ELECTRONIC INFORMATION SYSTEMS FOR MONITORING OF POPULATIONS AND MIGRATIONS OF INSECTS

O. M. Klyuchko, Z. F. Klyuchko

ISSN 2410-7751 (Print)
ISSN 2410-776X (Online)

"Biotechnologia Acta" V. 11, No 5, 2018
https://doi.org/10.15407/biotech11.05.005
P. 5-25, Bibliography 168, English
Universal Decimal Classification: 004:591.5:612:616-006

ELECTRONIC INFORMATION SYSTEMS FOR MONITORING OF POPULATIONS AND MIGRATIONS OF INSECTS

O. M. Klyuchko 1, Z. F. Klyuchko 2
The purpose of the work was to analyze existing information systems (IS) of biological objects and to propose the methods for development of such IS for insects on the example of *Noctuidae* (*Lepidoptera*).

A detailed analysis of technical information concerning the distributed networked systems, access to computer systems to the common data in electronic IS and the organization of biomedical databases in the Internet was done. The peculiarities of IS' prototypes development for environmental monitoring of the fauna have been discussed, in particular changes in the number of butterflies' populations throughout France (including western and southern departments), the *Noctuidae* (*Lepidoptera*) in the steppe zone of Ukraine (Striltzivskyi Steppe), and the development of such IS for all territory of Ukraine.

The results could be used to develop electronic IS for other biological organisms.

**Key words:** electronic information systems, bioinformatics, insects *Noctuidae* (*Lepidoptera*).


5. Klyuchko O. M. Cluster analysis in biotechnology. *Biotechnol. acta*. 2017, 10 (5), 5–18. [https://doi.org/10.15407/biotech10.05.005](https://doi.org/10.15407/biotech10.05.005)

6. Klyuchko O. M. Technologies of brain images processing. *Biotechnol. acta*. 2017, 10 (6), 5–17. [https://doi.org/10.15407/biotech10.05.005](https://doi.org/10.15407/biotech10.05.005)


*Bulletin of NAU*

31. Beloshitsky P. V., Klyuchko O. M., Onopchuk Yu., Kolchinska A. Z. Results of research of higher nervous activity problems by Ukrainian scientists in Prielbrussie. 
*Bulletin of NAU*  

*Bulletin of NAU*  

*Bulletin of NAU*  

34. Onopchuk Yu. M., Klyuchko O. M., Beloshitsky P. V. Development of mathematical models basing on researches of Ukrainian scientists at Elbrus. 
*Bulletin of NAU*  

35. Beloshitsky P. V., Klyuchko O. M., Onopchuk Yu. Results of research of adaptation problems by Ukrainian scientists in Prielbrussie. 
*Bulletin of NAU*  


56. Ma Y., Hof P. R., Grant S. C., Blackband S. J., Bennett R., Slatest L., McGuigan M. D., Benveniste H.
A three-dimensional digital atlas database of the adult C57BL/6J mouse brain by magnetic resonance microscopy.  


Understanding drugs in breast cancer through drug sensitivity screening. 
*SpringerPlus*
. 2015, 4(1), 611. 

75. Onopchuk Yu. M., Biloshitsky P. V., Klyuchko O. M. Development of mathematical models based on the results of researches of Ukrainian scientists at Elbrus. 
*Bulletin of NAU*

*Int. J. Appl. Sci. Biotechnol*
[http://dx.doi.org/10.3126/ijasbt.v5i2.17614](http://dx.doi.org/10.3126/ijasbt.v5i2.17614)

77. Zaslavsky L., Ciufò S., Fedorov B., Tatusova T. Clustering analysis of proteins from microbial genomes at multiple levels of resolution. 
*BMC Bioinform*
. 2016, 17 (8), 276. Published online 2016 Aug 31. 

[https://doi.org/10.1093/bioinformatics/btt302](https://doi.org/10.1093/bioinformatics/btt302)

*J. Comput.* 2013, 8 (1), 1017. 
[https://doi.org/10.1109/PAAP.2011.17](https://doi.org/10.1109/PAAP.2011.17)


85. Horn W. AI in medicine on its way from knowledge-intensive to data-intensive systems. *Artificial Intelligence in Medicine*. Elsevier. 2001, 23 (1), 512. [https://doi.org/10.1016/S0933-3657(01)00072-0](https://doi.org/10.1016/S0933-3657(01)00072-0)

86. Brake I. Unifying revisionary taxonomy: insect exemplar groups. *Abstr. XV SEL Congr. Berli*


https://doi.org/10.1016/j.fss.2006.01.001


https://doi.org/10.1016/j.artmed.2004.01.017

https://doi.org/10.1016/j.tree.2004.11.017


https://doi.org/10.1016/j.eswa.2005.01.011

*Curr. Opin. Pharmacol.* 2003, 3 (2), 114–120.  
https://doi.org/10.1016/S1471-4892(03)00005-5


111. Curtis C. Sohrab P. Shah, Suet-Feung Chin, Gulisa Turashvili, Oscar M. Rueda, Mark J. D


129. Masseroli M., Visconti A., Bano S. G. Pincirolli F. He@lthCo-op: a web-based system to support distributed healthcare co-operative work.  
*Comp. Biol. Med*  


131. Orgun B., Vu J. HL7 ontology and mobile agents for interoperability in heterogeneous medical information systems.  

*Comp. Biol. Med*  
https://doi.org/10.1016/j.compbiomed.2005.02.004

_in: Receptors and ion channels. Ed. By Ovchinnikov Y. A., Hucho F._  
Berlin-New York: Walter de Gruyter,  
1987, P. 127–137.

*Nalchik (Russia), “Hypoxia: automatic analysis of hypoxic states of healthy people and sick ones”*.  
135. Klyuchko Z. F., Klyuchko E. M. Analysis of taxonomic structure of moth fauna (Lepidoptera: Noctuidae s.l.) of Ukraine according to monitoring data. 

Eversmannia

136. Klyuchko Z. F., Klyuchko E. M. Moth (Lepidoptera: Noctuidae s. l.) of Chercasska region of Ukraine according to results of many-year monitoring. 

Eversmannia

137. Gonchar O., Klyuchko O., Seredenko M., Oliynyk B. Correction of metabolic disorders at hypoxia by new pharmacological preparations. 

Mater. 3 FEPS Congress. Nice (France), 2003, P. 228.

138. Seredenko M., Gonchar O., Klyuchko O., Oliynyk S. Peculiarities of prooxidant — antioxidant balance of organism under hypoxia of different genesis and its corrections by new pharmacological preparations. 


Proceed. 16th European Congress of Lepidopterology. Cluj (Romania), 2009, P. 31–32.


*X School on biophysics of membrane transport. Szczyrk (Poland),* 1990, V. 2, P. 271.


158. Klyuchko Z. F., Klyuchko O. M. Monitoring of the diversity of Noctuidae (Lepidoptera) fauna in Ukrainian Polissia. 


{/spoiler}