

# The Philadelphia Syntypes of *Ammonites hoffmanni* Gabb (Cretaceous) (Mollusca: Ammonoidea)

by

PETER U. RODDA

Department of Invertebrate Zoology and Geology, California Academy of Sciences,  
San Francisco, California 94118, USA

AND

MICHAEL A. MURPHY

Department of Geology, University of California, Davis, California 95616, USA

*Abstract.* Two syntypes of *Ammonites hoffmanni* Gabb, 1864, at the Academy of Natural Sciences of Philadelphia were inadvertently overlooked when a lectotype was chosen by MURPHY & RODDA (1977). These two specimens, and at least two others as yet unidentified, formed the basis of Gabb's composite illustrations for this species. The two syntypes belong to two taxa: The smaller syntype (ANSP 4794a) is designated a paralectotype of *A. hoffmanni* [= *Puzosia hoffmanni* (Gabb)], and the larger syntype (ANSP 4794b) is assigned to *Mesopuzosia colusaense* (Anderson, 1902).

## INTRODUCTION

In a previous paper (MURPHY & RODDA, 1977) we described the 10 syntypes of *Ammonites hoffmanni* Gabb, 1864, in the University of California, Museum of Paleontology, Berkeley (UCMP). We chose one of these (UCMP 12094) as the lectotype of *A. hoffmanni*; three other syntypes were designated paralectotypes (UCMP 14154, 14839, 14921). The other six syntypes were assigned to five different ammonite taxa: *Puzosia subquadrata* (Anderson, 1902), UCMP 14155; *Melchiorites indigenes* Anderson, 1938, UCMP 14156, 14157; *Melchiorites shastensis* Anderson, 1938, UCMP 14158; *Melchiorites* sp., UCMP 12091; and *Lytoceras argonautarum* Anderson, 1902, UCMP 14153. We inadvertently overlooked two

syntypes of *A. hoffmanni* at the Academy of Natural Sciences of Philadelphia (ANSP 4794) (RICHARDS, 1968: 212). The purpose of this paper is to describe, illustrate, and discuss these two additional syntypes. For comparisons we have used other specimens from the geology collections of the California Academy of Sciences (CASG). Measurements of all cited specimens are presented in Table 1.

## HISTORY

From 1862 to 1868 W. M. Gabb was a paleontologist for the Geological Survey of California (Whitney Survey), and he described many fossil species collected from Cretaceous and Cenozoic rocks of California (GABB, 1864, 1869). When the California Legislature terminated the Whitney Survey

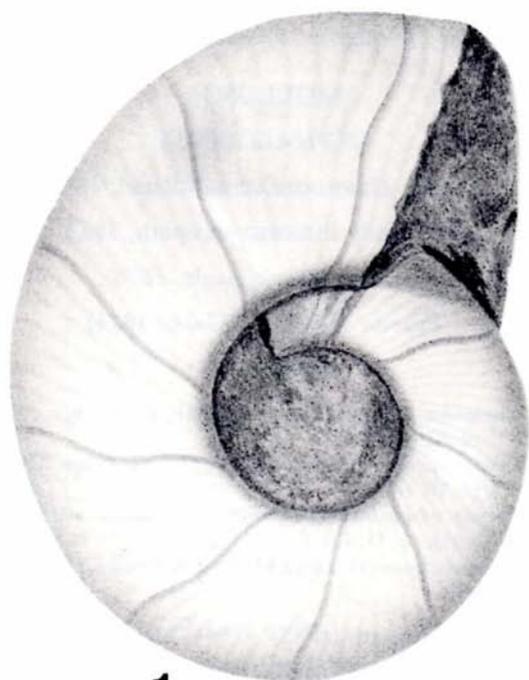
---

## Explanation of Figures 1 to 6

Figures 1, 2. *Ammonites hoffmanni* Gabb, 1864. Figure 1. Reproduction of GABB's figure (1864:pl. 11, fig. 13); original drawing 85 mm high. Figure 2. Reproduction of GABB's figure (1864:pl. 11, fig. 13a); original drawing 35 mm high.

