded on the territory of the East European (Russian) Plain: Ipatyevsky (Troitsk) in the mouth of the Kostroma River falling into the Volga River (1330); Savvino-Storozhevsky near Zvenigorod (1398); Kirillovo-Belozersky on the coast of the Siverskoe Lake (1397); Ferapontov on the Borodaevskoe Lake in 20 km from the Kirillovo-Belozersky monastery; Bohr Pafnutyev near Borovsk in the Kaluga region (1444); Borisoglebsk in Rostov Veliky (Rostov the Great) on the River Ust'e (XIVth century); Iosifo-Volokolamsky 140 km from Moscow, in 20 km from Volokolamsk (1479); The Solovetsky Monastery dedicated to Holy Transfiguration of Our Lord Jesus on islands of the White Sea in 165 km to the south of the Polar Circle (Fifteenth century) .

Fig.1 View of the Solovetsky Monastery from the Sacred Lake

Role of monasteries and convents in the society of the Old Russia.

These religious communities owned their lands, forests, and waters, which they used for collecting of mushrooms and berries, agriculture, husbandry, reindeer breeding, wild-hive beekeeping, fishery, salt collecting (in sea waters), and so on. These activities, at least at the period under consideration, led to the prominent role of these communities in the economic life of the country

Specifics of natural environment of the Northern Russian monasteries.

A term North of Russia is not very strict. For those who leave in Central and Southern Europe natural zones of coniferous – broad-leaved forests, taiga, forest-tundra, and tundra are correct to see as "North". The main characteristics of these zones are: excessive humidity, due to many rivers and huge marshlands, lakes, marshy forests, poor soils (excluding soils of floodplain meadows)

Fig.2: Big Zayatski Island near the entrance into the Great Solovestky inlet

Public functions of monasteries.

The monasteries on their lands developed agriculture and husbandry for their own use and trade. These activitiesmade monasteries not only religious, defensive, charitable, and educational establishments but also economic centers. At an early stage of its existence the monastic economy has been focused on production for own consumption. But later on, they began to sell a part of their production. The range of production was various: products of agriculture and livestock production, salt production, fishery, reindeer breeding. The most successful in trade were monasteries of the North – Solovetsky, Kirillo-Belozersky, Nicolo-Korelsky, etc.

Specifics of an environment of monasteries of the North of Russia.

The concept “North of Russia” - not really strict. For residents of Central and Southern Europe and the more so Mediterranean, it is quite correct to see the North of Russia as a zone of the coniferous and broad-leaved woods, a taiga, the forest-tundra and tundra. Within this huge aria from the western borders of Russia to the Ural Mountains hilly moraine-glacial plains, with loams soils in combination with fluvio-glacial outwash (sandur) plains and lowlands are widespread. The main features of these zones are a redundancy of moistening: the annual rainfall fluctuates from 650 to 900 mm, and the greatest possible evaporation from 200 mm/year in a tundra zone to 620 mm/year in the zone of the coniferous and broad-leaved woods. It causes development of river network, wide areas of swamps, lakes, and the boggy woods, unproductive soils, except for floodplains.

These specifics of geographic conditions had defined in many ways an originality of monastery lands: need of carrying out cleaning of the territory of the wood and bush, leveling of a relief, creation of an artificial drainage. Archaeological researches in the territory of Novgorod, Pskov, Moscow and other ancient cities of Russia testify to ability of Russians to drain the over wetted lands 500-800 years ago, long before the beginning of the XVIII century when during the Peter I and Lomonosov era the state organized drainage of lands for town planning, forest and agriculture, development of the water transport has begun.

Monasteries cared for increase in fertility of an arable land and meadows, for their expansion due to drainage of boggy lands, elimination of stones and bushes; realization of these various ways of melioration assumed long-term effect on their lands fertility. Solovetsky Monastery in these measures acts as a striking example.

Solovetsky islands as an object of landscape-historical researches.

Solovetsky islands – the unique historical and cultural complex included in 1992 in the list of objects of the World Heritage of the UNESCO. The big Solovetsky island (length of 25 km, width of 16 km, the area of 246 km ², Anzer, Big and Small Muksulmas, Big and Small Zayatskiys and a set of small islands make this largest archipelago of the White Sea with a total area about 300 km ². Islands are outstanding in a unique beauty of their sea coasts and interior lakes’ and forests’ landscapes. On the Solovetsky had been discovered the following unique items: a complex of monuments of primitive culture, more than 170 monuments of

Fig. 4: Map

history and

architecture, various objects of the nature deserving special care and guard. More then anything else, Solovetsky Monastery ensemble undoubtedly acts as a backbone landscape and architectural, various object of the highest order. It plays the leading role in natural, economic and spiritual development of islands.

Landscape structure of the Big Solovetsky Island.

The main feature of landscape structure of the Big Solovetsky island is its concentricity which is caused by a layering of relief and the climate which is quickly changing from the center to the periphery. Summer temperatures increase from +12º C on the coast to +23º C in the central parts of the island. Other feature of the nature of islands is an absence of river network and as result – a high percentage of lakes and marshes. There are more than 500 lakes on the island, and they occupy about 10% of its all area . Swamps occupy about 12% of the Big Solovetsky Island's area, to 25% of the island Anzer and 60% of Big Muksalma.

Landscape complexes are changing from the center of the island to the coast in the following order: central, highland, parts of the island represent the ouval-swale with a lot of lakes moraine plains occupied on hills by middle taiga pine-fir forests on thin stony podzolic soil, and on foots of hills

– by sphagnum bogs of tundra type, with prevalence of the crowberry (empetrum), a heather and a dwarfish birch. Often on a chain of lakes it is possible to track beaded ancient hollows of a drain of thawed glacial snow on which now unloading of surplus of atmospheric moisture continues.

These hollows are often occupied by more hydromorphic versions of pine-fir forests, with soil cover of Ledum, Heather, horsetails and Sphagnum mosses.

Thanks to the heavily rugged terrain and difficult accessibility to vehicles in the central part of the island there has been preserved unique plots of untouched forest. According to G.A. Boguslavsky pine forests that survived on the tops of moraine ridges in the Central and Northern parts of the Solovetsky Islands, are more than 300 years old. The remaining tracts of forest are either secondary pine-fir-birch, or conditionally indigenous coniferous forests which age rarely reaches 80-100 years.

Lower dawn the terrain, on leveled marine terraces, the number of lakes decreases and wetlands area increases. It is remarkable that virtually no islands have any transition plantgrowing lakes: we met either open lakes with clear defined coastline, and such lakes are typical for high levels of terrain, or lowland herbal swamps in lakes basins, or old (up to 7500 years according to N.A. Nikishin), Sphagnum bogs of transitional and highland types with peat and peat bogs (with depth up to 2 m). Marshes of this type occupy also the arias of vast terraces. Relatively high and good drained surfaces of high terraces are occupied with North taiga pine-fir forests of low bonitet. The lower terraces experience the cooling influence of the sea, and on them there are places of a forest-tundra birch elfin woodland, and the coast is occupied with the typical low-shrub tundra with thin (up to 10 cm) stony tundra peaty soils. The area and strike line of tundra and forest-tundra complexes on islands are not so much connected with direct proximity of the sea as with a force and the direction of sea winds. This dependence is well traced on the island Big Zayatsky on which ledges in a relief are clear landscape boundaries: windward slops are the typical tundra with all variety of tundra low shrubs, and leeward slopes of the southern exposition are dense thickets of a birch elfin woodland. Within the wind's attainability, it controls also forest stand height: with distance from the sea a birch from creeping forms transforms to five-six meters multi stems groves. And as regards unwavering rare pines and fir trees, wind shaves their tops on the universal level.

In fight against wind the Solovetsky islands act as a unit: small islands and peninsulas protect the Big Solovetsky island, taking on them the main blow of the penetrating wind. The areas of the tundra and the forest-tundra on small islands are huge, they occupy 100% of a surface of Zaytski islands, to 40% of the island Anzer, being a habitat of a reindeer, 100% of Small Muksalma and 30-40% of Big

Muksalma. On the Big Solovetsky island the forest-tundra appears as a narrow strip along the coast unprotected by other islands while, for example, in the Long lip protected from all directions the taiga advances up to the sea.

Specifics of adaptive and constructive environmental management on the Solovetsky Islands.

Although the main aim of Solovetsky Monastery was praying in wilderness for wellbeing of the Moscowy and her citizens, its functioning and development would be impossible without some material means. So, being far from any country's centers, the Monastery (as all other Northern Russian monasteries) had to develop communications for exchange of its products, which at that time had been salt, fish, flax, and some others, for grain, fabrics, clothes, metal wares, etc. So, it is understandable why the most old survived artificial hydrotechnical construction of the monastery is the hurbour refuge on the Big Zayatski Island near the entrance into the Great Solovestky inlet (Picture 2). This harbor (middle of the XVI centuary) could be used not only as a refuge during storms, but, in case of need, monks could make there some small repairs of their ships in period of ebb tide which left the ships on the bottom of the harbor.

Detailed documentary evidences of active development by monks, novices and monastic peasants of ways between Solovetsky Monastery, Vologda and Veliky Novgorod are available in materials of commercial agents of the English trade organization Muscovy Company. The Moscow Company - the English trading company which was also called the Russian Company represented alliance of the English merchants trading with Moskovia (The Russian state). The company was organized in 1555 by the English seafarer, the explorer and the cartographer Sebastian Cabot (1476-1557) and several London merchants, having received monopoly for the English-Russian trade. It was the first joint-stock English company. In 1553 Sir Hugh Willoughby (? - 1554) and Richard Chensler/Richard Chancellor (apprx. 1521 - 1556) moved off in searches of Northeast passage to China and "East India" (The Indonesian archipelago - "islands of spices"). Willoughby's ship was lost, but Chensler came to Arkhangelsk (at that time the Mikhailo-Arkhangelsky monastery) and established commercial intercourses with Moscow. Development of these communications and also searches of Northeast passsge were the initial purposes of the Moscow Company. Export to Moskovia included woollens, metals and the Mediterranean goods; the English merchants brought hemp, stearin, ropes (rigging) and other Russian goods through Arkhangelsk. Although the tsar Alexey Mikhaylovich cancelled privileges of the company in 1698, and in England it lost monopoly for the Russian trade, the company remained the influential organization in the London City and in the Eighteeth century participated in revival of the English-Russian trade.

