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REVIEW

D. DEFAYE, E. SUÁREZ-MORALES & J. C. VON VAUPEL KLEIN (eds.), 2011. Studies on freshwater Copepoda: a volume in honour of Bernard Dussart. Crustaceana Monographs, **16**: i-vi, 1-566, ill. (Koninklijke Brill Academic Publishers, Leiden and Boston). Hardcover. ISBN-10 and -13: 9004181385, 9789004181380. Price € 165.00 or US\$ 226.00.

This Festschrift-book starts with a presentation of the scientific activity of one of the prominent personalities within the scientific community of non-marine aquatic biologists in Europe during the last century. It is followed by 22 contributions offered by copepodologists from 23 countries.

Bernard Dussart was born in France in 1922 and developed a successful research and teaching career mainly in his native country, but quite profusely contributed to activities in other countries, mainly in the Americas and in Africa, too. He worked practically until his death in 2008, leaving a heritage of about 200 publications issued in various journals as well as several books, all of wide interest. Dussart started his career as a complete planktonologist, looking not only at microfauna but also at various groups of algae. As his career developed, his interest became increasingly focused on freshwater Copepoda, though never losing the overall picture of the plankton community as a whole. His openness of mind and charisma attracted a large number of collaborators with whom he published during his long career, and also imposed admiration within the scientific community.

The introductory chapter written by D. Defaye & J. C. von Vaupel Klein, allows us to understand how a successful carcinologist achieved to develop and to further communicate his ideas. The chapters that follow are written with this idea in mind, because they offer new and stimulating data for further research.

Interesting in the Defaye & von Vaupel Klein chapter is also the contribution of Dussart to the development of modern limnology, which he evoked, both in the world and, of course, in his own country. This aspect is especially useful for limnologists interested in the history of this domain, because Bernard Dussart belongs to a series of naturalists who followed, each in his or her own country, similar scientific trajectories. To my mind come the personalities of Heinz Löffler in Austria, Livia Tonolli in Italy, Herbert Fernando in Canada, Ramon Margalef in Spain, Arnold Nauwerck in Sweden, then in Austria, and also a little later Henri Dumont in Belgium. All of them were experts in both planktonic crustaceans and in general limnology, and it is not surprising that such personalities had long-lasting scientific contacts with each other and also contributed substantially to the education of the next generation of limnologists and carcinologists.

The contents of the chapters that follow the introduction will be, for the purpose of this review, roughly grouped into four themes: (1) presentation of morphological traits useful for a better comprehension of taxonomic and phylogenetic problems in various copepod groups; (2) descriptive taxonomy using modern methods; (3) aspects of developmental biology, phylogeny, and evolution of copepods; (4) ecology of copepods. I will point out features which I consider scientifically interesting and stimulating for carcinologists in general. In addition, for easy reference, I indicate all contributions according to their order in the table of contents as "Chapter" (Ch.) with a corresponding number (although they actually have no chapter nos. in the volume).

Readers will find useful information on the microstructure of copepod setation in several chapters: V. R. Alekseev & D. Defaye (Ch. 2) demonstrate this for *Eucyclops serrulatus* (Fischer) and F. Stoch & M. C. Bruno (Ch. 21) for the *Acanthocyclops vernalis* group. The authors of these chapters document how the exact mapping of microsetae, microspines, and/or spicules on the limbs (P. Drach

and F. Jacques called such cuticular structures “pseudochaetae”) can be helpful for taxonomic discrimination of populations that were considered to belong to widely distributed, polymorphic species. G. A. Boxshall & T. C. Kihara (Ch. 3) show the advantage of confocal microscopy for observation of the microstructure of the so-called antennular brush-setae, a characteristic of Eucyclopinae males.

A 3-D reconstruction of the female genitalia, in particular the seminal receptacle, is presented by C. Cuoc & D. Defaye (Ch. 6) based on two Eucyclopinae that are further compared with 10 species of Cyclopinae. The authors explore, besides the functional aspects of this complex structure, also the possibility to use it comparatively, i.e., for taxonomic purposes. R. Ranga Reddy (Ch. 20) shows that the body-chitinization in the case of harpacticoids of the genus *Parastenocaris*, can be used for both taxonomic and ecological interpretations.

