

# Introduction

## 1 Classification

Depending on the view of the higher classification of Crustacea, ostracods are classified as a subclass of the class Maxillopoda (Schram 1986; Brusca and Brusca 1990) or as a separate class (Forest 1994; Martin and Davis 2001) within the subphylum Crustacea. In the first case, ostracods are grouped together with tantulocarids, branchiurans, mystacocaridans, copepods, facetotectans, rhizocephalans, ascothoracidans, acrothoracicans, and thoracicans. McKenzie et al. (1983) classify ostracods into Entomostraca, together with Branchiopoda, Cirripedia, Branchiura, and Phyllocarida. Ostracods are here accepted as a separate class within Crustacea. According to Maddocks (1982) ostracods are divided into four orders: Myodocopida Sars 1866, Platycopida Sars 1866, Palaeocopida Henningsmoen 1953, and Podocopida Sars 1866. On the other hand, Martin and Davis (2001) and Horne et al. (2002) divide the class into subclass Myodocopa (with orders Myodocopida and Halocyprida) and Podocopa (with orders Platycopida, Podocopida, and Palaeocopida). Subclass Myodocopa has only marine representatives. Within the subclass Podocopa, Platycopida has almost only marine species (a very few brackish water species), Palaeocopida is known almost exclusively from fossils, and Podocopida has representatives in both fresh and marine environments. The Order Podocopida is treated in this book and its classification presented below (Table 1) follows Martens et al. (1998), Meisch (2000), and Horne et al. (2005). Letters after the names indicate the type of environment where representatives of a certain taxon can be found: “m” for marine species, and “f” for freshwater. Those with only marine representatives or commensal species are not considered further in the systematic part of the book, but, nevertheless, a key to all podocopid superfamilies as well as their general morphology is provided in this book.

**Table 1** Classification of the recent Ostracoda (only the podocopid lineages are listed below the suborder level)

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Class Ostracoda Latreille 1802
Subclass Myodocopa Sars 1866 m
Order Myodocopida Sars 1866
Suborder Myodocopina Sars 1866
Order Halocyprida Dana 1852
Suborder Halocypridina Dana 1852
Suborder Cladocopina Sars 1866
Subclass Podocopa Sars 1866 m/f
Order Platycopida Sars 1866 m
Order Podocopida Sars 1866 m/f
Suborder Bairdiocopina Sars 1866 m
Superfamily Bairdioidea Sars 1866
Family Bairdiidae Sars 1866
Family Bythocyprididae Maddocks 1969
Suborder Cytherocopina Baird 1850 m/f
Superfamily Cytheroidea Baird 1850 m/f
Family Bythocytheridae Sars 1866 m
Family Cobanocytheridae Schornikov 1975 m
Family Cuneocytheridae Mandelstam 1959 m
Family Cushmaniidae Puri 1974 m
Family Cytherettidae Triebel 1952 m
Family Cytheridae Baird 1850 m
Family Cytherideidae Sars 1925 m/f
Family Cytheromatidae Elofson 1938 m
Family Cytheruridae Müller 1894 m
Family Entocytheridae Hoff 1942 f (living commensally on other crustaceans)
Family Eucytheridae Puri 1954 m
Family Hemicytheridae Puri 1953 m
Family Kliellidae Schäfer 1945 f
Family Krithidae Mandelstam 1960 m
Family Leptocytheridae Hanai 1957 m/f
Family Limnocytheridae Klie 1938a f
Family Loxoconchidae Sars 1925 m/f
Family Microcytheridae Klie 1938a m
Family Neocytheridae Puri 1957 m
Family Paracytherideidae Puri 1957 m
Family Paradoxostomatidae Brady and Norman 1889 m
Family Parvocytheridae Hartmann 1959 m
Family Pectocytheridae Hanai 1957 m
Family Psammocytheridae Klie 1938a m
Family Schizocytheridae Howe 1961 m
Family Trachyleberididae Sylvester-Bradley 1948 m
Family Xestoleberididae Sars 1928 f/m
Superfamily Terrestrialcytheroidea Schornikov 1969 m

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(continued)

