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The Mayfly Newsletter

Peter M. Grant

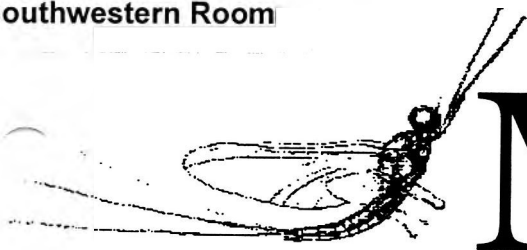
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THE MAYFLY NEWSLETTER

Vol. 12 No. 2

Southwestern Oklahoma State University, Weatherford, Oklahoma 73096-3098 USA

May 2003

Mayfly Diversity in the Headwaters of Brazilian Altitudinal Streams (Serra do Cipó National Park)

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Lab. of Benthic Ecology, Department of General Biology, Institute of Biological Sciences, Federal University of Minas Gerais, Belo Horizonte, MG, Brazil
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Introduction

Serra do Cipó is located in the central part of the Minas Gerais State (19°-20° S; 43°-44° W), the southeastern region of Espinhaço Mountain Chain. The vegetation is composed of savanna (locally called "cerrado") in the lower altitudes (up to 1000 m), rupestrian fields in the highest portions (above 1000 m) and riparian forest in the humid valleys along the rivers (Giulietti, 2002). The climate is classified as Cwb (Köppen), with rainy summers and dry winters and an annual median of pluviosity about 1500 mm (Galvão & Nimer, 1965).

The Ephemeroptera are a conspicuous and diverse group in the sediment and on aquatic macrophytes in lotic ecosystems of Serra do Cipó, and often constitutes the dominant group in the macroinvertebrate communities (Galdean *et al.*, 1999, 2000, 2001). Within these ecosystems, some are located in nearly "pristine" areas (e.g., Indaiá and Capão da Mata streams, located within the Serra do Cipó National Park), while others are located in regions that have been affected by human activities to varying degrees (Cipó, Peixe and Preto do Itambé rivers) (Galdean *et al.*, 2000).

The aims of my master dissertation were first to evaluate the distribution, diversity, structure and substrate associations of mayfly assemblages in these five representative lotic ecosystems of Serra do Cipó (Brazil), determining the major factors influencing the mayfly assemblages diversity and structure. Second, I studied some of the premises of the river continuum concept trying to evaluate aspects of the longitudinal distribution, diversity patterns and substrate association of mayfly nymphs in the longitudinal gradient of Indaiá stream, located inside the Serra do Cipó National Park.

Methods

The samples were collected during the rainy and dry periods of 1998, 2000 and 2001, using kick nets (0.250 mm mesh, 1m² of sampled area), and Surber sampler (0.250 mm mesh, 0.01 m² and 0.0625 m²) and preserved with 10% formalin. In the laboratory, the samples were washed through a 0.250 mm sieve, sorted and identified with a

stereomicroscope, and the identified organisms were preserved in 70% alcohol and deposited in the Reference Collection of Benthic Macroinvertebrates, Institute of Biological Sciences, Federal University of Minas Gerais (Callisto *et al.*, 1998). The physical and chemical parameters of the water column were measured "in situ" using a Horiba multiprobe (temperature, pH, electrical conductivity and dissolved oxygen). The analysis of the total alkalinity and the concentrations of total and dissolved nutrients were performed in the laboratory (Golterman *et al.*, 1978; Mackereth *et al.*, 1978; Carmouze, 1994).

Results Summary and Discussion

Since the preliminary studies in Serra do Cipó, accomplished by Galdean *et al.* (1999, 2000, 2001), taxonomic identification of several mayfly genera were added or corrected by using updated international literature (e.g., Salles, 2002; Dominguez *et al.*, 2001). At that time, 19 genera, within 5 families, were identified by Prof. Galdean. The dominant genera found by these authors were *Baetis* (Baetidae) and *Farrodes* (Leptophlebiidae). Besides their efficiency to explore the main available trophic resources of the investigated ecosystems, they also showed a larger amplitude to adverse abiotic conditions, such as higher nutrient concentrations and fine sediment granulometry. With the increasing taxonomic revisions and further collections in South America, developed by researchers such as Drs. C. Lugo-Ortiz, W. P. McCafferty, E. Dominguez,

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MSc. C. Molineri, and MSc. F. Salles, various new taxa were described and/or classified under different nomination. For instance, the genus *Baetis* is now recognized only in a North and Central American distribution. In this way, the former specimens identified under the old classification (*Baetis*) are now being classified as *Americabaetis* and *Cryptonympha*.

