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12th International Symposium on TARDIGRADA

V.N. Gaia, Portugal, 23-26 July 2012

Guest Editors:

L. Rebecchi, D.R. Nelson, R. Bertolani, P. Fontoura



Istituto per lo Studio degli Ecosistemi

Verbania Pallanza, Italy

Journal of Limnology

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Page 1: title of the contribution, full given name(s) and surname(s) of the author(s), mail address(es) and e-mail address for corresponding author, up to six key words, a condensed running head, number of tables and figures.

Page 2: abstract (between 350-400 words).

The body of the text beginning on page 3 should be organized as follows:

INTRODUCTION

METHODS

RESULTS

 Sub-heading 1

 Sub-heading 2

DISCUSSION

CONCLUSIONS

ACKNOWLEDGMENTS

REFERENCES

Tables

Figures

Figure legends

Particular attention should be taken to ensure that manuscripts exactly adhere to the journal style. In particular, take into account the following notes:

- Names of plants and animals and occasional expressions in Latin, Greek or languages other than English should be typed in italics.
- Authors must comply with the rules of biological nomenclature,

as expressed in the International Code of Zoological Nomenclature, the International Code of Botanical Nomenclature, and the International Code of Nomenclature of Bacteria. When a species name is used for the first time in an article, it should be stated in full, and the name of its describer should also be given. Descriptions of new taxa should comprise official repository of types (holotype and paratypes), author's collections as repositories of types are unacceptable.

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Each table should be numbered with Arabic numerals. It should have a title or explanatory legend at the top. Data may not be presented in both tabular and graphical form. Tables must fit the page vertically with a printed width of either 80 or 170 mm. Tables must be formatted as text, not as embedded images, and placed at the end of the manuscript.

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Figures and graphs must be submitted as .tif or .jpg files, with the following digital resolution:

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Black and white/grays: minimum 600 dpi

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Cite literature in the text in chronological, followed by alphabetical order and formatted like these examples: Campbell (1983,

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Scientific names: give the Latin names of each species in full and in italics.

Abbreviations

Abbreviations should be defined at first mention and used consistently thereafter.

Acknowledgments

Acknowledgments of people, grants, funds, etc. should be placed in a separate section before the reference list. The names of funding organizations should be written in full.

References

All publications cited in the text should be listed, alphabetically after first author.

- For a single author, references are to be arranged chronologically. If an author published several papers in the same year, they should appear as: White JH, 1970a. ... - White JH, 1970b. ...
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Hutchinson GE, 1975. A treatise on limnology. 3. J. Wiley & Sons, New York: 660 pp.

de Bernardi R, Giussani G, Lasso-Pedretti E, 1979. Food suitability and availability, demographic parameters and population growth in *Daphnia obtusa* Kurz under laboratory conditions. In: R. de Bernardi (Ed.), Proc. Symp. Biological and Mathematical aspects in population dynamics. Mem. Ist. Ital. Idrobiol. Suppl. 37:233-242.

Muyzer G, Brinkhoff T, Wawer C, 1998. Denaturing gradient gel electrophoresis (DGGE) in microbial ecology, p. 1-27. In: A.D.L. Akkermans, J. D. van Elsas and F. J. Bruijn (eds.), Molecular microbial ecology manual. Kluwer Academic Publishers.

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Biodiversity data publication

Authors are warmly encouraged to place all species distribution records in a publicly accessible database such as the national *Global Biodiversity Information Facility* (GBIF) nodes (www.gbif.org) or data centers endorsed by GBIF, including BioFresh (www.freshwaterbiodiversity.eu).