**Table 1** (continued)

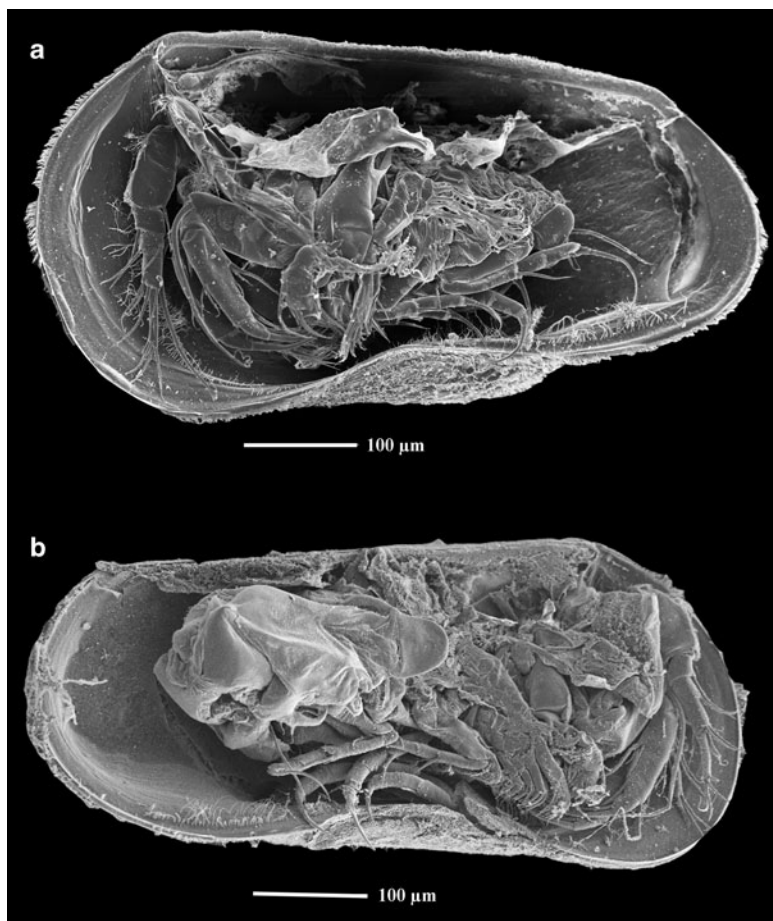
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Family Terrestrialcytheridae Schornikov 1969
Suborder Darwinulocopina Sohn 1987 f
Superfamily Darwinuloidea Brady and Norman 1889
Family Darwinulidae Brady and Norman 1889
Suborder Cypridocopina Jones 1901 m/f
Superfamily Cypridoidea Baird 1845 m/f
Family Candonidae Kaufmann 1900a m/f
Family Cyprididae Baird 1845 f
Family Ilyocyprididae Kaufmann 1900a, f
Family Notodromadidae Kaufmann 1900a, f
Superfamily Macrocypridoidea Müller 1912 m
Family Macrocyprididae Müller 1912
Superfamily Pontocypridoidea Müller 1894 m
Family Pontocyprididae Müller 1894
Suborder Sigilliocopina Martens 1992c m
Superfamily Sigillioidea Mandelstam 1960
Family Sigilliidae Mandelstam 1960

