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Classification of Early Cretaceous trochospiral and planispiral planktonic foraminifera: An update

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In the last twenty years several new genera of coiled planktonic foraminifera have been erected in the Early Cretaceous based on pore size and distribution, wall thickness and number and elongation of chambers in the last whorl. Based on detailed SEM analysis, the wall texture of Valanginian-Aptian planktonic foraminifera can be assigned to three types, 1) microperforate (pore size $<1 \mu\text{m}$), confined to the heterohelicids, 2) finely perforate with pore ranging in size from 1 to 3 microns observed in both the trochospiral and planispiral groups, and 3) irregularly reticulate, confined to the species *hoterivica*.

The finely perforate wall of the trochospiral group wall is characterised by rather randomly distributed, widely-spaced pores, ranging in size from 1 to 2 μm on most of the species, and from 3-3.5 μm on the early outer whorl chambers of some *Hedbergella trocoidea* specimens; the surface is smooth at the beginning of species range, acquiring volcano-like microstructures bearing pores at their top (perforation cones), which are more numerous in the early chambers of the outer whorl; these two types of wall coexist in all species, formerly attributed to the genera *Hedbergella*, *Praehedbergella* and *Blefuscuiana*, from small-sized *H. sigali* to larger-sized, many chambered *H. trocoidea*. Because the number of chambers in the last whorl is a criterion applicable only at species level, in the absence of other discriminating features of genus values the genera *Praehedbergella* Gorbachik & Moullade 1973 and *Blefuscuiana* Banner & Desai 1988 are considered junior synonyms of the genus *Hedbergella* Broennimann & Brown 1958. Moreover, Moullade *et al.* (2002) stated that the shape (radial elongation) of the outer chambers is not a consistent feature in discriminating at genus level; consequently, they invalidated the "clavate" genera *Lilliputianelloides* Boudagher-Fadel *et al.* 1997 and *Lilliputianella* Banner & Desai 1988. It is worth mentioning, however, that all "clavate" species possess a smooth wall and never developed perforation cones. In agreement with Moullade *et al.* (2002), the species previously attributed to the "clavate" genera *Lilliputianelloides* and *Lilliputianella* are also included in the genus *Hedbergella*.

Similarly to the trochospiral taxa, SEM analyses showed that all the Valanginian-Aptian planispiral species described so far possess a finely perforate wall with pores 1 to 3 μm in diameter, including the larger species *Globigerinelloides ferreolensis* and *G. algerianus*, the type species of the genus *Globigerinelloides* Cushman & ten Dam 1948, as already noticed by Boudagher-Fadel (1995). These observations invalidate the fundamental criterion on which Banner & Desai (1988) emended the diagnose of the genus *Blowiella* Kretzmar & Gorbachik 1971 (type species *Globigerinelloides blowi*). In fact, the other features used successively by several authors to discriminate *Blowiella* from *Globigerinelloides*, such as low/higher number of chambers in the last whorl, smaller/wider umbilical area, more/less developed relict apertures, bilobate last chamber, and laterally compressed/inflated test occur in species attributed to both genera and have a value only at species level. A further feature for retaining the genus *Blowiella* was its smooth wall (lacking the perforation cones of *Globigerinelloides*). However, our SEM observations indicate that the whole Aptian planispiral group is devoid of perforation cones, while the wall roughness on the earliest outer chambers observed in *Globigerinelloides* is simply due to pustules that may coalesce giving rise to ridges or plates, even though a few smooth morphotypes have also been detected. Consequently, the genus *Blowiella* is not valid and must be considered as junior synonym of the genus *Globigerinelloides*.