

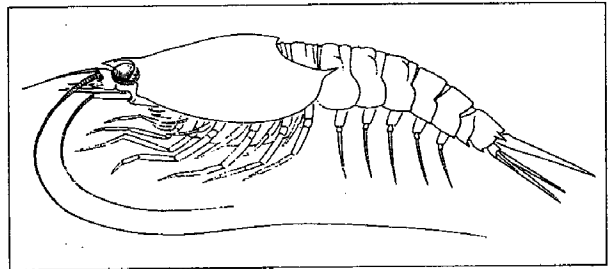
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Lophogastrida (Crustacea) of the Gulf of Mexico

W. Wayne Price, Richard W. Heard, Pål Aas, and Kenneth Meland

The order Lophogastrida is a relatively small group of malacostracan crustaceans, consisting of about 55 pelagic and bottom-associated deepwater species, formerly contained as a suborder within the Mysidacea. Both the orders Mysida and Lophogastrida are shrimplike in appearance, and because the ovigerous females carry developing embryos in a ventral brood pouch, from which their developed juveniles emerge, they are often referred to as "opossum shrimp." Lophogastrids have a worldwide oceanic distribution. Members feed principally on zooplankton but are also known to have a raptorial feeding habit, and some species appear to be bottom scavengers. Compared to the Mysida, members of the order are relatively large (1–8 cm) with at least one species, *Gnathophausia ingens*, reaching lengths of 35 cm (Mauchline 1980, Schram 1986, Brusca and Brusca 2003).

Lophogastrida are defined by the combination of the following morphological characteristics: (1) well-developed carapace extending over most or all of thorax, fused to no more than the anterior 4 thoracic somites; (2) right mandible without *lacinia mobilis*; (3) thoracopod 1 forming a maxilliped; (4) thoracomere 1 not separated from the head by an internal skeletal bar; (5) gills present on most thoracopods; (6) marsupium with 7 pairs of oostegites; (7) well-developed, biramous pleopods in both sexes, male pleopods not modified; (8) statocysts absent on uropodal endopods (W. Tattersall 1951, Schram 1986, Nouvel, Casanova, and Lagardère 1999, Brusca and Brusca 2003, Richter 2003).



Lophogastrida. After Faxon 1895.

Banner (1954), in his synopsis of the Mysidacea of the Gulf of Mexico (GMx), listed 3 species of lophogastrids, *Lophogaster americanus* Tattersall, 1951, *L. longirostris*, and *Gnathophausia ingens*. *Lophogaster americanus* is now considered a synonym of *L. longirostris* (see O. Tattersall 1960). *Gnathophausia zoea* was not included in Banner's list, but was reported by Tattersall in 1951 from 2 locations in the Gulf. Since 1954, 6 additional species have been recorded from Gulf waters in taxonomic, ecological, and distributional reports. *Eucopia grimaldii*, *E. australis* (= *E. major* Hansen, 1910 [see Fage 1942, O. Tattersall 1955]), *E. sculpticauda*, *E. unguiculata*, *Chalaraspidium alatum*, and *Gnathophausia gracilis* were collected with shrimp trawls (Springer and Bullis 1956) and Tucker trawls (Hopkins and Lancraft 1984, Hopkins et al. 1994) in the northeastern Gulf of Mexico. Additionally, Spears et al. (2005) used *Gnathophausia zoea*, *Gnathophausia ingens*, and *Eucopia* sp. (identified to *E. unguiculata* by K. Meland) from the GMx in their studies on peracarid

phylogeny. At present, 9 nominal species of Lophogastrida are recognized from the GMx, and no invasive species are known in these waters.

In 1957, Gordan was the first to produce a world list and bibliography of the Mysidacea (Lophogastrida and Mysida). Since that time, the species list and literature have been updated by Beeton and Clarke (1973), Mauchline and Murano (1977), Mauchline (1980), and Müller (1993).

Although the Lophogastrida are generally accepted to be monophyletic (Richter 1994, 2003, Casanova, De Jong, and Faure 1998), the phylogenetic relationship between the Mysida and Lophogastrida and their inclusion within the Peracarida is highly controversial. Based on suggested relationships to fossil forms such as the Pygocephalomorpha (Taylor, Schram, and Yan-bin 2001), the Lophogastrida are generally considered to be the most primitive of the Mysidacea. Recent phylogenetic studies based on morphological and molecular data suggest that the order Mysidacea is polyphyletic and represents 2 orders, the Lophogastrida and Mysida (Sieg 1983, Watling 1983, 1999, Schram 1984, 1986, Jarman et al. 2000, Taylor, Schram, and Yan-bin 2001, Brusca and Brusca 2003, Spears et al. 2005). In effect, the inclusion of the Mysida and/or Lophogastrida in the Peracarida has been questioned on both morphological (Watling 1983, 1999) and molecular grounds (Jarman et al. 2000, Spears et al. 2005). Other authorities support the unity of the Mysidacea as a monophyletic group and, based on morphological evidence, argue that the mysidaceans should be retained within the Peracarida (Richter 1994, De Jong-Moreau et al. 2000, De Jong-Moreau and Casanova 2001, Richter and Scholtz 2001). Despite the controversy on phylogenetic placement, monophyly of the Lophogastrida and Mysida as separate lineages is widely accepted, and in the most recent classification of the Crustacea, are therefore treated as 2 separate orders within the Peracarida (Martin and Davis 2001).

