

International Symposium on Groundwater Biology: Introduction

John R. Holsinger*
and
Arthur L. Buikema, Jr.**

The International Symposium on Groundwater Biology, a combination of the 4th International Colloquium on *Gammarus* and *Niphargus* and the 2nd International Symposium on Groundwater Ecology, was held in Blacksburg, Virginia, during the week of September 10-16, 1978. The precedent for combining these two meetings was set in 1975 when the two groups first met together at the Max-Planck-Institut für Limnologie in Schlitz, West Germany. The success of the Schlitz meeting, and the high degree of overlap between the research interests of amphipod workers and groundwater ecologists, made it desirable to hold a second combined meeting in 1978. Blacksburg was ideally suited for a conference of this nature because of its close proximity to numerous karst groundwater systems and amphipod habitats. The Symposium was co-sponsored by Old Dominion University and Virginia Polytechnic Institute and State University and supported in part by a grant from the National Science Foundation.

In addition to the traditional goals of international symposia, such as the exchange of information, hypotheses, and techniques among scientists from different countries, a major reason for meeting in the United States was to stimulate future research in groundwater ecology in North America. Although aquatic cave ecosystems in North America have received considerable attention in recent years, other types of groundwater ecosystems, like those associated with the hyporheic or parafluvial zone beneath surface or cave streams, have remained little investigated on this continent. In contrast, this important subterranean life zone has been intensively studied in Europe, and the resulting literature has proliferated. Based primarily on results obtained by European researchers, the potential wealth of new taxa that remain to be discovered in the hyporheic environment in North America is estimated to be great. Moreover, the population dynamics and community structure and function of the hyporheic promises to be a fertile area of investigation in the coming years. One rather simple but very useful piece of equipment widely

* Department of Biological Sciences, Old Dominion University, Norfolk, Virginia 23508, U.S.A.

** University Center for Environmental Studies, Virginia Polytechnic Institute and State University, Blacksburg, Virginia 24061, U.S.A.

employed in Europe for the extraction of interstitial organisms from hyporheic habitats is the Bou-Rouch pump, perfected some years ago by French scientists. Since it has rarely been used in North America, its demonstration by European workers at the Blacksburg conference proved extremely valuable to North Americans.

As reflected to some extent by the papers on amphipods presented at the Schlitz meeting, and to a much greater extent by those presented at Blacksburg, it is apparent that participation in *Gammarus-Niphargus* colloquia is no longer confined to those who conduct research on these two genera. Although this was the original intent of European workers in the late 1960s and early 1970s (cf., meetings in Verona, Karlsruhe, and Lyon), the meetings have evolved into far broader affairs that presently encompass research being done on many other genera of gammarid amphipods outside of Europe. Thus, retention of the name «*Gammarus* and *Niphargus* Colloquium» is now more symbolic than anything else. The great abundance and taxonomic diversity of gammarid amphipods in groundwater ecosystems throughout most of the world has resulted in the use of these organisms in numerous studies on groundwater biology. It is appropriate, then, that a conference on groundwater ecology should include current results from amphipod research, especially in freshwater systems, and a conference on amphipods should be concerned with research on groundwater ecosystems. That the workers in these two areas of research have much in common was clearly demonstrated both in Schlitz and Blacksburg. No attempt was made at the Blacksburg meeting to separate the amphipod and groundwater papers into discrete categories.

Sixty persons, including spouses, representing 14 countries, registered for the Symposium. Twenty participants were from outside of North America. A total of 39 papers covering a variety of topics was presented in eight formal paper sessions. Among the subjects covered were various aspects of the systematics, zoogeography, ecology, genetics, anatomy, and physiology of gammarid amphipods (primarily from freshwater habitats); zoogeography of subterranean copepods, ostracods, and isopods; ecology of cave crayfishes; and observations on faunal composition and species interactions in hyporheic, phreatic, and cave groundwater ecosystems.

In addition to the formal papers, four moderated discussion sessions were held. These were of particular interest and benefit because of their broad application to many of the problems currently confronting groundwater ecologists and amphipodologists. The topics and moderators were:

(1) Strategies for the production of endangered and threatened groundwater species and ecosystems — Dr. J. E. Cooper.

(2) Ecological classification of groundwater fauna and standardization of groundwater biotope and ecosystem terminology — Dr. H.K. Schminke.

(3) Revisionary concepts of gammaroidean amphipod taxonomy, with emphasis on ancestral and derived characters, evolutionary patterns and creation of higher taxa — Dr. E.L. Bousfield.

(4) Sampling techniques for groundwater fauna — Dr. D.L. Danielopol.

Highlighting the activities at mid-week was an all day field excursion to the Ward Cove-Maiden Spring karst area, a valley floored with Middle Ordovician limestone in Tazewell County, Virginia. Here conferees were treated to first-hand observations of two distinctly different subterranean stream ecosystems in the large Fallen Rock Cave system and were given the opportunity to collect amphipods from a limestone spring. In addition to the mid-conference field trip, two optional post-conference trips were offered: one to visit cave and karst groundwater ecosystems in the Powell Valley of southwestern Virginia and eastern Tennessee, and the other to see groundwater habitats in the Great Dismal Swamp in southeastern Virginia.

