

Group: Chitinozoa (uncertain affinity)

From early Ordovician to end of Devonian (or to Permian period)

Chitinozoa: organisms of flask-bottle shaped, resistant organic walled to oxidation, thermal alteration, tectonism or recrystallization. 50-200 micron length, they are commonly associated to Acritarchs, scolecodonts and graptolites with reference to associated benthic and trace fossil groups. Chitinozoa are marine have a wide range of shelf, most abundance outer shelf slope environment, their abundant presence in anoxic black shale indicates the majority were planktonic in high latitude waters, reef apparently unfavourable habitats.

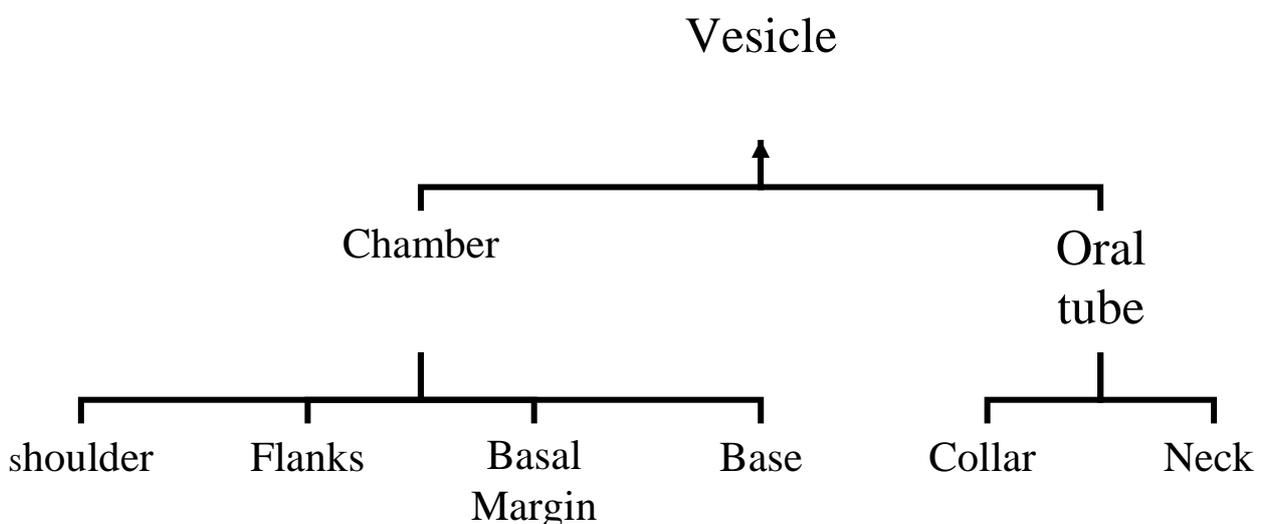
Morphology:

The vesicle: ranges from 30 to 1500 μm, mostly 150–300 μm, have longitudinal axis of symmetry.

The outer wall of the vesicle may be smooth, striate, tuberculate, hispid (i.e. hairy), folded into hollow spines or extended into a tubular sleeve (fig.8a,8c).

The inner wall can give rise to spines that penetrate through the outer wall (fig.8a,8b). Many chitinozoans are found united in long chains or clusters. The vesicles welded together at the operculum (i.e. the oral pole) and at the base (i.e. the aboral pole), (fig.1). in certain genera the operculum is deeply recessed within the neck so that the adhesion of the adjacent vesicle must be achieved by a basal, tubular appendage called a copula (fig.8c).

the vesicle consists of two parts:



The oral end which bears the aperture, is produced into a neck, whilst aboral end is broader and closed. The aperture is occluded by a separate operculum.

