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1996

**SYSTEMATICS  
AND  
EVOLUTION  
OF  
*LITTORINA***

**David G. Reid**

X + 463 p.  
131 figs.

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Maine in the western Atlantic) no confusion should arise with moderate or wave-exposed ecotypes of *L. obtusata* or *L. fabalis*, which have globular or almost flat-spined, smooth shells, often with strong microstriae. However, the sheltered/brackish ecotypes and the northern geographical varieties of both these species are more tall-spined and can approach smooth forms of the moderate and sheltered/brackish ecotypes of *L. saxatilis*. In these cases, useful characters of the shell of *L. saxatilis* are the more rounded whorls and more impressed sutures, and the absence of strong microstriae; characters of the oviduct, penis and radula all distinguish *L. saxatilis* from *L. obtusata* and *L. fabalis*.

Some Pacific species, particularly *L. sitkana*, *L. subrotundata* and *L. natica*, can resemble *L. saxatilis* and *L. arcana*. However, their distributions do not overlap, and both oviduct and radula distinguish them, although penes are sometimes similar.

### Doubtful species

Several fossil species are known from so few examples, sometimes poorly preserved, that their affinities within *Littorina*, and in some cases even their membership of the genus, are doubtful. These are discussed here.

#### ***Littorina* sp. Woods & Saul, 1986**

(Fig. 112A)

##### **Synonymy**

*Littorina* sp. Woods & Saul, 1986: 636; fig. 3.1 (Punta Rosarito, SW Baja California Norte, Mexico, UCLA loc. 7083; Palaeocene; [REDACTED] Fig. 112A).

##### **Remarks**

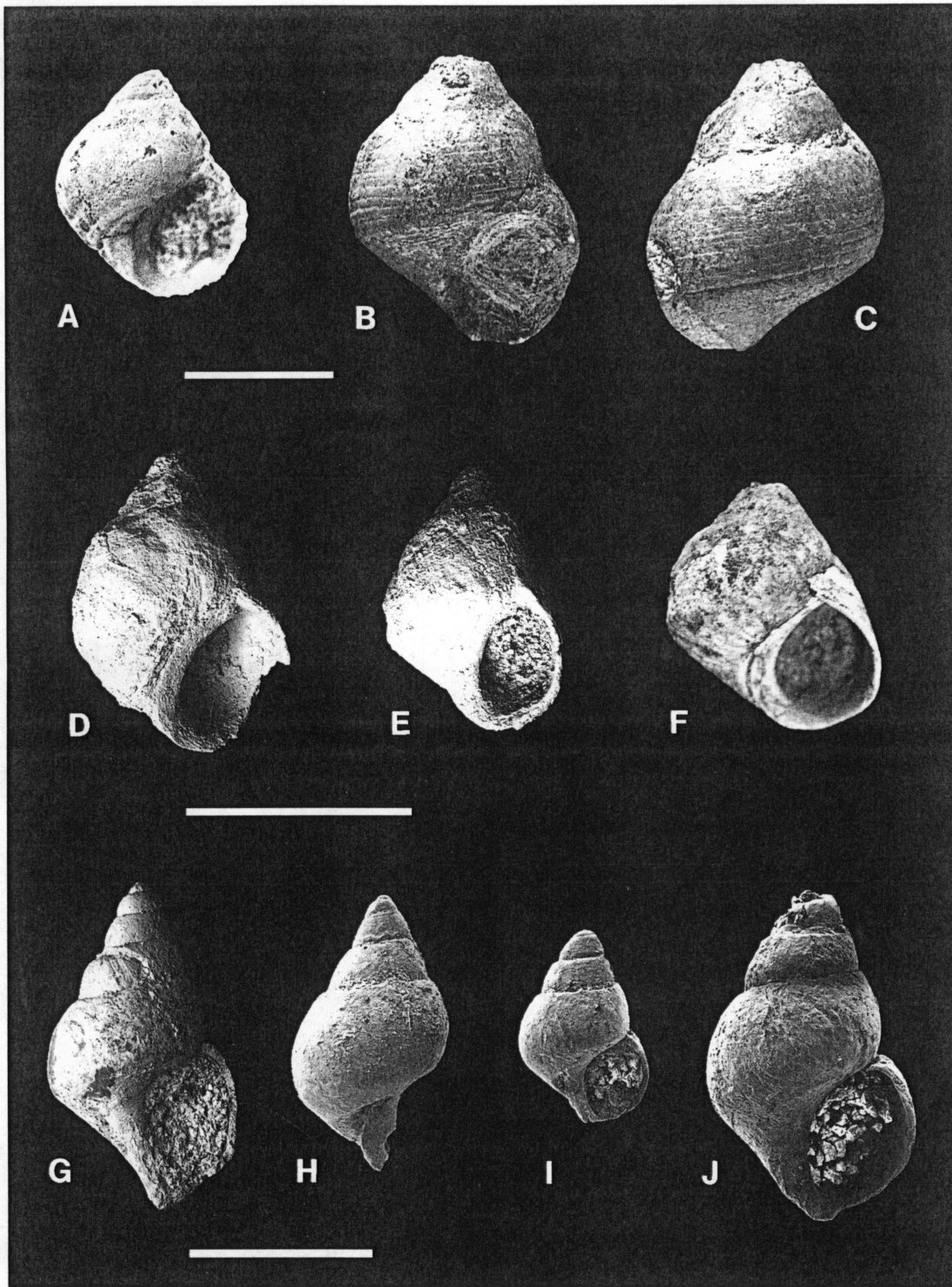
This fossil was figured, but not described or named, in a report on a collection of shallow-water and often wave-worn gastropod molluscs (largely Neritidae) from a locality on the western side of Baja California (Woods & Saul, 1986). The deposit was included in the Sepultura formation, said to be of Palaeocene or early Eocene age, although from comparison of gastropod fossils the authors considered the former to be more likely. Unfortunately the four specimens collected have since been lost (L. Saul, pers. comm.), but the original figure of one of them is here reproduced (Fig. 112A). The shell is 7.7 mm in height, of turbinate form, with five broad and shallow grooves on the base, becoming obsolete or eroded towards the periphery. No sculpture is clearly visible above the periphery. The overall shape, aperture and the form of the columella are typical of members of the Littorininae, and on this basis assignment to *Littorina* is possible. However, some of the more generalized shell shapes of species of the related genera *Nodilittorina* and *Littoraria* are extremely similar, and the generic assignment is therefore uncertain.

