



BIOLOGICAL EDUCATIONAL MUSEUM COLLECTION VALUE OF I. HORBACHEVSKY TERNOPIL STATE MEDICAL UNIVERSITY FOR LEARNING ABOUT WILDLIFE

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The relationship between higher education and material collections of museums is deeply historic. Natural objects and their images are at the top of leading places among great variety of wildlife around us. That is the reason why natural and biological educational museums occupy a certain place in the educational process. Museum exhibition design in the Medical Biology department is developed taking into account the curriculum specific topics. Environmental and systematic exhibition themes highlight biodiversity and environmental issues, involving students directly in learning biological objects creates powerful hands-on learning opportunities that can foster a fascination with diversity and the complexity of biological interactions. In this study, we were interested in the effect of our exhibition on visitor pupils and students learning in Biology Department Museum. We were also interested in how elements of verbal engagement at the exhibition might contribute to learning outcomes of biology. We conducted series of interviews. Students and pupils participated in the study of exhibition effect on visitor learning in Biology Department Museum. The study shows that the quantity of excursions in Educational-Biological Museum from 2014 to 2017 years is increased. Analyses of pupil's interviews had shown that exhibitions are of essential importance while learning the structure of multicellular organisms and the human role in changing of natural ecosystems. Students interviews show that exhibitions are of essential importance during practical medical parasitology classes as they demonstrate animal life and parasitic diseases signs. Students were particularly positive about note schemes with clinical manifestations and laboratory diagnosis methods of parasitic diseases. As a result students' understanding of parasites life cycles, infestation ways and knowledge of invasive diseases prevention is increasing. Also, our research indicates an increasing understanding of the macroevolutionary concepts, microevolutionary processes as well. Educational-Biological Museum of Biology Department in Ternopil Medical University affords an opportunity to form a knowledge system concerning the laws of nature, and to create a clinical thinking of the future medical specialists.

Key words: Biology Department, Educational Museum, Ternopil State Medical University, medical parasitology.

Introduction. In the 9th General Conference of the International Council of Museums (9 August 1968, Munich, Germany ICOM) the educational and museum cultural role was defined as «a permanent institution, with no lucrative aims, at the service of society and its development. An institution, open to the public, which acquires, conserves and exhibits material testimonies of man and his environment for their study, education and enjoyment». In accordance with this definition, which is the most widely accepted, one of the museum's purposes is to educate (Yanes, 2011).

The educational role of museums, as a place, where a lot of historical, art, scientific or even cultural objects are stored, is as old as the modern museums. So teachers often practice study tours to the museum. Museum visit is one of the most popular extracurricular activity for primary, secondary students and their tutors. Although both

museum and school are educational institutions, but they are characterized by very different learning experiences. Classroom studying may be driven by external incentives, such as grades and thus extrinsically motivated, while museum learning is often intrinsically motivated - that is, the learning takes place for its own goal, because the learner is interested, enjoying, or freely expressing. Even though children in school groups come to the museum with a wide range of interests and backgrounds, there are some general principles that can make intrinsic rewards a part of the museum experience (Cook et al., 2016).

The relationship between higher education and material collections of museums is deeply historic. It is known that museums and collections support the work of their institution, in general qualitative ways through the tripartite missions of teaching, research and engagement (Cook, et al. 2016). Some academic

disciplines are more likely to develop material collections than others. It is broadly acknowledged that many university collections started out as a way of augmenting teaching (Simpson, 2016). Especially important potential of material collections for navigating cross-disciplinary teaching (Simpson, 2012, Bartlett, 2012).

Exhibitions are compelling learning environments (Lynn Uyen Tran, 2007). Numerous studies have investigated the aspects of exhibition design that influence learning potential as conceptual coherence, multimodality, visual attractiveness, ample space, immediate apprehend ability (Mortensen and Smart, 2007). However, motivations for visiting museums appear to directly influence their in-museum learning. Individuals who had a dominant education motivation for visiting the museum learned different things than did those individuals who had a dominant entertainment motivation (Falk, 2006).