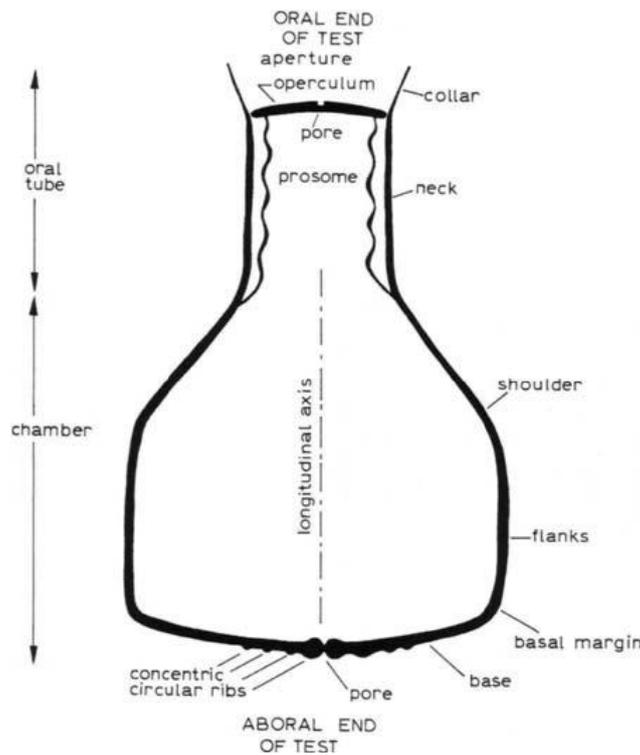


Fig.1: major feature of chitinozoa morphology (shape)

I-The chamber: consists of four parts: 1-shoulders, 2-flanks, 3-basal margin, 4-base and concentric ribs.

The basal margin assumes a greater diversity of form than other parts of the chamber and is important in classification. There are types of structure on the basal margin.

(1) The Carinae (fig.2)

A sharp outward extension from the chamber wall resembling a skirt or the brim of a hat.

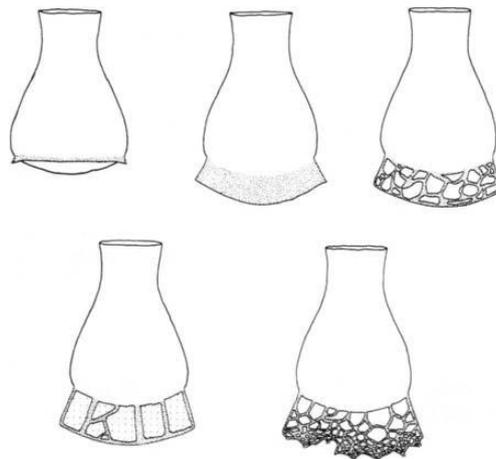


Fig.2: Types of carinae

(2) The Siphon (fig.3)

A hollow, open ended tube extending from the aboral end. It is developed in some chitinozoans with two layered test walls by the separation of the inner

and outer layers at the basal margin, to form, respectively, the base and the siphon.

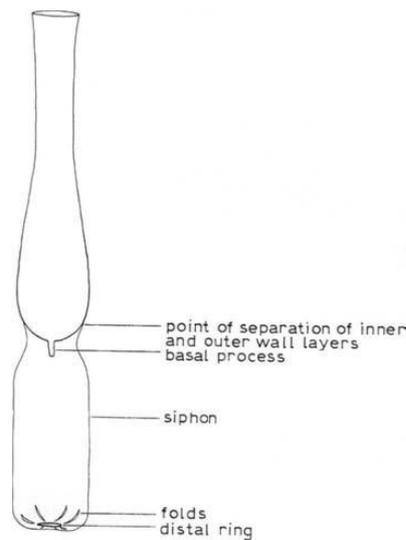


Fig.3: Lateral view of a siphonate chitinozoan

(3) Appendices (fig.4)

Generally discrete processes suspended from the basal margin. They rise from the same part of the chamber as the carinae and siphons of other tests and encircle the base. Occasionally they coalesce distally. Appendices are hollow but their interior do not open into the body cavity.

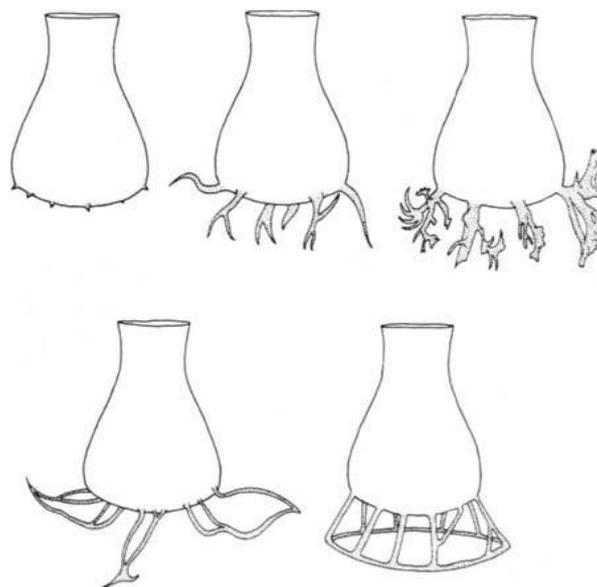


Fig.4: Types of appendices

The base: is the aboral surface of the chamber. The base does not refer to the original life position and direction of growth of the living organisms. Direction or orientation of the test that the wider part (base) directed downward and the large opening (aperture) uppermost.

