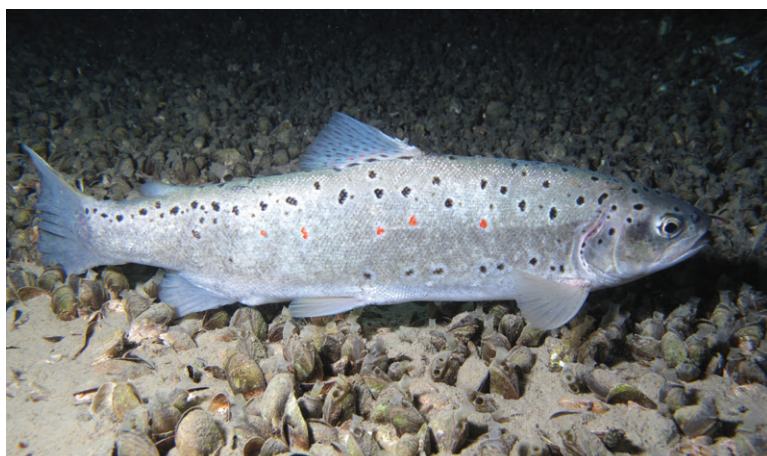


ACTA ZOOLOGICA BULGARICA

Supplementum 13

**Biodiversity and Ecological
State of Ancient
Lakes Ohrid and Prespa,
Republic of Macedonia**

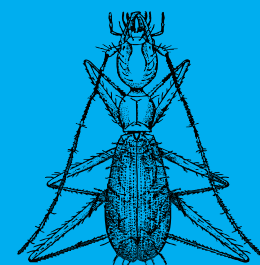
**Dedicated to the 80th Anniversary
of the Hydrobiological Institute Ohrid**



**Institute of Biodiversity and Ecosystem
Research**

Bulgarian Academy of Sciences

2019
March



ACTA ZOOLOGICA BULGARICA

Honorary Editor-in-Chief: *Vassil Golemansky*

Editor-in-Chief: *Boyko B. Georgiev*

Managing Editor: *Rositsa Kaneva*

Language Editor: *Vesela Evtimova*

Co-editors:

Apostolos Apostolou

Dragan Chobanov

Rumyana Metcheva

Paraskeva Mihailova

Ivan Pandurski

Vasil Popov

Pavel Zehtindjiev

Advisory Board:

Hristo Delchev (Sofia)

Victor Fet (Huntington)

Denis Geraads (Paris)

Georgi Georgiev (Sofia)

Peter Glöer (Hettingen)

Victor V. Glupov (Novosibirsk)

Andy J. Green (Seville)

Borislav Guéorguiev (Sofia)

Boris Kryštufek (Ljubljana)

Jean Mariaux (Geneva)

Josef Matena (Česke Budejovice)

Georgi Markov (Sofia)

Yuri M. Marusik (Magadan)

Vladislav Monchenko (Kiev)

Boris Nikolov (Sofia)

Anastasios Legakis (Athens)

Toshko Ljubomirov (Sofia)

Vlada Peneva (Sofia)

Aleksi Popov (Sofia)

Mitko Subchev (Sofia)

Milcho Todorov (Sofia)

Margarita Topashka (Sofia)

Yordan Uzunov (Sofia)

Jiri Vavra (Prague)

Jan Zima (Brno)

© Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences, 2019

Copy editor: *R. Kaneva*

Desktop publishing: *R. Kaneva*

Size: 60x84/8

Total print: 380

Cover: *Salmo letnica* Karaman, 1924, and *Dreissena carinata* (Dunker, 1853) in Lake Ohrid (Photo courtesy of Milutin Sekuloski, The Diving Club 'Amphora' Ohrid). See p. 97.

