



desmoceras. It seems to resemble *Mesopuzosia* in most of its features but the ribs do not reach the umbilical edge. If the species is assigned to *Mesopuzosia*, it extends the range of that genus down to the uppermost Albian from Turonian. It may be that this species is transitional between *Puzosia* and *Mesopuzosia*. In any case, the generic assignment is based on morphologic similarity and *Mesopuzosia* seems to be morphologically the most similar group.

Range.—This species has a restricted stratigraphic position and is probably uppermost Albian in age. It is found with *Pseudhelicoceras*, *Desmoceras* (*Pseudouhligella*), *Mortonicerias*, *Mariella*, *Eogunnarites*, and *Anisoceras* in clasts in the lowest conglomerate of the Bald Hills formation on the North Fork of Cottonwood Creek. It also occurs free in the matrix of this unit. It occurs in limestone nodules on the same horizon as *Pseudhelicoceras* cf. *P. petersoni* (Anderson) in the mudstone unit immediately above the conglomerate. *Desmoceras* (*Pseudouhligella*) and *Zelandites* occur both stratigraphically above and below the known occurrences of this species.

M. colusaense (Anderson) is recorded from the Peterson Ranch near Sites, Colusa County and from Dry Creek in Tehama County, as well as the North Fork of Cottonwood Creek localities listed in this paper.

Genus BEUDANTICERAS Hitzel, 1905

BEUDANTICERAS HAYDENI (Gabb)

Pl. 104, fig. 4, Pl. 105, figs. 1,2.

Ammonites haydeni Gabb, vol. I, 1864, p. 62, pl. 10, figs. 8,8a.

Desmoceras (*Puzosia*) *Haydeni* (Gabb), Whiteaves, 1900, vol. 1, pt. 4, p. 285; ? Anderson, 1902, p. 41; Hanna and Hertlein, 1943, fig. 61-8.

Beudanticeras haydeni (Gabb), Anderson, 1938, p. 190 in part, not pl. 48, figs. 2,3; Murphy, 1956, p. 2119, fig. 6; Anderson, 1958, p. 212, pl. 8, fig. 1,1a.

The holotype, no. 14973 in the Museum of Paleontology, University of California, Berkeley, was found on the North Fork of Cottonwood Creek, Shasta County, California. F. M. Anderson has notes with this specimen stating that it is not the type, but it agrees in detail with Gabb's figures and is regarded as the holotype in this paper. Anderson's figured specimens (1938, pl. 48,

figs. 2,3) are small specimens of *Brewericeras hulenense* (Anderson).

Beudanticeras haydeni (Gabb) has a compressed shell, narrowly rounded venter and a flank that is broad in relation to the small umbilicus. The ornamentation consists of falciform growth lines and periodic, low, crescent-shaped ridges on the peripheral half of the flank. The suture line (pl. 4, fig. 4) is virtually identical with that figured in Spath (1923, text fig. 12c) for *Beudanticeras beudanti*. The umbilical wall and flank meet at right angles to one another at the sharply angular umbilical edge. Specimens up to eight inches in diameter are in our collection, but the average specimen is about four inches in diameter.

Hypotypes.—Specimen 28659 U.C.L.A. Invertebrate Paleo. Cat. was collected from the lowest conglomerate of the Bald Hills formation on the North Fork of Cottonwood Creek, U.C.L.A. locality 3467. Specimen 28660 U.C.L.A. Invert. Paleo. Cat. was collected in the *Oxytropidoceras packardi* zone at U.C.L.A. locality 2900.

Remarks.—*B. haydeni* (Gabb) is very close to the genotype, *B. beudanti* (Brogniart) as interpreted by Spath (1923, pl. 2, fig. 4a,b). It differs in having more closely spaced crescent-shaped ridges and a slightly more rounded venter. The specimens of *B. haydeni* (Gabb) found in the Cottonwood district of northern California are generally fragmental and often poorly preserved. In this state they may be confused with *Brewericeras hulenense* (Anderson), especially when the suture line is not preserved or the whorl section is crushed. An apparently consistent difference in the ornamentation of the umbilical wall of large specimens may be used to separate the two species when other criteria fail. The configuration of the growth lines across the umbilical wall of *Br. hulenense* is like that of a rounded chevron, inflected posteriorly across the inner half then anteriorly across the remainder of the wall. An indented spiral line is often present at the peak of this chevron. In *B. haydeni* the growth line is not inflected on the umbilical portion of the wall but is inflected anteriorly from the half-way mark to the umbilical edge.