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INTERNATIONAL SYMPOSIUM ON
TARDIGRADA
V. N. Gaia | Portugal
23-26 July 2012

12th International Symposium on **TARDIGRADA**

V.N. Gaia, Portugal
23-26 July 2012

Proceedings Guest Editors

Lorena Rebecchi (*University of Modena and Reggio Emilia, Italy*)
Diane R. Nelson (*East Tennessee State University, USA*)
Roberto Bertolani (*University of Modena and Reggio Emilia, Italy*)
Paulo Fontoura (*University of Porto, Portugal*)



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GAIA, EEM



INTRODUCTION TO THE PROCEEDINGS

The Twelfth International Symposium on Tardigrada has been a further, wonderful occasion to meet together and to exchange suggestions and opinions as a part of a common experience. Luckily, every symposium on tardigrades has always been followed by printed proceedings, and always of good quality. The symposium of Vila Nova de Gaia is not an exception. First of all, for your contributions. Twenty-three papers are included in these proceedings, published in the prestigious *Journal of Limnology*. Even though focused on tardigrades, they look diversified and very interesting. The topics of the proceedings include taxonomy and phylogeny at morphological (structure and ultrastructure) and molecular level, faunal studies, biogeography, stress tolerance, ecology (communities, life histories), methodologies and datasets. We must thank all the authors who honored the symposium by sharing the results of their research with talks and poster presentations. All of them represent the outcome of hard work and fascinating interests.

The scientific papers are preceded by the wishes of the organisers and the guest editors and more importantly by three tributes dedicated to dear colleagues, friends for some or most of us. In 2012, within just a few months, we lost Clark Beasley, Frank Romano and Jeanne Renaud-Mornant, a high number of colleagues with respect to our small *community*. The tributes here included are an occasion for many of us to remember interesting discussions and happy moments, and for some of us a scientific collaboration. Certainly these tributes do not fill the great void that these friends have left and that was already tangible during our meeting in Portugal, where we remembered Clark and we sent our greetings to Frank.

Regarding these proceedings, we must thank the availability of the *Journal of Limnology*, a milestone in tardigradology. This journal published the proceedings of the first symposium in 1975 under the old name of *Memorie dell'Istituto Italiano di Idrobiologia dott. Marco de Marchi* and before and later, with the same name, it published monographs on tardigrades by Ramazzotti (1962, 1972) and their supplements, the monograph by Ramazzotti and Maucci (1983), and several other papers by Ramazzotti. Under the name *Journal of Limnology*, in 2007 we had the proceedings of the 10th International Symposium on Tardigrada, held in Catania (2006), for which we can again appreciate the quality of the journal. Now we are at the third experience, and we can only thank the editors of the journal, Gianluigi Giussani and Roberto Bertoni, both very willing and competent persons, with whom it is very easy to collaborate.

A special thank must be given to the many colleagues, tardigradologists and others, who have collaborated on the revision of the numerous contributions that enrich the proceedings of the 12th International Symposium on Tardigrada. In most cases three reviewers have considered the contributions, an approach that never created problems but on the contrary has allowed improvement of the content due to an evaluation from different points of view. Lastly, we cannot forget Paul Bartels, Harry Meyer and Sandra McInnes who, together with each one of us, have been involved in the grammar (and not only) corrections of several papers. To them and to other colleagues who directly revised the text, we send our special and certainly not less important thanks.

GUEST EDITORS

Lorena Rebecchi, Diane R. Nelson, Roberto Bertolani, Paulo Fontoura

12th INTERNATIONAL SYMPOSIUM ON TARDIGRADA

Tardigrada Symposia take place every three years and are unique opportunities for tardigrade scientific researchers, students and other tardigrade enthusiasts from all over the world to get together and to promote scientific exchange and friendship.

Tardigradologists are not organised as a formal scientific society. Nevertheless, since the first Symposium, held in Pallanza, Italy, 1974, as a tribute to Giuseppe Ramazzotti, ten other conferences have been regularly organised. After the 11th meeting held in 2009 at the University of Tübingen, Germany, we were honored with the responsibility to organise the next conference on behalf of the Faculty of Sciences of the University of Porto and the Parque Biológico de Gaia, Portugal. We would like to thank our fellow tardigradologists, especially the deans Diane Nelson, Roberto Bertolani, Hartmuth Greven and Reinhardt M. Kristensen, for their trust in our capability to organise the meeting.