Printed by: DEDRAX printing house

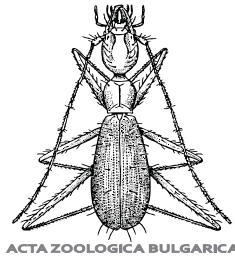
Address: Institute of Biodiversity and Ecosystem Research, 1 Tsar Osvoboditel Blvd., 1000 Sofia, Bulgaria

Tel: (+359) 884499726; (+359 2) 988 51 15; Fax: (+359 2) 988 28 97

E-mail: actazoologicabulgarica@gmail.com

Acta zoologica bulgarica

ISSN 0324-0770



Supplementum 13 • Sofia • March 2019

Biodiversity and Ecological State of Ancient Lakes Ohrid and Prespa, Republic of Macedonia

**Dedicated to the 80th Anniversary
of the Hydrobiological Institute Ohrid**

This Supplement was published with the financial support of:

Norwegian Ministry of Foreign Affairs

**Project: 'Assesment of Ecological Status According to the Water Framework
Directive (WFD) – Intercalibration Among the Western Balkan Countries'**



**NORWEGIAN MINISTRY
OF FOREIGN AFFAIRS**

Beneficiary: Hydrobiological Institute Ohrid, Republic of Macedonia





Guest Editors:

Sasho Trajanovski, Republic of Macedonia (Editor-in-Chief)
Suzana Patceva, Republic of Macedonia (Co-editor)
Teodora Trichkova, Bulgaria (Co-editor)
Lence Lokoska, Republic of Macedonia (Co-editor)
Christian Albrecht, Germany (Co-editor)
Marina Talevska, Republic of Macedonia (Co-editor)
Sajmir Bequiraj, Albania (Co-editor)
Lidija Velkova-Jordanoska, Republic of Macedonia (Co-editor)
Anna Wysocka, Poland (Co-editor)
Elizabeta Veljanoska-Sarafiloska, Republic of Macedonia (Co-editor)
Ivana Živić, Serbia (Co-editor)

Language Editor:

Yuriy Vanev

Reviewers:

<i>Aleko Miho</i> , Albania	<i>Jelena Krizmanić</i> , Serbia
<i>Aleksandra Vesić</i> , Serbia	<i>Jelena Rakočević</i> , Montenegro
<i>Alma Imeri</i> , Albania	<i>Marija Spoljar</i> , Croatia
<i>Anita Tosheva</i> , Bulgaria	<i>Mihaela Beshkova</i> , Bulgaria
<i>Dilian Georgiev</i> , Bulgaria	<i>Nadja Ognjanova-Rumenova</i> , Bulgaria
<i>Dimitar Kozuharov</i> , Bulgaria	<i>Nataliya Rubtsova</i> , Ukraine
<i>Eliza Uzunova</i> , Bulgaria	<i>Peter Glöer</i> , Germany
<i>Éva Ács</i> , Hungary	<i>Predrag Simonović</i> , Serbia
<i>F. Güler Ekmekçi</i> , Turkey	<i>Roumen Kalchev</i> , Bulgaria
<i>Gana Gecheva</i> , Bulgaria	<i>Sonja Tsoneva</i> , Bulgaria
<i>Gordana Rechkoska</i> , R. Macedonia	<i>Trajce Naumoski</i> , R. Macedonia
<i>Hristina Kalcheva</i> , Bulgaria	<i>Yordan Uzunov</i> , Bulgaria
<i>Ivan Botev</i> , Bulgaria	<i>Yuriy Kvach</i> , Ukraine
<i>Ivan Pandourski</i> , Bulgaria	<i>Zdravko Hubenov</i> , Bulgaria

Instructions to Authors

General Information

Acta Zoologica Bulgarica publishes contributions in systematics and phylogenetics, zoogeography and faunistics, terrestrial ecology and behaviour, aquatic ecology, parasitology, palaeozoology, zoomorphology and developmental biology, conservation biology, applied zoology and other branches of zoology dealing with diversity, ecology and evolution of animals. The geographical scope of the journal is worldwide but a priority is given to the Bulgarian and Balkan fauna as well as the fauna of associated regions (e.g. Black Sea, Danubian Basin and Southeast Europe). Descriptions of new zoological methods, short reviews of zoological books and information about scientific events are also accepted. Manuscripts are considered on the assumption that they have not been published elsewhere and have not been simultaneously submitted to another journal. Manuscripts must conform strictly with the instructions to authors before being sent to the editor. Papers should follow the *International Code of Zoological Nomenclature* (Fourth Edition, 1999). Incoming manuscripts are initially judged by the editor. If the manuscript is acceptable as corresponding to the scope of the journal and representing a major contribution deserving publication in an international journal, it will be forwarded to reviewers for evaluation. After the approval of the final version by the editorial board, the manuscript will be accepted for publication. The editor reserves the right to make editorial changes. Authors agree, with the acceptance of the manuscript, that the copyright is transferred to the publisher. Manuscripts, proofs, reviews and other correspondence concerning editorial matters should be addressed to the Editorial Office, e-mail actazoologicabulgarica@gmail.com.