Objects in higher education museums and collections will have the potential for multiple value propositions (Vitelli, 2013). Realising this potential, in a quantifiable form, however depends on a range of factors including the coherence of institutional processes. For example, the effectiveness of interactions between students cognitive activity and university museums and collections.

Due to this fact museums should be on a special position in the educational process. It is especially valuable and important while learning one of the fundamental sciences - Biology” said the founder of Educational-Biological Museum of Medical Biology Department, Ivan Ivanovych Yaremenko.

In this study, we were interested in the effect of our exhibition on visitor pupils and students learning in Biology Department Museum. We were also interested in how elements of verbal engagement at the exhibition might contribute to learning outcomes of biology.

Materials and Methods. We conducted series of interviews. The youth are challenged to answer a series of questions related to the exhibits of the museum. They undertake the role of a biological researcher and they are challenged to answer

correctly 10 multiple choice and 5 open-ended questions. Students and pupils participated in the study of the effect of exhibition on visitor learning in Medical Biology Department Museum.

In total, 592 youth were participated in the study. The remaining includes 269 girls and 323 boys identified as 59,4 % Ukrainian, 4,6 % Polish, 9 % Nigerians, 1 % Arabic and 26% Indian (table 1). For the purpose of analysis all participants were divided into two groups: pupils and students.

Results and Discussion. Educational-Biological Museum of Medical Biology Department was initially established as a teaching resource. Since 1957 the Educational-Biological Museum occupies the territory of 44 m², including 2155 exhibits, in particular: 345 stuffed animals, 263 wet mounts, 64 animal skeletons, 5 collections of representatives of insects including 500 species, about 260 molds, diagrams and models.

In 2012–2013 the Chief of the Medical Biology Department L. Ya. Fedonyuk on the initiative of Rector, conducted a huge work to reorganize the Educational-Biological Museum and named it after I. I. Yaremenko. The main purpose of the reorganization was a common idea to prevent the phenomenon when museums become a collection of monotonous unsystematized exhibits, facts and objects. A general aim of simultaneous separation and integration of biological, nature conserving, ecological, evolutionary and medical directions enabled to create a complete conception about our environment and give medical-biological content to living nature.

Museum exhibit design of the Medical Biology department is developed taking into consideration the curriculum specific topics. Environmental and systematic exhibition themes highlight biodiversity and environmental issues. The exhibition «Medical-biological aspects of parasitism» is grouped by the principle of the parasite and host interaction, demonstrates nature-mediated character of parasitic diseases, presenting a clear notion about animals and parasitic diseases interaction, forms clinical thinking of future medical specialists (fig. 1).

Table 1.
Division of museum visitors according to age, gender and language

| Gender | Pupils, n = 147 | | Students, n = 445 | | Total |
|--------|--------------------|-----------|----------------------|------------------|-------|
| | Age 12-14 | Age 15-17 | Native learners | Foreign students | |
| Female | 29 | 46 | 128 | 6 | 269 |
| Male | 20 | 42 | 87 | 174 | 323 |
| Total | 49 | 88 | 215 | 240 | 592 |



Fig. 1 Fragment of the exhibition «Medical-biological Aspects of Parasitism»

Analyses of pupils' interview of their trip experiences during a museum visit identified that the museum-based lessons in 92 % of visitors create memorable moments and positive effect on the content students remember from the visit. Especially 86% children like insects and vertebrate's collection,

including poison's animal exhibition presented in the museum. In addition, 91 % of students find particularly useful knowledge about the dangers of parasites to humans and animals (fig. 3). Our studies have not revealed a significant difference in the students' responses of different gender.



