Zeitschrift: Bulletin de la Société Vaudoise des Sciences Naturelles
Herausgeber: Société Vaudoise des Sciences Naturelles
Band: 80 (1990-1991)
Heft: 2

Artikel: Two species of Paracaloceras from the Canadense Zone (Hettangian-Sinemurian stages) in Nevada (USA)

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DOI: https://doi.org/10.5169/seals-279559

BULL. SOC. VAUD. SC. NAT. 80.2, 1990: 211-219

BULLETIN N°309 des Laboratoires de Géologie, Minéralogie, Géophysique
et du Musée géologique de l'Université de Lausanne

Two species of *Paracaloceras* from the Canadense Zone (Hettangian-Sinemurian stages) in Nevada (USA)

BY

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Abstract.-TAYLOR D.G. 1990. Two species of *Paracaloceras* from the Canadense Zone (Hettangian-Sinemurian stages) in Nevada (USA). *Bull. Soc. vaud. Sc. nat. 80.2*: 211-219.
Two species of *Paracaloceras*, *P. subsalinarium* (WAEHNER) and *P.* cf. *grunowi* (HAUER), from the Canadense Zone in Nevada help to provide a correlation of that zone with the Marmoreum Zone in Alpine Europe. The Canadense Zone appears to span the Hettangian–Sinemurian stage boundary. *Paracaloceras* cf. *grunowi* which occurs in the upper part of the Canadense Zone is allocated to the basal Sinemurian, while *P. subsalinarium* which occurs in the lower part of the Canadense Zone may be Hettangian in age. *Paracaloceras subsalinarium* and closely related species are ancestral to *Coroniceras*.

Résumé.-TAYLOR D.G. 1990. Deux espèces de *Paracaloceras* de la zone à Canadense (Hettangien-Sinémurien) du Nevada (USA). Bull. Soc. vaud. Sc. nat. 80.2: 211-219.
Deux espèces de *Paracaloceras* (*P.subsalinarium* (WAEHNER) et *P.* cf. *grunowi* (HAUER)) découvertes dans la zone à Canadense du Nevada permettent de préciser la corrélation de cette zone avec la zone à Marmoreum des Alpes. *P. subsalinarium* se trouve dans la partie inférieure de la zone à Canadense et il a probablement un âge Hettangien supérieur. Ce groupe est considéré comme l'ancêtre des *Coroniceras*. *P.* cf. *grunowi*, que l'on trouve dans la partie supérieure de la zone à Canadense, est assigné au Sinémurien basal.

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ISSN 0037-9603
CODEN: BSVAA6

1. Introduction

The Canadense Zone, first described from British Columbia (Frebold 1967) is well represented in Nevada in the Sunrise Formation, where it is known from the Clan Alpine Mountains, Shoshone Mountains and the Garfield Hills (Fig. 1). The zone has also been located by the author in the Graylock Formation, Oregon. While the Canadense Zone is widespread, *Angulaticeras marmoreum* (OPPEL) is the only species that has been reported to be common between it and the coeval Marmoreum Zone of Alpine Europe. The occurrence of that species in the Depressa Subzone in Northwest Europe was discussed in detail by Bloos (1988).

The purpose of this report is to describe two species of *Paracaloceras* from the Canadense Zone from the Shoshone Mountains that appear to be conspecific with material from the Marmoreum Zone. These descriptions are provided in the interest of furnishing additional means for correlation of the Canadense Zone with coeval zones from Europe.

