

TOWEIUS PETALOSUS NEW SPECIES, A PALEOCENE  
CALCAREOUS NANNOFOSSIL FROM ALABAMA

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I. ABSTRACT

A new species of a minute calcareous nannofossil, *Toweius petalorus*, is described from the Paleocene Clayton Formation and Porters Creek Clay of western Alabama.

II. INTRODUCTION

A previously undescribed, morphologically distinct, very small, coccolith was observed in nannofossil examinations of a series of surface samples collected along the west bank of the Tombigbee River, just below the Demopolis Rooster Bridge on U.S. Highway 80, Sumter County, Alabama. At this locality the upper Cretaceous Prairie Bluff Chalk is disconformably overlain in turn by about five feet of the Clayton Formation and 20 feet of the Porters Creek Clay. These latter two formations have been correlated with the lower part of the Paleocene Midway Group (Toulmin, 1967).

Three samples contain specimens of the new species, *Toweius petalorus*, among their nannofossil assemblages. Two of the samples were obtained from the upper two feet of the Clayton Formation and one sample from an interval five feet above the base of the Porters Creek Clay. A total of several hundred specimens of this extremely small coccolith (1-2 microns), and associated coccophores, were examined with the scanning electron microscope; the small size of *T. petalorus* n. sp. is beyond the resolution capabilities of the light microscope.

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conduct this investigation and to publish the results. Electron micrograph film negatives and prints of the holotype and paratypes are on file at the U.S. National Museum.

III. SYSTEMATIC DESCRIPTION

Family COCCOLITHACEA Kamptner, 1928  
Genus TOWEIUS Hay and Mohler, 1967

TOWEIUS PETALOSUS  
Ellis and Lohman, n. sp.

Plate 1, figs. 1-11

*Description:* Elliptical placolith with distal shield composed of 9 to 17 imbricate segments which terminate with a flat end; sutures between the segments have slight clockwise inclination if viewed on distal surface. Central pore also elliptical ranging from 0.47 to 0.87 microns in length; central area filled to varying degrees by extension of the proximal shield elements. From 9 to 17 large, high, petaloid plates originate from these central area segment extensions; they extend distally and radiate outward in a counterclockwise pattern. The petaloid plates expand in width toward their distal end with maximum width at about two-thirds the height of the plate. Plates extend beyond the lateral margin of the distal shield giving a crown-like appearance to the placolith in side view. A grille containing from 16 to 21 pores spans the central area on the proximal side. The proximal shield is composed of about the same number of segments as the distal shield and is slightly smaller. Observed specimens range from 1.2 to 1.9 microns in total length and 0.9 to 1.6 microns in total width; the petaloid plates range from 0.5 to 1.4 microns in height above the upper surface of the distal shield.

Coccospheres composed of from 42 to 54 placoliths are commonly devoid of placoliths at one pole. The petaloid plates of individual placoliths intermesh with those of adjoining placoliths or remain separated. Coccospheres range from 5.6 to 8.2 microns in diameter.

Over 60 SEM micrographs were used in determining measurements and in describing this new species.

*Remarks:* This distinctive species is different from any other described forms by virtue of the large petaloid plates which are present on the distal surface of the placolith and by its very small size. *Toweius petalosus* n. sp. also differs from *T. craticulus* Hay and Mohler, *T. eminens* (Bramlette and Sullivan), *T. helianthus* (Hay and Towe) and *T. tovae* Perch-Nielsen by being from one-half to one-fifth their size and by having only about one-fourth the number of shield segments. Because of its extremely small size, an electron microscope is required for the identification of *Toweius petalosus* n. sp.

The five species of *Toweius*, including *T. petalosus* n. sp., have been reported from Paleocene and lower Eocene sediments. The geographic occurrences of the various species include California, Alabama, France, England, and Poland.

*Age and Occurrence:* Numerous individual placoliths as well as entire coccospheres have been observed in samples of the Paleocene Clayton Formation and Porters Creek Clay of Sumter County, Alabama.

*Dimensions:* Holotype—length, 1.5 microns; width, about 1.3 microns.

*Holotype:* Plate 1, figure 1; USNM 175747.

*Paratypes:* Plate 1, figures 2-11; USNM 175748, 175749, 175750, 175751, 175752, 175753, 175754, 175755, 175756, 175757.

*Type Locality and Level:* Five feet above the base of the Paleocene Clayton Formation, west bank of the Tombigbee River below Demopolis Rooster Bridge on U.S. Highway 80, Sumter County, Alabama.