In total, 30 genera, distributed within 7 families, were identified, with a high dominance of Baetidae (mainly *Paracloeodes* spp. and *Americabaetis* spp.), Leptohiphidae (mainly *Leptohiphes* spp., although, some revision on the collected species are needed) and Leptophlebiidae (mainly *Askola* cf. *froehlichii* Peters, 1969 and *Miroculis* sp.). My study shows that most of the identified taxa present specific substrate associations, being found in 2-3 substrates. Some genera, besides being restricted found in association with few substrates, also show a clinal pattern in their longitudinal distribution, such as *Campylocia* cf. *bocainenses* (Euthyplociidae), found only in gravel/sand deposits in shallow and low flow areas, from 2nd to 4th order. It could also be observed the probable influence of temperature in the distribution of Ephemeroptera. Galdean *et al.* (1999) points out the possible competition between the Baetidae and Leptophlebiidae family in Serra do Cipó lotic ecosystems. I found that in the headwaters, the mayfly assemblages were composed mostly of leptophlebiid genera, with high diversity and abundance. Otherwise, in the lower stretches of the longitudinal gradient (e.g., 4th order and further), where temperatures reached higher values, we observed a modification in the assemblages structure, with the dominance of the baetid family presenting high numbers and higher diversity.

The main results that I obtained, besides the increased taxonomic survey of Serra do Cipó lotic ecosystems, include new distributional records of recently described mayfly genera and species and ecological data about little known Ephemeroptera taxa (*Paracloeodes*; *Americabaetis*; *Aturbina georgei* Lugo-Ortiz & McCafferty, 1996; *Apobaetis fiuzai* Salles & Lugo-Ortiz, 2002 - Baetidae; *Tricorythopsis* - Leptohiphidae; *Campylocia* cf. *bocainenses* Pereira & da Silva, 1990). This information, together with the assessment of ecological characteristics and preservation status of river stretches, contributes to the knowledge about the main factors governing the distribution and diversity of mayfly assemblages. These patterns are being used as tools for conservation strategies of altitudinal headwaters streams in Serra do Cipó (MG - Brazil).

Final Considerations

Some researchers (e.g., E. Dominguez, C., Molineri, F. Salles, P. Grant, L. Corkum, D. Hilsenhoff, D. Dudgeon, M. Sartori, J. Alba-Tecedor, C. Hawkins, N. Kluge, I. Campbell, J. Brittain and several others) helped a lot sending me reprints of papers about mayflies and/or benthic macroinvertebrate ecology or checking some material. However, there are still great difficulties in finding appropriate and recent literature about taxonomy and ecology of mayflies. I hope that our studies in the headwaters of Serra

do Cipó can help the scientific progress of mayfly ecology to elucidate some of the remaining questions in this aquatic insect order research in the Neotropics. In the future (probably during my Ph.D. thesis), it will be necessary to expend greater efforts on species identification. Future collaborations will be welcome.

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- MACKERETH, F. J. H.; HERON, J. & TALLING, J.F. 1978. *Water Analysis: some revised methods for limnologists*. Freshwater Biological Association. Windermere 120 p.
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History of Insects

Dr. Nikita Julievich Kluge, Department of Entomology, Biological Faculty, S.-Petersburg State University, 199034 Russia, <http://www.bio.pu.ru/win/entomol/kluge-en.htm>

A new book, *History of Insects*, edited by A.P. Rasnitsyn and D.L.J. Quicke, has been published by Kluwer Academic Publishers (P.O. Box 322, 3300 AH Dordrecht, The Netherlands, or 101 Philip Drive, Norwell, MA 02061, U.S.A.). It was prepared as the second edition of the book, *Historical Development of Class Insects*, published in Russian in 1980 in the series "Trudy Paleontol. Inst. Akad. Nauk SSSR," vol. 175, edited by B.B. Rohdendorf and A.P. Rasnitsyn. In fact, the new version is strongly changed and is several times thicker (517 large pages instead of 268 smaller ones).

