

CERATOLITHUS ACUTUS GARTNER AND BUKRY, N. SP.  
AND CERATOLITHUS AMPLIFICUS BUKRY AND PERCIVAL—  
NOMENCLATURAL CLARIFICATION

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ABSTRACT

The calcareous nannofossil *Ceratolithus acutus* Gartner and Bukry n.sp., is a birefringent ceratolith from early Pliocene sediment. It is distinct from *Ceratolithus amplificus* Bukry and Percival, the holotype of which is from late Miocene sediment. *Ceratolithus dentatus* Bukry is a junior synonym of *C. amplificus*.

HISTORICAL BACKGROUND

Bukry and Percival (1971) described and named a large and robust representative of the genus *Ceratolithus*, the species *Ceratolithus amplificus*. They indicated that this species occurs in late Miocene and early Pliocene sediment in the Atlantic and Pacific Oceans. Subsequently, Bukry was able to distinguish two distinct taxa within the group of specimens formerly included in *Ceratolithus amplificus* and therefore restricted the name *Ceratolithus amplificus* to the early Pliocene form (Bukry, 1971, table 2). To the late Miocene form he gave the name *Ceratolithus dentatus* (Bukry, 1973).

In a study of the evolutionary lineage of the genus *Ceratolithus*, samples from the type levels of several ceratolith species have been re-examined. It was found that at its type level *Ceratolithus amplificus* is associated with the five-rayed symmetrical asteroliths of the *Discoaster quinqueramus* group, and hence the age of the type specimen is late Miocene. A careful examination of *Ceratolithus dentatus*, which was described from the same stratigraphic level elsewhere, indicated that the two are identical. The name *Ceratolithus dentatus* is, therefore, a junior synonym of *Ceratolithus amplificus*.

This error has left the distinctive early Pliocene form without a name, and the species is herein named *Ceratolithus acutus*.

SYSTEMATIC PALEONTOLOGY

CERATOLITHUS ACUTUS

Gartner and Bukry, n.sp.

Plate 1, figures 1-4

*Description:* *Ceratolithus acutus* is a robust species that has unequal or almost equal horns and a blunt apical spine that terminates in an acute angle. This apical structure is nearly symmetrical and may bear a ridge-like thickening that runs somewhat off center from near the tip of the apical structure towards the inner curvature. In the preferred orientation, with the plane of the ceratolith normal to the direction of illumination, *Ceratolithus acutus* is highly birefringent. Specimens are brightest when the horns are at about 45 degrees to the polarizing directions of the crossed nicols and go to extinction when the horns are parallel to the direction of polarization. On the surface of the longer horn three or more prominent nodes may be present, and on some specimens these nodes coalesce to form a ridge.

*Remarks:* *Ceratolithus acutus* is similar to the closely related species *Ceratolithus rugosus* in its optical properties in cross-polarized light. It differs in having a pronounced broad apical spine, which is generally well preserved even on corroded specimens. *Ceratolithus amplificus* is only weakly birefringent or non-birefringent, and has the apical spine more asymmetrically located.

*Ceratolithus acutus* was previously identified as *Ceratolithus amplificus*, however, the type level of the latter is in the upper Miocene, well below the extinction level of *Discoaster quinqueramus*. The highly birefringent ceratoliths, of which *Ceratolithus acutus* is the oldest do not appear in the geologic record until well above the extinction level of *Discoaster quinqueramus*.

*Occurrence:* *Ceratolithus acutus* is most common in lower Pliocene sediment. At Capo Rossello in Sicily this species occurs in the Trubi Formation from about 6 meters above the base to about 48 meters above the base. In the equatorial Pacific the species first appears near the middle of the lowermost reversed event in the Gilbert epoch in Core RC 12-66 and apparently ranges no higher than the Gilbert "b" event in Core V24-59, (Gartner, 1973).

*Type specimen:* Plate 1, figure 4.

*Type locality:* DSDP 22-214-9-3, 22-23 cm; Indian Ocean, lat. 11° 20.21'S., long 88° 43.08'E., subbottom depth 79 meters.

#### CERATOLITHUS AMPLIFICUS

Bukry and Percival, emended

#### Plate 1, figures 5-7

*Ceratolithus amplificus* BUKRY and PERCIVAL, 1971, p. 125, pl.1, figs. 9-11.