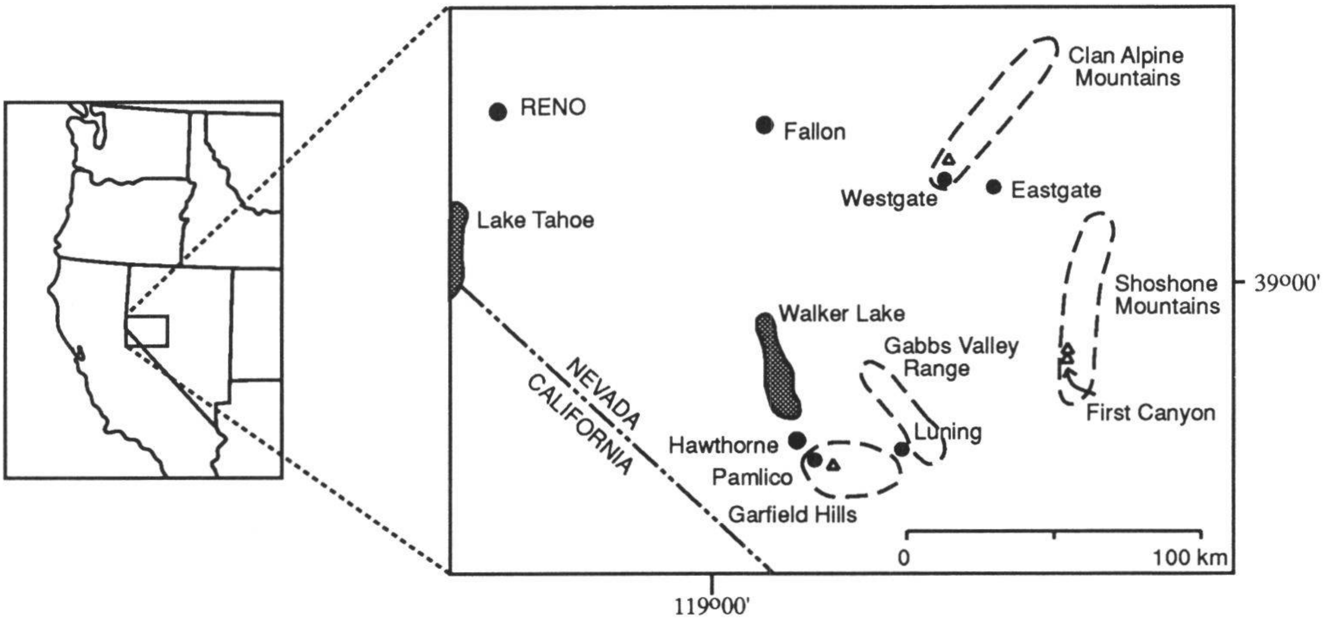

Figure 1. –Map giving localities, denoted by triangles, where the Canadense Zone has been documented in Nevada.

2. Biochronology

The most complete section for the Canadense Zone in Nevada occurs in the Shoshone Mountains in First Canyon (Fig. 1). That canyon is the locality where the two species of *Paracaloceras* under consideration were collected. There, the Canadense Zone straddles two lithologic units within the Ferguson Hill Member of the Sunrise Formation (Taylor *et al.* 1983). The lower unit (Silberling 1959, unit B) consisting of approximately 45 m of gray to black medium-bedded limestone and mudstone is termed the limestone-mudstone beds. The upper unit consists of thin- to medium-bedded, wavy-bedded, bioclastic limestone with thin siltstone interbeds. That unit is 15 m thick and is termed the bioclastic limestone beds (SILBERLING 1959, unit C). The two lithologies are conformable and their mutual boundary is sharp.

The Canadense Zone consists of two faunal assemblages. The lower assemblage, from the limestone-mudstone beds, is dominated by *Badouxia canadensis* (FREBOLD), *Metophioceras rursicostatum* (FREBOLD), and *Eolytoceras* spp. The upper assemblage known from the lower 1 m of the bioclastic limestone beds includes *Badouxia* cf. *occidentalis* (FREBOLD) in its upper part (Fig. 2). *Metophioceras* spp. and *Badouxia columbiae* (FREBOLD) are common faunal elements in that assemblage. At least two species of *Metophioceras* in addition to *M. rursicostatum* occur in the upper

