

## ANNOTATED CHECKLIST OF ANOMURAN DECAPOD CRUSTACEANS OF THE WORLD (EXCLUSIVE OF THE KIWAOIDEA AND FAMILIES CHIROSTYLIDAE AND GALATHEIDAE OF THE GALATHEOIDEA) – PREAMBLE AND SCOPE

### **Patsy A. McLaughlin**

*Shannon Point Marine Center, Western Washington University, 1900 Shannon Point Road, Anacortes, WA 98221-4042, USA*  
Email: hermit@fidalgo.net

### **Christopher B. Boyko**

*Department of Biology, Dowling College, 150 Idle Hour Blvd., Oakdale, NY 11769, USA*  
Email: cboyko@amnh.org

### **Keith A. Crandall**

*Department of Biology and Monte L. Bean Life Science Museum  
401 Widtsoe Building, Brigham Young University, Provo, UT 84602, USA*  
Email: keith.crandall@byu.edu

### **Tomoyuki Komai**

*Natural History Museum and Institute, Chiba, 955-2 Aoba-cho, Chuo-ku, Chiba, 260-8682 Japan.*  
Email: komai@chiba-muse.or.jp

### **Rafael Lemaitre**

*Department of Invertebrate Zoology, National Museum of Natural History, Smithsonian Institution,  
4210 Silver Hill Road, Suitland, Maryland 20746, USA*  
Email: lemaitrr@si.edu

### **Masayuki Osawa**

*Research Center for Coastal Lagoon and Environments, Shimane University,  
1060 Nishikawatsu-cho, Matsue, Shimane 690-8504, Japan*  
Email: osawam@soc.shimane-u.ac.jp

### **Dwi Listyo Rahayu**

*UPT Mataram, Indonesian Institute of Sciences (LIPI), Teluk Kodek, Pemenang, Lombok Barat 83352, NTB, Indonesia*  
Email: dwilistyo@yahoo.com

**ABSTRACT.** – Annotated checklists of the world’s Recent anomuran crustacean superfamilies Aegloidea, Hippoidea, Lithodoidea, Lomisoidea, Paguroidea and galatheoid family Porcellanidae are presented. Each is accompanied by brief reviews of the historical aspects of its classification, general external morphology, features of larval development and current phylogenetic status. This presentation is divided into four parts because the only unifying threads among the Aegloidea, Hippoidea, Porcellanidae and the crab-like Lithodoidea and Lomisoidea are their shared anomuran apomorphies and mutually exhibited, but independently evolved, carcinization. That carcinization similarly links the latter two superfamilies with the Paguroidea is still a passionately debated matter that will be briefly addressed, but certainly not resolved. The checklists include all currently recognized valid species, primary synonyms and homonyms, notes on matters of confusion and/or misunderstanding, and complete bibliographic references to all original descriptions. The lists are enhanced by a collection of photographs depicting the variety exhibited by members of these taxa.

**KEY WORDS.** – Checklists, valid taxa, primary synonyms, homonyms.

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### **PREAMBLE**

While the Brachyura Linnaeus, 1758 may claim the highest degree of diversity seen among decapod crustaceans (Ng et al., 2008), the Anomura certainly exhibits the greatest disparity within the Order Decapoda Latreille, 1802 despite being adjudged a monophyletic infraorder by both morphological and molecular studies (Scholtz & Richter,

1995; Schram, 2001; Dixon et al., 2003; Ah Yong & O’Meally, 2004; Porter et al., 2005; McLaughlin et al., 2007; Ah Yong et al., 2009; Bracken et al., 2009). Their evolutionary novelties notwithstanding, anomurans often have been united through the process of carcinization — the development of a crab-like body form. As originally hypothesized by Borradaile (1916), carcinization was not perceived as the process by which a hermit crab abandoned its gastropod carcinoecium and was

transformed into a free-living lithodid crab, although that is the interpretation that has evolved. Borradaile's focus was on the unusual and atypical hermit crab genus *Porcellanopagurus* Filhol, 1883, and he considered its crab-like appearance quite independent of carcinization in other anomurans. Borradaile (1916) interpreted the widening of the sternite of its third maxillipeds as the first step in carcinization. Further advances included broadening of the cephalothorax and accompanying calcification. He gave only passing attention to reduction and carriage of the pleon, a principal element in the current definition of carcinization.

