

## **INTRODUCTION TO 'MESOGASTROPODS'**

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## 1. INTRODUCTION

In the 'classical' systematic arrangement of the Gastropoda (Thiele, 1929-1935), the Mesogastropoda was an order within the subclass Prosobranchia and this classification can still be found in many textbooks. However, new ideas about evolutionary relationships among the major groups of gastropods, and efforts to make classifications more consistent with these relationships (i.e. to achieve a phylogenetic classification), have brought about a revision of the classification. The 'mesogastropods' are now believed to be a paraphyletic group within the order Caenogastropoda (= most of the 'mesogastropods' and 'neogastropods') (Ponder & Lindberg, 1997). Since only monophyletic groups are accepted in phylogenetic classifications, the term 'mesogastropods' is now used only as a convenient designation for an informal group of 'lower' Caenogastropoda, or in other words for the caenogastropods excluding the monophyletic Neogastropoda.

## 2. DEFINITION OF MESOGASTROPODA

Since the mesogastropods are not a 'natural' (i.e. monophyletic) group, it is hard to define them precisely. Furthermore, they are the largest of the 'classical' gastropod orders and highly diverse in their structure and habits. Their attributes include:

- i) Shell: porcellanous (not nacreous, i.e. 'pearly', internally); usually spiral, but sometimes limpet-shaped or even absent; aperture of spiral forms usually has an anterior canal only (or sometimes an entire margin with no canals); columella usually without folds.
- ii) Animal: single left monopectinate ctenidium present; one or two pairs of salivary glands, behind nerve ring; stomach often has a style; sexes usually separate, male often with penis, fertilization usually internal, egg capsules usually present; operculum usually present and corneous.
- iii) Radula: taenioglossate (2-1-1-1-2), occasionally ptenoglossate (n-0-n) (suborder

Ptenoglossa) or absent (Eulimidae).

- iv) Habitat: mostly marine, but also widespread in fresh water; relatively few on land.

## 3. CLASSIFICATION OF 'MESOGASTROPOD' FAMILIES

One of several alternative classifications of mesogastropod families is as follows (based largely on Ponder & Warén, 1988). (t = terrestrial; f = freshwater; \* see account of some families below).

### Superorder Caenogastropoda

#### ORDER ARCHITAENIOGLOSSA

##### Superfamily Cyclophoroidea

- Cyclophoridae (t)
- Neocyclotidae (t)
- Neopupidae (t)
- Craspedopomatidae (t)
- Diplommatinidae (t)
- Pupinidae (t)
- Aciculidae (t)

##### Superfamily Ampullarioidea

- Viviparidae (f)
- Ampullariidae (f)

#### ORDER NEOTAENIOGLOSSA

##### Suborder Discopoda

##### Superfamily Loxonematoidea

- Abysochrysidae

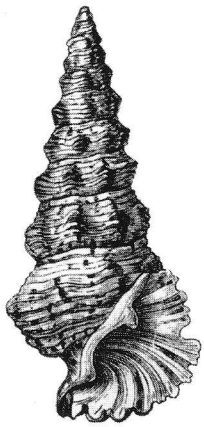
##### Superfamily Cerithioidea

- Campanilidae
- Diastomatidae
- Dialidae
- Obtortionidae
- Scaliolidae
- Dialidae
- Litiopidae
- Cerithiidae\*
- Potamididae\*
- Batillariidae
- Cerithideidae
- Thiaridae (f)
- Pachychilidae (f)
- Melanopsidae (f)
- Syrnolopsidae
- Planaxidae\*