Geographical knowledge of British of the North of Moskovia has considerably extended during Richard Chensler's voyage. In 1553 the Richard Chensler's ship Edward Bonaventure having passed along coast of the Kola Peninsula, has entered the White Sea and dropped an anchor in the mouth of the Northern Dvina. In such way the Western seafarers had discovered the White Sea. The captain Stephen Borough (1525 – 1584) commandeered the Chensler's ship. This captain would visit the White Sea in 1557. As a result of these travels, approximately in 1558 the hand-written map of coast of the Northern Europe was compiled (scale 1:5800000). It was made by the younger brother of Stephen Boro, William who accompanied the brother captain in both voyages. Russian Pomors Gavrila and Kirill connected with the Northern Orthodox Monasteries are mentioned in the diary of travel of 1556 as persons who had provided British sailors with information on coast of the sea for compilation of their chart. From 29 place names on the Kola Peninsula Borough's authorship can be

attributed only to 10. All others - Russian. On the chart there is no Kandalaksha Bay and the Onega peninsula. The White Sea has no name, but in diaries of voyage of Stephen Borough it is called Saint Nicholas's gulf (after the monastery in the mouth of Northern Dvina). Borough's chart has formed a basis for the image of this part of the White Sea on all contemporary European maps and charts.

During his second visit to Moskovia Richard Chensler has arrived to the mouth of Northern Dvina on June 23, 1555 and with all the goods has gone on barques up the rivers to Northern Dvina, Sukhona and Vologda to the city of Vologda and from there by land - to Moscow where British have arrived on October 4. Thus, the Russian monks and helmsmen have for the first time shown to British one of the ancient ways connecting Belomorye (bassin of the White Sea) with Moscow.

One of the first trade agents of the Moscow Company Thomas Southam and John Sparke in their description of the waterway from the village of Soroki [modern Belomorsk] on the coast of the White Sea to the Povenets on the coast of Lake Onega on which White Sea-Baltic Canal Route would be constructed 367 years later, proved that this way had been well-known and was actively used by the Russian people. In 1566 British aboad of three boats with twelve Russian oarsmen have passed all way from Soroki to Novgorod in one month. The vivid description of this travel, - The way discouered by water by vs Thomas Southam and Iohn Sparke, from the towne of Colmogro, by the Westerne bottome of the Baie of S. Nicholas, vnto the citie of Nouogrod in Russia, containing many particulars of the way, and distance of miles, as hereafter foloweth. Anno 1566 - demonstrates not that its authors as they claimed "had opened" this way, but its old development and use by the Russian people for communication and trade between Belomorie, Novgorod and the Baltic Sea. In the organization and providing means of communication for this way for a long time the main role were played by Pomors and northern monasteries (especially - Solovetsky) and the peasants belonging to them. From the first days of their travel British were convinced in this role.

Voyage from Holmogory down the Northern Dvina River and further across the White Sea through the Solovki to Soroka travelers successfully made aboad a lod'ya with weight displacement near the 25th tone with team of Pomors, who provided sailing by the rivers from the White Sea to Lake Onega under the supervision of Solovetsky Monastery, which had mastered this way long ago and actively used it in particular for trade in salt.

On the way to the Solovki, travelers waited for good weather in recently founded English trading station on the Rose Island opposite the St Nikolas Monastery.

On the Solovki British had not found the abbot of the monastery, the Reverend Philip who later would leave a noticeable mark not only in the history of the monastery, but also in all Moscow state's history. In ten days prior to their arrival he had been ordered to come to the capital by Ivan the Terrible who appointed Philip to the post of the Metropolitan of Moscow. Below we shall tell about the tragic result of this appointment.

Even without their abbot, monks had hospitably received foreign guests and at once shown to British, how well they were familiar with and mastered a way by which British wanted to travel. The monks provided British with the official travel letter with sealing wax press of the monastery and sent with them one of servants safely to accompany them on the dangerous voyage. In the accompanning letter it had been said that the monastic peasants living there should had to give to travelers help in all dangerous places and where it would be necessary, to move their vessels and goods on portages between rivers and lakes. From the further narration it becomes clear that for these monastic peasants service of a way to Lake Onega was most likely one of the main works [poslushanii] in which they have reached quite notable qualification. In the village Quequenich on the coast of the Vyg Lake the employee of Solovetsky Monastery accompanying British left them, but not before he had employed for them boats and had written down names of people which had to bring

travelers further to Povenets. It is necessary to add that the employee did not charge British any fee for his works because so it had been ordered him by monks.

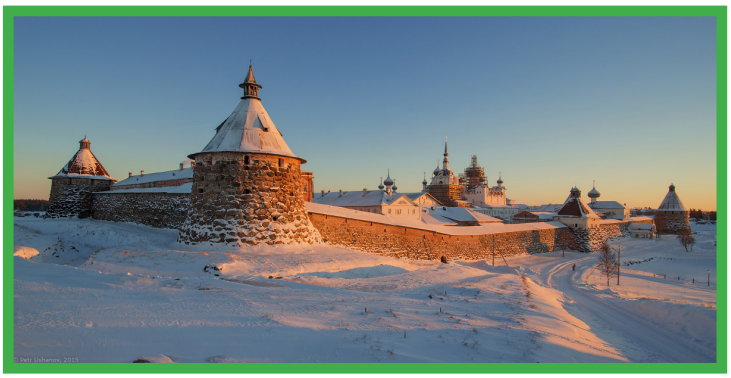
In Povenets British had also had no difficulties with hiring of seaworthy boats with crew for sail by Lake Onega, which short and realistic description is provided by them on the basis of their own observations and data received from locals. Across Lake Onega travelers have passed with stops, for spending nights and expectation of fair winds, in Tolvuye and on the islands Salasalmi, Voronii and Big Klimenetsky, having finished their voyage by the Onega in the place of a source of the river Svir from Lake Onega, at the monastery of Ascension (the modern village Вознесение [Voznesenie]). Spending two nights (in Vassiana and Selyukaks whose localization on the modern map isn't clear) going down the Svir River, British came to Lake Ladoga, reached the mouth of the Volkhov River and, with spending the night in the Nicolo Medvedsk Monastery, Gostinopolye (Gostinopolsky Nikolsky monastery), Myslov, Gruzino and a pogost Petrovsky, came to Veliky Novgorod. Let's repeat that for all way from Holmogory to Novgorod British spent only one month, and the fact that their Russian helmsmen and sailors surely brought them to all safe stops and shelters, confirms long development of this route by them and also - value of monasteries in providing travelers with transport, shelter and food. Let's notice that for monasteries maintenance of functioning of the way connecting them to the main ancient agricultural and trade centers of Russia was the integral element of their existence as the remote spiritual outposts of Orthodoxy which were carrying out missionary activity and were the attractive holy sites for pilgrims from every quarter of Russia. This way was of great importance also for economic activity both of monasteries, and of the country in general which was receiving salt mainly from the White Sea. By evidence of Russians written down by British, only in winter about 2000 sleds were used for transportation of solt by the frozen lakes. For future traderes who would wish to use this way, British travelors pointed out that their goods should be sent from Novgorod till January sixth so that they were in Some by Candlemas [Sretenie] [on February 2/15], or soon after it because if their goods are late in way till February 15 when the sun gains strength, it is dangerous as solar heat this day leads to cracks on deep lakes Ladoga and, especially Onega, and if in this case, there is sudden thaw as often happens at this time, then these lakes are opened and [ice] breaks, therefore perishes many people as sinks many both people, and horses though many rivers for a long time remain after that frozen.

Fig. 5: Solovki canal

Rapid growth of Solovetsky Monastery (founded in 1436) in the Sixteenth century has resulted in improvement of its internal means of communication and water supply of monastery, which measures had been put in force at the initiative of the abbot of the monastery, Saint Philip II. Taking into account an importance of this heroic clergiman in the history of Russia and for our theme, we would like to tell a little more about his life and activities.

He was born Feodor Stepanovich Kolychev [Федор Степанович Колычев] into one of the noblest boyar families of the Moscow State in the city of Galich (in present-day Kostroma Oblast). However, according to some sources, he was born in Moscow. Grand Prince Vasili III took young Theodore into the royal court. It is said that since childhood Theodore was on friendly terms with Ivan IV of Russia ("Ivan the Terrible"). According to an official account in his житие (Life of the Saint) his decision to become a monk occurred on Sunday, June 5, 1537, while he was standing in church for the Divine Liturgy, on hearing the words of Jesus: "No man can serve two masters" (Matthew 6:24). According to this account, he secretly left Moscow dressed as a peasant, and for a while he hid himself away from the world in the village of Khizna, near Lake Onega, earning his livelihood as a shepherd, later joining the monastery at Solovetsk. At any rate, he entered the monastery at Solovki at the age of 30, and a year and a half

later he was tonsured (took monastic vows), receiving the religious name of Philip. In the monastery he worked at the iron forge and as a baker.



Eleven years later, Philip was made hegumen [игумен] (abbot) of the monastery. During his term in office, monks under his supervision constructed two cathedrals, a brick-yard, many water-mills (including a mill for washing monastic dresses [портомойня] and storehouses, and a network of canals connecting 72 lakes. It is said that Philip took part in all these toils together with other monks. As a result, the monastery experienced a spiritual revival. He also adopted a new monastic Rule (Typicon) for the community. Most of Philip's projects in Solovki survive to this day. The tsar heard about the indefatigable monk and asked him to fill the vacant metropolitan see of Moscow. Philip agreed on condition that Ivan would abolish Oprichnina. On June 25, 1566 Philip was consecrated a bishop and enthroned as Metropolitan of Moscow and all Russia. After only two years, however, Ivan the Terrible persisted with committing murders under the aegis of Oprichnina. During Great Lent, on the Sunday of the Veneration of the Cross, March 2, 1568, when the Tsar came to the cathedral for Divine Liturgy, Philip refused to bless him and publicly rebuked him for the ongoing massacre. The Massacre of Novgorod ensued, and Philip's condemnation followed.

Ivan eventually deposed Philip from office by raising incredible charges of sorcery and dissolute living. Philip was arrested during Liturgy at the Cathedral of Dormition and imprisoned in a dingy cell of the Theophany (Bogoyavlenskii) Monastery, fettered with chains, with a heavy collar around his neck, and was deprived of food for a few days in succession. Then he was transferred and immured at the Monastery of the Fathers (Otroch Monastery) at Tver. In November 1568, the tsar summoned the Holy Synod, which had Philip deposed. A year later, on December 23, 1569, he was strangled by the Tsar's minion, Malyuta Skuratov at Otroch, two days before Christmas. As if aware of his approaching death, Philip had asked to receive Holy Communion three days earlier. After his martyrdom, monks from Solovetsky Monastery asked for permission to transfer the body of St. Philip to their monastery. When they opened up the tomb they found the body of the hierarch was incorrupt, and various healings began to be reported. The transfer of his remains from Tver to the Solovetsky Monastery took place in 1590. In 1652, Patriarch Nikon persuaded Tsar Alexis to bring Philip's relics to Moscow, where he was glorified (proclaimed a saint) later that same year.