Taxonomy occupies a relatively large space in this volume. Several authors describe new species or genera and some of these are named in honour of Bernard Dussart. Most of the authors offer, next to the taxonomic description, also ecological and/or phylogenetic information. This is the case for the new species *Carcinocaris dussarti* described in the chapter of V. Cottarelli & M. C. Bruno (Ch. 5), and in new harpacticoid *Paramorariopsis brigitae* that lives in a deep groundwater aquifer in contact with the karst in Slovenia, described by A. Brancelj (Ch. 4). In a study of the subterranean Parastenocarididae of Australia, T. Karanovic & J. B. Cooper (Ch. 13) present a new genus, *Dussartstenocaris*, using both morphological and molecular information. J. C. Paggi (Ch. 18) proposes a new species of diaptomid, *Idiodiaptomus dussarti*, and uses this occasion for a digression on the origin of the highly diverse diaptomid fauna in South America.

Considering the phylogeny of copepods, I have to mention the reconstruction done by G. A. Wyn-gaard, C. E. F. Rocha & A. Pepato (Ch. 22) of the relationships between the major groups of free-living cyclopoids as inferred from molecular analysis of ribosomal DNA. Aspects of the post-embryonic development of calanoids using *Pseudocyclops schminkei* as an example, offers F. D. Ferrari, S. Chullasorn & H.-U. Dahms (Ch. 7) the opportunity to discuss both the origin and the ancestry of the Pseudocyclopidae. Their analysis of the developmental trajectory of this species allows the authors to suppose that Pseudocyclopidae is the oldest extant calanoid family.

A special interest is offered by the contribution of S. Iepure & I. N. Meleg (Ch. 12), which deals with the post-naupliar development of the antennules of the stygobitic species belonging to the *Acanthocyclops kieferi* group. The authors note that within this cyclopoid group the antennular aesthetascs are shorter and occur in reduced numbers as compared to related taxa of cyclopoids from surface water habitats. This is a very unusual situation as compared to other stygobitic crustaceans. Related to this topic I have to mention the study of F. Fiers (Ch. 7), who describes the surprising morphological convergence between a complex of subterranean cyclopoid taxa from North America (inter alia, a new genus and species *Apalachocyclops minotaurus* are here documented) and the European stygobitic “speocyclopines”.

For the end of this presentation I have left the chapters dealing with ecological topics: M. Gutiérrez-Aguirre, E. Suárez-Morales, A. Cervantes-Martínez, N. Sarma & S. S. S. Sarma (Ch. 10) produced an interesting autecological study on the harpacticoid *Elaphoidella grandidieri*. They studied first the intra- and inter-population morphological variability, then also used cultures of natural and clonal populations, and thus opened the door to the idea that this widely distributed species represents a complex of cryptic species that further impose ecological studies of populations from various sites. Additionally, the fecundity of this species was studied and it was noted that this is a prolific species, which makes an interesting candidate for aquaculture, namely as fish food. D. M. P. Galassi, B. Fiasca & D. Del Tosto (Ch. 9) present a quantitative mapping of harpacticoid and cyclopoid communities in springs from central Italy. Using algorithms of multivariate statistical analysis, the authors point out that the low-land areas display a higher taxonomic diversity as compared to the high-mountain region. They also propose that for the protection of the diversity of spring copepods we have to develop environmental protection programmes that should consider

the spring as an ecological subunit of the underlying aquifer system. The problem of the extinction of copepod species leading to an impoverishment of the regional diversity of calanoids is exemplified by S. Young & C.-T. Shih (Ch. 23). In Taiwan, the apparent extinction of microcrustaceans is related to the massive transformation of paddy fields into dry lands. B. Pinel-Alloul, E. Cuson & L. Aldamman (Ch. 19) discuss the diversity and spatial distribution of copepods in the St. Lawrence River. They mention the importance of advective transport of species from the Great Lakes via Lake Ontario for the increase in species diversity in the adjacent fluvial zones of the St. Lawrence River. Additionally, those authors note that in the estuarine transition zone, where only few species occur, these do develop very abundant populations. M. Holyńska (Ch. 11) analysed species diversity of Cyclopidae according to latitudinal gradients. She found that the rather high diversity of the cyclopoid fauna of the temperate zone is due to a combined effect, viz., higher extinction in surface waters and higher survival rates for the subterranean cyclopoid fauna in those areas.

Finally, I want to mention the chapter by V. Montecino, J. P. Oyanedel, I. Vila & L. Zúñiga (Ch. 16), who present a record of the way B. Dussart and H. Löffler taught young limnologists studying zooplankton from the man-made lakes in Chile. Some of the participants of that MAB-Unesco course, held in Santiago in 1979, are now well-established teachers within their universities.

All in all, this is a remarkably well done book that should be acquired by both institutional libraries as well as by individual practitioners of carcinology. The price of the book, as for other titles of Brill's series "Crustaceana Monographs", is high, and it would be helpful, at least for young students, if the publishing house would find more flexible politics for selling the book, in some form, at cheaper prices, too.

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