The 12th International Symposium on Tardigrada was held in Vila Nova de Gaia, Portugal, from 23-26 July, 2012. The meeting took place at the auditorium of the Parque Biológico de Gaia, a permanent centre of environmental education and nature conservancy.

There were a record number of attendees, more than 80, coming from twenty countries from all over the world, presenting and discussing their latest findings on many diversified topics on tardigrade biology.

The scientific program was a success. The meeting included 36 oral and 40 poster presentations of high quality, about marine and limnic species, contributing to the integrative knowledge of the biology of these fascinating creatures. A special note should also be devoted to the high number of young researchers that attended the conference. Their presence is a guarantee for the future of tardigradology. Nineteen presentations were candidates for the *Young Scientist Awards* instituted to recognize and stimulate the scientific work developed by young researchers on Tardigrada. After a very difficult decision due to the excellent level of the presentations, the Jury constituted by senior scientists honored the oral presentation of Eliana Andrea Beltrán-Pardo about the DNA repair system of tardigrades and the poster of Vladimir Gross in which the muscular organization of marine and limnoterrestrial species had been analysed.

In addition to the promotion of scientific discussion and cooperation, symposia are events also providing contact with new cultures and moments of diversion. We have done our best to honor the traditional hospitality and authenticity of the Portuguese people, offering all the participants the opportunity to discover the charm, natural beauty and history of the cities of Gaia and Porto and to taste the wonderful Portuguese gastronomy. The Symposium included a visit to the port wine cellars, allowing the visitors to taste this worldwide famous nectar and get in touch with its history. A sightseeing tour at the seaside of Porto and Vila Nova de Gaia to admire the picturesque urban landscape and some stunning beaches, with a walk in the local nature reserve of the Douro estuary and park dunes of Aguda, ended by the conference dinner, was also included in the social program. Finally, an all-day boat cruise on the river Douro from Porto to Régua to admire the beautiful landscape combining lovely rural scenarios and vineyards shaped by human sweat was also held. The river Douro valley, rewarded in the 18th century by the Marquis of Pombal with the title of the first demarcated wine region in the world, is considered a World Heritage Site by UNESCO since 2001. During the conference sessions, an additional social program for accompanying persons was also offered.

However, the success of the 12th International Symposium on Tardigrada would not be possible without the support of some public and private organizations. We want to thank the Municipality of Vila Nova de Gaia, the University of Porto, the Comissão de Coordenação e Desenvolvimento Regional do Norte (CCDR-N, responsible for the execution of the Program ON.2 O Novo Norte co-funded by the European Regional Development Fund - ERDF), the Eco-Ethology Research Unit, the Grupo Taper and the Árvore Digital. We also received the help of many people to whom we are grateful. In particular, the Organizing Committee wants to thank the colleagues Diane Nelson, Roberto Bertolani and Lorena Rebecchi for their indispensable scientific collaboration. Without their help we would not have been able to accomplish this initiative. A special acknowledgment is devoted to all the members of the staff of Parque Biológico for their enthusiastic and patient work and also to some students of Biology (University of Porto) for their voluntary collaboration. Last but not least, we are also indebted to all the participants in the Symposium. Their amiable nature and range of expertise were responsible for four days of an agreeable atmosphere of friendship and science.

It was a great pleasure to host the 12th International Symposium on Tardigrada in Vila Nova de Gaia. We sincerely wish an even greater success for the next symposium, where we hope to meet the old and new tardigradologists.