So, one of the main material memorials of St. Filipp II activities was construction of a uniform system of channels on the Big Solovetsky Island which have connected numerous fresh-water lakes to the Sacred Lake (Svyatoe Ozero) which is located under monastery walls from outside, opposite to the White Sea coast. The channels laid between lakes in many places passed across swamps and arias of the boggy tundra, providing thus melioration of these territories: lakes became flowing that interfered with their bogging, and swamps, being drained, freed the arias over time growing with the wood, or becoming the meadows and arable lands used by monks and monastic trudniks [трудники] (volunteer workers) for livestock production and agriculture. (Picture 4) Expansion of channel system resulted in need of its regulation by means of locks, and with navigation development, construction of dams, gates and sluices. In the beginning these technical actions were carried out by purely experimental methods of "tests and mistakes", and in XVIII - the beginning of the twentieth century, with arrival to the monastery of the monks with good secular education, design and construction of hydraulic engineering constructions at the technical level corresponding to the period began to develop (Pictures 5 - 7). Continuous intake of fresh water to the monastery has allowed monks to provide almost autonomous existence: have been constructed - a water supply system, baths, a water-mill, laundry and, at the beginning of the Twentieth century, one of the Russia's first hydroelectric

power stations.

On the basis of uniform hydrotechnical system a natural and economic complex of the monastery was formed, as well as gradually it led to a modern structure of types of environmental management which included water management (drinking water supply, transport), agricultural (crop production, livestock production), forestry and landscape. Energy of water streams was used. The adaptation direction of environmental management was fully shown in agriculture. The local population used very wise intra landscape conditions: specifics of local climates and even microclimate, character of a relief and natural fertility of soils. The Solovki cultural landscapes created by the beginning of the twentieth century were synthesis of traditional high-eco-friendly environmental management and urgent engineering decisions.

Now we, during our field research, have found gradual bogging of the territory of islands owing to neglect and in places even destruction after 1917 of extensive monastic hydraulic systems. Meadows on islands survived poorly: at rough calculation actually forb-cereal complexes occupy the space about 270 hectares on two islands. The largest apportionment, 105 hectares, has remained on the island Big Muksalma, the former livestock center of monastic economy. Here farmyards and the main areas of pastures were located. In spite of the fact that meadow areas are on a leveled surfaces of the second and third terraces, successfully created drying system almost century keeps the territory from secondary bogging though in places green mosses get into a meadow cover. On Big Solovki meadows have remained on small areas, they occupy in total 160 hectares on Kulikovo Field , near Isakovo, the Savvatiyevsky monastery, the Filippovsky Skete and around the Kremlin, including the modern airfield. Particulary in the region showed on the mentioned above Picture 4, during our field research we found relicts of monastic meadows.

At the end of the Nineteeth century the military doctor Peter Fedorovich Fedorov (1856 - ?) exploring history, ethnography and actual reality of the Solovetsky Islands had in details described monastic life and pointed out that, haying meadows of two islands – Big Solovki and Muksalma – gave on average for 1882-1885 2123 hay promezheks. Peter Fedorov himself determined one promezhek by volume as two carts of 30 poods each, that is 983 kg that means that an average meadows gave 2,086 tons of hay a year. At average productivity of natural hay meadows of 7,7-8 centner/hectare across the Arkhangelsk region for 1990-2002, it is possible to estimate the historical areas of only haying meadows at 2,658 hectares.

But every summer it was necessary to graze herd of cows to 113 heads, sheep – to 200 heads and about 180 horses. Thus, the historical areas of meadows exceeded modern by 10 times. There is an interesting geographical task of searching for the territories which had been cultivated in the Nineteenth century and then restored to the level of original vegetation during the Twenteeth century.

Modern meadows are characterized by the highest on islands vegetation indices , what is connected with high fertility of soils. And indeed, in literature on life of Solovetsky Monastery the authors repeatedly mentioned how monks had cared for fertilization and increase in efficiency of the meadows and kitchen gardens. Thus, it is possible to assume that rather fertile soils and the considerable efficiency of ecosystems displayed by high value of the vegetative NDVI index will also be characteristic of the left meadows. The ash-content of undisturbed riding peat is minimum: 0,8-2,5%. At drainage the ash-content of riding peat grows because in the drained horizons decomposition processes amplify. So, on Kulikovo Field the ash-content of peat thickness increases from 4,5-5,0% in the lower horizons up to 10-12 (even 16,4) % on top. The analysis of territories

with high values of vegetative indexes and the raised ash-content of peat has allowed us to reveal the missing areas of meadows and to carry, for example, the leveled territory of the second sea terrace near the lake Besednoye occupied now with the young pine and birch wood to the degrading monastic agricultural grounds. Here peat thickness is low (23 cm), and an ash-content of the lower peat horizon reach 20%. It is obvious that this natural complex has undergone not one transformation – originally grass swamp as a result of artificial drainage has been transformed to a meadow complex, and then as a result of recovery succession – to the modern wood.

Modern meadows are characterized by the highest on islands a vegetative index (Picture 8), what is connected with high fertility of soils. And it is confirmed by authors of works on life of Solovetsky Monastery who repeatedly mentioned how monks cared for fertilizer and increase in efficiency of the meadows and kitchen gardens. Thus, it is possible to assume that rather fertile soils and the considerable efficiency of ecosystems displayed by high value of the vegetative NDVI index will also be characteristic of the left meadows. The ash-content of undisturbed higher lays of peat is minimum: 0,8-2,5%. At drainage the ash-content of higher lays of peat grows because in the drained horizons decomposition processes amplify. So, on Kulikovo Field the ash-content of peat thickness increases from 4,5-5,0% in the lower horizons up to 10-12 (even 16,4) % on top. The analysis of territories with high values of vegetative indexes and the raised ash-content of peat has allowed us to reveal the missing areas of meadows and to qualify as degraded monastic agricultural fields, the leveled territory of the second sea terrace near the lake Besednoye occupied now with the young pine and birch wood. Here peat thickness is low, 23 cm, and an ash-content of the lower peat horizon reach 20%. It is obvious that this natural complex has undergone not one transformation – originally grass swamp as a result of artificial drainage has been transformed to a meadow complex, and then as a result of recovery succession – to the modern wood.

We found another kind of antropogen transformation in the regions with poor humus (less than 1%, content of nitrogen less than 0,75%), acid and the high acid (pH 4,6-5,6) soils where monks developed high-yielding kitchen gardens on which monastic gardeners grew up all necessary (potatoes, cabbage, a radish) and exotic (tomatoes, water-melons) vegetables. Monastic kitchen gardens are also well identified in space pictures in the maximum size of biological efficiency. Monks had chosen for their kitchen gardens gentle slopes of runnels of drain and dried hollows of ancient lakes' bottoms. Such choice is explained by the fact that here processes of carrying out of useful elements are slowed down and peat, rather rich in contents, collects. As a result of drainage and additional fertilizer peat was processed into humus which yielded a good crop of vegetables. It is known that the most part of provisions was being delivered to islands from the continent: it was necessary to support about 200 constant monks of the monastery and up to 1500 voluntary trudnik during the whole summer. But fresh vegetables arrived on a monastic table only from their own kitchen garden beds. Therefore special attention was paid to truck farming, and monks had applied then all possible types of melioration, which were (in modern terms): drying, chemical, and even irrigation! But irrigation there had been aimed not at moistening, but at the improvement of climate of the soil: on kitchen gardens of the Makaryevsky Skit (nowadays Botanical garden) hot water was pumped by pipes from the wax bleaching plant and candle factory. Near monastery walls the old lake's hollow with humus soils is still used by locals for private kitchen gardens, generally under potato, but humus is gradually degrading, and in some parts one could see already the sand which is slightly painted by black organic matter.

Fig. 6: Solovki canal

Expeditions of the Russian Academy of Sciences and Lomonosov Moscow State University.

In 2007 the S. I. Vavilov Institute of History of Natural Sciences and Technology

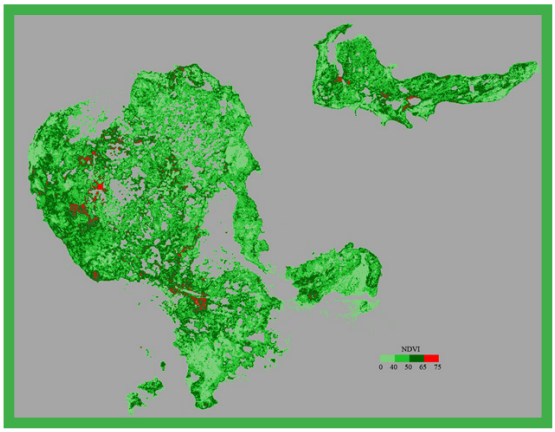


Fig. 7: Vegetation indice (NDVI)

of the Russian Academy of Sciences with the assistance of the Department of Physical Geography of the M.V. Lomonosov Moscow State University had organized the International Historical-Geographic Expedition to the Solovetsky Islands (the research supervisor prof. Alexey V. Postnikov). The program of our research included two blocks of the interconnected directions: cultural and historical and landscape and geoecological, paleogeographical. The main objects of the social and economic structure of the islands have been studied, described and catalogued as monuments of history of science and technology. Studying of dynamics of landscapes, specifics of their development in the Holocene and a research of influence of canal system on change of its natural landscapes were very important part the expedition's activity. For studying of dynamics and functioning of landscapes dendrochronology methods were used. In typical geosystems of the island drill cores of trees whose ages were of 90-100 to 210 years had been selected. The standard technique of data processing was used. Width of wood rings is determined by the scanner and the computer on automatic system of measurement "Lintab 5" then cross dating with finding of an index of dating (CDI) and cross-correlation was carried out. The technique of standardization (indexing) and creation of the generalized chronology has been applied to processing of ranks of an annual growth. The contribution of various factors of a gain, first of all climatic, was determined by ex-potential model of a curve of growth in the ARSTAN program.

For fir-trees the important role of air temperature of June is established. We could not trace a strict connection of size of a year gain with an atmospheric precipitation of the vegetative period. At the majority of pines in abnormally low air temperature years from May to September the gain was characterized by low values, and the maximum gains of pines were tipical for years with high summer temperatures. V. V. Matskovsky pointed out that the stable positive response of a gain of pines to summer temperatures falls on 1910-1975. We have found some intra landscape distinctions of connections between a gain and climatic factors depending on remoteness from the seashore and an exposition of slopes.

It is known that planetary process of bogging of landscapes of Europe and Western Siberia had begun in the Holocene approximately 7900 – 7000 years ago. It happend at the beginning of the Atlantic optimum when the climate became warmer (summer temperatures were higher then modern on 1.5-3ºC), and rainfall rise for 10-25% . Using radio carbonic datings (by C14) of peat bogs it has been established that bogging of hypsometric levels of the island land higher than 50 m has begun about 7000 years ago. At lower hypsometric levels (32-35 m) – 3800 years ago.

We performed dendrochronologic researches in a zone of influence of a drainage. Main result: development of hydrotechnical system has led to increase in productivity of the woods and their bonitet, the environment of the island on which at disembarkation of the first monks dominated tundra, had changed to forest-tundra and North taiga landscapes, which now transformed in places, even to South taiga. But on the other hand we should take into consideration some global trends of climat changes, therefore the dinamics of natural landscapes could not be connect only with partial drainage of the island.