Fig. 2 General view of the Educational Biological Museum named after I. I. Yaremenko



Fig. 3 Fragment of the exhibition «Medical-biological Aspects of Parasitism»

Analyses of students' interview show that parasite collections linking host and parasite offer an extraordinary resource to introduce students to biological complexity. The 87% of students, among which 62% are native learners, majority of them were females (59%) were particularly positive about note schemes with clinical manifestations and laboratory diagnosis methods of parasitic diseases (fig. 4). Male students were particularly positive about parasites exhibits and stuffed animals. As a result students knowledge of parasites life cycles, infestation ways, invasive diseases prevention

methods is increasing. Also, our research indicates an increasing understanding of the macroevolutionary concepts, microevolutionary processes as well, which was indicated in 83% of students interviews.

Analyses of entries journal of visitors of Educational-Biological Museum exhibition in our study shows that the quantity of attendance of the museum is increased by 20-30% in 2015 and 2017 compared with 2014, while in 2016 it was smaller compared to the same year (fig. 5).

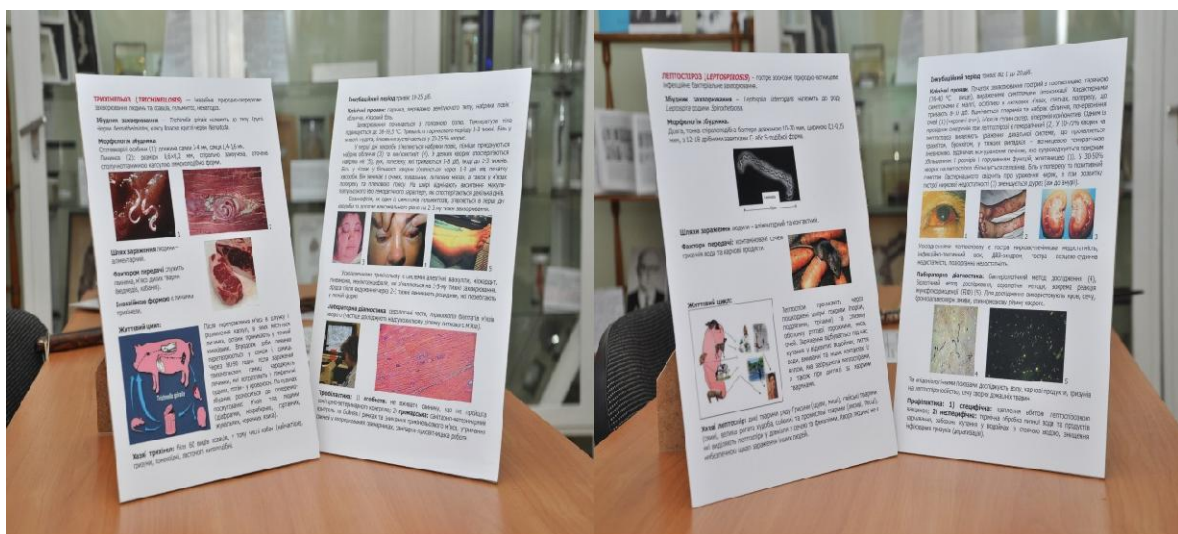


Fig. 4 Fragment of the exhibition «Medical-biological Aspects of Parasitism».