Lophogastrida have traditionally been treated as 2 families, Lophogastridae and Eucopiidae. In 1984, Udrescu split the Lophogastridae by proposing a new family, Gnathophausiidae, to include members of the genus *Gnathophausia*. This suggestion has been followed by some workers (Wittmann et al. 2004) but not others (Casanova 1993, 1996, 1997, De Jong and Casanova 1997, Casanova, De Jong, and Faure 1998, Nouvel, Casanova, and Lagardère 1999, De Jong-Moreau and Casanova 2001). However, because no argument was given for the rejection of the proposed family Gnathophausiidae, the usage

of this family is still highly subjective. In 1992, Petryashov, based on morphological evidence and an earlier discussion by O. S. Tattersall (1955), transferred *Gnathophausia gigas* and *G. ingens* to a new genus *Neognathophausia*. Casanova, De Jong, and Faure (1998) examined the relationships of the Lophogastridae and Eucopiidae using morphological and molecular data from species of *Gnathophausia* and *Eucopia*. Their results showed a sister-group relationship between *G. gracilis* and all other *Gnathophausia* that included a monophyletic *G. gigas* and *G. ingens* group. Following these results, the exclusion of both of these species from the *Gnathophausia* would make the genus *Gnathophausia* paraphyletic. Casanova, De Jong, and Faure (1998) rejected the genus *Neognathophausia* and also concluded that the Eucopiidae originated from the Lophogastridae.

Most Gulf of Mexico records for the order are based on specimens collected in mid- or deepwater trawls. The taxa thus far identified from Gulf waters are cosmopolitan species, and with the possible exception of *Lophogaster longirostris*, are pelagic.

Relatively little epibenthic and hyperbenthic sampling has been done in the Gulf region, and most that has been done has not utilized gear such as epibenthic sledges with fine-mesh netting, gear suitable for exploring the bottom fauna and consequently recording the possible presence of bottom-living lophogastrids. The only published studies in which bottom trawls or dredges were used were those of Springer and Bullis (1956), Tattersall (1951), and Faxon (1896), but this gear was apparently more suited (mesh size) for the collection of larger crustaceans, such as decapods. This possible artifact of sampling may be the reason that only one species of *Lophogaster*, a genus containing some hyperbenthic species (e.g., *Lophogaster typicus* (Tattersall and Tattersall, 1951)), is presently known from the region. It would be useful in future deep-water sampling in the Gulf if epibenthic sledges could also be employed as part of the general sampling regime.

At present there are no known endemic species of Lophogastrida from the Gulf of Mexico (see the taxon summary). If any endemics should occur in the Gulf basin, it is most probable that they will be species associated with the bottom rather than pelagic forms, as these are fairly well sampled for most parts of the Gulf.

Abbreviations

All taxa are listed in an alphabetical sequence. The habitat/biology descriptors used in the checklist are indicated

by the following abbreviated codes: ocs = oceanic surface and epipelagic; dps = deep sea; plg = pelagic. All numbers for depths are rounded to the nearest meter, appear in roman, and are restricted to records from within the Gulf of Mexico. Overall geographic distribution of each species is indicated by the following abbreviated codes: A = Atlantic; AN = Antarctic; I = Indian; M = Mediterranean; and P = Pacific. Gulf of Mexico distributional ranges for lophogastrids, a group that generally occurs beyond the continental shelf in oceanic waters, are indicated by the quadrants, nw, ne, sw, and se.

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Taxonomic summary for Lophogastrida of the Gulf of Mexico.

Component subgroups	Total species	Number endemic species
Family Eucopiidae	4	0
Family Lophogastridae	5	0

Checklist of Lophogastrida from the Gulf of Mexico.

Taxon	Habitat-Biology	Depth (m)	Overall geographic range	GMx range	References/Endnotes
Order: Lophogastrida					
Family: Eucopiidae					
<i>Eucopia australis</i> Dana, 1852	dps, plg	800–1701	A, AN, I, P	ne	11, 14, 15, 32
<i>Eucopia grimaldii</i> Nouvel, 1942	dps, plg	1518–1701	A, AN, I, M, P	ne	15, 32
<i>Eucopia sculpticauda</i> Faxon, 1893	dps, plg	500–1770	A, I, P	nw, ne, se	12, 14, 15, 32
<i>Eucopia unguiculata</i> (Willemoes-Suhm, 1875)	dps, plg	550–1870	A, AN, I, M, P	ne	14, 15, 17, 22, 31, 32, 33, 36
Family: Lophogastridae					
<i>Chalaraspidium alatum</i> (Willemoes-Suhm, 1876)	dps, plg	1426–1701	A, AN, P	ne	32
<i>Gnathophausia gracilis</i> Willemoes-Suhm, 1875	dps, plg	1426	A, I, P	ne	32
<i>Gnathophausia ingens</i> (Dohrn, 1870)	dps, plg	300–3552	A, I, P	ne, sw	14, 15, 31, 32, 35
<i>Gnathophausia zoea</i> Willemoes-Suhm, 1873	dps, plg	779–3410	A, I, P	ne, se	31, 35
<i>Lophogaster longirostris</i> Faxon, 1896	ocs, dps, plg	161–358	New England to Puerto Rico	ne, se	12, 32, 34