Technique of researches

Field researches of landscapes of the Solovetsky islands were performed in June, 2007 and included detailed descriptions of natural complexes (a relief, deposits, soils, vegetation) and getting of soil samples and wood cores. Soil samples were collected in meadow complexes and on the drained swamps from the organogenic horizons; as a whole we collected 21 tests. Wood cores we got in the central parts of islands Solovetsky and Anzer in relatively old age forest stands using Preszler's drill, twice from each tree in grupp of 5-6 trees on each explored locality.

Analytical researches. In vitro, using Tyurin's method, the volume of a humus was found in soil samples , and by means of incideration the gross content of organic substance has been determined at a temperature of 500 °C Sizes of an annual radial gain of trees were determined by the selected cores on the Lintab device. In group of trees from each local area cross dating of cores was carried out

and samples with low indicators of synchronism were discarded to cut trees which dynamics of gain is defined more not by climate, but by autochthonic factors (a disease, inrushes of the near trees and so forth). Further, with help of the Statistica program, we checked an influence of climatic parameters on our compiled generalized chronologies on each locality.

Methods of remote sensing. For identification of the ecosystems which are characterized by the highest biological efficiency and, most likely, felt the beneficial influence of human activities, we used Landsat space pictures. In the program Erdas Imagine we calculated the normalized differential vegetative index (NDVI) equal to the relation of a difference of reflection of the land surface in near infrared and red ranges of a range to their sum. Further the received NDVI values have been correlated to indicators of fertility of soils.

Conclusion.

Expansion of channel system caused requirement to its regulation by means of creation of locks, and with navigation development – construction of dikes and dambs. Drainage led to expansion of arable, pastures and haying grounds, as well as forested the territories. Based on single hydro technical system there was formed a natural and economic complex of the monastery; gradually a modern structure of types of environmental management developed which included water management (drinking water supply, transport), agricultural (crop production, livestock production), forestry and landscape. Energy of water flows was used. The adaptation direction of environmental management was fully shown in agriculture. The local population was used precisely according to the intra landscape conditions: specifics of local climates and even microclimate, nature of a relief and natural fertility of soils. The Solovetsky cultural landscapes created by the beginning of the XX century were synthesis of traditional high-eco-friendly environmental management and actual engineering decisions. catalogued by us as monuments of history of science and technology during our expeditions.

Fig. 8: Solovki canal

Main conclusion of these researches: development of channel system has led to significant improvement of the environment of the island on which at disembarkation on it the first monks, the forest-tundra dominated and now middle taiga and in places even South taiga landscapes prevail. It should be pointed out, that after Bolsheviks closed Solovetsky Monastery in 1920 they would not care for its channel system. During our expeditions we found out that such neglect caused a real damage to the system and depending on it technical constructions. Our continuing explorations showed that locks and gates can not work and difficult to revive, which fact make it impossible to navigate the channels. The water supply system also suffered very much, because the regular monks' control of levels in the lakes (and especially in the Svyatoe [Sacret] lake) had stopped, the locks and gates opened, or destroyed which facts would lead to the permanent flow of water through the whole system down to its destination – the walls of Solovetsky Monastery. Before 1920, the water was accepted under the walls by system of pipes (initially – wooden) to be transported to different consumers (mechanical and human) inside the monastery. With time, without a proper supervision, the overflowing of the system led to drastic consequences: the pipes had rusted, got littered and collapsed. As a result, water from the lake found its own ways to the White Sea under the walls and the territory of the Monastery. These ways with time led to very dangerous developments, which we studied in details during our expeditions. First, we discovered frost mounds in places on corner of the wall where water from the lake froze underground in winter. On the lake embankment near monastery walls we found sink-holes. It happened in 2007. At that time we raised an alarm in the Monastery's Museum, pointing out that the development of this process could lead to large scale sinks and destruction of walls. In summer of 2016 we were sad to find out that nothing was done and situation

became worse for such a measure that all cars traffic by the embankment between walls and the lake is impossible and forbidden.

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The Mikhailo-Arkhangelsky monastery — the orthodox monastery founded in the 12th century by the Novgorod archbishop Ioann in the mouth of Northern Dvina and which later woul be has named Arkhangelsk. In the early 1930s the monastery has been destroyed.

Originally the monastery was on the cape Pur-Navolok. In 1419 had been ruined by Norwegians, but was restored on the former place. For two hundred years was one of the centers of the Russian North. In 1584 under the decree of the tsar Ivan the Terrible, the voivode Nashchokin and Zaleshanin within a year have constructed around the monastery the wooden fortress called New Holmogora who has given rise to Arkhangelsk. The five-domed cathedral temple has been erected in 1685-89 practically in at one time with a cathedral in Holmogory. For more details see: Soykin P. P. Archangel Michael Monastery in Arkhangelsk//Orthodox Russian monasteries: The complete illustrated description of Orthodox Russian monasteries in the Russian Empire and on Athos. (SPb.: Revival, 1994): 55-57; V. I. Suvorov Monastery, Arkhangelsk for the sake of Saint Michael the Archangel,//Orthodox encyclopedia. Volume II. (M.: Orthodox Encyclopedia church scientific center, 2001): 487-489.

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Hamel, Iosif Khristianovich, 1788-1861; Leigh, John Studdy, tr.

England and Russia; comprising the voyages of John Tradescant the Elder, Sir Hugh Willoughby, Richard Chancellor, Nelson, and others, to the White Sea, etc. (London: R. Bentley, 1854): 137.

For the first time this description had been published by the English clergyman and historian of geographical exploration and discoveries Richard Hakluyt (1553-1616) in 1589 (Hakluyt, Richard (1589). The Principall Navigations, Voiages, and Discoveries of the English Nation: Made by Sea or Over Land to the Most Remote and Farthest Distant Quarters of the Earth at Any Time within the Compasse of These 1500 Years: Divided into Three Several Parts According to the Positions of the Regions Whereunto They Were Directed; the First Containing the Personall Travels of the English unto Indæa, Syria, Arabia ... the Second, Comprehending the Worthy Discoveries of the English Towards the North and Northeast by Sea, as of Lapland ... the Third and Last, Including the English Valiant Attempts in Searching Almost all the Corners of the Vaste and New World of America ... Whereunto is Added the Last Most Renowned English Navigation Round About the Whole Globe of the Earth. London: Imprinted by George Bishop and Ralph Newberie, deputies to Christopher Barker, printer to the Queen's Most Excellent Majestie. In 1598 - 1600 was published enlarged and upgraded edition of the same book in three volumes: Hakluyt, Richard (1598–1600). The Principal Navigations, Voiages, Traffiques and Discoueries of the English Nation, Made by Sea or Overland ... at Any Time Within the Compasse of these 1500 [1600] Yeeres, &c. London: G. Bishop, R. Newberie & R. Barker. 3 vols.; folio. In our work we use the recent web edition: The principal navigations, voyages, traffiques and discoveries of the English nation Collected by RICHARD HAKLUYT, Preacher and Edited by EDMUND GOLDSMID, f.r.h.s. This web edition published by eBooks@Adelaide. Last updated Friday, March 7, 2014 at 19:47. eBook@Adelaide. The University of Adelaide. South Australia 5005 http://ebooks.adelaide.edu.au/h/hakluyt/voyages/v03/chapter49.html: The way discouered by water by vs Thomas Southam and Iohn Sparke, from the towne of Colmogro, by the Westerne bottome of the Baie of S. Nicholas, vnto the citie of Nouogrod in Russia, containing many particulars of the way, and distance of miles, as hereafter foloweth. Anno 1566.

Old traditional Russian boat with sail (s) and ors.

The island lying opposite to the Nicolo-Karelian monastery located between Pudozhemsky and Nikolsky mouths of Northern Dvina River, according to documents is known since 1501. This island which is among the most ancient Novgorod possession in descriptions and on mapss of the XVI-XVIIth centuries was called differently: Yagra, the Yagorsky island, Agra - Big or Nikolsky. In the XVI-th century the island had great trade value and it could be called the first trade port of Russia. After Richard Chensler's trip to Moscow in 1553 Ivan the Terrible has issued to British the diploma in which has allowed them to trade bezdanno, [duty-free] all over the Russian and has allowed to found trade pier in the mouth of the Northern Dvina. They had chosen the island Yagry and in 1555 constructed pier, trading house, barns on this island, and the island was nicknamed "Rose" as it was covered with thickets of the blossoming dogrose. Details see: http://www.yagri.ru/Story_Chr/Story_Of_Jagr.html

The Nicolo-Karelian monastery where subsequently the city of Severodvinsk would be founded.

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Iconography

Fig. 1: Fig.1 View of the Solovetsky Monastery from the Sacred Lake

Fig. 2: Big Zayatski Island near the entrance into the Great Solovestky inlet

Fig. 3: Map by William Borough, /1536-1599/ Sailing plat MS 1560

Fig. 4: Solovki canal. Photo by Photo by Sergei Mikhailovoch Prokudin-Gorsky (1915). Library of the Congress (USA) Collection.

Fig. 5: Solovki canal. Photo by Photo by Sergei Mikhailovoch Prokudin-Gorsky (1915). Library of the Congress Collection (USA)

Fig. 6: Vegetation indice (NDVI), calculated on base of Landsat survey on June 28, 2000.

Fig. 7: Solovki canal. Photo by Sergei Mikhailovoch Prokudin-Gorsky (1915). Library of the Congress Collection (USA)

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HISTORY OF HUMAN EVOLUTION ACCORDING TO DARWIN

Charles Robert Darwin was a biologist, a naturalist and a philosopher. He was born in 1809 and ever since he was little he was very interested in science, in fact he would often collect things like bird's eggs, insects and so on. His studies were influenced by his father Robert Darwin (a physician), and by his grandfather Erasmus Darwin that was an illuminist with his own thought relating to evolution. Erasmus Darwin thought that we all descend from a common species, that the organisms were subject to modifications as a result of the selective pressure for survival, and that they would transmit those modifications.

Darwin's theory of evolution through natural selection is such a powerful and fascinating product of human mind that is definitely worth being discussed and popularised. This article is a homage to Darwin, and a way to provide a short introduction to his theories for a person who is fond to learning more about how human evolution works.

