

three mainland faunal Provinces, the Aupourian, Cookian and Forsterian. Powell (1937: 370, 372) also recorded *Z. acinaces* from 10 stations of the *Echinocardium* Association and its subsidiary Polychaete + *Zenatia* Associes from Auckland Harbour and environs, from mud and sandy mud substrata in depths of two and a-half to eight fathoms. The fossil specimens examined by the writer are from silty sandstones and sandy siltstones, and rarely from greensands and pure siltstones. Well preserved double-valved specimens are known only from the Dunroonian Stage (coarse greensand), Awamoan Stage (silty sandstone, and shellbeds with this matrix), and the Wanganui Series (silty sandstones and sandy siltstones). There are no specimens from the Southland or Taranaki Series in which it is possible to see all internal characters, and it is only in these Series that specimens are found in pure siltstones.

It seems that *Zenatia* s. s. is a rather sedentary burrower in sandy silts and silty sands in shallow depths in the outer parts of harbours and off ocean beaches.

Trueman (1964:68) described the ligamental structures and ecology of *Mya arenaria* (Linnaeus) and *Lutraria lutraria* (Linnaeus). These species have fused mantle margins, and hydrostatic pressure in the mantle cavity protrudes the siphons and supplements the opening action of the ligament. In *Mya*, and probably in *Lutraria*, retraction of the siphons causes the valves to be forced apart and adduction of the valves causes protrusion of the siphons. To accommodate these movements, changes have occurred in the ligament to allow rocking of the valves on a dorsoventral axis, as well as the normal opening and closing on the antero-posterior axis. The ligament is greatly reduced in anteroposterior length in spite of the great length of the valves, and consists of two parts. The "outer layer" is a short, narrow, true ligament which joins the hinge plates just behind the top of the resilary pit. The "inner layer" is a resilium, functional over the ventral third of the resilifer only, and fractured apart above this. This small block of resilium acts as a pivot in the rocking of the valves. The dorsal margins of the valves are united by a flexible sheet of periostracum.

Although the minor elements differ greatly, the hinge structures of all Zenatiinae are basically very similar to those of *Lutraria lutraria* figured by Trueman (1964:69) and seen in specimens of *Lutraria solida*, and as these structures are so similar in such unrelated animals as *Mya* and *Lutraria* I conclude that Zenatiinae function in the manner described above. There seems to be a slight difference, in that very fresh Recent Specimens of *Zenatia acinaces* have irregular sheets of periostracum hanging from the ventral edges of the valves. This periostracum appears to have united the valves ventrally as it does along the dorsal margin of *Lutraria*.

When a valve of *Zenatia* or *Zenatraria* is viewed from above, it is seen that the dorsal margin is not straight, and is not parallel to the ventral margin. If the two valves of one specimen are placed together so that the dorsal margins meet along the length of the portion behind the umbones, the ventral margins meet only at the curve at the base of the posterior edge. If the valves are now rocked forwards so that the ventral margins meet along their length, the dorsal margins meet only at the umbones. This movement is presumably equivalent to the rocking movement of the valves in live *Lutraria*, and it would therefore seem probable that a somewhat diagonal rocking motion takes place in Zenatiinae. If Zenatiinae have the ventral margins of the valves united by periostracum as suggested above, the animal would not be able to open its shell very far in the manner normal to other lamellibranchs. As the anterior gape is almost closed when the posterior gape is widely open, *Zenatia* s. s. and *Z. (Zenatraria)* would seem to be able to protrude the foot only when the siphons are also protruded. *Z. (Zenatraria) vellai*, however, still has quite a large anterior ventral gape when the posterior is gaping widely, and may have been able to burrow with its siphons retracted.