"This is the first time that a single book has attempted to cover the whole fossil history of insects so comprehensively. The volume embraces the history of insect paleontology, the methods of studying fossils, the taphonomic processes leading to their formation, the diagnostic features of all insect orders, both extant and extinct, the major fossils of each order, and the implications that can be drawn from the paleontological record about past ecology and climates.

"Many new insights are presented. It is the product principally of the largest paleontological group in the world, in Moscow, and makes full use of the remarkable collection that these workers have developed. It includes a very large number of illustrations showing both real fossils and reconstructions of extinct taxa.

"The systematic part is treated in a phylogenetic framework with information on fossil groups being used to help interpret relationships. An appendix provides information on virtually all sites where fossil insects have been found.

"This book is essential to all students of paleontology and contains a wealth of information that will be of interest to students of evolutionary relationships and of paleontology in general."

The book is built like the Tower of Babel: there are 22 co-authors, each with their own opinion about insect phylogeny, thus the text is full of contradicting statements. Particularly, the characteristics of mayflies in the narrower sense ["2.2.1.1.1.3. ORDER EPHEMERIDA Latreille, 1810. THE TRUE MAYFLIES (=Ephemeroptera Hyatt et Arms, 1891 (s.l.); =Euephemeroptera Kluge, 2000)"] is written by N.Ju. Kluge and N.D. Sinitshenkova, who could not agree with the characteristics of mayflies in a wider sense written by A.P. Rasnitsyn ["2.2.1.1.1. SUPERORDER EPHEMERIDEA

Latreille, 1810. THE MAYFLIES (=Panephemeroptera Crampton, 1928)"].

An unfortunate misprint is Fig. 84 which presents an old Demoulin's (1956) reconstruction of *Triplosoba pulchella* and the legend stating that this is "restored by N.Yu.Kluge (orig., based on Brongniart 1893 and Carpenter 1963a)."

Nevertheless, the book really contains a lot of important information on the fossil history of insects, being the most comprehensive source on this subject. Analysis of phylogeny of neopteran groups given in this book is most comprehensive this time, until the continuation of the book, *Modern Systematics of Insects* (Kluge, 2000) which is not finished.

2004 International Joint Meeting

XI International Conference on Ephemeroptera
XV International Symposium on Plecoptera

Flathead Lake Biological Station and
Division of Biological Sciences
The University of Montana
Polson, Montana (USA)
August 22 - 28, 2004

For further information or to be added to the mailing list, send an email to Ms. Sue Gillespie, sgill@selway.umt.edu or go to the web page at <http://www.umt.edu/biology/flbs/Events/StoneMay2004.htm>.

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do Museu Nacional, N.S., Rio de Janeiro, Zoologia, No. 336:1-12.

PETERS, W. L. 1969. *Askola froehlichii*, a new genus and species from southern Brazil (Leptophlebiidae: Ephemeroptera). Florida Entomologist 52:253-258.

SALLES, F. F. 2002. *Contribuição ao estudo da taxonomia da família Baetidae (Insecta: Ephemeroptera) na região sudeste do Brasil*. Master dissertation. Universidade Federal de Viçosa, Viçosa, Minas Gerais. 129 p.

SALLES F. F. & LUGO-ORTIZ C. R. 2002. A distinctive new species of *Apobaetis* (Ephemeroptera: Baetidae) from Mato Grosso and Minas Gerais, Brazil. *Zootaxa*. 35, 1-6.

Mayfly WWW Sites

Mayfly Central

<http://www.entm.purdue.edu/entomology/research/mayfly/mayfly.html>

Ephemeroptera Galactica

<http://www.famu.org/mayfly/>

Entomologie für Fliegenfischer

Walter Reisinger, Ernst Bauernfeind, Erhard Loidl. 2002. Vom Vorbild zur Nachahmung. Ca. 288 Seiten, ca. 500 Fotos. Gebunden. Format 19 cm x 24,5 cm. ISBN 3-8001-3594-9.

In the last issue of this newsletter, I announced the availability of a new book, *Entomologie für Fliegenfischer*, by Reisinger et al. I was fortunate to receive a copy of this book and must comment on it further.

