

FORAMINIFERA FROM THE CRETACEOUS OF
SOUTHERN LIMBURG, NETHERLANDS, V.

by J. HOFKER

BOLIVINA FIRMA NOV. SPEC.

Virgulina tegulata (non Reuss) Visser, Thesis Leyden, 1950, p. 259, pl. 2, fig. 11.

Test strong, elongate, slightly tapering towards the apertural end, last formed chambers slightly inflated. Sutures of the chambers in the larger part of the test straight and oblique, in the last formed chambers slightly rounded with the concave side towards the apertural end.

Margin rounded, and the whole test slightly twisted as in some *Virgulinae*. Transverse section rounded, test in the middle only slightly thinner than broad. Number of chambers large, 9—10 rows. Apertural end more or less blunt, mostly with large proloculus. Aperture a strongly built slit riding on the suture of the last formed chamber and running towards the top of that chamber. Toothplate simple, not virguline but as in typical *Bolivina incrassata*. Wall thick and not translucent. Pores extremely fine, covering the whole chamberwall.

Length of tests 1.4—2 mm; breadth up to 0.4 mm in the broadest part; thickness about 0.3 mm.

This species is quite different from so-called *Loxostoma tegulata* from the type-locality, given by Cushman (Family *Virgulinidae*, Spec. Publ. 9, Cushman Lab. For. Res., 1937, p. 169, pl. 20, figs 17, 18), viz. the Gerhardsreuter Schichten at Siegsdorf, Bavaria, from which the author had topotypic material. Real *Bolivina* (*Loxostoma*?) *tegulata* (non *Virgulina tegulata* Reuss from the Turonian and Santonian) is much smaller (0.8—1.4 mm), shows sutures which in the initial end are more oblique,

whereas at the apertural end the inflated chambers show sutures with their convex side towards the apertural end, and the pores of the thinner tests are placed more scattered in the walls. Moreover a statistic study of *Bolivina tegulata* (= *Bolivina limbosa* Cushman) from the Gerhardsreuter Schichten showed, that the species is apogamic with very small proloculus, whereas that of *B. firma* always is much larger in the megalospheric form. All these features show, that *Bolivina firma* has nothing to do with *Loxostoma tegulata* and nothing with *Virgulina tegulata* Reuss. It is quite a different species, belonging in the vicinity, possibly, of *Loxostoma limbosum* Cushman.

This species is limited to the middle part of the Mb; very rare specimens occur in the Ma, which is from Mb time. In the lowest part of the Md very rare specimens reappear, but always in bad condition, so that they may be reworked by the transgressing Md sea which, in some parts of Southern Limburg (viz. Savelsbos) forms at its base a real basal conglomerate. So it seems, that it is restricted to the Middle Mb only, where it occurs in many samples, but never common.

Visser describes the pores of this species as coarse; she seems to have adopted the views of Egger's, who described real *Loxostoma tegulata*, which has not coarse pores, but distinct pores. The sutures are not slightly oblique, but strongly oblique.

It is possible, that *Bolivina incrassata* Reuss, var. *limonensis* Cushman, as described by Marie (For. Craie à Belemn. mucronata; Mém. Mus. Nat. new. Ser., 12, 1941, p. 205, pl. 32, figs. 303—306) is a forefather of our species; but this species is broader and more compressed. Marie's species is not a *Bolivina limonense* in the author's view.

FIGURE

The four specimens left from the line are *Bolivina tegulata* from the type-locality of Cushman's, Gerhardsreuter Graben near Siegsdorf, Bavaria, Lower Maestrichtian.

The specimens at the right side of the line are *Bolivina firma*, from different localities; upper row, first specimen, Enci, sample Kruit 482, lower Mb; second specimen, upper row: outcrop Enci 4, sampling Romein, at level 1.50 m, middle Mb; lower row, first specimen: outcrop Enci, sampling Romein, level 1.50 m, middle Mb; second specimen: Savelsbos, outcrop II, sampling Jonker and De Vries, No. 11, Middle Mb.

All figures with an enlargement $\times 60$. The difference between the two species is seen in the quite different initial parts and the different sutures between the chambers.