A very important experience for Darwin was his travel to Galapagos islands. Galapagos is an archipelago of thirteen islands in South America. These islands are characterized for their huge variety of habitats and animal species. The trip permitted him to visit these islands from where he collected up a lot of samples. When he returned back home Darwin analysed the samples and with the help of some ornithologists he discovered that all the different samples of species ha had identified in the Galapagos belonged to one species: the finches. So Darwin, influenced by the discovery and by the thoughts of his grandfather, began to think about the possible reality of the theory of evolution and he started to look for a way to

STORIA DELL'EVOLUZIONE UMANA SECONDO DARWIN

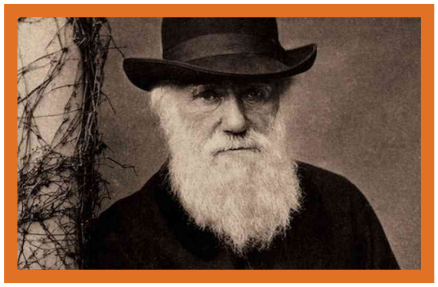

Fig.1: Charles Darwin 1809-1882

Charles Robert Darwin era un biologo, un naturalista ed un filosofo. Nato nel 1809, sin da quando era piccolo ha mostrato un grande interesse nei confronti della scienza. Collezionava, infatti, esemplari naturalistici come uova d'uccello, insetti e così via. I suoi studi sono stati influenzati da suo padre Robert Darwin (un medico), e da suo nonno Erasmus Darwin, illuminista, che aveva a lungo riflettuto riguardo l'evoluzione. Erasmus Darwin pensava che discendiamo tutti da una specie comune, che gli organismi sono soggetti a cambiamenti dovuti alla pressione ambientale per la loro sopravvivenza, e che questi cambiamenti si trasmettono nel tempo.

La Teoria dell'Evoluzione attraverso la selezione naturale di Darwin è un prodotto della mente umana così potente e affascinante che questa conoscenza merita di essere diffusa. Questo articolo è un omaggio a Darwin, ed è anche una maniera per introdurre brevemente le sue teorie, essendo indirizzato a chiunque voglia capire meglio i meccanismi dell'Evoluzione.

Un'esperienza molto importante per Darwin fu il viaggio alle Galapagos, un arcipelago di tredici isole situate nell'Oceano Pacifico, a un migliaio di chilometri a largo dell'Equador. Queste isole si caratterizzano per la loro grande

prove it.

Darwin's theory about evolution through natural selection involves two distinct notions: evolution and natural selection.

The former implies the idea that the mankind descends from non-human species. At the time when Darwin proposed it this appeared like a revolutionary but wrong theory because the immutability of the human form was common wisdom, based on Aristotle's beliefs about essential kinds, so for centuries the Christians believed in the theory of the fixed species. They thought that any form of life was created by God and that nothing had changed in the meantime, so when scientists began to understand that evolution was possible given a sufficient period of time, the Church once more strongly supported the dogma of God creation. In fact, according to the Bible the world was just 6000 years old and therefore, it was too young to produce such a wide variety of living beings from a single organism. Today, thanks to a large amount of scientific data, we know that the Earth is about 4,5 billion years old so the species has had all the time to evolve and descend from a single ancestor. Moreover, the theory of evolution was proved thanks to many fossils that were found: if we analyse at them carefully, we will note that most of them arranged in sequence show small changes that form a series that connects one fossil to another.

But how does evolution happen?

Evolution is possible thanks to natural selection that consists in a mechanism by which things can change their structure without external intervention. Natural selection is divided in two parts: the first is a mistake in the copying of the genes while the second is the selection of the changes that turns out to be the most adaptive.

Fig. 2: Galapagos

varietà di specie animali. Il viaggio compiuto da Darwin a bordo della nave Beagle gli permise di visitare queste isole e di raccogliere parecchi campioni. Tornato in patria, Darwin li studiò e, servendosi dell'aiuto di alcuni ornitologi, scoprì che tutti gli esemplari di fringuelli che aveva raccolto erano di tredici specie presumibilmente tutte discendenti da un'unica specie iniziale. Fu così che Darwin, influenzato dai pensieri del nonno e dalla scoperta appena compiuta, cominciò a pensare alla possibile realtà della Teoria dell'Evoluzione e a cercare un modo per dimostrarla.

La teoria di Darwin sull'evoluzione attraverso la selezione naturale riguarda due diverse nozioni: evoluzione e selezione naturale. La prima implica l'idea che la razza umana (per esempio) discende da individui non umani. A tal proposito, quando Darwin la propose al consesso scientifico, fu considerata come una teoria rivoluzionaria ma sbagliata, perché l'immutabilità della forma umana era di conoscenza comune, basata sulle convinzioni di Aristotele sull'essenzialità della specie. È per questo che per secoli i Cristiani hanno creduto nella teoria della fissità della specie. Essi pensavano che qualunque forma di vita fosse stata creata da Dio e che niente fosse cambiato nel frattempo. Quando gli scienziati cominciarono a capire che l'evoluzione sarebbe stata possibile in un adeguato periodo di tempo, la Chiesa continuò ad affermare il dogma della creazione divina. Secondo la Bibbia il mondo aveva solo 6000 anni e, quindi, era troppo giovane per produrre una così grande varietà di esseri viventi da un singolo organismo. Oggi, grazie a numerose ricerche e dati, sappiamo che la Terra ha circa 4,5 miliardi di anni; le specie hanno quindi avuto il tempo di evolversi discendendo da un singolo antenato comune. La Teoria dell'Evoluzione venne inoltre provata grazie al ritrovamento di numerosi fossili: se li studiamo attentamente, noteremo che la maggior parte di essi, posti in una sequenza, mostra dei piccoli cambiamenti che formano una serie che connette un fossile di un periodo con l'altro.

Ma come funziona l'Evoluzione? Questa è possibile grazie alla selezione naturale che consiste in una serie di meccanismi - mutazioni genetiche - attraverso i quali gli organismi possono cambiare la loro struttura senza un intervento esterno. La selezione naturale comprende due fasi, di cui la prima consiste in un errore nella copiatura dei geni; la seconda è la

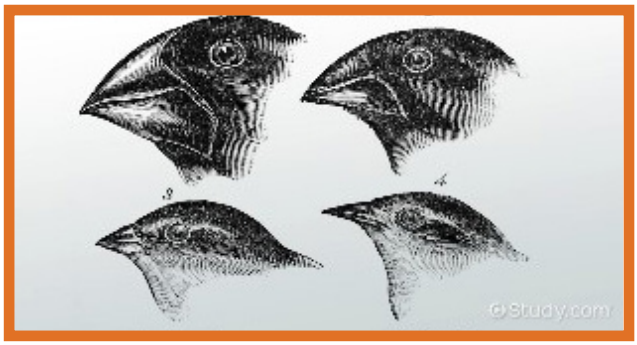

Fig. 3: Evolution
Fig 3:: Evoluzinoe

But in order to have a complete picture we must also speak about scholars that disagree with Darwin's theory like William Paley who wrote a book containing some topic against natural selection theory. In his book William Paley supported the project's idea. It says that if you find a complex machine, such as a clock, you already know that it was created by a clever creature. He took as an example the woodpecker: he has a very strong and hard beak that allows him to pierce the bark of a tree. Paley was convinced that it was impossible to get to beak structure of a woodpecker through evolution, so the only way for the creation of this magnificent structure was the work of God. Darwin understood that the woodpecker evolution could not have happened in a single step but in many small steps. In fact, this animal has a very complicated structure, while there are simplest cases where evolution in a single step works and consists in the wrong copy of a gene.

We can use the history of moths as an example. The moths we are talking about were part of a species called Biston betularia: before industrial revolution they were of light colours but then the trees became darker so the moths had to became darker too, by necessity. The first dark moths were found in 1848 near to Manchester. Instead in unpolluted regions the moths have remained light coloured. This is considered a nice illustration of how evolution in a single step works.

But what do I believe in? Do I believe in Darwin's revolutionary theory or in God creation? Guglielmo di Occam was a medieval philosopher who formulated a theory according to which we should believe in the one we consider easier to believe. If we compare the selezione naturale dei cambiamenti che risultano essere i più vantaggiosi dal punto di vista adattativo. Ma per avere un quadro completo noi dobbiamo anche parlare di alcuni studiosi che sono in disaccordo con la teoria di Darwin, come ad esempio William Paley che scrisse un libro contenente alcuni argomenti contro la teoria della selezione naturale. Dentro il suo libro Paley supporta l'idea del progetto: essa dice che se trovi un oggetto completo come un orologio, sai già che è stato creato da una creatura intelligente. Paley ha preso come esempio il picchio: esso ha un becco rigido e appuntito che gli permette di perforare la corteccia di un albero. Lo studioso era convinto che fosse impossibile arrivare alla struttura di un becco di un picchio tramite l'evoluzione, quindi l'unica maniera per la creazione di questa magnifica struttura era il lavoro di Dio. Darwin capì che l'evoluzione del picchio non poteva essere avvenuta in un singolo passo ma attraverso tanti piccoli successivi passi. Questo animale ha, infatti, una struttura davvero complicata. Esistono casi più semplici in cui l'evoluzione attraverso una prima, singola fase funziona e passa attraverso la copiatura sbagliata di un gene. Possiamo usare la storia delle falene come esempio. Le falene di cui stiamo parlando facevano parte di una specie chiamata Biston betularia: prima della rivoluzione industriale erano di colori chiari ma quando gli alberi divennero scuri a causa dei fumi delle industrie, anche le falene dovettero adattarsi e diventare più scure. Le prime falene scure vennero trovate nel 1848 vicino Manchester. Nelle regioni non inquinate le falene rimasero invece di colori chiari. Il caso delle falene è considerato un esempio di come funziona l'evoluzione in un singolo passo.

Ma in cosa credo io? Credo nella teoria rivoluzionaria di Darwin o nella creazione divina? Guglielmo di Occam era un filosofo medievale che formulò una teoria secondo la quale dovremmo credere nella cosa più facile da credere. Se noi comparassimo la tesi della creazione con la teoria di Darwin probabilmente preferiremmo la seconda. Tuttavia io non penso che succeda veramente questo: per la maggior parte delle persone è più facile credere in Dio come una sorta di magia piuttosto che cercare di capire come funziona l'evoluzione. La Chiesa è stata un ostacolo per molte teorie scientifiche rivoluzionarie finché Papa Giovanni Paolo II organizzò una conferenza per raggiungere un livello di comprensione reciproca tra filosofi,

thesis of creation with Darwin's theory on this ground, we should probably prefer the latter. However, I think that this is not what actually happens: for most people it's easier to believe in God as sort of a magic rather than trying to understand how evolution works. The Church has been an obstacle for many revolutionary scientific theories until Papa Giovanni Paolo II organized a conference to reach a level of mutual understanding between philosophers, theologians and scientists. At the end of this conference the church recognized some of its errors such as the condemnation of Galileo and they acknowledged that evolution through natural selection really happened.

Today Darwin's theory is one of the most discussed topics within the scientific community but also in society as a whole. His ideas are still celebrated in Darwin's days, close to the date of his birthday. This year in Catania they have been held from 14 to 17 of February, organized by the atheists' association, which is a sign that the debate between religion and science is far from being completed.

teologi e scienziati. Alla fine di questa conferenza la Chiesa ha riconosciuto alcuni dei suoi errori come ad esempio la condanna di Galileo e che l'evoluzione attraverso la selezione naturale sia una teoria plausibile.