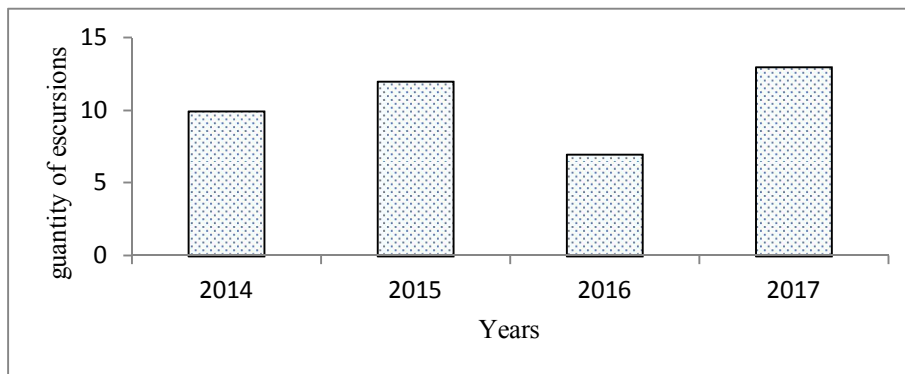


Fig. 5. Quantity of excursions from 2014-2017 years

Parasites in the broad sense, including viruses, bacteria, protozoans, fungi, helminthes, and arthropods, are often obscure to students and certainly are among the most underappreciated components of biological systems (Cook et al., 2016). Incongruously, however, these organisms collectively represent in excess of 40–50% of species on Earth, play a role in at least 75% of food chains within food webs (Dobson, 2008), and are significant mediators of health and well-being for people and animals. The myriad ways in which parasites interact with their environment create compelling pathways for students to learn about fundamental biological phenomena. For example, patterns of geographic distribution and host association among parasites offer unique insights into both natural and anthropogenic processes that have structured biodiversity over deep history (Hoberg, 2010). These observations open windows into changing patterns of distribution and emergence of pathogens in contemporary time (Hoberg and Brooks, 2008), providing access points for students to learn about rapidly emerging and interacting crises linking burgeoning human populations, environment, ecological disruption, species loss, and emergent diseases. To date parasites collections

meet their potential as resources for student training. In complex host-parasite systems systematic position, morphology, the developmental cycle of a parasite as causative agent, ways of infection, clinical signs, methods of laboratory diagnostics and prevention are indicated and illustrated on 7 infectious and 6 invasive diseases. Moreover, involving students directly in learning biological objects creates powerful hands-on learning opportunities that can foster a fascination with diversity and the complexity of biological interactions, it was indicated in 45 % questionnaires.

On the other way, focusing on everyday health in the development and execution of an exhibition can improve knowledge for the prevention of invasive disease in development of personal hygiene skills, providing healthy food and public warning methods. As it was mentioned before, increased knowledge might lead to an intention to behavioral change of our students and their future patients (Christensen et al., 2016).

Evolution is a central organizing principle for all of the life sciences. For better students understanding world biodiversity department teachers created the exhibition “Evolution of the earth, biosphere and man” (fig. 6, 7).



Fig. 6 Fragment of the exhibition “Chronology of Wildlife Evolution”



Fig. 7 Fragment of the exhibition “Wildlife in Geological Past”

Exposition is based on phylogenetic trees that are core representations in the life sciences and are used by biologists to derive lineages of species according to the characteristics that they share with a most recent common ancestor (Horn et al., 2016). Collection of rock, mineral and fossil specimens was established early in the history of the university to enhance the understanding of evolutionary change.

The exhibition “Poisonous animals” presents wet specimens, stuffed poisonous animals and information stands containing the materials concerning general characteristics of poisonous animals, their classification, way of existence (fig. 8).

A certain stand contains the information dealing with the clinical manifestation of toxic action of poisons, rules to give the first aid in case of bites/stings of poisonous animals as well as peculiarities of snake venom and its use in medicine. The 87 % of students respondents, 53% of which

were foreign students, noted, that this information is important for them and their predicted patients.

For studying of the living organism’s interaction and habitat the exhibition “The conception of ecosystem in modern ecology” was established and presented by the examples of freshwater and surface, which is organized by the level order with the aim to visualize the chains of supply and rules of ecological pyramid. The exhibition “The Redbook plants and animals of Ternopil region”, presents herbal specimens of 29 plants rare species collected in Ternopil region (fig 9,10). The exhibition valuable worth is “The Red Book of Ukraine” – the principal document summarizing the materials about contemporary state of plants and animals rare species and those which are under the danger of extinction. This exposition is used in the learning of human ecology, structure of the biosphere and human impact on it.