The base may be convex, flat, concave or hemispherical, and may bear stout process.

In some species the center of the base is perforated by a fine pore (fig.5).

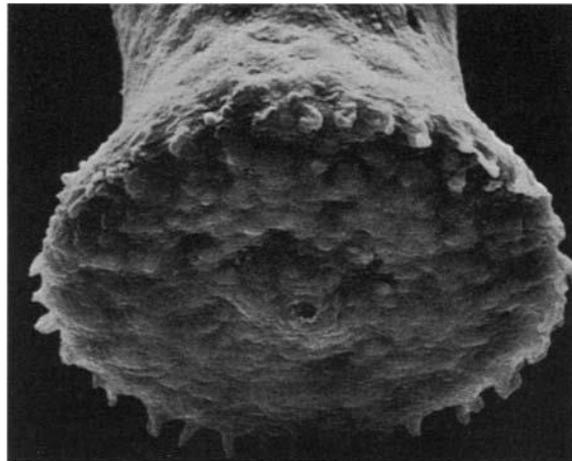


Fig.5: small pore at the center of the base in *Conochitina* species

Concentric circular ribs often surround the pore (fig.6).

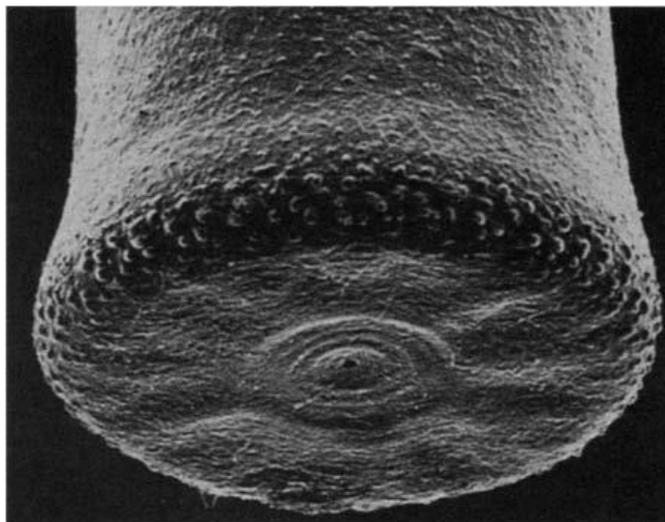


Fig.6: ribbing around a central pore in *Conochitina* species

Which are thought to result from contact with the aperture of another test, when the test formed part of a chain of tests joined aperture-to-base.

The pore may at some stage have provided for communication between the interior of adjacent tests in chains.

II-Oral tube

The oral tube has two parts, the collar and the neck (fig.1).

They may be distinguished from each other by a change in thickness of the test wall or by a change in the walls profile.

The collar encircles the aperture and sometimes terminates in a fringe of small spines. The neck is a hollow, more or less cylindrical tube, however few chitinozoans lack necks and collars altogether.

An internal structure: the Prosome lies within the neck (fig.1). in some chitinozoans, it is made of a series of rings or discs and terminates orally in a disk like operculum, which may have sealed the contents of the test from the outside (fig.1).

In some genera, however, particularly those without necks, the prosome lacks the rings or discs and consists only of an operculum (fig.7a,7b).

Sometimes an operculum shows a central pore and concentric ribs.

The wall

Is translucent, amber colored, carbonized tests, wall of one or two or three layered, mostly two layers of (pseudochitin) dark brown or black. It encloses an empty body chamber. Outer surface smooth or ornamented (fig.9)



Fig.9: Types of ornament

Ornament generally is less strongly developed on the neck than on the chamber. Ornamentation process often stand in rows parallel with the length of the test. Small ornamented process are solid or have "spongy" interiors, when largely processes are hollow. Like appendices, large process do not open into the body cavity, and the surface of the test lying within the basic of a large process does not differ from the adjacent surface outside the base of the process. Processes may have served to control the buoyancy or as a means of attachments.