Oggi la teoria di Darwin è uno degli argomenti più discussi all'interno della comunità scientifica. Delle sue idee si discute ancora nei Darwin's days, celebrati vicino alla data del suo compleanno. Quest'anno a Catania sono stati tenuti dei convegni dal 14 al 17 febbraio, organizzati dall'Associazione degli Atei, e questo è un segno che il dibattito tra religione e scienza non è ancora finito.

Fig. 4: Woodpecker
Fig. 4: Picchio

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Fig. 1: http://bit.ly/2GTtbi5

Fig. 2: https://goo.gl/kFapCQ

Fig. 3: https://goo.gl/A1Qn4H

Fig. 4: https://goo.gl/zq7Jz6

Fig. 5: https://goo.gl/HBbYK2

Fig. 5: Moth
Fig. 5: Falena

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WOMEN LAUREATES IN CHEMISTRY

Marie Skłodowska Curie (1867 –1934)

Marie Skłodowska was born in Warsaw, at the time Poland was part of the Russian Empire. She studied chemistry, mathematics and physics at the Sorbonne University. Afterwards she continued the research on the magnetic properties of steel, during which she met Pierre Curie, a scientist and expert in piezoelectricity and magnetism, whom she married in 1895.

After her marriage, Marie started research on her Ph.D. thesis. She became interested in the work of Henri Becquerel, who had found a type of rays different than x-rays, which were emitted by uranium and could pass through metal. Marie using new techniques and with the help of her husband discovered that the rays coming from uranium were constant, independently of its form or condition, and hypothesized that the radiation came from the element's atom itself, something revolutionary in the theory of atoms' indivisibility.. In 1898 Marie and Pierre Curie announced the existence of "polonium", a new element named after Marie's country, Poland and "radium", from the word "ray". They studied several properties of these new elements, and this new type of emission was called radioactivity. In 1903 Marie was awarded her Ph.D. from Sorbonne and received a Nobel Prize in physics for her contribution to radioactivity research along with her husband and Henri Becquerel, thus becoming the first woman to ever receive a Nobel Prize in physics. Marie and Pierre did not go to receive the award, however, as they were too busy working! Unfortunately, in 1906 Pierre was killed in a road accident and Marie was offered his position at the university and became the first female professor.

Marie continued her studies on radioactive

Χορηγίες γυναικών στη χημεία

Μαρία Σκλοντόφσκα Κιουρί (1867-1934)

Η Μαρία Σκλοντόφσκα γεννήθηκε στη Βαρσοβία όταν ακόμα η Πολωνία υπαγόταν στη ρώσικη αυτοκρατορία. Σπούδασε στο Πανεπιστήμιο της Σορβόννης χημεία, μαθηματικά και φυσική, όπου και συνέχισε να ερευνά τις μαγνητικές ιδιότητες του χάλυβα. Εκεί η Μαρία γνώρισε ένα νεαρό επιστήμονα με εξειδίκευση στον τομέα του πιεζοηλεκτρισμού και του μαγνητισμού, τον Πιέρ Κιουρί, με τον οποίον παντρεύτηκε το 1895.

Μετά το γάμο της η Μαρία ξεκίνησε να εργάζεται για το διδακτορικό της. Εστίασε τα ερευνητικά της ενδιαφέροντα στη δουλειά του Μπεκερέλ, ο οποίος είχε ανακαλύψει ένα είδος ακτινοβολίας -διαφορετικής από τις ακτίνες χ- που εξέπεμπε το μέταλλο ουράνιο και η οποία διαπερνούσε τα μεταλλικά αντικείμενα. Οι Κιουρί εργαζόμενοι μαζί και χρησιμοποιώντας νέες για την εποχή τεχνικές, κατέληξαν στο συμπέρασμα ότι η ακτινοβολία αυτή προέρχεται από το εσωτερικό των ατόμων του ουρανίου και είναι σταθερή και ανεξάρτητη από τις συνθήκες που βρίσκεται αυτό. Αυτό ήταν μια επαναστατική ανακάλυψη για την εποχή, μιας και ερχόταν σε πλήρη αντίθεση με τα μέχρι τότε δεδομένα για το άτομο – άτμητο. Το 1898, οι Κιουρί ανακοίνωσαν ότι δύο νέα χημικά στοιχεία το Πολώνιο και το Ράδιο παρουσιάζουν παρόμοιες ιδιότητες και αφού μελέτησαν τις ιδιότητές τους ονόμασαν αυτή τη νέα ακτινοβολία ραδιενέργεια. Το 1903 η Μαρία αναγορεύθηκε διδάκτορας της Σορβόννης ενώ παράλληλα μοιράστηκε το Νομπελ Φυσικής με τον Πιέρ Κιουρί και τον Ανρί Μπεκερέλ για τη συμβολή της στην έρευνα για τη ραδιενέργεια. Η Μαρία Κιουρί ήταν πλέον η πρώτη γυναίκα που πήρε Νόμπελ Φυσικής. Οι Κιουρί όμως δεν πήγαν να πάρουν το Νόμπελ

elements and in1910 she managed to isolate pure radium. In 1911 she was awarded a second Nobel Prize, in chemistry, in recognition of the discovery and study of new elements and the isolation of radium. Thus she became the first person and the only woman to have won two Nobel Prizes and the only person to have both a Nobel Prize in chemistry and in physics.

During World War I, Curie and her daughter, Irene, helped the treatment of a vast number of wounded soldiers by using portable x-ray machines. During this period she understood the value of radioactive elements' rays in treating tumors and went on to explore their medical use. She established the Radium Institute for that cause, which continues to work today.

Her death at 1934 was caused by a severe blood cancer due to her systematic and chronic exposure to radiation. It is known that due to her enthousiasm for science she was carrying radioactive elements in her pockets. It is also said that even her books are still so radioactive that they are stored in lead boxes and can only be opened wearing protective suits.

Marie Curie's scientific work is remarkable and a proof for this is the numerous awards she received, including her two Nobel Prizes. Curie's and Pierre's remains are entombed in the Panthéon in Paris. Curie became the first and only woman to be laid to rest there.

Fig.1: Marie Curie in her laboratory
Fig 1: Η Μαρία Κιουρί στο εργαστήριό της

Irene Joliot-Curie (1897 –1956)

Irene Curie was the first daughter of Marie and Pierre Curie, born in Paris in 1897. She received a traditional education. In 1914 she entered the Faculty of Science at Sorbonne, Paris, but her studies were interrupted by 1st World War I. During

μιας και ήταν πολύ απασχολημένοι με την έρευνά τους στο πανεπιστήμιο! Δυστυχώς, το 1906 ο Πιέρ σκοτώθηκε σε αυτοκινητιστικό δυστύχημα και το Πανεπιστήμιο πρόσφερε τη θέση του στη Μαρία, η οποία έγινε η πρώτη γυναίκα καθηγήτρια Πανεπιστημίου.

Η Μαρία συνέχισε τη μελέτη των ραδιενεργών υλικών και το 1910 απομόνωσε καθαρό ράδιο. Το 1911 της απονεμήθηκε ένα δεύτερο Νόμπελ Χημείας για την ανακάλυψη και μελέτη νέων χημικών στοιχείων και την απομόνωση του ραδίου.

Έτσι έγινε ο πρώτος άνθρωπος και η μοναδική γυναίκα με 2 βραβεία Νόμπελ, ένα στη Φυσική και ένα στη Χημεία.

Κατά τη διάρκεια του πρώτου Παγκοσμίου πολέμου η Μαρία μαζί με την κόρη της Ιρέν, χρησιμοποίησαν φορητές συσκευές παραγωγής ακτίνων χ για την ίαση των όγκων ασθενών στρατιωτών και έτσι κατανόησε την αξία των ραδιενεργών υλικών στην ιατρική και ίδρυσε το Ινστιτούτο Ραδίου γι' αυτό το σκοπό.

Ο θάνατός της το 1934 προκλήθηκε από ένα είδος καρκίνου του αίματος, προφανώς εξαιτίας της χρόνιας έκθεσής της στη ραδιενέργεια. Είναι γνωστό πως ο ενθουσιασμός της για την έρευνά της ήταν τόσο μεγάλος, που έφερε συνέχεια στις τσέπες της τα ραδιενεργά υλικά. Λέγεται ακόμα, πως ακόμα και τα βιβλία της εκπέμπουν ισχυρή ως σήμερα ραδιενέργεια, ώστε φυλάσσονται σε μολύβδινες θήκες και ανοίγονται με ειδικά μόνο γάντια.

Η Μαρία και ο Πιέρ Κιουρί έχουν ταφεί στο Πάνθεον στο Παρίσι. Η Μαρία είναι η μοναδική γυναίκα που έχει ταφεί εκεί.

Ιρέν Ζολιό- Κιουρί (1897 –1956)

Η Ιρέν , η πρώτη κόρη της Μαρίας και του Πιέρ Κιουρί γεννήθηκε στο Παρίσι. Μετα από την κλασσική εκπαίδευση, ακολούθησε σπουδές φυσικών επιστημών στη Σορβόννη αλλά η φοίτησή της διακόπηκε από τον πρώτο παγκόσμιο πόλεμο.Κατά τη διάρκεια του πολέμου εργάσθηκε με τη μητέρα της ως νοσοκόμα ραδιογράφος, βοηθώντας τους πληγωμένους στρατιώτες. Μετά τον πόλεμο η Ιρέν συνέχισε την έρευνά της στο Ινστιτούτο Ραδίου και το 1925 αναγορεύθηκε διδάκτωρ των φυσικών επιστημών με θέμα διατριβής τις ;άλφα ακτίνες του πολωνίου. Συνάντησε τον Φρεντερίκ Ζολιό κατά τη διάρκεια των μαθημάτων που παρέδιδε στο Ινστιτούτο και παντρεύτηκαν το 1926. Οι δυό τους αποτέλεσαν ένα πολύ ισχυρό ζεύγος στην επιστημονική κοινότητα.

the war she was a nurse radiographer along with her mother and helped wounded soldiers at the battlefield. After the war, Curie continued her studies at the Radium Institute, an institution established by her parents. Curie became Doctor of Science in 1925, having prepared a thesis one the alpha rays of polonium. She met Frederic Joliot when she had to teach him in her mother's laboratory. They married in 1926 and became a dynamic duo in science.

Irene and Frederic Joliot studied the atomic nuclei and could have discovered the existence of positron and neutron if they had not misinterpreted the results of their experiments. However, they did important work on natural and artificial radioactivity, transmutation of elements and nuclear physics. synthesizing new radioactive elements by bombarding already existing ones with alpha rays.

Irene and Frederic shared the Nobel Prize in chemistry in 1935, in recognition of their synthesis of new elements and Irène was awarded a position at the Faculty of Science. She continued doing research on the action of neutrons along with her colleagues and in 1938 they made an important contribution to the discovery of uranium fission.