Figures 3, 4. *Puzosia hoffmanni* (Gabb, 1864). Paralectotype, ANSP 4794a, maximum diameter 56 mm. Figure 3. Apertural view. Figure 4. Lateral view.

Figures 5, 6. *Mesopuzosia colusaense* (Anderson, 1902). Hypotype (ex syntype of *Ammonites hoffmanni* Gabb, 1864), ANSP 4794b, maximum diameter 127 mm. Figure 5. Lateral view. Figure 6. Apertural view.



1



2



3



4



5



6

Table 1

Measurements of lectotype and paralectotypes of *Ammonites hoffmanni* Gabb, 1864 [= *Puzosia hoffmanni* (Gabb)], and of other cited specimens. Abbreviations are as follows: D, shell diameter; H, whorl height; W, whorl width; U, umbilical diameter. All measurements are in millimeters. Numbers in parentheses express measurements as percentages of shell diameter. Dashes indicate measurement could not be taken.

	D	H	W	U
<i>Puzosia hoffmanni</i> (Gabb, 1864)				
UCMP 12094 (lectotype)	110	42 (38)	45 (41)	39 (35)
ANSP 4794a (paralectotype)	56	23 (41)	19 (34)	16 (29)
UCMP 14154 (paralectotype)	57	22 (39)	22 (39)	20 (35)
UCMP 14839 (paralectotype)	43	18 (42)	16 (37)	12 (28)
UCMP 14921 (paralectotype)	43	18 (42)	17 (40)	14 (33)
<i>Mesopuzosia colusaense</i> (Anderson, 1902)				
CASG 4283 (holotype)	240	106 (44)	88 (37)	61 (25)
CASG 10798 (hypotype)	145	65 (45)	45 (31)	38 (26)
ANSP 4794b (hypotype)	127	56 (44)	41 (32)	— (—)

in 1868, Gabb deposited a large collection of California fossils at the Academy of Natural Sciences of Philadelphia; other survey fossils were deposited later at the University of California, Museum of Paleontology, and at Harvard University, Museum of Comparative Zoology (MERRIAM, 1895; STEWART, 1926). These collections include the type specimens of many California fossil species.

STEWART (1926, 1930) reviewed Gabb's species of gastropods and bivalves, and designated type specimens, but there is no such comprehensive treatment for Gabb's California fossil cephalopods. ANDERSON (1938) describes some of Gabb's California Cretaceous ammonites that were deposited at the Museum of Paleontology (UCMP) and at Philadelphia (ANSP). ANDERSON (1938) examined several of Gabb's specimens of *Ammonites hoffmanni* at the Museum of Paleontology, but he either overlooked the two syntypes at Philadelphia, or they were not available at that time. However, Anderson's designation of a lectotype for *A. hoffmanni* (ANDERSON, 1938:187, pl. 45, figs. 1, 2) is invalid because he did not choose a specimen from the existing syntypes (MURPHY & RODDA, 1977:78). Subsequently, we selected a valid lectotype from the 10 syntypes at the University of California, Museum of Paleontology, Berkeley (MURPHY & RODDA, 1977:79).

#### SYSTEMATIC DISCUSSION

The two ANSP syntypes are assigned to two species. The smaller syntype (ANSP 4794a) is conspecific with *Puzosia hoffmanni* (Gabb, 1864) as characterized by MURPHY &

RODDA (1977), and the larger syntype (ANSP 4794b) is identified as *Mesopuzosia colusaense* (Anderson, 1902).

#### MOLLUSCA

#### CEPHALOPODA

Family DESMOCERATIDAE Zittel, 1895

Subfamily PUZOSIINAE Spath, 1922

Genus *Puzosia* Bayle, 1878

*Puzosia hoffmanni* (Gabb, 1864)

(Figures 1-4)

*Ammonites hoffmanni* GABB, 1864:65, pl. 11, figs. 13, 13a, pl. 12, fig. 13b.

*Desmoceras dilleri* ANDERSON, 1902:97, pl. 4, figs. 116, 117, pl. 10, fig. 192.

*Puzosia subquadrata* (Anderson): ANDERSON, 1938:186 (in part), pl. 45, fig. 4.