- Fossaridae  
 Modulidae  
 Turritellidae  
 Siliquariidae  
 Superfamily Littorinoidea  
 Zerotulidae  
 Littorinidae\*  
 Pomatiasidae (t)  
 Annulariidae (t)  
 Skeneopsidae  
 Superfamily Cingulopsoidea  
 Eatoniellidae  
 Cingulopsidae  
 Rastodontidae  
 Superfamily Rissosoidea\*  
 Anabathridae  
 Emblandidae  
 Barleeidae  
 Rissoidae  
 Bithyniidae (f)  
 Hydrobiidae (f)  
 Pyrgulidae (f)  
 Truncatellidae (t)  
 Assimineidae (f)\*  
 Pomatiopsidae (f)  
 Falsicingulidae (f)  
 Iravadiidae (f)  
 Hydrococcidae (f)  
 Stenothyridae (f)\*  
 Elachisinidae  
 Epigridae  
 Tornidae  
 Vitrinellidae  
 Adeorbidae  
 Caecidae  
 Pickworthiidae  
 Superfamily Stromboidea  
 Aporrhaiidae  
 Struthiolariidae  
 Strombidae\*  
 Seraphidae  
 Superfamily Vanikoroidea  
 Hipponicidae  
 Vanikoridae  
 Superfamily Calyptraeidea  
 Calyptraeidae\*  
 Capulidae
- Superfamily Xenophoroidea  
 Xenophoridae  
 Superfamily Vermetoidea  
 Vermetidae\*  
 Superfamily Cypraeoidea  
 Cypraeidae\*  
 Ovulidae  
 Superfamily Lamellarioidea  
 Triviidae  
 Lamellariidae  
 Pseudosacculidae  
 Superfamily Naticoidea  
 Naticidae\*  
 Superfamily Tonnoidea  
 Cassidae\*  
 Tonnidae\*  
 Ficidae  
 Ranellidae\*  
 Personidae  
 Bursidae  
 Laubierinidae
- Suborder Heteropoda\*  
 Superfamily Carinarioidea  
 Atlantidae\*  
 Carinariidae\*  
 Firolidae  
 Pterosomatidae  
 Suborder Ptenoglossa  
 Superfamily Triphoroidea\*  
 Triforidae  
 Sherborniidae  
 Cerithiopsidae\*  
 Triphoridae\*  
 Superfamily Janthinoidea  
 Epitoniidae\*  
 Janthinidae  
 Aclididae  
 Superfamily Eulimoidea  
 Eulimidae\*

#### 4. NOTES ON SOME OF THE MOST IMPORTANT MARINE 'MESOGASTROPOD' FAMILIES

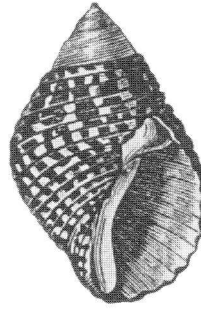
Illustrations from Chenu (1859, *Manuel de Conchyliologie*, vol. 1) and Wilson (1993). For additional notes on habits and anatomy of families, see Boss (1982).



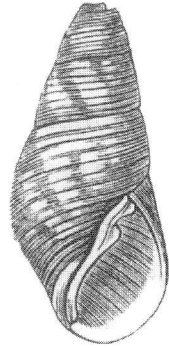
*Rhinoclavis  
fasciatus*  
(70 mm)



*Cerithium  
nodulosum*  
(100 mm)



*Planaxis sulcatus*  
(20 mm)



*Fissilabia  
decollata*  
(30 mm)

### Family Cerithiidae

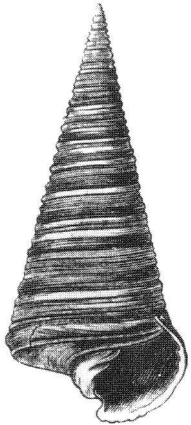
Shell medium to large, narrow, elongate, granular sculpture, short anterior canal; peristome thickened, often forming varices; operculum paucispiral. Herbivorous, grazing on algae. Genera include *Cerithium* and *Clypeomorus* (hard substrate), *Rhinoclavis* (in sand of seagrass beds and reefs).

References: Houbrick (1978, 1985, 1992)

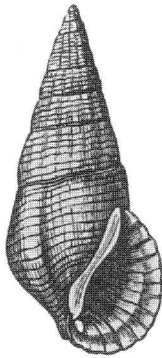
### Family Planaxidae

A small family of turbanate shells, smooth or with spiral grooves, resembling Littorinidae, but with anterior canal. Found intertidally under stones. Females brood eggs in pouch within head. *Fissilabia* has a decollate (broken off) apex.