Occurrence of Chitinozoans test

Most tests occurred as single or joint in linear chains either large or chain of spiral coil of hundred tests which found tightly packed together and enclosed in an organic pellicle called a cocoon.

Classification: Group Chitinozoa

Based on outline shape. Generally arranged alphabetically of suprageneric classification proposed by 1972 Eisenack, the following classification based partly on Jansonious 1970: into two subgroups:

I-Subgroup: Simplexoperculatifera

Consists of two orders:

a-order: Operculatifera (without neck)

is characterized by an operculum, reduced oral tube (usually with a corollate, but lacking a neck)

family: Desmochitinidae (and six subfamilies)

genus: Desmochitina (L. Ord. – U. Sil.) (fig. 7a, 7b)

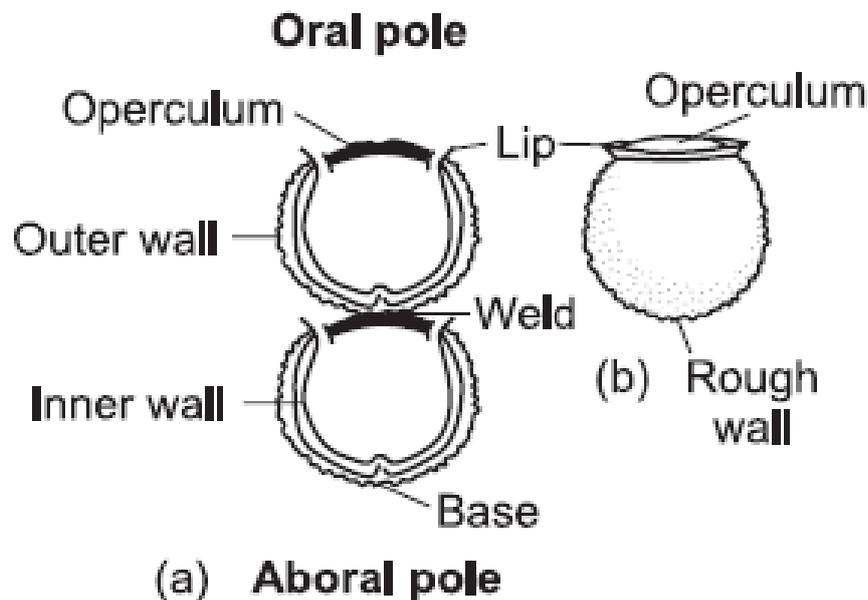


Fig.7a,7b: *Desmochitina*: operculum

Desmochitina is Subspherical vesicle with short lips, but no neck and commonly united in chains (fig.7).

b-order: Prosomatifera (with neck and prosome)

have a prosome and well developed necks. This order contains two families:

1-family: Conochitinidae, genus: *Conochitina*

2-family: Lagenochitinidae, genus: *Lagenochitina*

The two families are distinguished by the relationship between the chamber and the neck.

In *Lagenochitina*, the operculum is recessed within the neck of *Lagenochitina* (L. Ord.-L. Sil.) (fig. 7c, 7d).

