

More about Brachiopods.

Brachiopods are marine animals with a two-valved shell. At first look they show a certain resemblance with bivalves. They possess a hinged pair of valves and feed by filtering off food particles. Zoologically however they are quite different animals. The two valves of Brachiopods are most of the time different in size and symmetrical about a median plane (left-right symmetry see figure 1). Bivalves however have in equilateral valves, causing symmetry of the upper and lower valve. These valves are often equal in size.

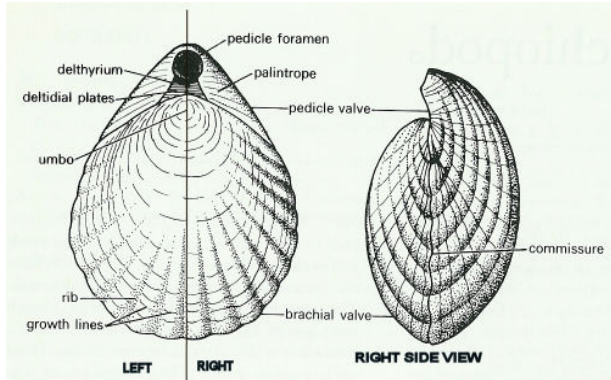


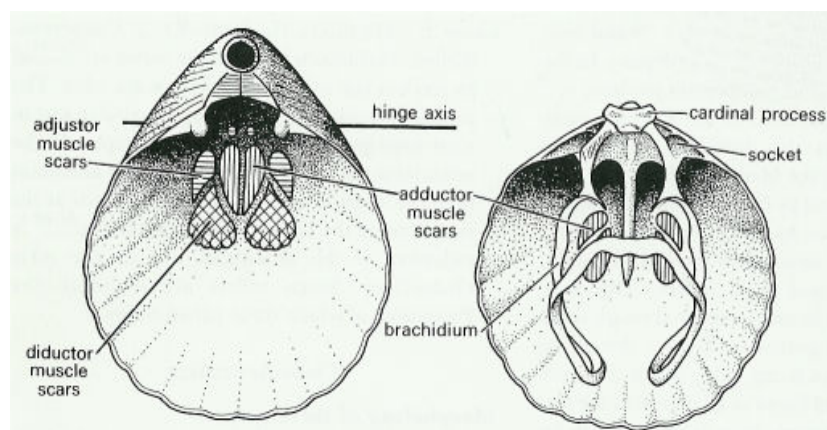
Figure 1.

The left-right symmetry of Terebratula type Brachiopod shells is shown here by the recent *Magellania flavescens*.

Unfortunately the symmetry rule has its exceptions. Some bivalves for instance, like *Pecten* sp. with a spherical and a flat valve, look a lot like some Brachiopods at first sight. A closer look at the inside however (see figure 2) can take away our doubts. Brachiopods have a complex food gathering and respiratory mechanism, the so called 'lophophore'. It is supported by a kind of 'skeleton', a long, loop shaped calcareous ribbon, the 'brachidium'. This brachidium or parts of it, can often be recognised in well preserved fossil specimen. Bivalves don't have anything that looks like this 'brachidium'. Another fundamental character shared by most brachiopods is the so called 'pedicle'. It is a kind of stalk with the function to fix the animal to the sea floor. The pedicle itself doesn't fossilise, but the hole in the brachiopod shell through which it came out can simply be recognised.

Figure 2. *Magellania flavescens*, internal morphology.

- 1: **Pedicle** hole
- 2: **Scars of the**
- 3: **adductor, diductor and**
- 4: **adjustor muscles.**
- Cardinal process**
- and **socket**, both play a role in opening and keeping the two valves together.
- 5: **Brachidium**, the 'arm' of the brachiopod, supporting the **lophophore**.



Differences in composition and structure of the elements described above give us the opportunity to divide brachiopods into two distinct classes:

Class 1: Inarticulata. (Cambrian till recent) These are brachiopods in which the valves are not hinged by teeth and sockets. *Lingula* (figure 3, top left) is the most well known member of this class. Inarticulata are usually considered to be more primitive in comparison with the members of class 2. Their shells are usually chitinophosphatic. Very few of them have a calcareous shell. Their pedicle is mostly fleshy and muscular. Some species fix themselves to the substrate by cementation.

Class 2: Articulata (Cambrian till recent) These brachiopods always have calcareous shells. They have valves hinged by teeth in on valve and sockets in the other. Their pedicle is made of horny, dead material. This group became abundant in the early Ordovician

Something about the origin and evolutionary history of brachiopods.

The origin of brachiopods still is a bit mysterious. Some scientists think they originated through 'neotony' (this means something like 'becoming an adult when keeping a juvenile appearance') from bryozoans. It seems more likely however to look for a lophophore possessing animal without any hard parts somewhere in the Late-Precambrian. A fact is: during the Palaeozoic brachiopods were living in a large number of marine environments. Generally speaking they populated the environments inhabited by marine bivalve today. Adult brachiopods live a rather sessile (non-mobile) life, the larvae however are drifting free into the water. Sea currents can move them over significant distances. The various species adapted to a great number of environments. These adaptations show themselves often in the divers shape of brachiopod shells. The most well known shape, showing some resemblance to ancient roman oil-lamps, gave an entire group (the Terebratula's) the nickname 'lamp-shells'. But the variety is much larger. A few of them are shown in figure 3.