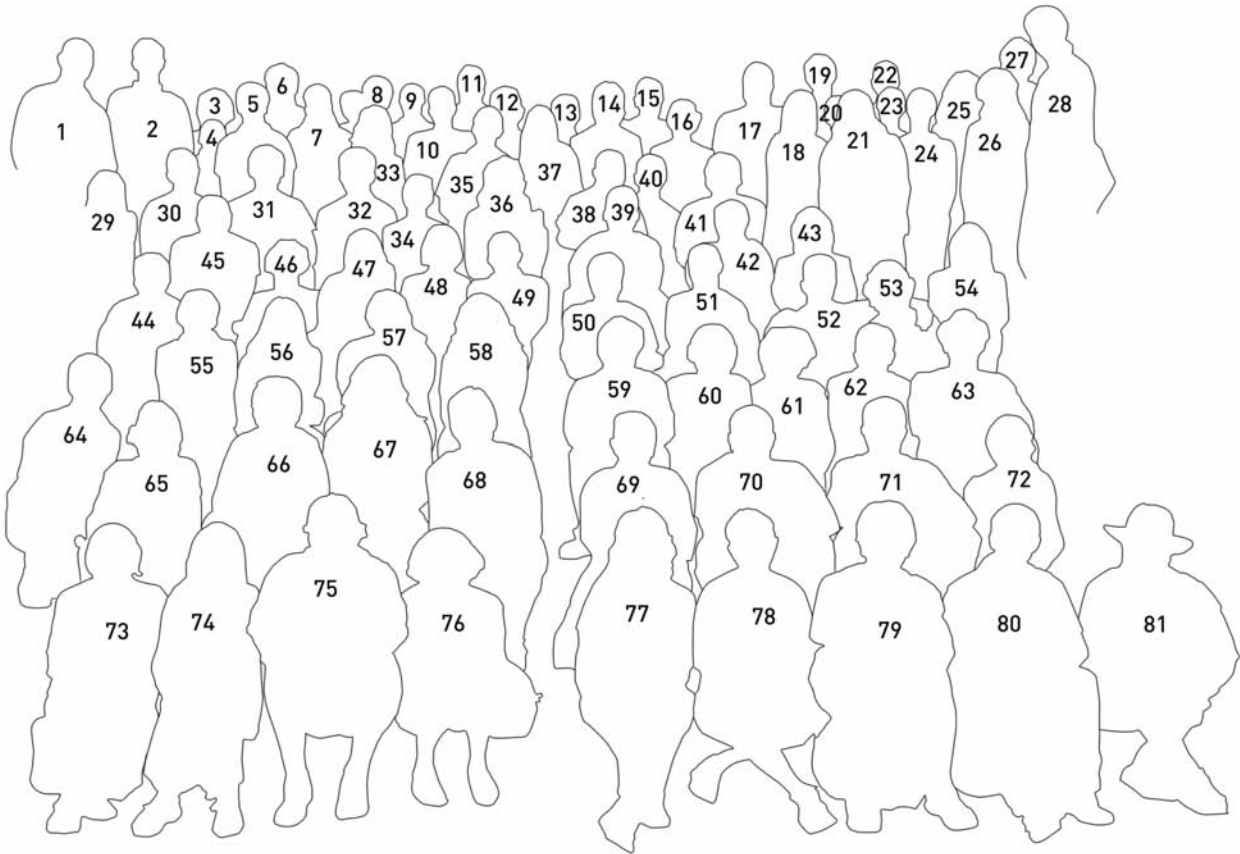
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12th INTERNATIONAL SYMPOSIUM ON TARDIGRADA

July 23rd – 26th 2012, Vila Nova de Gaia (Portugal)