*Puzosia hoffmanni* (Gabb): MURPHY & RODDA, 1977:79, figs. 1-5.

The small syntype (ANSP 4794a) has the whorl profile and cross-section, umbilical characteristics, ribbing, and constrictions of *Puzosia hoffmanni* (Gabb) (= *Ammonites hoffmanni* Gabb) as redefined by MURPHY & RODDA (1977). This syntype (ANSP 4794a) is here designated as a paralectotype of *A. hoffmanni*.

Genus *Mesopuzosia* Matsumoto, 1954

*Mesopuzosia colusaense* (Anderson, 1902)

(Figures 5-10)

*Desmoceras colusaense* ANDERSON, 1902:96, pl. 5, figs. 128, 129, pl. 10, fig. 200.

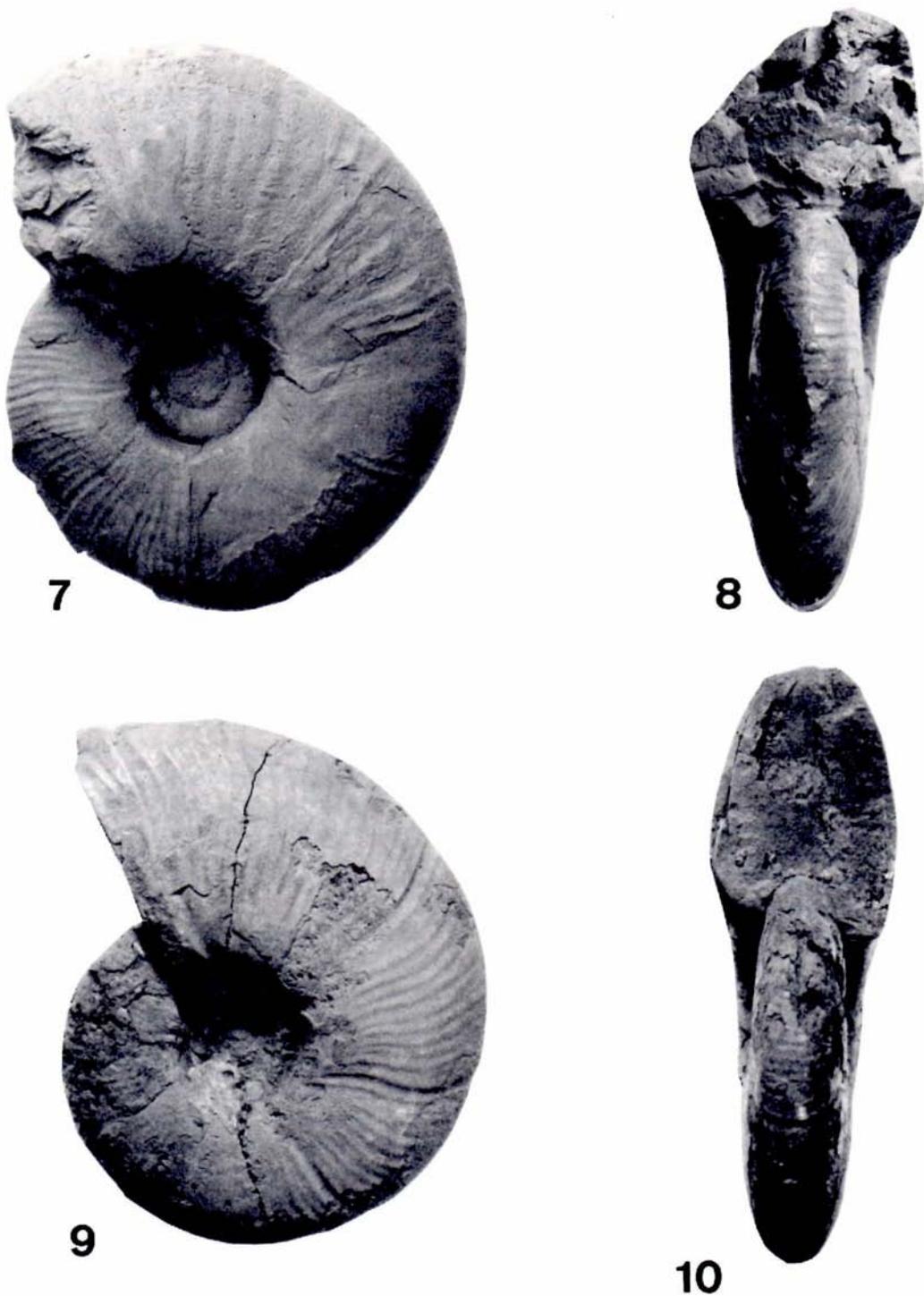
*Puzosia* (*Parapuzosia*) *colusaensis* (Anderson): ANDERSON, 1958:236, pl. 10, fig. 1.