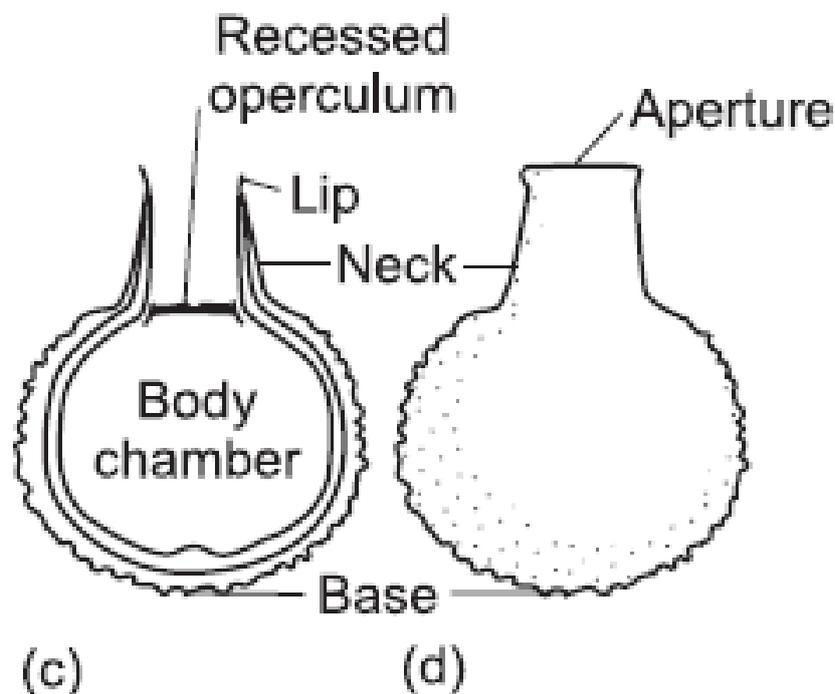


Fig.7c,7d: genus: *Lagenochitina*

II-Subgroup: Complexoperculati

Order: Prosomatifera

Bear a recessed operculum provided with a sleeve like extension, the flange, which together are called the prosome (fig.8). this subgroup consists of two families:

1-Family: Sphaerochitinidae, genus: *Ancyrochitina* (fig.8a,8b)

In *Ancyrochitina* (Ord. – Dev.) vesicle lack aboral sleeves and copulae. Which has a flask – shaped vesicle with a ring of spines around the base.

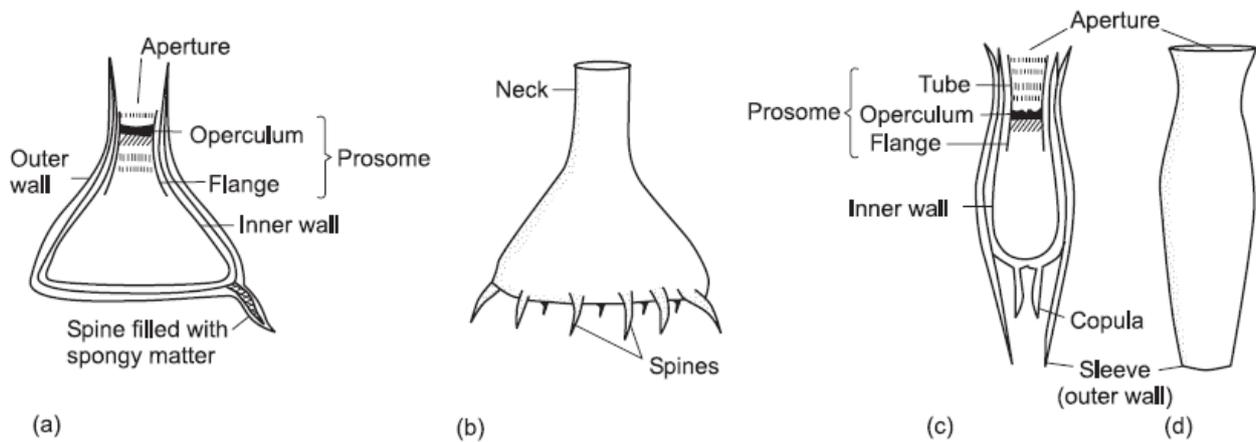


Fig.8: Prosomatifera (diagrammatic). (a) *Ancyrochitina*, longitudinal section. (b) *Ancyrochitina*, exterior view. (c) *Velatachitina*, longitudinal section. (d) *Velatachitina*, exterior view. (Based partly on Jansonius 1970.)

2-Family: Tanuchitinidae, genus: *Velatachitina* (fig.8c,8d)

Display elaborate differentiation at the aboral end and their vesicles are often tubular. Genus *Velatachitina* (L. Ord. – L. Sil.) is cylindrical with a sleeve at either end formed from the outer wall. The inner wall is produced into a copula, whilst prosome has an orally extended tube with ring like marking (annulations).

Evolutionary trends of Chitinozoa group

Major changes in the Ordovician – Devonian Chitinozoa (fig.10)

- 1-Decreasing in size from Ordovician to Devonian periods.
- 2-Early Ordovician forms characterized by large siphons (fig.10:18,19,20).
- 3-In Arenig (E. Ordovician) elaborate network suspended from basal margin (fig.10:27).
- 4-Ordovician forms of larger than 1000 micron size.
- 5-Lenticular forms with operculum and outer membrane continued to Devonian time (fig.10:7,8,13,14,15).
- 6-Chains of spherical smaller forms appeared at early and middle Devonian (fig.10:14,15).
- 7-Carinae developed in Caradoc to wide flaring skirt like translucent membrane (fig.10:25,26).
- 8-During Caradoc and Ashgill ages (Late Ordovician), tiny processed appeared quickly become larger and more elaborated in forms of Early Ordovician (fig.10:33,36,40) toward Silurian (fig.10:55,58,59,62).