This species is of particular importance because of its great age. The oldest certain *Littorina* species, *L. sookensis*, is only of Upper Oligocene age, and no undoubted fossils of the Littorinidae are yet known that are older than the present species (Reid, 1989a). For comparison, the age of the divergence of the sister-genera *Littorina* and *Nodilittorina* has been estimated at 43 to 67 Ma (Middle Eocene to latest Cretaceous) from mitochondrial DNA sequence data (Reid, Rumbak & Thomas, 1996), similar to the age of this fossil. If this is indeed a member of a relatively derived littorinid genus, such as *Littorina*, *Nodilittorina* or *Littoraria*, the diversification of the family must have occurred earlier, and this record pushes back the likely origin of the family. New material would be of great interest.

#### ***Littorina subobesa* Cooper, 1896**

##### **Synonymy**

*Littorina subobesa* Cooper, 1896: 331; pl. 47, figs 3, 4 (Morley, Shasta Co., California, Cretaceous A [probably Santonian (Member V), Saul, quoted by Coan, 1981]; Marysville Buttes [Sutter Co.], Cretaceous B or Eocene [Capay Stage, Middle Eocene, Coan, 1981]; False Bay, San Diego [Mission Bay], Cretaceous B or Eocene [probably Rose Canyon shale, Domengine Eocene, Coan, 1981]; types in CAS probably destroyed in San Francisco fire, Keen & Bentson, 1944). Keen & Bentson, 1944: 168. Coan, 1981: 173.



**Figure 112.** Doubtful fossil species of *Littorina*. **A**, *Littorina* sp. Woods & Saul, 1986; copy of Woods & Saul, 1986; fig. 3.15; Punta Rosarito, SW Baja California Norte, Mexico; Palaeocene; UCLA 59432 (now LACM). **B, C**, *Littorina kozaiensis* Nomura & Onisi, 1940; holotype, SHKM 21762; Yōsuibori, Simizu, Kozai-mura, Sennan district, Miyagi Prefecture, Japan; Middle Miocene. **D-F**, *Littorina* cf. *mountsoloensis* Weaver & Palmer, 1922; quarry on NW side of Oakville, Grays Harbor County, Washington; basal Lincoln Creek formation, Upper Eocene; BMNH PL.TG.2013. **G**, *Littorina oligocenica* Dickerson, 1917; holotype, CAS 181.01; probably a member of the genus *Lacuna*; Gries Ranch, Lewis County, Washington; basal Lincoln Creek formation, Upper Eocene. **H-J**, '*Littorina*' (probably *Lacuna*) *oligocenica*; Gries Ranch, Lewis County, Washington; basal Lincoln Creek formation, Upper Eocene; BMNH PL.TG.2014. Scale bar (A-C)=5 mm; scale bar (D-F)=5 mm; scale bar (G-J)=2 mm.