The participants

- | | | |
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| 2 – F. Bemm | 30 – I. Poprawa | 58 – A.M. Rocha |
| 3 – L. Grothman | 31 – P. Degma | 59 – T. Hashimoto |
| 4 – A. Grothman | 32 – T. Kunieda | 60 – S. Fujimoto |
| 5 – K. Oguchi | 33 – S. Kawada-Suzuki with J. Suzuki | 61 – B. Pappalardo |
| 6 – G. Grothman | 34 – B.V. Trygvadóttir | 62 – S.J. McInnes |
| 7 – B. Ramsay | 35 – J. Palhas | 63 – Ł. Michalczyk |
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| 9 – R. Guidetti | 37 – A. Cardoso | 65 – I. Šatkauskienė |
| 10 – S. Gonçalves | 38 – D. Persson | 66 – A.M. Jørgensen |
| 11 – A. Jørgensen | 39 – K.A. Halberg | 67 – N. Møbjerg |
| 12 – J. Eibye-Jacobsen | 40 – K. Zawierucha | 68 – H. Greven |
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| 15 – W.R. Miller | 43 – C. Rocha | 71 – G. Mayer |
| 16 – J. Miller | 44 – P. Fontoura | 72 – E. Beltrán-Pardo |
| 17 – H.A. Meyer | 45 – R. Bertolani | 73 – J.G. Hinton |
| 18 – B. Luz | 46 – S. Ferrari | 74 – S.M. Jørgensen |
| 19 – Y. Kiosya | 47 – V. Inshyna | 75 – R.M. Kristensen |
| 20 – M. Czerneková | 48 – C. Gonçalves | 76 – G.M. Kristensen |
| 21 – E. Santos | 49 – R. Londoño | 77 – T. Altiero |
| 22 – V. Gross | 50 – J. Nelson | 78 – D.R. Nelson |
| 23 – M. Bryndová | 51 – I. Jönsson | 79 – A.C. Suzuki |
| 24 – C. Schulze | 52 – T. Prasath | 80 – R.O. Schill |
| 25 – M. Nottoli | 53 – D. Santos | 81 – N. Marley |
| 26 – T. Tischer | 54 – P. Veiga | <i>Not in the photo:</i> |
| 27 – P. Bartels | 55 – S. Tanaka | A. Lyons |
| 28 – M. Rubal | 56 – S. Komine | C. Neves |



Courtesy of Ralph O. Schill

TRIBUTE TO DR. CLARK W. BEASLEY

Dr. Clark W. Beasley passed away unexpectedly in July 2012. We received the notice of his death shortly before the 12th International Symposium on Tardigrada in Porto, Portugal, which he was planning to attend. A special tribute to Clark was presented at the beginning of the symposium by Dr. Paulo Fontoura.

After receiving his PhD in 1968 from the University of Oklahoma, Clark joined the Biology Department at McMurry College in College Station, Texas, USA, in 1969, becoming the chair in 1973. He was awarded the

honour of Distinguished Professor in 1999. Even after his retirement from McMurry University in 2010, Clark continued his research on tardigrades and his interest in helping others with tardigrade taxonomy, especially those who were just beginning.

With his first publication on tardigrades from Kansas in 1967, Clark began a life-long interest in tardigrades. After his first symposium participation in the 3rd International Symposium of Tardigrada at Johnson City, Tennessee, USA, in August 1980, he continued to be a *regular* at all the subsequent symposia, greeting all with his welcoming smile and hearty laughter. Assisted by others, Clark translated the Italian monograph *Il Phylum Tardigrada* (Ramazzotti and Maucci 1983) and published the English version, making it available worldwide. He also compiled a pdf bibliography of tardigrade publications through July 2010, which he shared with other tardigradologists. China held a special attraction for Clark, who made several field trips there, publishing articles on new records and new species from his extensive collections. Perhaps Clark's greatest contribution came in his role as the editor for 77 tardigrade publications in *Zootaxa* from 2001-2010.

Sandra McInnes summed it up well, *Clark's support, assistance and guidance to both early stage researchers and those with longer track records will be sadly missed.* My friendship with Clark goes back 32 years and is filled with sharing many fond memories of tardigrade symposia.

