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A BIODIVERZITÁSI ISMERETEK MEGJELENÉSE
A MAGYAR OKTATÁSBAN: AZ ÉJSZAKAI ÁLLATOK
BEMUTATÁSA A BIOLÓGIA TANTÁRGY KERETÉBEN.

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Összefoglaló

A WWF Living Planet 2018. évi jelentése szerint (Living Planet index) 1970 és 2014 között a világ fajállománya 60%-kal csökkent, de a faji diverzitás tényleges csökkentéséről, annak részleteiről a felnövekvő generáció nem rendelkezik elegendő és naprakész információkkal a tankönyvek anyagából. Holott minél szélesebb körű ismeretek állnak rendelkezésre a fajok sokféleségéről, annál könnyebben megvalósítható a fenntarthatóság minden életforma számára, így az ember számára is. A környezeti nevelés tényeinek figyelembevételével elemeztem az iskolai tananyagot. Tanulmányomban egy tartalomelemzés eredményeit fogalom össze, amely kiterjed a 10. évfolyamos magyar középiskolai osztályok napjainkban alkalmazott tankönyveiben előforduló éjszakai állatfajok vizsgálatára, mivel a biológiai sokféleség veszteségének egyik legveszélyeztetett csoportját képezik az éjszakai életmódot folytató állatok.

Kulcsszavak: faji diverzitás; éjszakai állatfajok; magyar biológia tankönyvek

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Abstract

According to the state of the world WWF Living Planet Report 2018 the Living Planet Index has recorded an overall decline of 60% in species population sizes between 1970 and 2014. In many cases, the drastic decline in biodiversity, might even due to the fact that, young generation does not always have access to sufficient and up-to-date information from their textbooks, however, the greater species diversity knowledge a person has, the more natural sustainability is provided for all life forms, for them, humans as well. Considering these facts within environmental education, the elements in school materials were examined. This article intends to summarize the results of a content analysis, which extends to the exploration of animal species in frequently used textbooks in 10th Hungarian secondary school classes, where taxonomy, knowledge of species, should be the most extended part of the school curriculum. This work also demonstrates the number of the animal species, appeared in the most significant currently educated textbooks, and even the number of nocturnal animals, being the main victims of the biodiversity loss, because of one of the major threats, the light pollution. The current article was written as part of a tender called the effect of light pollution on wildlife, biodiversity in particular, EFOP 3.6.2-16-2017-00014, Establishing an international research environment in the field of light pollution.

Keywords: animal species; Hungarian textbooks; Nocturnal animal species; present-day Biology education

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Introduction

The three most acute components of the unsustainability problem areas these days are climate change, soil degradation and the rapid decline of biological diversity. (Mika et al., 2015) The astonishing decline in wildlife populations shown by the latest Living Planet Index – a 60% fall in just over 40 years – is a grim reminder and perhaps the ultimate indicator of the pressure we exert on the planet. (WWF Living Planet Report 2018, page 14) The biodiversity loss essentially results from overharvesting, poaching, the destruction and degradation of habitats, or climate change, (Slingenberg et al., 2009; Barnosky et al., 2011) the substantive causes in many instances may lie simply in the actual content of the education. Greater species diversity knowledge might ensure natural sustainability for all and so human life forms (Miteva et al., 2012) In order to have this interpreted by the rising generation we need to teach them different characteristic features of the animal species to get to know the real them. Thus, the aim of this article was to discover the actual teaching elements related to biodiversity In Hungary, and since one of the most conspicuous ways we alter the natural world is to light the darkness, (http://www.seaturtle.org/PDF/Witherington_1997_InBehavioralApproachestoConservationi_p303-328.pdf), the light pollution is the most urgent area to research. (Gaston, 2012) In the light of these, this paper provides details about all the animal species that currently occur in the most frequently used textbooks in class 10th together with the list of their information about their occurrence at night. My hypothesis is that there are not so many nocturnal animal species examples in the 10th grade curriculum.

Species occurrence categories

In order to know what kind of category, nocturnal or diurnal, the given animals actually belong to, it is necessary to clarify, what the concepts exactly cover.

The adjective nocturnal comes from a Latin word, nocturnalis, which means “belonging to the night,” like bats and fireflies, who sleep during the day and come out when the sun goes down. The opposite of nocturnal is diurnal, meaning active during the daytime. (https://www.vocabulary.com/dictionary/nocturnal)

There is a third category called cathemeral, referring to an animal behavior, which describes the behavior of sleeping partly during the daytime and partly during the night. The activity of an organism may be regarded as cathemeral when it is distributed approximately evenly throughout the 24h of the daily cycle, or when significant amounts of activity, particularly feeding, occur within both the light and dark portions of that cycle. (Ankel-Simons, Friderun, 2007) many species, particularly among primates, may be classified as cathemeral. (Tattersall, 1987)
Therefore, some animals might belong to all three categories. Furthermore, it is important to emphasise, that creatures, which are awake at night, are rather exposed to, as Verheijen (1985) used the term, ‘photopollution’ or in other words the effect of the detrimental artificial light to the environment, so the most significant aim of this work is to discover which animal species can be said nocturnal of the living organisms that occur in some form in the most widely used 10th grade Hungarian compulsory Biology Lénárd textbooks according to its night activity.