- 9-Longitudinal rows of spines which connected at their tips by longitudinal bars or fins in mid Caradoc (fig.10:37) and reticulum process forms (fig.10:38) which developed from Ordovician.
- 10-Decreasing in numbers and variety of chitinozoa forms with spherical distinct chamber (fig.10:63,64).

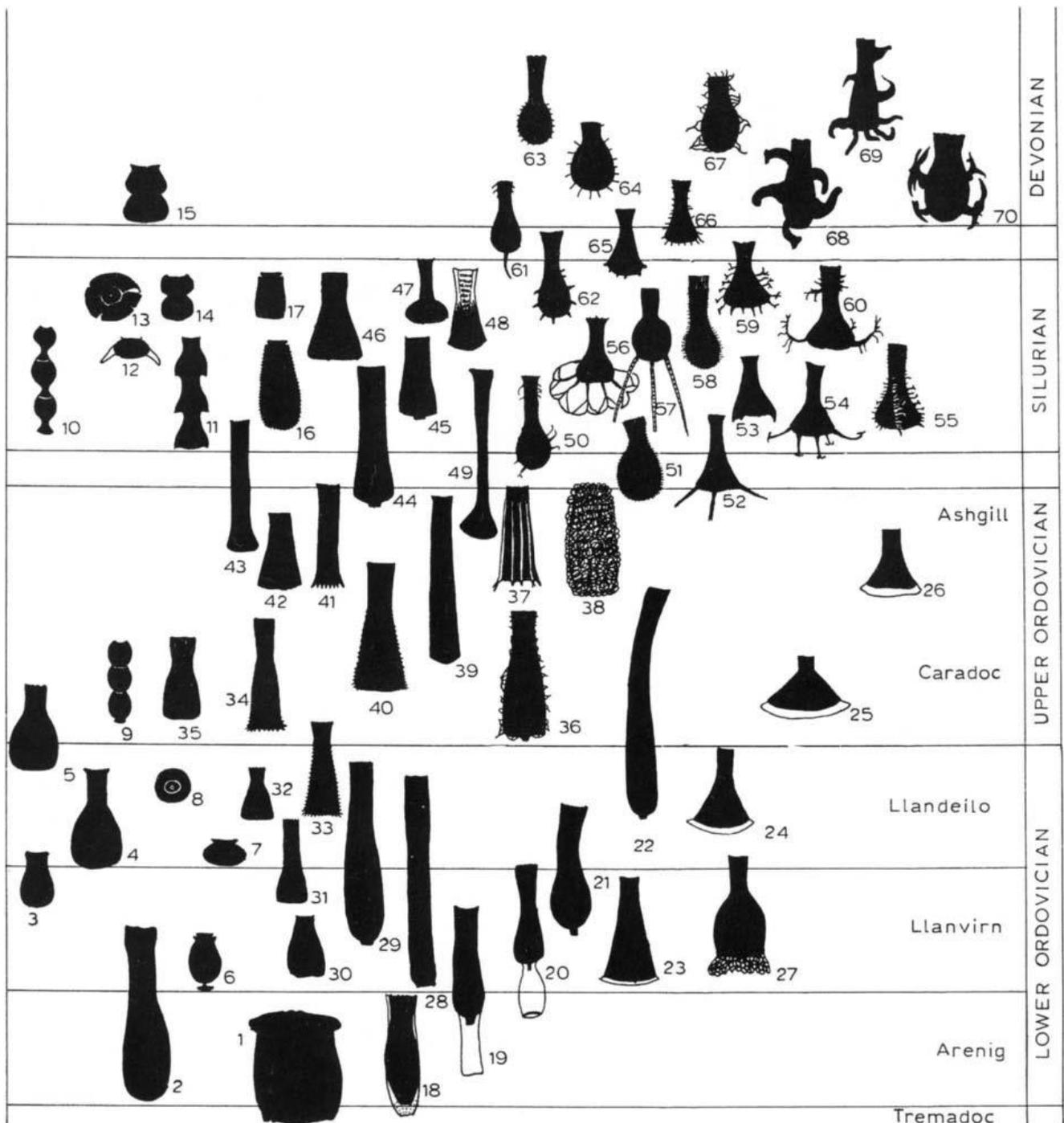


Fig.10: Evolutionary trends of Chitinozoa group