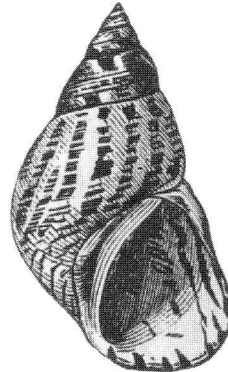
Reference: Houbrick (1987)



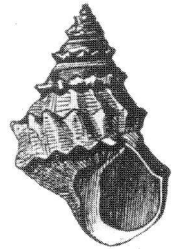
*Telescopium telescopium*  
(100 mm)



*Terebralia  
sulcata* (60  
mm)



*Littoraria scabra*  
(30 mm)



*Nodilittorina  
trochoides*  
(10 mm)

### Family Potamididae

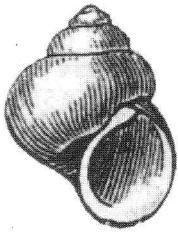
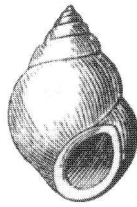
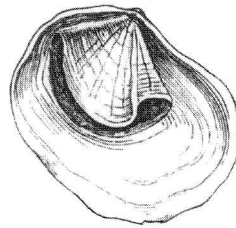
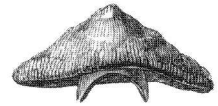
Shell like Cerithiidae, but operculum round and multispiral. Herbivorous, grazing on algae and leaves. Typical inhabitants of mudflats and mangrove forests, often in brackish water. Genus *Cerithidea* sometimes included (otherwise in separate family Cerithideidae).

References: Houbrick (1984, 1991)

### Family Littorinidae

Shell small, turbanate, smooth or striate or nodulose, peristome entire (no anterior canal). Herbivorous, grazing on algae. Abundant in high intertidal and supratidal, on rocks, driftwood and mangroves. Genera include *Littoraria*, *Nodilittorina*.

References: Reid (1986, 1989, 1992)

*Assimineia* sp. (5 mm)*Stenothyra* sp.  
(4 mm)*Siphopatella walshi*  
(30 mm)*Cheilea equestris*  
(20 mm)

### Superfamily Rissooidea

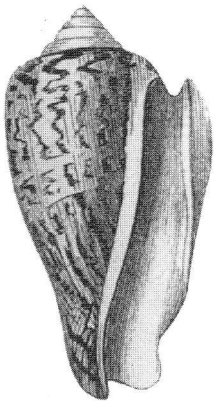
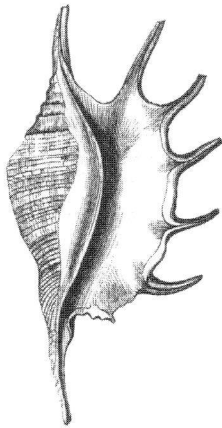
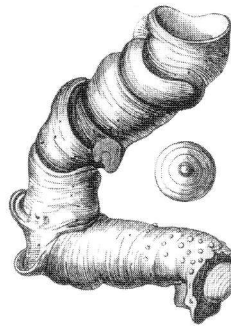
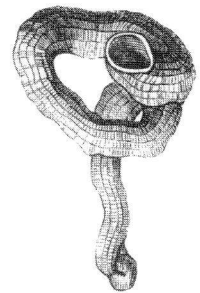
A very large superfamily of some 21 families, all of minute (1-10 mm) shells; mostly elongate, sometimes depressed (Tornidae, Adeorbidae, Vitrinellidae), occasionally tubular (Caecidae). Herbivorous. Wide habitat range, also abundant in fresh and brackish water, e.g. *Assimineia* and *Stenothyra* in mangrove forests. Herbivorous.