Diane R. Nelson



Courtesy of Jack Nelson

TRIBUTE TO DR. FRANK A. ROMANO III

Dr. Frank A. Romano III, retired chair of the Department of Biology, Jacksonville State University, Jacksonville, Alabama, USA, passed away on 17 August 2012 after an extended battle with esophageal cancer. Photos and videos of Frank and his students can be viewed on the JSU Biology web page, www.jsu.edu/biology

With a PhD from Syracuse University, Frank joined the JSU faculty in 1989 and became chair in 2002. He retired in May 2012, due to his illness. Throughout his career, his professionalism and rapport with his students and

colleagues were unparalleled. He was selected for the 2010 Meritorious Teaching Award given by the Association of Southeastern Biologists. In honor of his retirement, the *Dr. Frank Romano III Outdoor Classroom* was dedicated at Jacksonville State University.

Frank had a unique ability to interest students in pursuing research, especially sharing his fascination and enthusiasm for working with tardigrades. Many of his students earned their Master's degrees at JSU studying the ecology of limno-terrestrial and marine tardigrades, and several presented their research at our international symposia. One of Frank's students, Dr. Brent Nichols, who went on to earn his PhD at the University of South Florida under Dr. Jim Garey, played a major role in organizing the 9th International Symposium on Tardigrada in Tampa, Florida, USA, and served as one of the Guest Editors for the symposium volume published in *Hydrobiologia*.

Those of you who were fortunate to know Frank from his attendance at our international symposia were blessed to have a friend and a colleague who shared his enthusiasm for life and tardigrades and his positive outlook, sense of humor, and pride in his Italian heritage.

It has been 20 years since Frank asked me at an ASB meeting to help him and his students study tardigrades. I am privileged to have had such a long friendship with this dedicated man, who has meant so much to so many people.

Diane R. Nelson



Courtesy of Jack Nelson



From *Psammonalia*, number 158, December 2012

TRIBUTE TO DR. JEANNE RENAUD-MORNANT

Jeanne Renaud-Mornant passed away on 18 September 2012 in Paris. Retired since 1989, she was *Directeur de Recherche Honoraire* of the National Centre of Scientific Research (CNRS) in France.

Jeanne Renaud-Mornant was born in 1925 at Vellexon (Franche-Comté, Haute-Saône) near Besançon, France. After finishing the academic studies at the University of Bordeaux, she started her research activities at the Marine Station of Arcachon, France. The PhD thesis of Jeanne Renaud-Mornant, concluded in 1961, at Paris, under the supervision of Delamare-Deboutville, was an innovative document on the distribution of the interstitial micrometazoans in relation with the substrate. At that time, this document was considered a major event in meiofauna research.

During her long and remarkable career, Jeanne Re-

naud-Mornant specialized in taxonomy and ecology. She participated in diversified marine scientific expeditions all around the world, with special emphasis in the Atlantic ocean (French coast, Angola and Namibian coasts, Antilles and Brazil) and in the Pacific ocean (French Polynesia). She studied the fauna of very different ecosystems (e.g. estuaries, sandy beaches, coral reefs, abyssal deeps). Jeanne devoted her attention to several meiofaunal groups, such as Gastrotricha, Annelida, Crustacea, Loricifera, but definitely, her main interest was the study of tardigrades. She published important papers on morphology and phylogeny of tardigrades and described an impressive number of new taxa: 56 new tardigrade species (more than 25% of all the marine species known today), 17 new genera and 5 new families or subfamilies. She also participated in three of the four international tardigrade symposia from 1974 (first) to 1985 (fourth).

Her scientific and human qualities were widely recognized by her fellow researchers, allowing the development of numerous research projects in collaboration with a lot of international institutions (Universities, museums and marine stations), not only in Europe but also in North and South America. As a tribute to the work of Jeanne Renaud-Mornant, her name has been attributed to a large number of new taxa: several species of different phyla, and one genus and one family of tardigrades bear her name. The commitment of Jeanne to the formation of a new generation of marine biologists of diverse nationalities also deserves special mention.

We have lost a remarkable scientist, undoubtedly one of the more important names in tardigradology, and we are grateful for her incomparable contributions to the development of science.

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