This book is divided into four sections. Each of the first three sections focuses on mayflies, stoneflies, or caddisflies. The sections begin with general information about the biology of the order. Following that is information about species of interest to fly fishing, organized by family. Each section ends with a table with flight period information for the species discussed.

The last section contains information about fly tying

What really caught my eye were the color photographs - over 500. There are photographs of habitat, the adult stage of the species discussed, and tied flies. These photographs are exquisite. They are very clear and show much detail.

For further information, contact the publisher at Verlag Eugen Ulmer GmbH & Co., Postfach 70 05 61, D-70574 Stuttgart, phone (0711) 4507-0, fax (0711) 4507-120, email info@ulmer.de.

The web site describing this book in more detail is located at <http://www.ulmer.de/Vorlagen/Webapp/ULMERSHOP/Load/AllgemeinTexte/veu.htm>.

Proceedings of the Fourth International Conference on Ephemeroptera

V. Landa, T. Soldan and M. Tonner, eds. 1984.

Three copies of these proceedings remain, which we believe to be the last copies available. To purchase a copy, send US\$50.00 to Peter Grant, Department of Biological Sciences, Southwestern Oklahoma State University, 100 Campus Drive, Weatherford, Oklahoma 73096-3098, USA. To reserve a copy, you might want to email me first at grantp@swosu.edu.

Money earned from the sale of these proceedings will be deposited in the William L. Peters Scholarship Fund.

Trends in Research in Ephemeroptera and Plecoptera

Eduardo Dominguez, ed. 2001. Kluwer Academic/Plenum Publishers. ISBN 0-306-46544-2. 490 pp. EUR 156.00, USD 135.00, GBP 95.00.

These are the proceedings of the IXth International Conference on Ephemeroptera and the XIIIth International Symposium on Plecoptera, held in Tucuman, Argentina, in 1998.

After much anticipation, this book has been published and is now available for purchase. Conference participants should have received their personal copies in the mail.

See the publisher's website (<http://www.wkap.nl/prod/b/0-306-46544-2?a=2>) for additional information or to order a copy.

Books About Mayflies

Phylogenetic System of Ephemeroptera. Vol. 1

Dr. Nikita Julievich Kluge, Department of Entomology, Biological Faculty, S.-Petersburg State University, 199034 Russia, <http://www.bio.pu.ru/win/entomol/kluge-en.htm>

This book is being prepared for publication on paper. Its first version, *Draft Revision of Supraspecies Taxa of Ephemeroptera (Without Atalophlebiinae)*, has been available in English text since 1988. The second version, *Revision of Supraspecies Taxa of Ephemeroptera (Except for Atalophlebia/fg1)*, has been available in Russian text since 2000.

The new text markedly differs from the previous ones. Here are presented only the contents, classificational scheme, foreword and indexes of taxa names.

Look please to the index of species names and the index of supraspecies taxa names to search for mayfly species or genera which you or your colleagues introduced or changed in status (apart from those belonging to Baetidae and Leptophlebiidae). Some information about it can be found on the web at <http://www.bio.pu.ru/win/entomol/KLUGE/EPH/Contents.htm>.

It is not excluded that I missed something important in recent publications, so I would be thankful to everybody to inform me about this by email (kluge@ent.bio.pu.ru).

Etude Systématique, Cladistique et Biogéographique des Baetidae (Ephemeroptera) de Madagascar

Systematic, Cladistic and Biogeographical Study of the Malagasy Baetidae (Ephemeroptera)



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Mayflies (Ephemeroptera) are among the oldest known flying insects and encompass a very small number of species (ca. 2500 species). Larvae are strictly freshwater inhabitants; this stage lasts generally one year. The imaginal stage is extremely short, from a few hours to a few days, and is devoted almost entirely to reproduction.

Madagascar is the fourth largest island in the world by area. It is situated in the western part of the Indian Ocean, at a distance of more than 300 km from the African coast. Madagascar belonged to Gondwana. It was first separated from the African plate (-165 M.y.), then moved to the South (-65 M.y.), before the break-off with the Indian plate (-65 M.y.).