As no internationally accepted list could be found that clearly classifies living beings in any of the 3 categories, a detailed individual study of the animal species was required.

The summary table (Table 1) was compiled according to whether the characteristic feature of the given species is the nocturnal activity or not. If so, it was marked with “\textbf{n}”, meaning \textit{nocturnal}, but if the animal was not characterized by this property, it was marked with “\textbf{d}”, meaning \textit{diurnal}. The third category \textit{cathemeral} thus becomes evident in many cases, so it is not indicated. There were a few instances, where it was impossible to decide clearly what category the organism belonged to from the available data, these cases are indicated with “\textbf{nod}” meaning no available data about it.
### Animal species occurrence in the National experimental textbook (class 10) published in Gábor Dr. Lénárd (2019)

| Species                        | Nocturnal (n) | Diurnal (d) | No data (nod) |
|--------------------------------|---------------|-------------|---------------|
| Ursus arctos                   | n             | d           |               |
| Ursus americanus               | n             | d           |               |
| Ursus arctos beringianus       | n             | d           |               |
| Issoria lathonia              |               |             | d             |
| Vulpes vulpes                  | n             | d           |               |
| Sycon raphanus                 | n             | d           |               |
| Spongilla officinalis          |               |             | nod           |
| Euplectella aspergillum        |               |             | nod           |
| Ascaris lumbricoideas          | n             |             |               |
| Enterobius vermicularis        | n             |             |               |
| Trichinella spiralis           | n             |             |               |
| Helix pomatia                  | n             | d           |               |
| Limax maximus                  | n             | d           |               |
| Anodonta cygnea                | n             | d           |               |
| Sepia officinalis              | n             |             |               |
| Octopus vulgaris               | n             |             |               |
| Lumbricus terrestris           | n             |             |               |
| Hirudo medicinalis             | n             |             |               |
| Pieris brassicae               | n             |             |               |
| Scorpiones sp.                 | n             |             |               |
| Homarus gammarus               | n             | d           |               |
| Pagurus bernhardus             | n             |             |               |
| Daphnia pulex                  | n             |             |               |
| Coccinella septempunctata      |               |             | d             |
| Apis mellifera                 |               |             | d             |
| Ixodes ricinus                 |               |             | d             |
| Araneus diadematus             | n             |             |               |
| Asteroidea sp.                 | n             | d           |               |
| Arbacia lixula                 | n             |             |               |
| Holothuria forskali            | n             |             |               |
| Cephalochordata sp.            | n             |             |               |
| Carcharodon carcharias         | n             |             |               |
| Salmo trutta                   | n             |             |               |
| Barbatula barbatula            | n             |             |               |
| Barbus peloponnesius           | n             |             |               |
| Cyprinus carpio carpio morpha  | n             |             |               |
| Carassius carassius            | n             |             |               |
| Abramis broma                  | n             |             |               |
| Esox lucius                    | n             |             |               |
| Species                          | Status |
|---------------------------------|--------|
| Umbra krameri                   | n      |
| Clupea harengus                 | n      |
| Sardina pilchardus              | n      |
| Gadus morhua                    | n      |
| Thunnus thynnus                 | n      |
| Rana esculenta                  | n d    |
| Hyla arborea                    | n d    |
| Pelobates fuscus                | n      |
| Vipera berus                    | n d    |
| Crocodylus acutus               | n      |
| Emys orbicularis                | n      |
| Aptenodytes forsteri            | n      |
| Erithacus rubecula              | n      |
| Haliaeetus albicilla             | n d    |
| Diomedeidae                     | n      |
| Macropus rufus                  | n      |
| Ornithorhynchus anatinus        | n      |
| Phascolarctos cinereus          | n d    |
| Pan troglodytes                 | n d    |
| Pongo sp.                       | n d    |
| Gorilla sp.                     | n d    |
| Panthera pardus                 | n d    |
| Hippopotamus amphibius          | n      |
| Balaenoptera musculus           | n d    |
| Cestoda                         | n      |
| Hydra sp.                       | n      |
| Odonata sp.                     | n      |
| Gasterosteus aculeatus          | n d    |
| Lampropeltis triangulum         | n d    |
| Salmo salar                     | n      |
| Lutra lutra                     | n      |
| Catocala elocata                | n      |
| Pavo cristatus                  | n d    |
| Ptilonorhynchus violaceus       | n      |
| Cichlasoma tetracanthuris       | nod    |
| Papio sp.                       | n      |
| Larus pacificus                 | d      |
| Tadorna ferruginea              | d      |
| Turdus merula                   | n d    |
| Canis lupus familiaris          | n d    |