*Ceratolithus dentatus* BUKRY, 1973, p. 676, pl.2, figs. 1-3.

*Description:* *Ceratolithus amplificus* is a robust strongly asymmetrical horseshoe-shaped species with a short but thick apical spine. The apical spine is located above the larger of the two horns with which it appears to be more or less continuous. The smaller horn has the appearance of a sharply curved hook at the tip of the extended apical region. On well-preserved specimens one surface of the large horn as well as the apical region may bear a line of rough nodes. On many specimens a ridge may be visible in place of the nodes. In the preferred orientation with the plane of the ceratolith normal to the direction of illumination *Ceratolithus amplificus* generally is nonbirefringent, tilted specimens may be weakly birefringent and the

#### PLATE 1

Figures 1-4

*Ceratolithus acutus* Gartner and Bukry n. sp.

1, 2. RC12-66; 1620 cm; X2500. 1 Interference contrast; 2 Cross-polarized light, with long axis of specimen at 45 degrees to direction of polarization.

3, 4. DSDP 22-214-9-3; 22-23 cm; X5000. Scanning electron microscope photographs.

Figures 5-7

*Ceratolithus amplificus* Bukry and Percival

5. DSP 22-214-12-3; 14-15 cm; X5000. Scanning electron microscope photograph.

6. DSDP 22-214-12-cc; X2500. Light-microscope photograph, phase contrast.

7. P6603-49, 1001 cm; X2500. Light-microscope photograph, interference contrast.

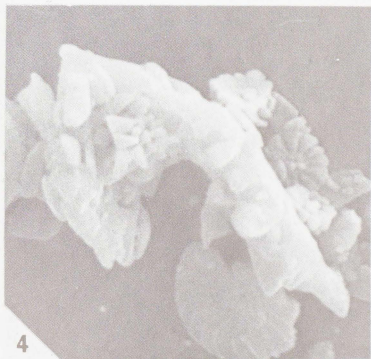
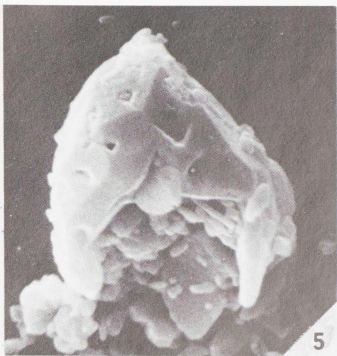
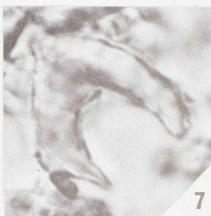
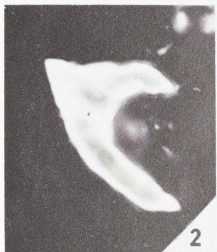
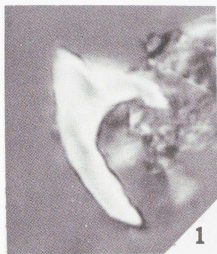


PLATE 1

orientation at which they are brightest varies, depending on the way the specimen is tilted.

*Remarks:* *Ceratolithus amplificus* is similar to *Ceratolithus acutus*, from which it differs by the more asymmetrical position of the apical spine, by having the horns farther apart and proportionately shorter and by the lack of strong birefringence in cross-polarized light. *Ceratolithus tricorniculatus* is also similar to *Ceratolithus amplificus* but the former is much more delicate. Although both species may be weakly birefringent, *Ceratolithus tricorniculatus* and *Ceratolithus amplificus* may be brightest with the horns parallel to the direction of polarization. Birefringence in both species is generally attributable to tilting of the specimens, which occurs frequently because of surface decorations of the species.

The pronounced curvature or hook formed by the smaller horn of *Ceratolithus amplificus* may give this species an angular appearance. The nodes on the surface of this species are no doubt the predecessors of the rods which form the proximal keel of *Ceratolithus cristatus*. An intermediate development of this accessory structure can be seen on some well-preserved specimens of *Ceratolithus acutus* and *Ceratolithus rugosus* also.

*Occurrence:* *Ceratolithus amplificus* occurs in late Miocene sediments in association with

*Ceratolithus primus*. Its earliest occurrence is somewhat above the first occurrence of *C. primus*, and it disappears from the record at about the level of the first occurrence of *Ceratolithus acutus*.

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