Knowledge of the Malagasy mayflies was until recently extremely poor. The program *Biodiversity and Biotypology of Malagasy Freshwaters*, jointly run by the French ORSTOM and the Malagasy CNRE, began a global survey of the freshwater macroinvertebrates. The systematics of several mayfly families (Tricorythidae, Polymitarcyidae, Palingeniidae,...), and other invertebrate groups (caddisflies, blackflies,...) was the subject of ground studies. Our present study is one part of this global program.

Until the middle of the nineties, only four baetid species belonging to three different genera had been described from Madagascar. During the last six years, 25 papers were dedicated to the systematics of the Baetidae, allowing the description of 50 new species and 8 new genera. The Malagasy fauna now encompasses 22 genera and 54 species. Despite its size, Madagascar has the same diversity, at specific and generic levels, as a continent.

Our knowledge of the Baetidae is sufficient to perform a cladistic and biogeographical study. Our phylogenetic reconstruction allows us to propose five main lineages and to indicate, for each of them, the genera included and their features.

The Malagasy Baetidae possess a high level of endemism: 53 of the 54 species and one third of the genera are endemic. It shows extremely strong affinities with the African fauna, as more than 90% of the genera present in Madagascar or in Africa have a distribution restricted to this area. Other components, especially Oriental and Oceanian, are negligible. These areas share with Madagascar only a few widespread genera. These African affinities are in contradiction with the geological events, especially the break-off history of Gondwana.

Some explanations can be given to solve this contradiction. The most likely is that the dispersal power of the mayflies, especially of the Baetidae, is greatly underestimated. The study of recent volcanic islands, particularly of the Comoros, clearly demonstrates that the Baetidae are able to disperse over more than 300 km. Consequently, a colonisation by the Baetidae of Madagascar from continental Africa, after the break-off, must be considered as possible.

We have established scenarios explaining the biogeographical history of each of the five lineages. For four of them, Africa has to be regarded as the centre of origin. The fifth lineage probably has a Palearctic origin; Africa should be considered as a secondary centre of speciation. These lineages should have secondarily colonised Madagascar from continental Africa.

This work opens up new perspectives. It allows the use of the Baetidae for faunistic and ecological studies, especially for problems related to water quality. It must be also considered as a first step for understanding the dispersion and colonisation of the islands of the western part of the Indian Ocean.

[Editor's note: Jean-Luc completed his Ph.D. thesis last spring on the above research. A PDF version of his thesis is available on CD. Contact him at the above address for a copy.]

Request for Postdoctoral Position

My doctoral dissertation, which is now finished, had three components: (1) reconstruction of the phylogeny of Ephemeroptera; (2) classification of the Chinese Ephemeroptera, and (3) the relationship between mayflies and water quality.

I am very interested in mayflies and in using them to monitor water quality, especially of rivers. So, I hope to continue my studies in the USA someday. With the developing of society, the pollution of water is serious, and there are few researchers in this field in China.

So, I would like to locate a postdoctoral position on mayflies or aquatic biology. Please contact me if you might have some information regarding my request: ZHOU Changfa, Department of Biology, Nankai University, Tianjin, 300071, Peoples Republic of China, email cfzhou@eyou.com.

Mayfly Newsletter Update

- Due to an error on some mailing labels, a number of February 2002 newsletters were returned, particularly those sent overseas. If you did not receive a copy of the February 2002 newsletter, please let me know and I will mail one to you.
- The last issue of *The Mayfly Newsletter* was February 2002, 12(1).
- A new mailing label format is now in use. Please check your mailing label for accuracy. Let me know if changes need to be made.



National Geographic

Check out the article on *Palingenia longicauda* in the May 2003 issue of *National Geographic*. The photographs are gorgeous!

Guidelines for Submitting Proposals to Host an International Conference

As reported in the February 2002 newsletter, the representatives from the International Conferences on Ephemeroptera and the International Society of Plecopterologists agreed that there should be a set of guidelines for submitting proposals to host conferences. This was decided during the joint business meeting on 9 August 2001 in Perugia, Italy. Peter Zwick, Michel Sartori, and Peter Grant were appointed to prepare the following guidelines.

Preliminary Proposals

Preliminary proposals to host a conference may be submitted six years (i.e., two conferences) prior to the year of the proposed conference, but a final vote on the conference site will not be made until three years (i.e., the

previous conference) prior to the actual conference date.