Although the restrictive "hermit to king" hypothesis still prevails in many analyses, there also is morphological and molecular evidence to support the belief that carcinization evolved independently in more than one major anomuran taxon (e.g., Sternberg, 1996; McLaughlin & Lemaitre, 1997; Morrison et al., 2002). However, a detailed discussion of carcinization is not appropriate for these checklists. Suffice it to say that while members of all of these major taxa exhibit certain attributes of the phenomenon of carcinization, each is provided with morphological characters that set it apart from the others, and all in turn are set apart from the Brachyura by the synapomorphies of Anomura listed below.

In general terms, the Anomura are best described as having an assortment of adult body shapes from lobster-like to true crab-like. About the only universally shared characters are the marked reduction of fifth pereopods that are not used as ambulatory appendages, the articulated or missing eighth thoracic sternite and the cephalothorax that is not fused to the epistome as it is in brachyurans. The reduction of the fifth pereopods, however, is not exclusively an anomuran character; it also is seen in the basal Brachyura. The anomuran cephalothorax may be weakly to well calcified and the carapacial coverings varying in extent, shape and ornamentation. The anomuran pleon exhibits similar plasticity, from moderately well calcified with clearly identifiable pleura to membranous with little if any visible evidence of segmentation. The pleon may be carried posteriorly, twisted to accommodate an external covering such as a gastropod shell, or tightly tucked under the cephalothorax. Like brachyurans, anomurans occupy a broad spectrum of habitats from terrestrial atolls to abyssal seas and while the majority of species are marine, some also have colonized terrestrial and freshwater environments.

Classifications of this major group of decapods, like the hierarchical names themselves and their authorships, have been controversial. McLaughlin & Holthuis (1985) reviewed the histories and applications of both *Anomala* Latreille, 1817 and *Anomura* MacLeay, 1838, and concluded that as rules of nomenclature did not apply above the family level, the junior name *Anomura*, which had more common usage, should be adopted for those decapods represented by the Galatheaidea Samouelle, 1819, Hippoidea Latreille, 1825, Lomisoidea Bouvier, 1895 (as Lomoidea) and Paguroidea Latreille, 1802. And while, with few exceptions, the *Anomura* (or *Anomala*) always has been comprised of the hippids, galatheids and pagurids, in the past, for one author or another

it also has included, or excluded, the porcellanids, lithodids, thalassinids, *Lomis* H. Milne Edwards, 1837, dromiids, homolids and raninids. Numerous authors, including McLaughlin (1980) and Bowman & Abele (1982) incorrectly credited authorship of the *Anomura* to H. Milne Edwards (1832). With the acceptance by Martin & Davis (2001) of *Anomura* in their "Updated Classification of the Recent Crustacea" this infraordinal name has increasingly gained favorable reception and its correct authorship recognized. In these checklists, while we concur with Martin & Davis in the use of *Anomura*, we have adopted the classification of McLaughlin, et al. (2007) for the family group taxa, as did De Grave et al. (2009).

## SCOPE

With the exceptions the superfamily Kiwaoidea and families Chirostylidae and Galatheaidea of the superfamily Galatheaidea, treated elsewhere (Baba et al., 2008), annotated checklists of the Recent anomuran crustacean superfamilies of the world, are presented. These checklists are limited to the currently recognized valid taxa in each superfamily or family; the format utilized follows that of Ng et al.'s (2008) *Systema Brachyurorum: Part I*. Each major taxon is introduced with brief summaries of its morphological attributes, larval development and current phylogenetic status. At the family group level, we have provided what we believe to be complete lists of synonyms. At the genus group level, we have provided the current valid names together with their primary synonyms, type species and gender. At the species group level, the currently accepted binomials are given as well as primary synonyms and homonyms, and any misspelling that we are aware of. When generic names have changed, the original genus is indicated in square brackets, following the entry, but no attempt has been made to trace all generic transfers, misidentifications and/or misinterpretations by subsequent investigators. For each of the entries, the original reference is given in the Literature Cited. If a name is preoccupied by a senior homonym, the senior name and its reference also are given. For each family, a series of notes is provided to clarify points of confusion and/or misunderstanding. These are indicated by bracketed { } numbers following the specific taxa that correspond to the same numbers in the Notes section for that family.

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A. Anker	C. Lukhaup
P. Bacchet	M. Marmach
C. B. Boyko	J. W. Martin
T. -Y. Chan	M. Mitsugi
R. Cléva	S. Ohta
K. A. Crandall	M. Osawa
J. -F. Dejouannet	G. Paulay
D. L. Felder	J. Poupin
D. Fenolio	T. Smit
O. Gargominy	H. Tachikawa
G. Jensen	S. Thurston
T. Komai	C. d'Udekem d'Acoz
R. Lemaitre	

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