Irene, worked on the establishment of a large center for nuclear physics at Orsay France.

Like he mother, she died from leukemia at 1956, probably caused by her long-term exposure to radioactivity.

Fig. 2: Physicist Irene Joliot-Curie in 1921
Fig. 2: Η Φυσικός Ιρέν Ζολιό- Κιουρί το 1921

Conclusion

In conclusion, Marie Curie and Irene Joliot-Curie are considered two great scientists, contributing to science not only with their work but also by offering a dynamic female presence in the scientific field. Their conclusions were important for the evolution of chemistry and physics, and even medicine, while their research

Η Ιρέν και ο Φρεντερίκ μελέτησαν τον πυρήνα του ατόμου και θα μπορούσαν να είχαν ανακαλύψει την ύπαρξη νετρονίων και ποζιτρονίων αν δεν είχαν ερμηνεύσει λανθασμένα τα πειραματικά τους αποτελέσματα. Παρόλα αυτά έκαναν πολύ σημαντική δουλειά με θέμα τη φυσική και τεχνητή ραδιενέργεια, τη μεταστοιχείωση και την πυρηνική φυσική, συνθέτοντας νέα ραδιενεργά υλικά από ήδη γνωστά ραδιενεργά στοιχεία μέσω ακτινοβολίας με ακτίνες α.

Το 1935 η Ιρέν και ο Ζολιό μοιράστηκαν το Νόμπελ Χημείας και η Ιρέν πήρε θέση καθηγήτριας στο Τμήμα Φυσικών επιστημών της Σορβόννης. Εκεί συνέχισε την έρευνα σχετικά με το ρόλο των νετρονίων, ενώ συνέβαλλε ιδιαίτερα στην ανακάλυψη της σχάσης του ουρανίου. Τέλος συνετέλεσε στην ίδρυση ενός μεγάλου κέντρου Πυρηνικής Φυσικής στο Ορσέ της Γαλλίας.

Ακριβώς όπως η μητέρα της, έφυγε από τη ζωή από λευχαιμία το 1956 και πάλι εξαιτίας της μακροχρόνιας έκθεσής της στη ραδιενέργεια.

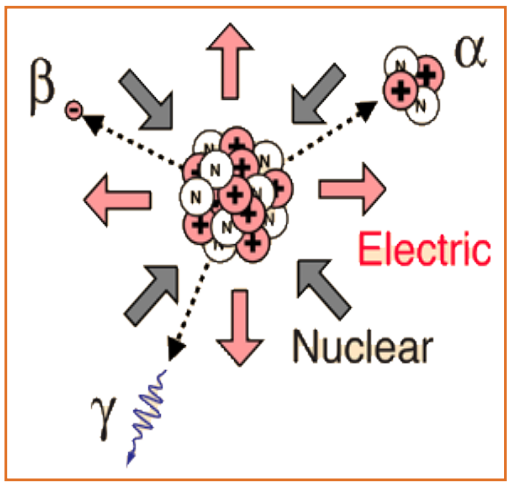

Fig. 3: Nuclear emission
Fig. 3: πυρηνική εκπομπή

Επίλογος

Συμπερασματικά, η Μαρία Κιουρί και η Ιρέν Ζολιό-Κιουρί αποτελούν δύο σπουδαίους επιστήμονες , συνεισφέροντας στην επιστήμη όχι μόνο με το έργο τους, αλλά και προσφέροντας τη δυναμική γυναικεία παρουσία στον επιστημονικό χώρο. Τα συμπεράσματα στα οποία κατέληξαν υπήρξαν σημαντικά για την εξέλιξη των επιστημών της χημείας και της φυσικής, ακόμη και της ιατρικής, ενώ η ερευνητική τους πορεία είναι ενδεικτική του επιστημονικού τρόπου εργασίας και μπορεί να αποτελέσει πηγή έμπνευσης για νεότερους επιστήμονες.

is indicative of the scientific way of working and can be a source of inspiration for younger scientists.

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Iconography

Fig. 1: http://serious-science.org/marie-curie-6408

Fig. 2: https://commons.wikimedia.org/wiki/File:Ir%C3%A8ne_Joliot-Curie_(1897-1956),_1921_(4405641939).jpg

Fig. 3: http://hyperphysics.phy-astr.gsu.edu/hbase/Nuclear/imgnuc/Radioact.gif

Fun Pages

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COMPLETE THE SENTENCES AND MATCH THEM WITH THE PICTURES

a) 8g ..... & 1g hydrogen make 9g water. → .....

b) 23g ..... & 35,5g chlorine make 58,5g sodium chloride (salt). → .....

c) It's chemical symbol is C. → .....

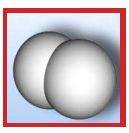
d) It is used as fuel on space missions. → .....

e) The atomic number of ..... is 17. → .....

f) It is the most expensive metal in the world. → .....

g) This chemical element is made at the sun. → .....

h) It's chemical symbol is Sn. → .....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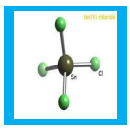
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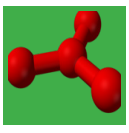
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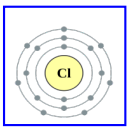

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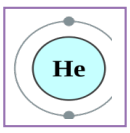

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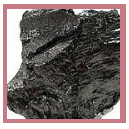
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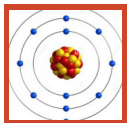
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FIND THE HIDDEN WORDS ABOUT CHEMISTRY

D	H	U	K	L	R	N	M	H	J	J	F	R	Y	F	H	Y	T	U	P	F	D	F	D	H	U	K	L	R	N	M	H	J	T
Y	F	H	Y	T	U	B	D	F	K	U	D	S	I	L	I	C	O	N	A	Y	H	U	I	O	F	H	K	V	B	D	F	K	U
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F	K	H	J	H	Y	D	R	O	G	E	N	R	W	I	G	F	A	S	F	E	W	T	Y	G	S	H	E	X	F	J	G	F	O
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Y	D	F	V	M	P	D	F	S	D	F	G	H	L	D	D	H	H	J	X	X	D	Y	I	L	G	K	I	H	D	S	A	N	I
R	S	D	X	I	R	O	N	T	Y	U	O	G	K	T	G	K	S	N	U	P	T	U	S	O	D	I	U	M	H	K	C	B	O
C	Y	J	W	S	R	L	A	S	D	F	G	H	L	D	A	S	D	F	G	A	L	U	M	I	N	U	M	B	M	L	E	A	D
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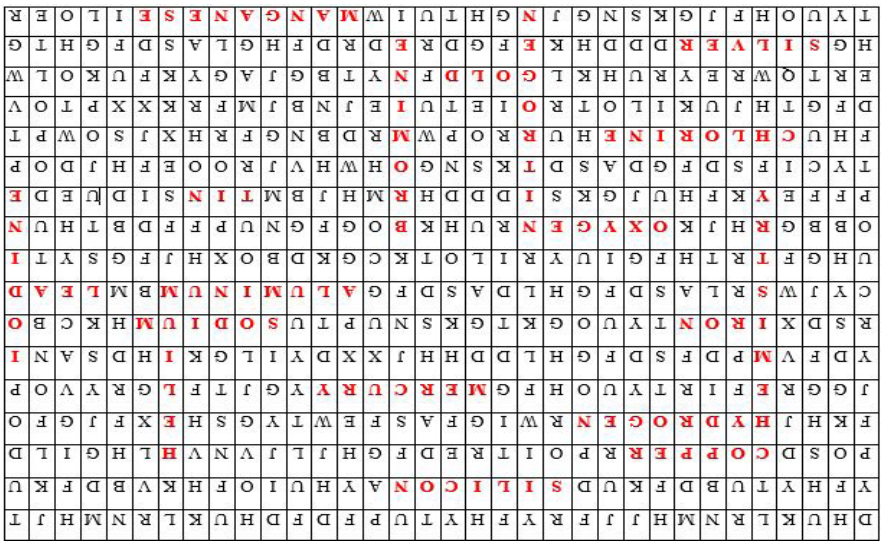
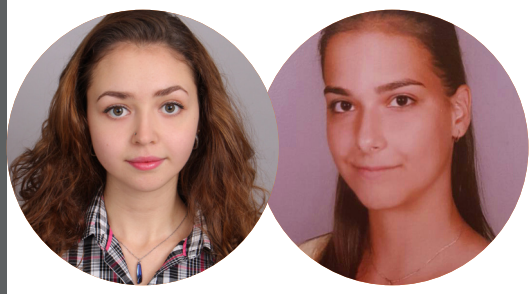
WORDS	
SILICON	CHEMISTRY
COPPER	GOLD
MERCURY	CHLORINE
HELIUM	SILVER
SODIUM	IRON
ALUMINUM	HYDROGEN
IODINE	NITROGEN
LEAD	OXYGEN
TIN	BROMINE
	MANGANESE



Solutions



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IT 19

PHOTOGRAMMETRY: A PROMISING AND PRESTIGIOUS PROFESSION RELATED TO MODERN INFORMATION TECHNOLOGY

Фотограметрията: многообещаваща и престижна професия, свързана със съвременните IT технологии

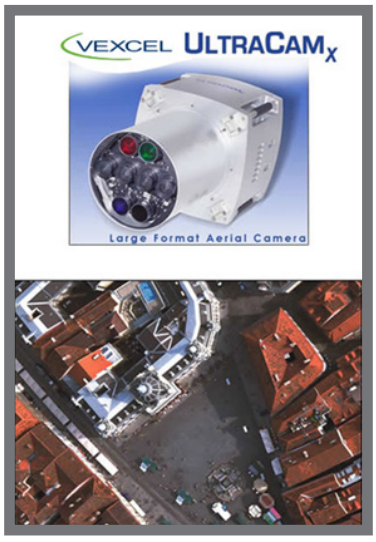

Fig. 1 Digital photogrammetric camera and her air-photo made of it
Fig 1: цифрова фотограметрична камера и направена от нея аерофотоснимка

Photogrammetry is the science built on geometric relationships between objects in space and their photographic images. It is a measurement of the geometric properties of the object by the use of photographs. The word photogrammetry is composed of three Greek words, namely "Focus", meaning "light"; "grams"- "drawing" and "metro" –"measurements". "Focus (light); grams (drawing); metro (measurements)".

It can be traced back almost as far as modern photography, dating to the mid-

Фотограмерията е научна дисциплина, изградена върху геометричните отношения между предметите в пространството и техните фотографски изображения.

Думата фотограметрия е съставена от три старогръцки думи думи:

фокус – светлина, грама – чертеж и метро – измервания. Французинът Еме Лоседа през 1859-1861 г. пръв изработва план от фотографски снимки.