Final Proposals

1. Proposals should be submitted at least one month prior to the conference during which the proposal will be officially presented.
2. A copy of this proposal should be sent to the chair of each committee - International Conferences on Ephemeroptera and the International Society of Plecopterologists.
3. Proposals should be submitted by email. This facilitates distribution of the proposal to the members of the two committees.
4. Proposals should contain detailed information regarding plans to host the conference.

Eaton's Revisional Monograph for Sale

Bob Boyle reports that he has parts 2 and 3 of Eaton's "A Revisional Monograph of Recent Ephemeridae or Mayflies" (*The Transactions of the Linnean Society of London*): Part 2, July 1884, pages 77-152 of text, 20 pages of plates (Plates 25-45); Part 3, April 1885, pages 153-230 of text, Plates 46-63. Description: small folio, original brown paper covers, covers slightly age worn, some text pages unopened.

He is asking for US\$200, which is what he paid a British dealer some time ago.

Contact Bob at Shad Roe, Lane Gate Road, Cold Spring, New York 10516 USA, phone (845) 265-2944, fax (845) 265-7838.

Proceedings of the First Symposium of Aquatic Entomologists

The proceedings of the first symposium of aquatic entomologists in East Asia has recently been published:

Bae, Y. J., ed. 2001. *The 21st Century and Aquatic Entomology in East Asia. Proceedings of the 1st Symposium of Aquatic Entomologists in East Asia.* The Korean Society of Aquatic Entomology, Korea.

These proceedings contain 10 papers (3 on mayflies) and one invited lecture.

Contact Dr. Bae for more information: Y. J. Bae, Biology, Seoul Womans University, 126 Kongnung 2-Dong, Nowon-Gu Seoul 139-774, KOREA.

2001 Mayfly Bibliography

[Editor's note: This bibliography was published as the Ephemeroptera portion of the 2001 (2002) North American Benthological Society's (NABS) *Current and Selected Bibliography on Benthic Biology*.]

The following is a list of current publications on Ephemeroptera that have been published up to and during 2001 and have not appeared in previous NABS Bibliographies.

I would appreciate receiving a reprint or complete bibliographic reference of any article about mayflies, especially if it contains scientific names, so that it may be included in next year's bibliography. Also, I would like to be informed of any corrections or omissions in this or past bibliographies. Suggestions are always welcome.

Please send all correspondence to Peter M. Grant, Department of Biological Sciences, Southwestern Oklahoma State University, 100 Campus Drive, Weatherford, Oklahoma 73096-3098 USA, phone (580) 774-3294, fax (580) 774-7140, email grantp@swosu.edu.

If you would like an electronic copy of this year's mayfly bibliography, simply send me a request via email. I will send this file to you as an attachment. This bibliography is also available on my website: <http://www.swosu.edu/~grantp/research.htm>.

- Adamek, Z.; Sukop, I. 2001. The role of supplementary feeding in food competition between common carp (*Cyprinus carpio*) and perch (*Perca fluviatilis*) in a pond culture. *Krmiva* 43: 175-184.
- Alba-Tercedor, J.; Picazo-Munoz, J.; Jaimez-Cuellar, P. 2000. Presence of *Labiobaetis neglectus* (Navas, 1913) (Ephemeroptera, Baetidae) in the south of the Iberian Peninsula. *Bol. Asoc. Espanola Entomol.* 24(3-4): 221-222. (In Spanish)
- Alba-Tercedor, J.; Picazo-Munoz, J.; Jaimez-Cuellar, P. 2000. First record of *Pseudocentropilum nanum* (Bogoescu, 1951) (Ephemeroptera, Baetidae) in the Iberian Peninsula. *Bol. Asoc. Espanola Entomol.* 24(3-4): 224. (In Spanish)
- Alba-Tercedor, J.; Puig-Garcia, M. A. 2000. *Labiobaetis tricolor* (Tshernova, 1928) (Ephemeroptera: Baetidae) misrecorded in the Iberian Peninsula. *Bol. Asoc. Espanola Entomol.* 24(3-4): 223. (In Spanish)
- Amundsen, P. A.; Gabler, H. M.; Ruse, L. S. 2001. Intraspecific food resource partitioning in Atlantic salmon (*Salmo salar*) parr in a subarctic river. *Aquat. Living Resour.* 14(4): 257-265.
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