Manuscripts

Manuscripts must be submitted in correct English by e-mail. The following formats are accepted: Winword, Word Perfect, InDesign. The text should be left-justified, font size 12, no column or page breaks, double-spaced (c. 30 lines per page), without word hyphenations, A4 format. The pages must be numbered in Arabic numerals. Places of figures and tables within the text should be indicated. Generic and species names must be spelled out at least once in the text and should be in italic. Family names of authors of taxa should be in regular font.

Four categories of contributions are published, with the following size of standard manuscript: 1. Research articles: max. 20 pages, including the list of references, figures, captions to figures and tables (on separate sheets); 2. Review articles (invited or consulted with the editor before the submission): 10-25 pages; 3. Short communications: up to 8 pages; 4. Book reviews: up to 3 pages. Information about scientific events, past or forthcoming, will also be accepted (up to 3 pages). The manuscripts should conform to the following format:

Title: It should be concise and enough informative. Superior taxa should be noted in the title in parentheses, e.g. (Order: Family).

Author(s): Full first name(s), middle initials and surname(s) in bold and italic.

Address(es): As complete as possible, including e-mail address(es).

Abstract: It should consist of only one paragraph of maximum 15 lines, briefly describing main results and conclusions with no description of methods, discussions, references or abbreviations.

Key words: Normally 3-6 items suitable for information-retrieval system, not repeating already those contained in the title.

The standard order of sections should be: Introduction, Material and Methods (including Study Area, if relevant), Results, Discussion, Conclusions (optional), Acknowledgements and References.

Tables: They must not repeat information already presented in the figures or in the text. Each table must be self-explanatory and as simple as possible, it should be double-spaced within an A4 page size. Tables must be numbered consecutively. They should be typed on separate sheets and enclosed after the references. An explanatory caption, located on the top of the table, should be provided.

Illustrations: Lines and letters in figures must be able to be enlarged or reduced without reduction in quality. They should conform to the size of the type area (16.5 x 24 cm), which is the limit for all illustrations. Magnification should be shown by scale bars. Illustrations must be submitted in electronic version in TIF format in minimum 300 DPI. Black and white photographs must be sharp, of high quality, presented on plates (maximum 14x17 cm in size). Figures must be numbered consecutively and should be provided with an explanatory legend on a separate sheet (titled 'Text under figures'). All tables and figures must be referred to in the text. The printed version of the journal may contain only greyscale illustration. The electronic version can contain colour versions of the same illustrations.

Citations and References

Each citation in the text must be accompanied by a full reference in the list of references. Each reference included in the list of references should be cited in the text. The in-text citations are as follows (please, note small caps of author's names): (BURESH 1941), (BURESH 1941: 35) [if a certain page should be cited]; BURESH & ZONKOV (1941); (BURESH 1941, PETROV 1956, IVANOV 1996) [in chronological order] or BURESH et al. (1949), if three or more authors are cited. The references should be arranged primarily alphabetically by the first author's family name and by year of publication in case of multiple publications by the same author(s). In case of papers written in letters other than Latin, if there is an English title in the summary, it may be used instead. If there is not such a summary, the author's name must be transliterated and the title of the paper must be translated into English; in this case, the original language of the cited reference should be noted in parentheses at the end of the paragraph, e.g.: (In Bulgarian). Examples of bibliographic descriptions of references:

AUTHOR A. V. 1990a. Title of the article. Full Title of the Journal 56 (3): 35-105.

AUTHOR A. V. & AUTHOR C. P. 1990a. Title of the article. Full Title of the Journal 56 (2): 35-105.

AUTHOR A. V., AUTHOR B. B. & AUTHOR C. P. 1990a. Title of the article. Full Title of the Journal 56 (1): 35-105.

AUTHOR A. V. 2000b. Title of the book. Place of publication: Publishing House. 220 p.

