

# Fossil and Modern Clam Shrimp (Branchiopoda: Spinicaudata, Laevicaudata): The World's First Clam Shrimp Symposium and a Celebration of Brian V. Timms

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This special volume of Zoological Studies is the result of a symposium entitled “Fossil and Modern Clam Shrimp” held at the midyear meeting of The Crustacean Society in May of 2019. This symposium is the first ever focusing on clam shrimp, and the first conference where both palaeontologists and biologists specialising in these animals were able to come together. The papers presented here provide insight into the palaeontology, biology, ecology, taxonomy and phylogeny of the clam shrimp. This chapter introduces the symposium, its aims, and the resulting research, presented in the subsequent chapters. In addition, in this symposium we celebrate our great friend Brian V. Timms, who has mentored so many of us, brought us on various excursions across Australia, and has done more to advance Australian branchiopod studies than anyone else in history.

**Key words:** Large branchiopods, Diplostraca, The Crustacean Society, Palaeontology, Phylogeny, Taxonomy, Ecology, Morphology.

## Introduction to the Proceedings

This special volume of Zoological Studies represents the proceedings of a special symposium “Fossil and Modern Clam Shrimp”. This symposium was held at the midyear meeting of The Crustacean Society in May of 2019, in Hong Kong at the Chinese University of Hong Kong. This symposium represents the first ever united conference on fossil and recent clam shrimp.

Clam shrimp are a collection of suborders of the Branchiopoda. Class Branchiopoda originated in marine systems sometime in the Cambrian (~488 to 510 Ma; Harvey et al. 2012) and invaded freshwater habitats sometime in the Paleozoic (Gueriau et al.

2016). Branchiopoda encompasses the orders Anostraca (fairy shrimp), the Notostraca (tadpole shrimp), Kazacharthra (Kazacharthrans<sup>†</sup>) and the Diplostraca. Order Diplostraca is further divided into the suborders Laevicaudata (smooth clam shrimp), Spinicaudata (spiny clam shrimp), Cyclestherida (tropical clam shrimp) and the Cladocera (waterfleas). The clam shrimp have the richest fossil diversity (Tasch 1969) and second greatest recent diversity (after Cladocera) of all branchiopods (Rogers 2020).

We specifically solicited contributions for this symposium from diverse disciplinary backgrounds, including palaeontology, taxonomy, systematics, phylogeny, morphology, physiology, behaviour, ecology, biomechanics, and developmental biology.

Unfortunately, we were not able to find authors to cover all three clam shrimp suborders; the Cyclestherida are not represented here. But it was not for lack of trying.

### Brian V. Timms

We chose to honour and celebrate our dear friend and colleague Prof. Brian Victor Timms, Ph.D, D.Sc in this symposium. Both the symposium and the proceedings are in honour and recognition of his incredible knowledge, research, and publications concerning the Branchiopoda of Australia. The announcement, coupled with his happy astonishment, at the beginning of the symposium brought several minutes of applause from the sixty or so attendees. Brian has been a dear friend and mentor to all students of the Branchiopoda, and he has taken many of us on long excursions across various parts of Australia, and especially his beloved Paroo Desert. Brian has and continues to produce paper after paper on the biology, ecology and taxonomy of these amazing animals. No other researcher has invested so much in the branchiopod fauna of their region.

Of the Australian branchiopod crustacean fauna, Brian described (alone or with others) 30 of the 62 Australian anostracan species, and one anostracan genus. He has described four of the six Australian

laevicaudatan clam shrimp species. He has described 40 of the 69 Australian spinicaudatan clam shrimp species, and one of the genera. On top of that, he has described 17 species and five genera of Australian cladocerans. And in 1976, the late Nikolai Smirnov described the cladoceran *Echinisca timmsi* in Brian's honour; in 2008, a cnidarian was named after him: *Cladonema timmsi* Gershwin & Zeidler, and in 2012, the cladoceran *Extremalona timmsi* Sinev & Shiel was named in his honour (a species that lives in hypersaline lakes with a pH near 3!). In total, Brian has had around a dozen species named in his honour. Since the year 2000, Brian Timms discovered and described some 54% of the fairy shrimp and clam shrimp diversity of Australia and New Zealand. He has more than 180 publications, and still has more to do!

Brian Timms originally completed his Ph.D in comparative limnology and he wrote a definitive book on Lake Geomorphology. Brian received his B.Sc. (Hons) from the University of Queensland, his Ph. D (in 1972) from Monash University, and his D.Sc from University of Queensland. Brian lectured at the University of Newcastle and Avondale College, even after retirement, and now is an adjunct professor at the University of New South Wales. He also engaged in some environmental consulting.

Between 1967 and 2000, he wrote 71 papers, with the occasional zoological focus (cladocerans, copepods,



**Fig. 1.** Prof. Dr. Brian Timms in his natural habitat: Sue's Clay Pan, Bloodwood Station, New South Wales, Australia, 24 July 2014 (photo by D.C. Rogers).

aquatic beetles), and only one paper on clam shrimp (reporting *Cyclestheria* from Australia) in all that time. In Timms (1992), he wrote the definitive textbook on lake geomorphology. After 2000, Brian became fascinated with the large branchiopods, and travelled the length and breadth of Australia to find them, publishing 110 papers in this time period, almost entirely focused on these crustaceans.

Although Brian's focus has always been Australia, he has explored the world, often with many of us, hunting for large branchiopods in the field and in museums. Brian is a great mentor, collaborator, reviewer, encourager, and friend. And he is tremendous fun in the field (Fig. 1)!!

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