Range.—*B. haydeni* (Gabb) has been found in association with the following

forms: *Oxytropidoceras packardi* Anderson, *Puzosia aldersona* Anderson, *Desmoceras (Pseudouhligella) vetus* Murphy and Rodda, and *Mortoniceratid? hulenana* (Anderson).

Anderson has reported that this species occurs with *Brewericeras hulenense* (Anderson) (1938, p. 191). He also reports that the two species are abundant at Horsetown and Texas Springs (1938, p. 191; 1958, p. 212). No specimens of *Beudanticeras haydeni* have been recovered by the writers from these classic localities although *Brewericeras hulenense* is abundant at both places. Anderson's collections in the California Academy of Sciences from the above localities and from localities in his "Neptune zone" contain only one specimen (C.A.S. Type Coll. No. 5944) of *B. haydeni*. The specimen figured in his 1938 paper (pl. 48, figs. 2,3) is a small compressed specimen of *Brewericeras hulenense*. It is concluded, therefore, that the reported occurrences of *Beudanticeras haydeni* with *Brewericeras hulenense* in the "Neptune zone" of Anderson, at Horsetown and at Texas Springs are based largely on misidentifications and that the lowest occurrence of *B. haydeni* is in the *Oxytropidoceras packardi* zone of the middle Albian. The single exception, cited above, is from C.A.S. locality 1344, "Old Horsetown." Since there are cretaceous rocks of several ages ranging from lower Albian to Turonian in the vicinity of the site of Horsetown, (Rodda, 1960), we must wait for more positive proof that *B. haydeni* occurs with *Br. hulenense*.

The specimen figured in this paper (Pl. 105, figs. 1,2) was found in the lowest con-

glomerate of the Bald Hills formation on the North Fork of Cottonwood Creek by W. P. Popenoe of the University of California, Los Angeles.

Genus DESMOCERAS Zittel, 1884
Subgenus PSEUDOUHLIGELLA
Matsumoto, 1942

In his discussions of the subgenus Matsumoto has distinguished two criteria by which *Pseudouhligella* may be distinguished from *Desmophyllites* Spath. The first of these is on the nature of the umbilicus: "Besides the typical *Desmoceras* (i.e. *latidorsella* Jacob), there are compressed forms which include the subgenus *Pseudouhligella* and the genus *Schlüteria* [= *Desmophyllites*].¹ Although these two resemble each other, *Schlüteria* has a very narrow, crater-like umbilicus, its sutural element U_{vi} being situated outside the umbilical shoulder, even at a comparative early stage of growth, whereas *Pseudouhligella* in the adult stage is gradumbilicate and is ornamented with a weak ventral subcosta." (Matsumoto, 1942, p. 25). The second criterion is on the basis of the number of elements in the suture: "*Desmophyllites*, which is one of the true desmoceratids, is allied to the present subgenus, but has more numerous elements in the suture-line, very narrow and crater-like umbilicus and, accordingly, a *Phylloceras*-like shell-form. No connecting form has yet been found between the Cenomanian *Pseudouhligella* and Campanian *Desmophyllites*." (Matsumoto, 1954, p. 252). According to

¹ [] are the writers'.

EXPLANATION OF PLATE 105

All figures $\times 1$

- FIGS. 1,2—*Beudanticeras haydeni* (Gabb). 1, lateral view of specimen 28659 U.C.L.A. Invert. Paleo. Cat. showing ornamentation; 2, cross-sectional view of same specimen showing shape of whorl.
3—*Brewericeras hulenense* (Anderson). Specimen 28661 U.C.L.A. Invert. Paleo. Cat. figured here to show similarity of early whorls to early whorls of *Beudanticeras haydeni* (Gabb) with which it has been confused.
4,5—*Puzosia sullivanana* n. sp. Ventral and lateral views of the holotype, 28657 U.C.L.A. Invert. Paleo. Cat.