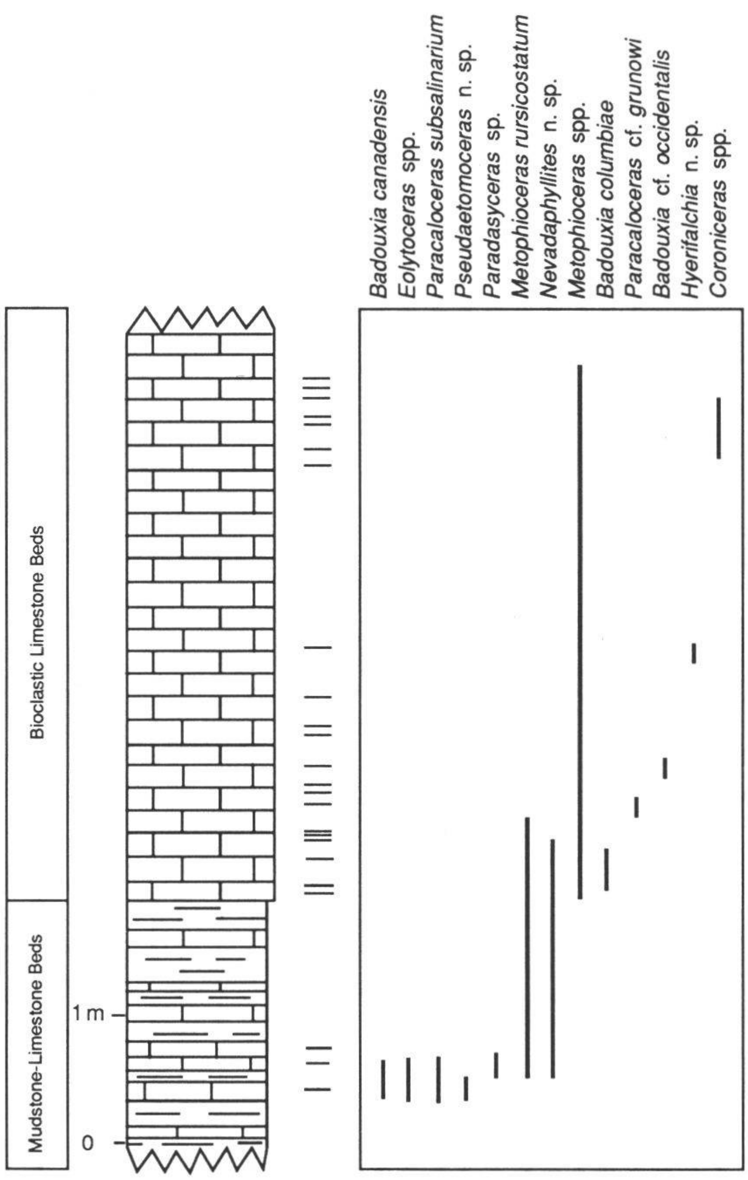

Figure 2.–Stratigraphic section within the Ferguson Hill Member at First Canyon. The Canadense Zone occurs in the limestone - mudstone beds and in the lower l meter of the bioclastic limestone beds. The superjacent faunas with *Coroniceras* (=zone C of TAYLOR 1986) is correlative with the Rotiforme Subzone.

assemblage. One has strongly prorsiradiate ribbing and perhaps has affinities with *M. multicostatum* (FREBOLD), and the other has concave but nearly upright ribbing. The latter is a large species having a shell diameter of at least 35 cm. *Metophioceras* ranges upsection where it overlaps with *Coroniceras*. (The upper beds with *Coroniceras* correlate with the Northwest European Rotiforme Subzone.)

The suggested correlation of the Canadense Zone with the Northwest European succession is given in Figure 3. The upper assemblage

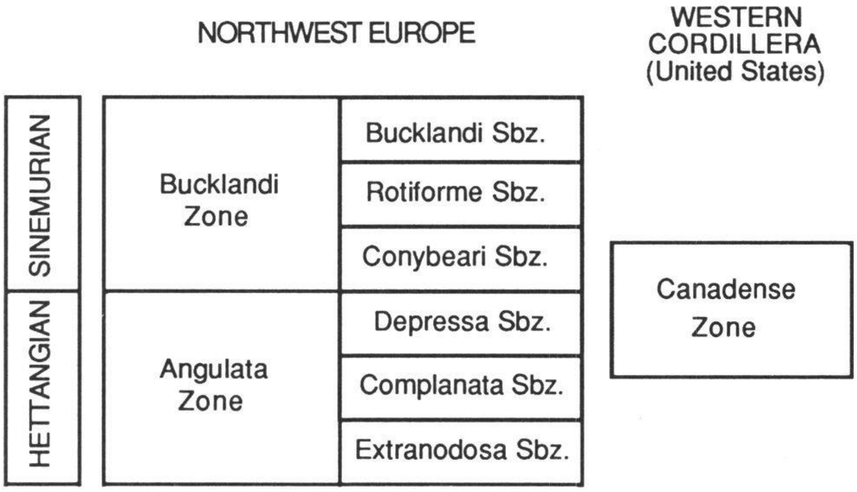

Figure 3.–Correlation of the Canadense Zone with the Northwest European zonation.

characterized by *B. columbiae* and diverse *Metophioceras* , correlates with the Conybeari Subzone. Although it is possible that the lower assemblage correlates in part with the Conybeari Subzone, it is largely coeval with the Depressa Subzone and probably part of the Complanata Subzone, as well. The faunas from the Graylock Formation given in TAYLOR (1988, Fig. 2) are older than the Canadense Zone and are correlative with the Angulata Zone.