AUTHOR A. V. & AUTHOR C. P. 1990. Title of the contribution. In: EDITOR V. A. (Ed.): Title of the book or volume. Place of publication: Publishing House, pp. 235-265.

Corrections

The (senior) author will receive only one proof for checking (PDF file). Only printer errors may be corrected. The corrected version should be sent back to the journal editor within two weeks.

For more detailed instructions to authors, see the journal homepage: www.acta-zoologica-bulgarica.eu.

CONTENTS

Introductory Article

TRAJANOVSKI S. & TRICHKOVA T. – The Hydrobiological Institute Ohrid as a centre of long-term hydrobiological studies in Lake Ohrid Region, Republic of Macedonia.....5

Water quality

VASILEVSKA S. P., VELJANOSKA-SARAFILOSKA E. M. & LOKOSKA L. S. – Water quality of the rivers in the Prespa Region in 2014.....	11
LOKOSKA L. S., VELJANOSKA-SARAFILOSKA E. M. & VASILESKA A. M. – Water quality of the rivers in the Prespa Region in 2014.....	19
VELJANOSKA-SARAFILOSKA E. M., LOKOSKA L. S. & PATCEVA S. B. – Water quality of Lakes Ohrid and Prespa based on physical-chemical and biological parameters in 2013–2014.....	25
VASILESKA A. M. & LOKOSKA L. S. – Microbial phosphatase activity as an indicator of water quality in tributaries and littoral area of Lake Ohrid in the period 2013–2014.....	33
LOSHKOSKA T., TRAJANOVSKI S., ZDRAVESKI K., PATCEVA S., KUPE L., VELJANOSKA-SARAFILOSKA E., TRAJANOVSKA S. & BUDZAKOSKA GJORESKA B. – Preliminary assessment of the ecological status of some tributaries of Lake Ohrid (Macedonian part) based on diatom community according to the Water Framework Directive	39
TRAJANOVSKA S., TALEVSKA M., BUDZAKOSKA GJORESKA B. & TRAJANOVSKI S. – Macrophyte-based assessment of nutrient pollution of Lake Prespa, Republic of Macedonia.....	45

Biodiversity and Conservation

PATCEVA S. B. & LESHOSKI J. V. – Phytoplankton composition of Lake Prespa, Republic of Macedonia	51
TASEVSKA O., GUSESKA D. & KOSTOSKI G. – A checklist of monogonont rotifers (Rotifera: Monogononta) of Lake Ohrid, Republic of Macedonia	57
GUSESKA D., TASEVSKA O., KOSTOSKI G. & GUSESKI D. – Biomass dynamics of pelagic Crustacea in Lake Ohrid, Republic of Macedonia, in the period 2000–2009	63
TALEVSKA M. & TRAJANOVSKA S. – Belts of macrophyte vegetation in Lake Ohrid	69
BUDZAKOSKA GJORESKA B., TRAJANOVSKI S., TRAJANOVSKA S. & ZDRAVESKI K. – Assessing the status of endangered invertebrates from the ancient Lake Ohrid: The endemic species <i>Gocea ohridana</i> Hadžišće, 1956 (Gastropoda: Hydrobiidae).....	75
TRAJANOVSKI S., ZDRAVESKI K., TRAJANOVSKA S., BUDZAKOSKA GJORESKA B., VELJANOSKA-SARAFILOSKA E., LOKOSKA L. & TRICHKOVA T. – Conservation of Velidab, the biodiversity hotspot in Lake Ohrid: Species inventory and site valuation.....	81
TRAJANOVSKI S., BUDZAKOSKA GJORESKA B., KENDEROV L., TRAJANOVSKA S., ZDRAVESKI K. & TRICHKOVA T. – Potential threats to benthic macroinvertebrate fauna in Lake Ohrid watershed: Water pollution and alien species	91

Ecosystem Functions and Services

ZDRAVESKI K., PETRI L., TRAJANOVSKI S., BEQIRAJ S., BUDZAKOSKA GJORESKA B., TRAJANOVSKA S. & TRICHKOVA T. – First contingent valuation of the endemic species: <i>Salmo letnica</i> Karaman, 1924 (Actinopterygii: Salmonidae) and <i>Gocea ohridana</i> Hadžišće, 1956 (Gastropoda: Hydrobiidae) from Lake Ohrid.....	99
---	----