*Pachydesmoceras colusaense* (Anderson): MATSUMOTO, 1959a:62; MATSUMOTO, 1959b:22.

*Mesopuzosia colusaense* (Anderson): MURPHY & RODDA, 1960:850, pl. 102, fig. 10.

The compressed whorl, narrow venter, and sigmoidal ribs of the larger syntype (ANSP 4794b) of *Ammonites hoffmanni* Gabb (Figures 5, 6) are similar to small specimens, or the internal whorls of larger specimens, of the puzosid ammonite *Mesopuzosia colusaense* (Anderson). The holotype of this species (CASG Type No. 4283; ANDERSON, 1902:pl. 5, figs. 128, 129) and Anderson's 1958 hypotype (CASG Type No. 10798; ANDERSON, 1958:pl. 10, fig. 1) are illustrated here for comparison (Figures 7-10). The holotype, a moderately large specimen (diameter 240 mm), is from the Petersen Ranch, near Sites, Colusa County, California. The hypotype was collected on the North Fork of Cottonwood Creek, Shasta County, California.

**Remarks:** Gabb's original description of *Ammonites hoffmanni* (GABB, 1864:65, pl. 11, figs. 13, 13a, pl. 12, fig. 13b) included three illustrations, a lateral view, a whorl



Explanation of Figures 7 to 10

Figures 7, 8. *Mesopuzosia colusaense* (Anderson, 1902). Holotype, CASG 4283, maximum diameter 240 mm. Figure 7. Lateral view. Figure 8. Apertural view.

Figures 9, 10. *Mesopuzosia colusaense* (Anderson, 1902). Hypotype, CASG 10798, maximum diameter 145 mm. Figure 9. Lateral view. Figure 10. Apertural view.

cross-section, and a suture line. The lateral view (pl. 11, fig. 13) is a lithograph of a finely ribbed ammonite about 130 mm in diameter, with numerous constrictions and a partly exposed umbilicus. The whorl cross-section (pl. 11, fig. 13a) is an outline drawing 35 mm high and 25 mm wide. Both of these illustrations are reproduced here (Figures 1, 2).

Figure 13 of GABB (1864:pl. 11) is a composite drawing based on at least three different specimens, the two syntypes at the ANSP (4794a, 4794b), and one or more as yet unknown specimens. The general outline of GABB's figure (1864:pl. 11, fig. 13) was taken from the larger syntype, ANSP 4794b. This specimen is about the same size as the illustration, has the same general outline, and has the same distinctive terminal fracture of the outer whorl (Figures 1, 5). However, unlike Gabb's original illustration, this specimen has a completely covered umbilicus. The partly exposed umbilicus of GABB's figure (1864:pl. 11, fig. 13) closely matches the umbilicus of the smaller syntype, ANSP 4794a (Figures 3, 4). The constrictions on GABB's figure (1864:pl. 11, fig. 13) do not exactly match those of either ANSP syntype, nor a combination of the two, in character or position. Gabb's illustration has 10 sigmoidal constrictions that are projected adapically on the ventrolateral area. The larger syntype (ANSP 4794b) has 10 constrictions projected *adorally* on the ventrolateral area; only the five inner constrictions agree in position with Gabb's illustration. The small syntype (ANSP 4794a) has eight constrictions, also projected *adorally* on the venter, that do not match the constrictions of GABB's figure (1864:pl. 11, fig. 13).