През XX век фотограметрията има бурно развитие. Тогава се създават технически средства и методи за получаване на топографски оригинали чрез обработване на фотографски изображения. В съвременния свят информацията и базата данни за местността (релеф, земно покритие, постройки, граници и инфрастрктурни обекти) са особено ценни и придобиването им е сравнително скъпо. Геодезическите измервания на терен са зависими от атмосферните условия, от достъпността на терена и видимостта на заснеманите обекти. И тук идват способите на фотограметрията – от снимките да се извлече максимална информация в канцеларски условия и по всяко време. Фотограметрията е първият дистанционен метод за набиране на геодезически данни. Аерофотоснимките (въздушни снимки) се получават чрез различни аналогови

19th century and in the simplest example, the distance between two points that lie on a plane parallel to the photographic image plane, can be determined by measuring their distance on the image, if the scale of the image is known. In the twentieth century, photogrammetry has a rapid development, technical means and methods for obtaining topographic originals being created by processing photographic images. The origin of photogrammetry goes back as far as 1480 when Leonardo da Vinci developed the concept of perspective and projective geometry. In 1840 the first use of photogrammetry was reported by the French Geodeist Arago using process called Daguerreotype. Nine years later, Frenchman Laussedat who is known as the "father of photogrammetry" was the first person to use terrestrial photographs for the topographic map compilation. Following these discoveries, in 1859-1861 the Frenchman Aimé Laussedat made the first plan of photographs. Photogrammetry developed rapidly in the twentieth century when methods and technical means were created for processing photographs and obtaining topographic originals. Nowadays the information and database site (topography, land cover, buildings, boundaries and infrastructure sites) are especially valuable and their acquisition is relatively expensive. Geodesic measurements of the terrain are dependent on weather, the availability of terrain and visibility of the subject. And the techniques of photogrammetry are used in this context - photos to extract maximum information in stationery conditions at any time.

Photogrammetry is the first remote method used for collecting geodesic data. Aerial photography is produced by a variety of analog or digital photogrammetric cameras mounted on board of airplanes, helicopters, drones.

Depending on the site of shooting, it may be:

• Earth photogrammetry - applied to mountainous areas where large areas can be photographed.

• Aerial Photogrammetry - ground is taken from an airplane and it is used to create plans and maps of any terrains. These two photographs illustrate the capture of satellite imagery, showing a digital photogrammetric camera, which is mounted on the airplane and made with aerial photographs. It is followed by an image made with such a camera

These days more and more satellite

или цифрови фотограметрични камери, монтирани на борда на самолети, вертолети, безпилотни летателни апарати.

В зависимост от мястото на заснемане тя може да бъде:

• Земна фотограметрия – прилага се за планински райони, където е възможно заснемането на обширни територии.

• Въздушна фотограметрия – земната повърхност се заснема от самолет и се използва за създаване на планове и карти на всякакви терени. Информация за заснемането на сателитните изображения дават тези два снимкови материала, като показват дигитална фотограметрична камера, която се монтира на самолета и с нея се правят аероснимки, последвана от изображение, направено с такава камера. Все повече напоследък се използват и сателитни изображения. Така от сателита изображенията се правят от по-голяма височина и покриват значителни площи,

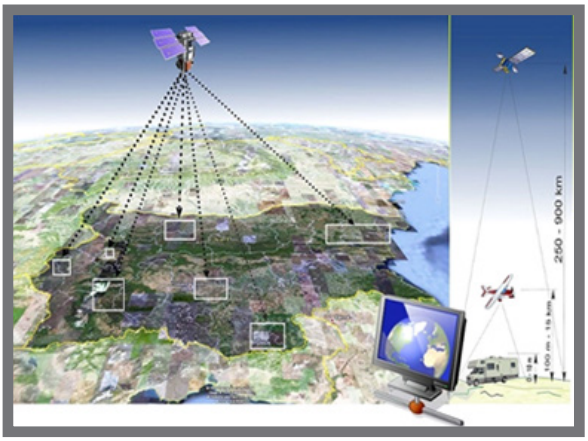

Fig. 2 Images made by a satellite

Fig. 2: Изображения, направени чрез сателит

които се използват за анализ на различни геодезични данни. Заснемането се извършва на ивици с определен процент хоризонтално и верткално застъпване, което позволява създаване на 3D(стереоскопичен) модел на терена. Чрез това застъпване се улавя повърхността с хоризонтални и вертикални припокриващи се снимки, спомагащи за детайлизираното изображение. Съвременната фотограметрична обработка на снимките се базира на бързодействащи компютри с голям обем на паметта, мощно софтуерно обезпечение и стереомонитори . Те се съставните части на дигиталнни работни станции с богати характеристики. За нагледно представяне на процесът при обработка спомага стерео – фотограметричната станция

images are used. Thus, from the satellite, the images are made from a higher altitude and cover significant larger areas that are used to analyze different geodetic datum. The shooting of the photos is done in stripes with a certain percentage of horizontal and vertical overlap, which allows the creation of 3D (stereoscopic) terrain model. Through this overlapping, the surface is captured with horizontal and vertical overlapping images thus leading to significantly more detailed images. Modern photogrammetric processing of images is based on high-speed computers with large memory capacity, powerful software and security stereo monitors. They are components of digital workstations with rich features. For visualization of the process, the stereo - photogrammetric station helps with assisting the photogrammetric operator at the workstation. Stereo (3D) glasses are used to draw vector data with specific software.

When data is set in Geographic Information System, it becomes a product with rich functionality. When using it there are no practical restrictions. This picture gives an example of photogrammetric capture products, based on the stereo model of the photos, creating three-dimensional models of buildings and the terrain.

Any analysis can be performed of the area for:

- creating and updating of GIS;
- construction;
- architecture;
- for military purposes;
- metrology;
- oceanography;
- geology;
- agriculture;
- forestry;
- environmental monitoring;
- management;
- cartography;
- disasters and others.

The implemented projects give a clear picture of the promising photogrammetry as laying the grounds for an attractive profession related to modern IT technologies. Photogrammetry and remote methods presents a series of advantaged as they are:

- extremely interesting;
- high-technological;

с оператор – фотограметрист на неговото работно място. Използват се стерео (3D) очила за изчертаването на векторни данни със специфичен софтуер. Когато данните се наберат в Географска информационна система, тя се превръща в продукт с богата функционалност. При използването ѝ практически няма ограничения.

Примерзапродуктиотфотограметричното заснемане дава тази снимка, като при нея на базата на стереомодела от снимките се създават триизмерни модели на сгради и терен. Могат да се изпълняват всякакви анализи на местността с цел:

- Създаване и актуализиране на ГИС;
- Строителството;
- Архитектурата;
- За военни цели;
- Метреологията;
- Океанографията;
- Геологията;
- Селското стопанство;
- Горското стопанство;
- Екологичен Мониторинг;
- Управление;
- Картографиране;
- Бедствия и др.

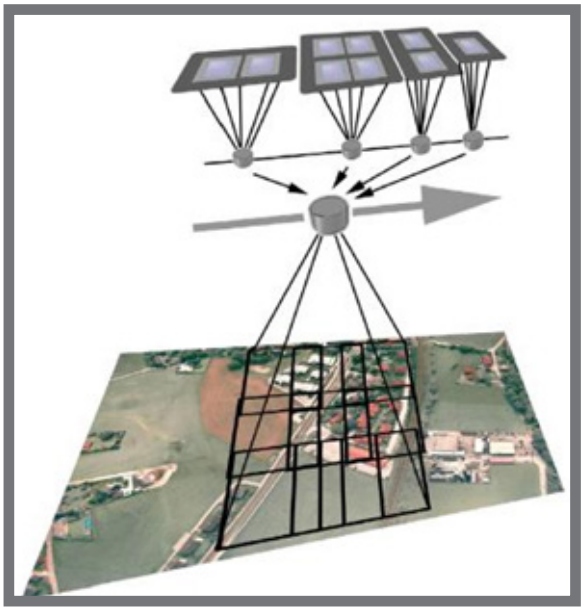

Fig. 3: Capturing surface with horizontal and vertical overlapping photos

Fig. 3: заснемане на повърхността с хоризонтално и вертикално застъпване на снимките

С изпълнените проекти се дава ясна представа за фотограметрията като многообещаваща и престижна професия,

> economical cheap;
> dynamic;
> versatile application;

and a great example of modern scientific challenge.

Conclusion

Photogrammetry and remote sensing are innovative, fast-growing and very interesting sciences. At the same time, they are not widely known to the public. That is why their quality and effectiveness study has greatly contributed to both their promotion and the formation of modern and contemporary development of the field denoted under the term “Geodesy” , alongside methodology of teaching it. The study of photogrammetry and remote sensing becomes on the one hand, very interesting and useful, but on the other - equally difficult. For this reason our paper intends to offer an incentive to both supporters and teachers.

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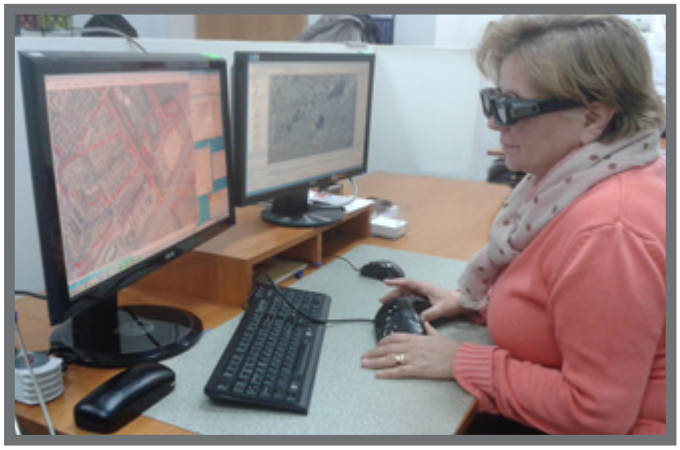

Iconography

1. https://lh3.googleusercontent.com/Z6T-OXxkXJqVxT1nFeibX8tDNdxawCts2FmR8-nkTxsm9W0e-JbduWcgyOkFfOUN1OGOg2Q=s85
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4. Svetla Pankova – author photo

свързана със съвременните IT технологии.

Фотограметрията и дистанционните методи са:

> изключително интересни;
> високо технологични;
> икономически изгодни
> динамично развиващи се;
> с многостранно приложение

и чудесен пример за съвременно научно предизвикателство.

Заключение

Фотограметрията и дистанционните методи са иновативни, бързоразвиващи се и изключително интересни науки. В същото време те не са широко известни сред обществеността. Ето защо тяхното качествено и ефективно изучаване има голям принос както за популяризирането им, така и за формирането на модерния и съвременен облик на специалност „геодезия“ и за успешната ни професионална реализация. Изучаването на фотограметрията и дистанционните методи става, от една страна, все по-интересно и полезно, но от друга – все по-трудно. Поради тази причина искаме да дадем стимул както на съмишлениците ни, така и на преподавателите.

Fig. 4: operator - a photogrammetrist on her workplace,
Fig. 4: оператор – фотограметрист на работното си място

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