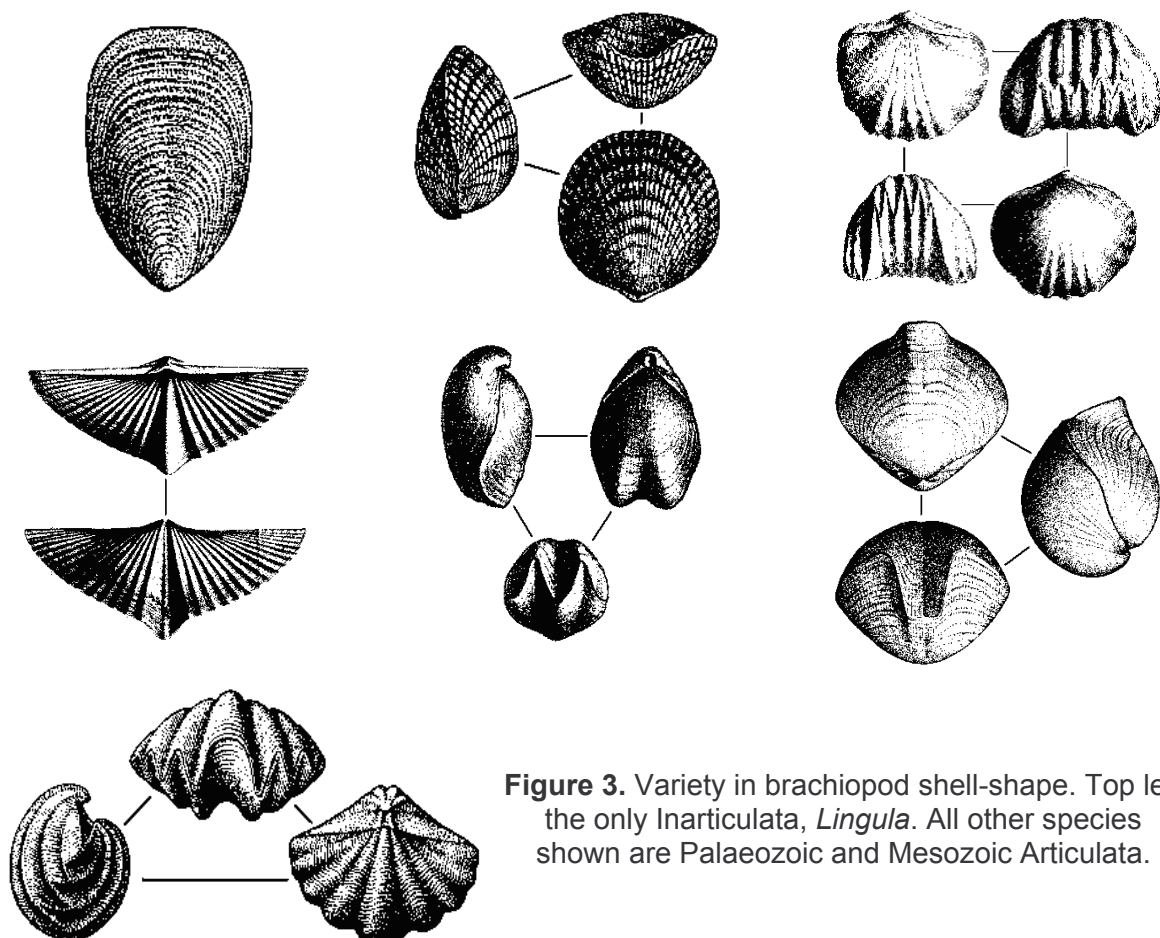


Figure 3. Variety in brachiopod shell-shape. Top left the only Inarticulata, *Lingula*. All other species shown are Palaeozoic and Mesozoic Articulata.

The identification of Brachiopods.

Brachiopods offer a number of visible marks to identify them, like the shape and decoration of the shell, their size and the form of the border between the two valves. but using them in a proper way is made difficult by a number of reasons. Brachiopods show a rather significant gradual evolutionary change within the group and different species. Intermediate forms standing somewhere in the middle between two species not rare. And there is a lot of resemblance in the way they adapted to deal with similar environmental circumstances through their geological history. This makes it very important to date them correctly. To find a brachiopod's exact (species) name without knowing its geological age is almost always impossible to an amateur palaeontologist.

Further reading:

Invertebrate Palaeontology and Evolution
By: E. N. K. (Euan Neilson Kerr) Clarkson
Blackwell Publishing, fourth edition 1998
ISBN 0632052384

Invertebrate Palaeontology and Evolution is well established as the foremost palaeontology text at undergraduate level. This fully revised fourth edition includes a complete update of the sections on evolution and the fossil record, and the evolution of the early metazoans.