The small syntype (ANSP 4794a) has a whorl section similar to, but not identical with, that of GABB's figure (1864:pl. 11, fig. 13a); ANSP 4794a is smaller and slightly wider. The whorl section of the larger syntype (ANSP 4794b) has about the same proportion of height to width as the figured cross-section, but ANSP 4794b has a distinctly different cross-sectional shape with a narrower venter and a more trigonal outline (Figure 6). The suture line (GABB, 1864:pl. 12, fig. 13b) appears to have been taken from another, as yet undetermined specimen; no suture line is visible on either of the ANSP syntypes. In summary, Gabb used at least four different specimens to illustrate *Ammonites hoffmanni*, and one figure (GABB, 1864:pl. 11, fig. 13) is a composite drawing based partly on the two syntypes at the Academy of Natural Sciences of Philadelphia.

In choosing a lectotype, preference should be given to originally illustrated specimens if available (Recommendation 74B, International Code of Zoological Nomenclature). In the present case, when the lectotype of *Ammonites hoffmanni* Gabb was chosen (MURPHY & RODDA, 1977: 79), the existing, partly illustrated, Philadelphia syntypes were inadvertently overlooked. However, because of the composite nature of Gabb's illustrations, the interpretation of the ANSP syntypes described above is in taxonomic harmony with our previous designation of the lectotype,

and thus conforms, at least in spirit, to ICZN Recommendation 74B.

**Distribution:** On the old labels with the two syntypes at the ANSP, the collecting locality for both specimens is indicated as "Cottonwood Creek" (Shasta County, California). The only locality for *Ammonites hoffmanni* indicated in GABB (1864:65, 220) is "Horsetown," an old mining camp on Clear Creek, about 8 km northeast of the North Fork of Cottonwood Creek.

Fossils from the site of old Horsetown occur in dark gray sandstone within the *Brewericeras hulenense* ammonite zone (MURPHY, 1956; MURPHY & RODDA, 1977). To our knowledge no specimens of *Puzosia hoffmanni* have been found at this locality or at this stratigraphic level. We have collected *Puzosia hoffmanni* from the North Fork of Cottonwood Creek and vicinity in fine-grained limy nodules scattered in mudstone and in the mudstone itself (Budden Canyon Formation of MURPHY *et al.*, 1969). The paralectotype (ANSP 4794a) has the fine-grained limy matrix typical of the North Fork occurrences.

Specimens of *Mesopuzosia colusaense* similar to the larger syntype (ANSP 4794b) of *Ammonites hoffmanni* have been collected from limy nodules in mudstone, and from sandstone and conglomeratic sandstone (Budden Canyon Formation), on Huling Creek and the North Fork of Cottonwood Creek, Shasta County, and on Dry Creek, Tehama County (MURPHY & RODDA, 1960; MURPHY *et al.*, 1969). The stratigraphic age of *M. colusaense* is significantly younger than any fossils known from the site of old Horsetown. The large syntype (ANSP 4794b) (= *M. colusaense*) has a matrix of yellow-brown, fine- to medium-grained sandstone that resembles the sandstones that crop out near the junction of the North Fork of Cottonwood Creek and Huling Creek.

In the Cottonwood Creek district, *Puzosia hoffmanni* and *Mesopuzosia colusaense* have different, non-overlapping stratigraphic ranges (MURPHY, 1956; MURPHY *et al.*, 1969; MURPHY & RODDA, 1977; RODDA & MURPHY, 1987). We have collected *Puzosia hoffmanni* from the *Gabbiceras wintunius* zone through the *Leconteites lecontei* zone of early to middle Albian age (MURPHY, 1956; MURPHY *et al.*, 1969). *Mesopuzosia colusaense* is a suggested local guide fossil for rocks of latest Albian age (MURPHY *et al.*, 1969).

The two syntypes of *Ammonites hoffmanni* at the ANSP came from different stratigraphic levels, and both probably came from the North Fork of Cottonwood Creek or nearby. Neither specimen is likely to have been collected at old Horsetown.