References: Brandt (1974); Ponder (1988, as 'Truncatelloidea')

### Family Calyptraeidae

Shell limpet-like, with slight spiral coil and an internal septum (shelf). Microphagous ciliary feeders, living permanently attached to hard substrates including other shells. Hermaphrodite; females brood eggs beneath shell. *Calyptraea* and *Cheilea* attach under rocks; *Siphopatella* within empty gastropod shells.

References: Hoagland (1977)

*Strombus luhuanus*  
(50 mm)*Lambis lambis*  
(170 mm)*Vermetus* sp. (100 mm)*Serpularbis* sp.  
(50 mm)

### Family Strombidae

A small family of large, heavy shells with flared lips (*Strombus*), sometimes with finger-like projections (*Lambis*); notch in outer lip for eyestalk is characteristic of family; claw-like operculum used in leaping locomotion. Herbivorous, grazing on algae on sand; common in lagoons and seagrass beds.

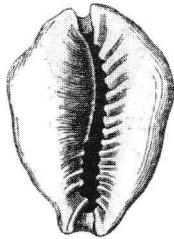
References: Abbott (1960, 1961)

### Family Vermetidae

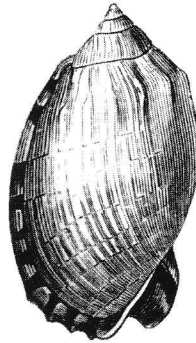
Shell tubular and uncoiled, resembling a worm tube, permanently attached to hard substrate. Filter feeding by means of mucous strands. Sometimes colonial, forming encrustations on intertidal rocks. Genera include *Vermetus*, *Dendropoma*, *Serpularbis*. References: Morton (1965); Hadfield *et al.* (1972)



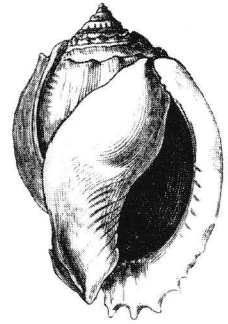
*Cypraea arabica* (60 mm)



*Cypraea moneta*  
(20 mm)



*Cassmaria erinacea*  
(50 mm)



*Phalium glaucum*  
(70 mm)

### Family Cypraeidae

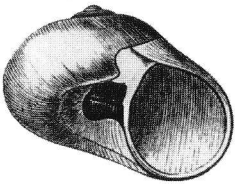
Cowries. Globular shells, with short spire visible only in juveniles, glossy dorsal callosity and apertural teeth develop in adults. Colourful shell concealed by mantle when active. Operculum absent. Omnivorous grazers on sponges and algae. Classification controversial; some workers use only the genus *Cypraea*, but others recognize many genera (e.g. *Erosaria*, *Lyncina*).

References: Burgess (1985); Lorenz & Hubert (1993)

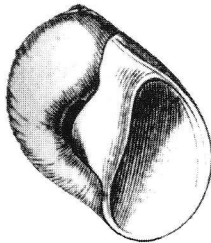
### Family Cassidae

Small family of heavy, sometimes very large, shells; inflated body whorl, narrow aperture, shield-like callus on parietal wall and columella. Sand-dwelling carnivores that feed on echinoderms. Examples include *Cassia*, *Cypraeacassis*, *Phalium*, *Cassmaria*.

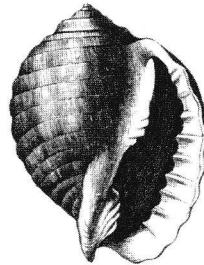
Reference: Abbott (1968)



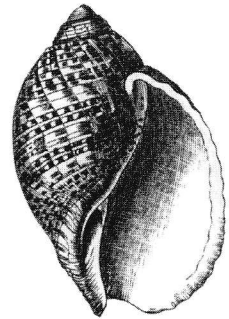
*Polinices didyma*  
(50 mm)



*Polinices mammilla*  
(30 mm)



*Malea pomum*  
(50 mm)



*Tonna perdx*  
(200 mm)