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## PLATE 1

### Figures

#### 1-11 *Toweius petalosus* Ellis and Lohman, n. sp.

- (1) holotype, distal surface. Clayton Formation, X 20,000; USNM 175747. (2) paratype, distal surface. Clayton Formation, X 20,000; USNM 175748. (3) paratypes, distal surface of several specimens, absence of petaloid plates on one specimen shows central pore area and sutures on distal shield surface. Clayton Formation, X 17,500; USNM 175749. (4) paratypes, partial coccosphere showing intermeshing of petaloid plates of adjoining placoliths. Clayton Formation X 7,500; USNM 175750. (5) paratypes, proximal surfaces showing grille with pores covering central area. Clayton Formation, X 10,000; USNM 175751. (6) paratypes, proximal surfaces showing central area grille and sutures on proximal shield surface. Clayton Formation, X 17,500; USNM 175752. (7) paratype, lateral view showing petaloid plates. Porters Creek Clay, X 15,000; USNM 175753. (8) paratype, lateral view showing petaloid plates extending beyond lateral margin of the two shields. Clayton Formation, X 20,000; USNM 175754. (9) paratype, lateral view showing crown-like appearance of placolith. Clayton Formation, X 15,000; USNM 175755. (10) paratypes, coccosphere devoid of placoliths at one pole. Porters Creek Clay, X 9,000; USNM 175756. (11) paratypes, coccosphere showing some placoliths with poorly developed petaloid plates. Porters Creek Clay, X 7,000; USNM 175757.

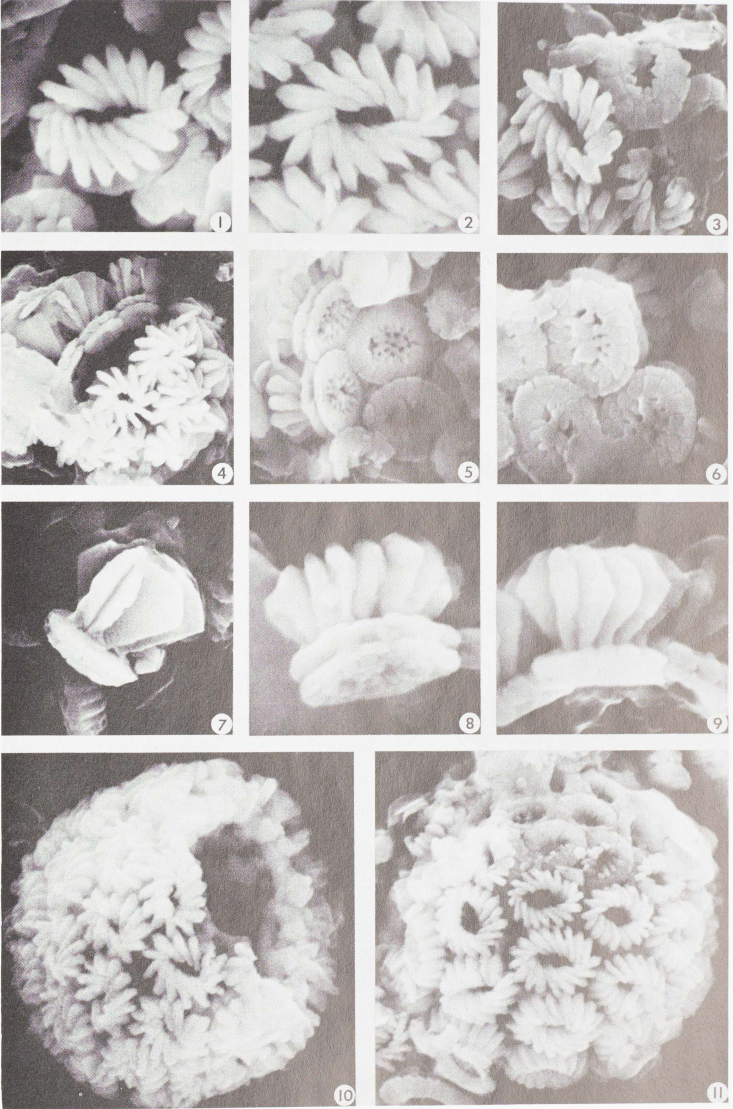


PLATE 1

## IV. REFERENCES

- BRAMLETTE, M. N. and SULLIVAN, F. R., 1961, Coccolithophorids, and related nannoplankton of the Early Tertiary in California: *Micropaleontology*, v. 7, p. 129-188.
- HAY, W. W. and MOHLER, H. P., 1967, Calcareous nannoplankton from Early Tertiary rocks at Pont Labau, France, and Paleocene-Early Eocene correlations: *Jour. Paleont.*, v. 41, p. 1505-1541.
- HAY, W. W. and TOWE, K. M., 1962, Electron-microscopic examination of some coccoliths from Donzacq (France): *Eclogae Geol. Helv.*, v. 55, p. 497-517.
- PERCH-NIELSEN, K., 1971, Einige neue Coccolithen aus dem Paleozän der Bucht von Biskaya: *Bull. Geol. Soc. Denmark*, v. 20, p. 347-361.
- TOULMIN, L. D., 1967, Summary of Lower Paleogene lithostratigraphy and biostratigraphy in Alabama in *Geology of the Coastal Plain of Alabama*: *Geol. Soc. Amer. Field Trip No. 1 Guidebook*, D. E. Jones, edit., p. 33-43.

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- INTRODUCTION TO GEODESY, by Clair E. Ewing and Michael M. Mitchell. Published by American Elsevier Publishing Company, Inc., New York, 1970, x + 304 pp., illus., \$17.50
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