The papers given at the Symposium are being published as Proceedings. Those dealing more generally with groundwater ecology are being published in this issue. Those concerned strictly with amphipod biology are being published in a special supplement to *Crustaceana*.

The manuscripts published herein were reviewed by members of the Symposium Coordinating Committee. Members of the committee were:

- Dr. J.L. Barnard (Smithsonian Institution)
- Dr. E.L. Bousfield (National Museums of Canada)
- Dr. T.E. Bowman (Smithsonian Institution)
- Dr. J.E. Cooper (North Carolina State Museum)
- Dr. D.C. Culver (Northwestern University)

Technical editorial assistance was provided by Ms. Darla Donald.

It has been agreed that a third combined meeting will be held near Lodz, Poland, in September 1981. This meeting is being organized by Drs. K. Jażdżewski and A. W. Skalski.

Symposium Co-Chairman and Co-Editors of the Proceedings on Groundwater Ecology:

Dr. John R. Holsinger (Old Dominion University)

Dr. Arthur L. Buikema, Jr. (Virginia Polytechnic Institute and State University)

List of papers on Biology of Gammaridean Amphipods

(Published in *Crustaceana*, Supplement 6, 1980)

- J.L. Barnard and G. S. Karaman — "Classification of Gammarid Amphipoda"
- J.R. Holsinger and A.W. Skalski — "The Taxonomy and Systematic Status of *Crangonyx paxi* Schellenberg (Crangonyctidae)"
- T. Gledhill — "Designation and Description of the Lectotype of *Niphargus fontanus* Bate (Crustacea: Amphipoda)"
- A.W. Skalski — "The Variability and Systematic Position of Three Species of *Niphargus* from the Caucasus"
- K.S. Lee and H.S. Kim — "On the Geographical Distribution and Variation of Freshwater *Gammarus* (Amphipoda: Gammaridae) in Korea, Including Descriptions of Four New Species"
- G.A. Cole — "The Mandibular Palps of North American Freshwater Species of *Gammarus*"
- K. Jażdżewski — "Range Extensions of Some Gammaridean Species in European Inland Waters Caused by Human Activity"
- B.R. MacPherson and V.J. Steele — "Microanatomy of the Central Nervous System of *Gammarus setosus* Dementieva (Crustacea, Amphipoda): The Suboesophageal Ganglion and Ventral Ganglion Chain"

- A.L. Buikema, Jr., A. Chester, and H.R. Steeves, III — "Intersexuality in *Gammarus minus* Say"
- L. Vassallo and D.H. Steele — "Survival and Growth of Young *Gammarus lawrencianus* on Different Diets"
- J. Mathieu and J. Gibert — "Evolution des Teneurs en Proteines, Glucides et Lipides de *Niphargus rhenorhodanensis* (Crustaces, Amphipodes Phreatobies) Comparee entre L'eleve en Milieu Naturel Reconstitue et le Jeune Experimental"
- J. Gibert and J. Mathieu — "Relations entre les Teneurs en Proteines, Glucides, et Lipides au Cours du Jeune Experimental, Chez Deux Especes de *Niphargus* (Crustace, Amphipode) Peuplant des Biotopes Differeents"
- C. Roux, A.L. Roux, and Y. Opdam — "Repartition Ecologique et Metabolisme Respiratoire de *Gammarus roeseli* (Crustace, Amphipode)"
- J. Mathieu — "Activite Locomotrice et Metabolisme Respiratoire a 11°C de L'Amphipode Troglobie *Niphargus rhenorhodanensis*"
- H.H. Costa — "The Effects of Some Heavy Metal Pollutants on the Heart Beat of *Gammarus pulex* (L)"
- M. Hiroki — "Relation between the Two Diel Phenomena Shown by Freshwater Gammarids --Drift and Vertical Migration"
- M.P.D. Meijering — "Drift, Upstream-Migration, and Population Dynamics of *Gammarus forssarum* Koch, 1835"
- F. Jenio — "The Life Cycle and Ecology of *Gammarus troglophilus* Hubricht and Mackin (Amphipode: Gammaridae)"
- A. Goedmakers — "Microgeographic Races of *Gammarus forssarum* Koch, 1836 (Amphipoda, Crustacea)"
- S. Pinkster and N.W. Broodbakker — "The Influence of Environmental Factors on Distribution and Reproductive Success of *Eulimnogammarus obtusatus* (Dahl, 1938) and Other Estuarine Gammarids"
- J. Dessaix and A.L. Roux — "Structure and Dynamics of the French Upper Rhone Ecosystems, An Estimation of the Secondary Production of Gammarids in the Main Stream".

The following papers were given at the Symposium, but are not being published as a part of the Proceedings:

- E.L. Bousfield — "A Revised Classification and Phylogeny of Amphipod Crustaceans"
- H.P. Bulnheim — "Studies on the Physiological Ecology of Five Euryhaline *Gammarus* Species"
- A. Goedmakers and S. Pinkster — "Migration of Freshwater Gammarids"
- G. Longley and J.R. Holsinger — "Subterranean Amphipod Population Dynamics Based on Organisms Sampled From an Artesian Well in Texas".