### Family Naticidae

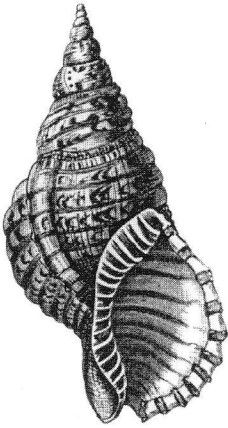
Smooth, globular shells with entire peristome, often thick columellar callus; paucispiral, sometimes calcareous, operculum. Shallow burrowers in sand and mud; shell covered by expanded foot anteriorly. Predators on bivalves; shells are drilled using the radula and proboscis is inserted through bevelled hole. Genera include *Polinices*, *Natica*, *Sinum*.

References: Cernohorsky (1971); Wilson (1993)

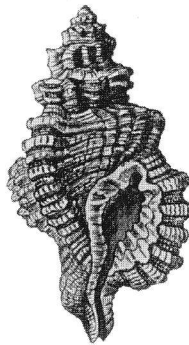
### Family Tonnidae

Large, thin, swollen shells, without varices or operculum. Buried in sand during the day, emerge at night to eat holothurian prey, which are engulfed whole. Foot is large and colourful.

Reference: Wilson (1993)



*Charonia tritonis*  
(300 mm)

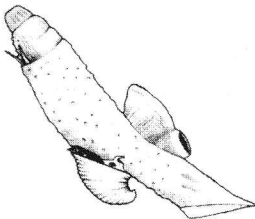


*Cymatium nicobaricum*  
(50 mm)

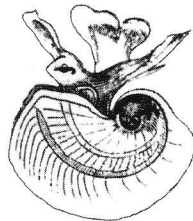
**Family Ranellidae**

Large, heavy shells with thick (sometimes hairy) periostracum and strong varices; anterior canal forms a short spout. Egg capsules hatch into very long-lived veliger larvae (hence worldwide tropical distribution of some species). Carnivorous on molluscs, echinoderms and ascidians.

Reference: Beu (1998)



*Carinaria lamarcki*  
(150 mm)

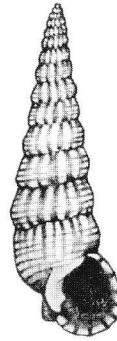


*Atlanta* sp.  
(10 mm)

**Superfamily Carinarioidea**

Pelagic gastropods found in mid-ocean, only rarely washed up on beaches. Simple, spiral shells with large slug-like bodies; swim by means of a pedal fin. Active carnivores, feeding on ctenophores, crustaceans and other pelagic animals.

Reference: van der Spoel (1976)



*Ataxocerithium* sp.  
(7 mm)



*Viriola* sp. (5 mm)

**Superfamily Triphoroidea**

Small, elongate shells with granular sculpture, resembling miniature Cerithiidae; sometimes sinistral. Specialized predators on sponges, with which they live. Very many species, poorly known taxonomically.

Reference: Marshall (1983)



*Epitonium scalare*  
(50 mm)



*Opalia* sp.  
(20 mm)

**Family Epitoniidae**

A large family of tall-spired, pale shells with strongly raised axial ribs and round, entire aperture. All live with and feed upon anthozoan coelenterates. Taxonomy is poorly understood.

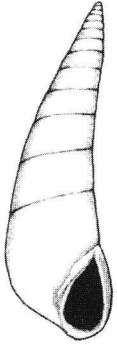
Reference: Wilson (1993)

**Family Eulimidae**

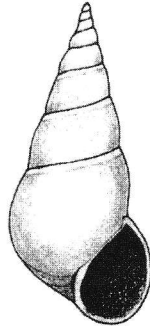
Small, pale, often smooth and glossy, usually tall-spired shells, rarely limpet-like or

globular; no siphonal canal. Numerous species, poorly known taxonomically. Highly specialized ectoparasites of echinoderms, feeding by sucking fluids from coelomic cavity of host; radula usually absent.

Reference: Warén (1984).



*Melanella* sp.  
(10 mm)



*Vitreobalcis* sp.  
(5 mm)

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