Table 1. Species occurrence in the National experimental textbook (class 10)
The test results

Despite my hypothesis, there are surprisingly many species with nocturnal activity among the organisms studied in the analyzed 10th grade Biology book, called Biology 10., written by Gábor Dr. Lénárd. As shown in Fig. 1, a very high proportion (57%) of the collected animal examples in the book contain organisms that can be said to be exclusively active mainly at night, i.e. nocturnal animals, and compared to the entire sample the proportion is also high also for those for which I found both the “nocturnal” and the “diurnal” feature together (32%). Only a fraction of the sample is typical, where I did not find any specific data, and so it is negligible (4%), while the proportion of animal species showing only daytime activity, i.e. exclusively diurnal, is quite low (7%) as well.

Due to the large number of occurrences great emphasis should be placed on a more detailed description of the emphasized species, as in many cases they appear only in the curriculum as an inspiring photo, or as a shorter reference to a particular topic. The more animals, children encounter in their studies, the more they can understand from the world around them, making them more effective in halting the drastic decline of species that is observed today. Especially when not only a photo or a name can be seen about it, but also a short description about what the living thing really is.

Among other things, it would be worth highlighting the exact damage caused by artificial lighting and light pollution, because there is no reference or minimal mention of this topic, as well as the importance of biodiversity, although in my opinion it would be useful for the entire curriculum. It would even be significant to initiate, or at least to suggest, the fact of the drastic decline in the number of living beings, and to begin with this, the entire 10th grade material, so that students would be able to consciously see the seriousness of the current situation and learn the other parts of the course with this in mind.
Due to this, they could better articulate how to help them determine the living conditions that determine their own lives as well. Unfortunately, in many cases, today's curriculum does not provide this adequately, and this can give us the feeling that we are teaching a false situation analysis to the next generation.

We should approach the topic as many times as possible by processing up-to-date concepts too, so that children not only experience what surrounds them from the media, but also by introducing an internationally accepted detailed part of the curriculum, supplemented by their own impressions of the outside world. The basic 3 categories outlined in the article, *nocturnal*, *diurnal*, and the *cathemeral* mentioned, also show deficiency. The search and getting to know the individual species itself would be greatly facilitated by a generally accepted list of living beings covering all known living beings, which on the one hand would make it easier for teachers and students to understand the system of known species in 10th grade. This resource could be made available even to educators in early childhood education sessions.

Following the identification of the categories, the search was further complicated by the fact that although some living beings may fall into all three categories but 2 more categories appeared, called *crepuscular* being one of the representatives of those that are active primarily during twilight (the periods of dawn and dusk) (Eppley, et al., 2015) and *vespertine* being associated with the Latin root vesper, which means “evening” because these animals often refer to animal species occurring in the evening (https://www.merriam-webster.com/dictionary/vespertine)

After a multidirectional interpretation of the 5 concepts, I narrowed the research to the categories *nocturnal* and *diurnal* and then it was only examined whether or not the species were indicated in the textbook showed nocturnal activity and based on this I classified the *nocturnal* “n” or the *diurnal* “d” category. In several cases, I started a word search in articles, mainly in Google books or in the Digitális tankönyvtár, or I used search engines (eg research gate), where I entered the Latin or rarely Hungarian names of the species, and then I paired the words with the phrases “at night”, “night” or “éjszakai”. I used the terms “nocturnal” or, if there was no reference to either, I also tried the words “diurnal” for exclusion. In the bibliography, I indicated the Latin name of the given organism after each reference in parentheses for the easier retrieval.

Evaluating the rate of the characteristic features can also be significant (e.g. how many species fell into the different categories). This is what diagrams serve as an indication.

In which article I found a reference specifically to daytime activity, I indicated it in the table with “n” (Table 1), but I did not look specifically for daytime “d” activity, therefore I will definitely have the opportunity to expand the list later and it is planned, too.

We must teach young people as many species as we are able to, because these pieces of information, can be decisive for their lifetime even for their descendants. If they also get additional information about the characteristics of
the species, they will more likely to become more environmentally conscious.

How can young children learn about creatures in the classrooms if they do not have enough examples or enough information only a picture or its Hungarian name about the animals being introduced to them. How can them be expected to identify and save the creatures around them in the nature without this ability? These fundamental questions should be answered before teachers and students when they start a new 10th year.

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