Fig. 8 Fragment of the exhibition «Poisonous Animals»



Fig.9 “The Red Book of Ukraine (Plant World)” and “The Red Book of Ukraine (Animal World)” – a valuable treasure of the exhibition «The Redbook Plants and Animals of Ternopil Region



Fig.10 Fragment of the exhibition «The Redbook Plants and Animals of Ternopil Region»

Conclusions. This article is an evidence in the data that the Educational-Biological Museum of Medical Biology Department and its collections are strongly involved in the support of academic teaching programs within their respective disciplines. Educational-Biological Museum is an exhibition project and remains a teaching resource of the Medical Biology and affords an opportunity to form the knowledge system concerning the laws of nature and the foundation to develop a clinical thinking of the future medical specialists. Taking into account positive feedback from our visitors, we recommend Educational-Biological Museum of Medical Biology Department for schools, colleges and universities students, and we sincerely invite you to visit the museum located at Ternopil city, Slovatskogo street 2.

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ЗНАЧЕННЯ ЕКСПОЗИЦІЇ МУЗЕЮ КАФЕДРИ МЕДИЧНОЇ БІОЛОГІЇ ТЕРНОПІЛЬСЬКОГО ДЕРЖАВНОГО МЕДИЧНОГО УНІВЕРСИТЕТУ ІМ. І. Я. ГОРБАЧЕВСЬКОГО ДЛЯ ВИВЧЕННЯ ЖИВОЇ ПРИРОДИ

Л. Я. Федонюк, І. Б. Привроцька

Взаємозв'язки між закладами вищої освіти та матеріальними колекціями музеїв є глибоко історичними. Природні об'єкти та їх зображення займають провідні місця серед великої різноманітності в оточуючій нас живій природі. Ось чому біологічні навчальні музеї займають чільне місце у навчально-виховному процесі. Не став виключенням музей кафедри медичної біології ДВНЗ «Тернопільський державний медичний університет ім. І.Я. Горбачевського МОЗ України». Дизайн експозицій навчально-біологічного музею ім. І. Я. Яременка розроблений з урахуванням конкретних тем навчального плану. Екологічні та систематичні експозиції музею підкреслюють біорізноманіття натуральних об'єктів, вказують на екологічні проблеми навколишнього середовища та залучають відвідувачів безпосередньо до їх вивчення, створюючи потужні навчальні можливості, що сприяють заохоченню учнів та студентів до вивчення природних об'єктів та їх взаємозв'язків. Метою дослідження було з'ясувати вплив наочного матеріалу експозицій навчально-біологічного музею кафедри медичної біології на якість навчання учнів і студентів. Нас також цікавило, яким чином взаємодія викладача та аудиторії може сприяти кращому засвоєнню біологічних знань. Для досягнення мети проведено серію опитувань серед відвідувачів, в яких оцінювали вплив виставки матеріальних колекцій на навчання в музеї

кафедри медичної біології та його відвідуваність. Дослідження показало, що кількість екскурсій у навчально-біологічному музеї з 2014 по 2017 рік зростає. Аналіз опитувань учнів показав, що експозиції відіграють суттєву роль при вивченні будови багатоклітинних організмів, особливостей їх життєдіяльності, у тому числі отруйних тварин, а також ролі людини у зміні природних екосистем. Крім того, встановлено, що експозиції мають важливе значення під час проведення практичних занять з медичної паразитології, оскільки вони демонструють принципи взаємодії паразита та хазяїна, що можуть бути основою для розуміння студентами основних методів профілактики паразитарних захворювань. Студенти особливо позитивно відгукуються про інформативність схем із клінічними проявами та методами лабораторної діагностики інвазій. Як результат, зростає розуміння студентами життєвих циклів паразитів, шляхів зараження ними та способів профілактики паразитарних захворювань. Крім того, дослідження вказує на поглиблене розуміння мікроеволюційних і макроеволюційних процесів завдяки представлених у музеї експозиціях. Таким чином, експозиції навчально-біологічного музею кафедри медичної біології ДВНЗ «Тернопільський державний медичний університет ім. І.Я. Горбачевського МОЗ України» дають можливість сформувати у відвідувачів систему знань про закони природи та сприяють розвитку клінічного мислення у майбутніх медиків.

Ключові слова: кафедра медичної біології, навчально-біологічний музей, Тернопільський державний медичний університет, медична паразитологія.

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