In conclusion, 12 syntypes of *Ammonites hoffmanni* Gabb, 1864, representing seven different taxa, are at two depositories. The 10 specimens at the University of California, Museum of Paleontology are assigned to six different taxa, and UCMP 12094 was chosen as the lectotype (MURPHY & RODDA, 1977). The two specimens at the Academy of Natural Sciences of Philadelphia (ANSP 4794a, 4794b) belong to two taxa, and they demonstrate the composite

nature of Gabb's original illustrations. The smaller of these two syntypes (ANSP 4794a) is herein designated a paralectotype of *A. hoffmanni* Gabb, 1864 [= *Puzosia hoffmanni* (Gabb, 1864)]. The larger specimen (ANSP 4794b) is assigned to *Mesopuzosia colusaense* (Anderson, 1902).

#### ACKNOWLEDGMENTS

We are grateful to George Kennedy, Los Angeles County Museum of Natural History, for calling our attention to the ANSP specimens, and we thank George Davis, Academy of Natural Sciences of Philadelphia, for the loan of the two syntypes.

#### LITERATURE CITED

- ANDERSON, F. M. 1902. Cretaceous deposits of the Pacific Coast. California Academy of Sciences, Proceedings, Third Series, *Geology* 2(1):1-154.
- ANDERSON, F. M. 1938. Lower Cretaceous deposits in California and Oregon. Geological Society of America, Special Paper 16:1-339.
- ANDERSON, F. M. 1958. Upper Cretaceous of the Pacific Coast. Geological Society of America, Memoir 71:1-378.
- GABB, W. M. 1864. Description of the Cretaceous fossils. Geological Survey of California, *Paleontology* 1:55-243, pls. 9-32.
- GABB, W. M. 1869. Cretaceous and Tertiary fossils. Geological Survey of California, *Paleontology* 2:1-299, pls. 1-36.
- INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE. 1985. International Code of Zoological Nomenclature. 3rd ed. International Trust for Zoological Nomenclature: London. 338 pp.
- MATSUMOTO, T. 1959a. Cretaceous ammonites from the upper Chitina Valley, Alaska. Kyushu University, *Memoirs of the Faculty of Science, Series D, Geology* 8:49-90, pls. 12-29.
- MATSUMOTO, T. 1959b. Upper Cretaceous ammonites of California. Kyushu University, *Memoirs of the Faculty of Science, Series D, Geology, Special Volume 1:1-172*, pls. 1-41.
- MERRIAM, J. C. 1895. A list of type specimens in the Geological Museum of the University of California, which have served as originals for figures and descriptions in the paleontology of the State Geological Survey of California under J. D. Whitney. University of California, Berkeley: Geology Department. 3 pp.
- MURPHY, M. A. 1956. Lower Cretaceous stratigraphic units of northern California. *American Association of Petroleum Geologists, Bulletin* 40:2098-2119.
- MURPHY, M. A. & P. U. RODDA. 1960. Mollusca of the Cretaceous Bald Hills Formation of California. *Journal of Paleontology* 34:835-858, pls. 101-107.
- MURPHY, M. A. & P. U. RODDA. 1977. The type specimens of *Ammonites hoffmanni* Gabb, and *Melchiorites indigines* Anderson (Cretaceous: Ammonoidea). *The Veliger* 20:78-81.
- MURPHY, M. A., P. U. RODDA & D. M. MORTON. 1969. Geology of the Ono quadrangle, Shasta and Tehama Counties, California. California Division of Mines and Geology, *Bulletin* 192:1-28, pl. 1.
- RICHARDS, H. G. 1968. Catalogue of invertebrate fossil types at the Academy of Natural Sciences of Philadelphia. Academy of Natural Sciences of Philadelphia, Special Publication 8:1-222.
- RODDA, P. U. & M. A. MURPHY. 1987. Paleontological Survey, Hulen Reservoir project. California Department of Water Resources, Northern District, Red Bluff. 308 pp.
- STEWART, R. B. 1926. Gabb's California fossil type gastropods. Academy of Natural Sciences of Philadelphia, *Proceedings* 78:287-447, pls. 20-32.
- STEWART, R. B. 1930. Gabb's California Cretaceous and Tertiary type lamellibranchs. Academy of Natural Sciences of Philadelphia, Special Publication 3:1-314, pls. 1-17.