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## 2 Basic Morphology

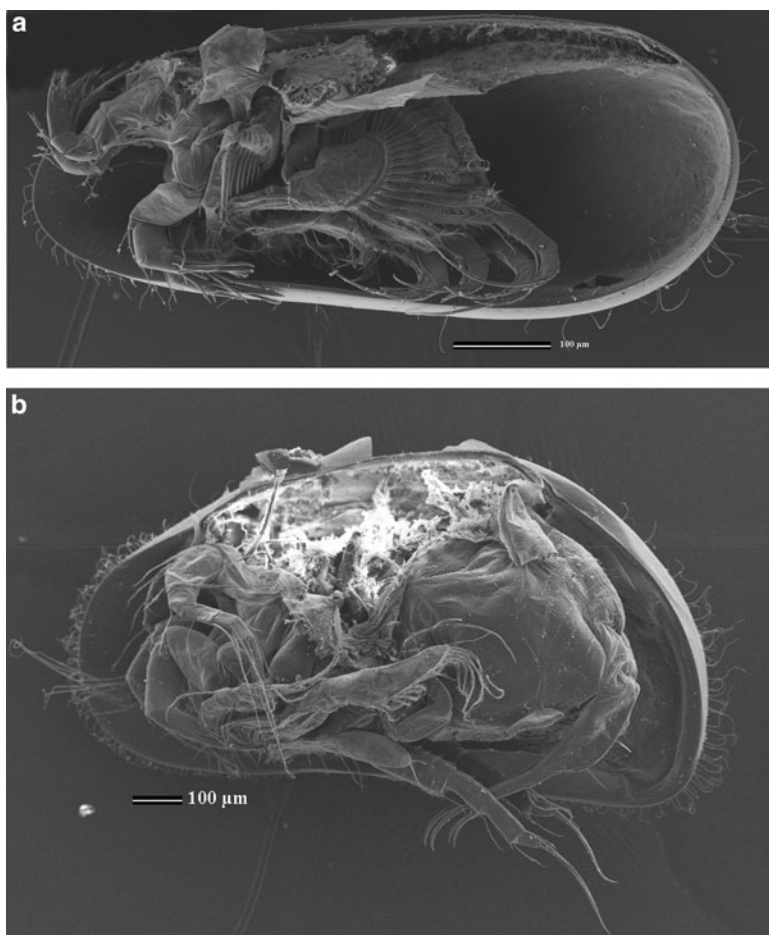
As in many crustacean groups there is no standard terminology that is in universal use. Specialists working on Suborder Cytherocopina tend to have different terminology to the ones working on the Suborder Cypridocopina. Obviously in an overview, such as this book, a standard terminology needs to be adopted. Horne et al. (2002) already attempted to establish a consistent terminology for all ostracods. In this book, standard terms used for all other crustaceans describing a general structure of the crustacean appendage (endites, protopod, exopod, endopod, epipod, and segments) are used here as well. The terminology applied here for the ostracod limbs is a combination of the standard terms used by many modern authors in their publications. Descriptions of the limb chaetotaxy are based on the nomenclature proposed by the following authors: Broodbakker and Danielopol (1982), Martens (1987a), Meisch (1996, 2007), Rossetti and Martens (1996), and Karanovic (2007). Nomenclature used for the carapace surface structures follows Sylvester-Bradley and Benson (1971). However, not all terms defined by the latter authors are described here as they are applicable mostly for the marine taxa of the suborder Cytherocopina and are not developed on the shells of the freshwater species. General morphology and structure of the valves are the same as in Meisch (2000). In this chapter, each appendage is compared between the three superfamilies found in the freshwaters: Cytheroidea, Darwinuloidea, and Cypridoidea, with some remarks on other ostracods (Figs. 1–3).



**Fig. 1** *Paralimnocythere karamani* (Petkovski 1960a), SEM: (a) inside view of the adult ♀; (b) inside view of the adult ♂.

## 2.1 Carapace

The ostracod body is enclosed between two calcified valves that are connected in the dorsal part with simple chitinous, like in Cypridoidea, or complex calcite nonslip locking device (hinge), like in Cytheroidea. As in other crustaceans, the cuticle of the carapace is mineralized with low magnesium calcium carbonate in the form of calcite. The calcified shell consists of small crystallites embedded in a chitinous and protein matrix. The shell can be almost completely built of calcite crystals or composed of parallel chitinous lamellae together with a layer of crystallite. The carapace is an important functioning part of the ostracod anatomy, it encapsulates and protects the animal from predators, provides additional stability for the benthic way of life, and forms an integral part of the exoskeleton, providing anchorage



**Fig. 2** A, *Darwinula stevensoni* (Brady and Robertson 1870), (a) inside view of the adult ♀; (b), *Candona lindneri* Petkovski 1969, inside view of the adult ♀.

points for some muscles of the limbs. Ostracods keep almost all their soft parts within the valves, but sometimes even substantial parts of uropodal rami, walking and cleaning legs, as well as the first and the second antenna, can be seen protruding through the valves (Fig. 4). Ostracods are enclosed in the carapace even in the first instar of their development. The carapace is formed by two lateral folds of the epidermis, originating dorsally in the head region. These folds or *duplicature* have an inner and an outer lamella. The space between the two lamellae is an extension of the body which in some taxa may house certain reproductive and digestive organs. The outer lamella is well calcified throughout, while the inner lamella has uncalcified and calcified parts (Fig. 5a). The calcified inner lamella is an extension of the calcified outer lamella, i.e., they are continuous with one another, and the only difference between the two lamellae can be found in the disposition of their cells and

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