REVIEW OF *POSTLIGATA*, A LATE CRETACEOUS PELECYPOD

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ABSTRACT

The late Cretaceous pelecypod *Postligata* is shown to be glycymeridid with opisthogyrate beaks, and in extreme instances, a prosodetic ligament. It lacks radial ribs or striae. *Postligata* has been reported from Georges Bank southwestward to Mississippi and Tennessee.

The name *Postligata* was used by Gardner (1916, p. 543) as a proposed subgenus of *Glycymeris*. She assumed that the ligament was behind the beaks (opisthodetic), hence the name *Postligata*. She also assumed that the beaks pointed forward (prosogyrate). Gardner's two assumptions for the orientation of the shell of *Postligata* are what one would expect for most pelecypods. However, if we assume that *Postligata* is a glycymeridid as Gardner thought, it would be appropriate to compare this genus with other living and fossil glycymeridids. Newell (1969, p. N269) and most other paleontologists have oriented *Postligata* and other glycymeridids incorrectly, but malacologists (Abbott, 1974, p. 426) have oriented the shells of glycymeridids correctly, and this is based on both anatomical and shell characteristics.

The following morphological features of the shell are helpful in the orientation of the valves of glycymeridids (Nicol, 1947):

1. The scar of the anterior adductor muscle is subtrigonal, with the dorsal side more angular than the corresponding side of the posterior adductor muscle scar, which is subcircular.

2. If the adductor muscle scars are unequal in size, the larger one is the anterior.

3. Where the pallial line joins the adductor muscle scars, small sinuses are formed. The deeper sinus is below the posterior adductor scar.

4. The flange bordering the anterior side of the posterior adductor scar is more abrupt or steep than the flange bordering the posterior side of the anterior adductor scar.

5. In somewhat oblique shells, the axis slopes downward posteriorly. In shells that have one end either truncated or produced, it is the posterior end.

6. On the exterior of the shell, the posterior end bears more borings and various attached organisms.

7. In Recent specimens, the interior of the shell is more highly colored on the posterior side.

If the beaks are not orthogyrate, they are always opisthogyrate in all living species of glycymeridids. Opisthogyrate beaks are not nearly so common as orthogyrate beaks, but opisthogyrate beaks occur in *Axinactis*, *Glycymerella*, most species of *Axinola*, some species of *Glycymeris*, and a few species of *Tucetona*. The earliest species of glycymeridids all had orthogyrate beaks, but before the end of the Cretaceous some species developed opisthogyrate beaks. However, in the Cenozoic the trend has been for a greater frequency of opisthogyrate beaks. Thus, the ligament is: exactly amphidetic, amphidetic but placed more in front of the beaks than behind them; or, in some in-

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stances, completely in front of the beaks (prosodetic). If the chevron-shaped grooves of the ligament are unequal, the anterior limb is always longer than the posterior limb, and in a few extreme instances, the posterior limb is absent. We have figured (Figure 1) Wade's species of *P. crenata* to show the proper orientation of *Postligata*. Opisthogyrate beaks occur in some other arcoids such as the Noetiidae, but some species of anadarids have strongly prosogyrate beaks.

There are at least six described species of *Postligata*, of which the type, *Glycymeris wordeni* Gardner, is one of the most aberrant. The evolutionary trends include a circular outline and a small size. Some species attain a height and length of less than 10.0 mm. They are lenticular and the ratio of height to convexity (the distance between the two valves) is generally 0.50 or slightly less, which is very low for most glycymeridids. The interior ventral margin has no crenulation in *G. wordeni* Gardner, 1916. This lack of crenulations also occurs in *Postligata aventi* Stephenson, 1947, and *P. monroei* Stephenson, 1947. Small crenulations do occur in *P. crenata* Wade, 1926, and *G.* (?) *greenensis* Stephenson, 1923. The interior ventral margin was not exposed in Stephenson's

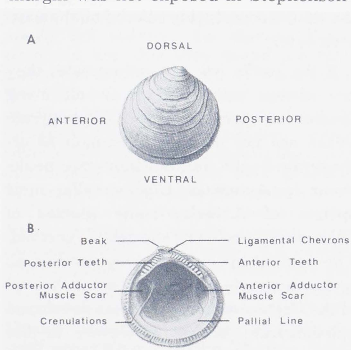

Figure 1. *Postligata crenata* Wade, 1926, showing the proper orientation of the shell. Height and length of specimen 9.0 mm. A, Exterior view. B, Interior view.

species *P. schalki*, 1936. The outer surface of the shell has only concentric lines and radial ornamentation is lacking in all six species of *Postligata*. The lack of radial ornamentation is rare in glycymeridids, but at least one living species of *Axinola* does not have radial ribs.

Glycymeris subgyrata Stephenson, 1927, can possibly be allocated to *Postligata*. It lacks radial ribs but the interior ventral margin is crenulate, the beaks are only faintly opisthogyrate, and the height and length of the valves are about 30.0 mm. Another species which also may be allocated to *Postligata* is *Glycimeris [sic] subcrenata* Wade, 1926. In this species the beaks are apparently orthogyrate; there are faint radial striae on the outer surface of the shell, but the inner ventral margin is almost smooth. The ratio of height to convexity in *Glycymeris subcrenata* is low and the valve outline is typically circular. When all the species of *Postligata* are examined, it becomes obvious that there are clear morphological characteristics that link a typical glycymeridid to *Postligata* and that this genus was an aberrant and short-lived member of the Glycymerididae during the late Cretaceous.

The known geographic range of the six species of *Postligata* is from Georges Bank southwestward to Tennessee and Mississippi. The genus has been reported from Delaware, Maryland, North Carolina, and South Carolina (Figure 2). The stratigraphic range of the genus is Maastrichtian and possibly Campanian.

Newell (1969, p. N268) erected a new subfamily of glycymeridids, the Arcullaeinae, for the genera *Arcullaea*, *Peruarca*, *Pettersia*, *Postligata*, *Protarca*, and *Trigonarca*. These Cretaceous genera have hinge teeth and a ligament that resemble the Glycymerididae. Except for *Postligata*, there is no direct evidence that the other five genera arose from a glycymeridid ancestor or that they are closely related to each other. Some of these genera are monotypic and are known from few specimens. Apparently several stocks, which had cucullaeoid-type teeth, developed acroid-type teeth through neotony during the Jurassic and Cretaceous (Nicol, 1950, p. 96). In other words, the Arcullaeinae is a polyphyletic taxon. The exact family relationships of all of these genera, except *Postligata*, are unknown at the present time and should be considered as *incertae sedis*.

Figure 2. Map showing the known geographic range of *Postligata*. 1. Georges Bank; Stephenson, 1936. 2. Delaware; Richards and Shapiro, 1963. 3. Maryland; Gardner, 1916. 4. North Carolina; Stephenson, 1923. 5. South Carolina; Stephenson, 1927. 6. Tennessee; Wade, 1926. 7. Mississippi (subsurface); Stephenson, 1947. 8. Mississippi (subsurface); Stephenson, 1947.

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