HELIOLITHUS BUKRYI
A NEW UPPER PALEOCENE CALCAREOUS NANNOFOSSIL

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INTRODUCTION

A new species of Heliolithus was found during a detailed nannofossil study of the Paleogene core samples from the Rio Grande Rise in the southwest Atlantic Ocean. Most species of this genus described previously have biostratigraphic utility, i.e., H. kleinpellii is used in the zonations of both Martini (1971) and Okada and Bukry (1980); H. riedelii is used in Martini's (1971) zonation; and H. university is used in Wise's (1983) zonation. The new species, described below as Heliolithus bukryi, has been found in two closely spaced samples from DSDP Site 516 on the Rio Grande Rise in the upper Paleocene sediments and has been figured by Bukry (1971) from a upper Paleocene sample from the northwest Atlantic Ocean. It was also found in one upper Paleocene sample (LB 821, see Hay and Mohler, 1967) from Pont Labau (France) when the present author reexamined these middle to upper Paleocene samples. The erection of the new species will facilitate the correct application of other index species of Heliolithus to stratigraphy and may be useful for refining stratigraphy and providing paleoenvironmental information.

SAMPLES AND METHODS

Samples were taken from DSDP Hole 516F in the southwest Atlantic Ocean (30°16.59'S, 35°17.10'W). Detailed information on the geologic setting, stratigraphic framework, lithology and paleoenvironment of the site can be found in Barker and Johnson (1983).

In addition to the conventional method of examination, the new species has been studied using a slightly modified technique of Moshkovitz (1978). This technique facilitates the observation of the same nannofossil specimens under the light microscope and in the SEM, and is the best among all those proposed to date for the light microscope-SEM correlation study of the same nannofossil specimens (see Shafik, 1983 and the references cited there).

SYSTEMATIC PALEONTOLOGY

Genus HELIOLITHUS Bramlette and Sullivan 1961

Heliolithus bukryi Wei, n. sp.

Plate 1, Figures 1,3-11.

Heliolithus sp. Bukry, 1971, p. 1002, pl. 8, fig. 5.

Diagnosis: Relatively large and compressed heliolithid with a small and low cycle.

Description: This species has two cycles of elements. The larger cycle (presumably the distal cycle, see Romein, 1979) has 23-36 elements (most commonly around 30). The smaller cycle

(presumably the proximal cycle) is about one third the size of the larger cycle. Under cross nicols, both cycles are birefringent.

Remarks: A morphometric study of 22 random specimens of Heliolithus bukryi from DSDP Sample 516F-85-2, 35-36 cm showed that the diameter of the distal cycle ranges from 10 to 17 μm (mean=14, standard deviation=1.86), the diameter of the proximal cycle ranges from 4 to 6 μm (mean=5.1, standard deviation=0.8), and the number of elements in the distal cycle varies from 23 to 36 (mean=31.2, standard deviation=3.3). Heliolithus bukryi differs from H. kleinpellii by that the former has a smaller cycle and has fewer elements and the latter (see Plate 1, Figure 12) has a proximal cycle which is over 1/2 the diameter of the distal cycle and usually has more than 40 elements (the holotype showing 45). No transitional form between the two species has been observed. The new species can be distinguished easily from H. cantabriae, H. riedelii, or H. universus by its compressed cycles and the large difference in the diameters between the two cycles. The latter species all have thick columns, and the proximal and distal cycles have similar diameters. Though the outline of Heliolithus bukryi resembles that of Biantholithus conicus, the distal cycle of the latter species does not birefringe under cross-polarized light and thus it is easy to differentiate it from heliolithids. Similarly, the distal side of Heliolithus bukryi looks identical to Discoaster multiradiatus in SEM micrographs (see Plate 1, Figures 3 and 4), but the former species birefringes under cross-polarized light whereas the latter does not.

Occurrence: Few to rare near the bottom of Heliolithus kleinpellii Zone (Zone CP5 of Okada and Bukry, 1980) in Rio Grande Rise upper Paleocene sediments. It was reported from the bottom of Heliolithus kleinpellii Zone (Zone CP5) in the northwest Pacific sediment at DSDP Site 47 (Bukry, 1971, p. 1002). The present author also found it common in one sample (LB 821) from Discoater mohleri Zone (CP6) in Pont Labau (France) section.

Size: Holotype: 13 μm in diameter; isotypes: 10-15 μm in diameters.

Holotype: Plate 1, Figures 1, 5, 6 (Negatives FSU PN88317-88319).

Isotypes: Plate 1, Figures 3, 4, 7-11 (Negatives FSU PN88320-88326).

Type locality: Deep Sea Drilling Project Site 516 (Rio Grande Rise, southwest Atlantic Ocean), Sample 516F-85-2,35-36cm.

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PLATE 1

Figures

1,3-11 Heliolithus bukryi Wei, n. sp.
DSDP Sample 516F-85-2, 35-36 cm. 1, 5, 6, Holotype. 1, SEM, proximal view, X4,000; 5, same specimen as 1, phase-contrast light, proximal view, X1,770; 6, same specimen as 1, cross-polarized light,proximal view, X1,770; 3, 4, 7-11, isotypes. 3, SEM, distal view, X4,000; 4, SEM, distal view, X3,300; 7, 8, 11, cross-polarized light, X1,770; 9, same specimen as 3, phase-contrast light, distal view, X1,770; 10, same specimen as 3, cross-polarized light, distal view, X1,770.

2, 12 Heliolithus kleinpellii Sullivan
DSDP Sample 516F-85-2, 35-36 cm; 2, SEM, oblique view, X4,000; 12, phase-contrast light, distal view, X1,350.

PLATE 1