3. SYSTEMATIC PALEONTOLOGY

Genus *Paracaloceras* SPATH, 1923

Remarks: The genus *Paracaloceras*, derived from *Alsatites*, includes a wide range of late Hettangian and earliest Sinemurian species and is the radical for important arietitid genera including *Coroniceras*. It is apparent that *Paracaloceras* who's range extends to just below *Coroniceras* is directly ancestral to that genus. *Paracaloceras subsalinarium* (WAEHNER) is one such species that appears to provide a transition to *Coroniceras*. The similarities of that species with *Coroniceras* include details of shell proportions, suture and ornamentation. Both have depressed inner whorls with inflated flanks, concave-rursiradiate ribbing, bifurcate costation in the ventro-lateral area, projected ribbing on the venter, development of ventral sulcation fairly late on the inner whorls, and presence of a tricarinate venter. The morphology of the venter is virtually identical, for example, between certain *P. subsalinarium* specimens and *Coroniceras hyatti* (DONOVAN, 1952, pl. 28, fig. 1b). The only consistent dissimilarity between *P. subsalinarium* and early *Coroniceras* is the presence in the latter of tubercles.

Paracaloceras cf. *grunowi* (HAUER)
(Pl. 1, Fig. 1,2; Pl. 2, Fig. 1)

Description: The whorl section on the inner and intermediate whorls is strongly depressed and has quite inflated flanks. At largest preserved shell diameters the section is moderately to quite weakly depressed. The venter on intermediate whorls supports a very weak blunt keel while at large shell dimensions the venter is shallowly sulcate and weakly tricarinate. Ribbing is simple and concave on the whorl side, and is projected on the venter where it fades well before reaching the keel.

Discussion: The material described above agrees closely with *Paracaloceras grunowi* (HAUER) as described in WAEHNER (1888). The Nevadan material may be a little less densely ribbed, have slightly more rapidly expanding whorls, and have ribbing on the venter that is more strongly projected. One figured individual (Pl. 2 fig. 1) appears to be more compressed than the other specimens, but that compression is likely the result of diagenesis. The ribbing density is quite similar to *P. centauroides* (SAVI & MENEGHINI, CANAVARI 1882) as figured in WAEHNER (1888), which differs in having a stronger keel and less projected ventral ribbing.

The material from Chile referred by HILLEBRANDT (1981) and SINN (1987) to *Alsatites* cf. *platystoma* (LANGE) is a new species of *Paracaloceras* very close to *P. grunowi*. Those speciemns are unlike *A. platystoma* in having much more rapidly expanding whorls, significantly weaker ribbing, approximately radial rather than strongly prorsiradiate ribbing, and a quite dissimilar whorl section. The South American material differs from *P. grunowi* in having outer whorls with weaker or blunter ribbing and perhaps costation that is rather irregular in strength. The specimen figured by HILLEBRANDT (1981) has more rapidly expanding outer whorls.

Paracaloceras subsalinarium (WAEHNER)
(Pl. 2, Fig. 2-4)

Arietites subsalinarius WAEHNER, 1891, p. 241, pl. 16, fig. 1-2.

Arietites anastreptoptychus WAEHNER, 1891, p. 243, pl. 16, fig. 3-5.

Description: The shell is moderately to highly evolute and the whorl section is strongly depressed. The inner whorls (as observed down to a shell diameter of 10 mm) have a quite broad venter which supports a low keel. The sulcae on some specimens are apparent by 10 mm shell diameter while on others they may begin as late as 15 mm. On the outer whorls the venter becomes tricarinate, with the central keel being the highest. The venter between the lateral keels and ventro-lateral shoulders forms inclined planes in several specimens, while in some examples it forms distinct depressions that take on the appearance of weak sulcae.

Ribbing on the flank is simple, nearly straight to markedly concave, and commonly quite strongly rursiradiate. In the ventro-lateral area it bends forward, becomes strongly projected on the venter and weakens quickly as it approaches the lateral keel. Ribs commonly bifurcate in the ventro-lateral area on the inner and intermediate whorls. The bifurcation sites most commonly are ill-defined where the ribbing is blunt, or diffuse.

Discussion: The nucleus in some specimens appears to be a little more serpentic in coiling than the specimens described in WAEHNER (1891), although the hypodigm reveals a range in whorl expansion rate that encompasses the European material. Also, the inner whorls of most specimens may have ribbing that is not quite so sharp or distinct as on the Alpine specimens.

The very similar *Paracaloceras retroversicostatum* (CANAVARI) differs from *P. subsalinarium* (WAEHNER) in having ribbing that is weakly projected on the venter .

4. ACKNOWLEDGEMENT

The author would like to thank Jean Guex for his assistance and for invaluable discussions regarding lower Liassic ammonite problems.

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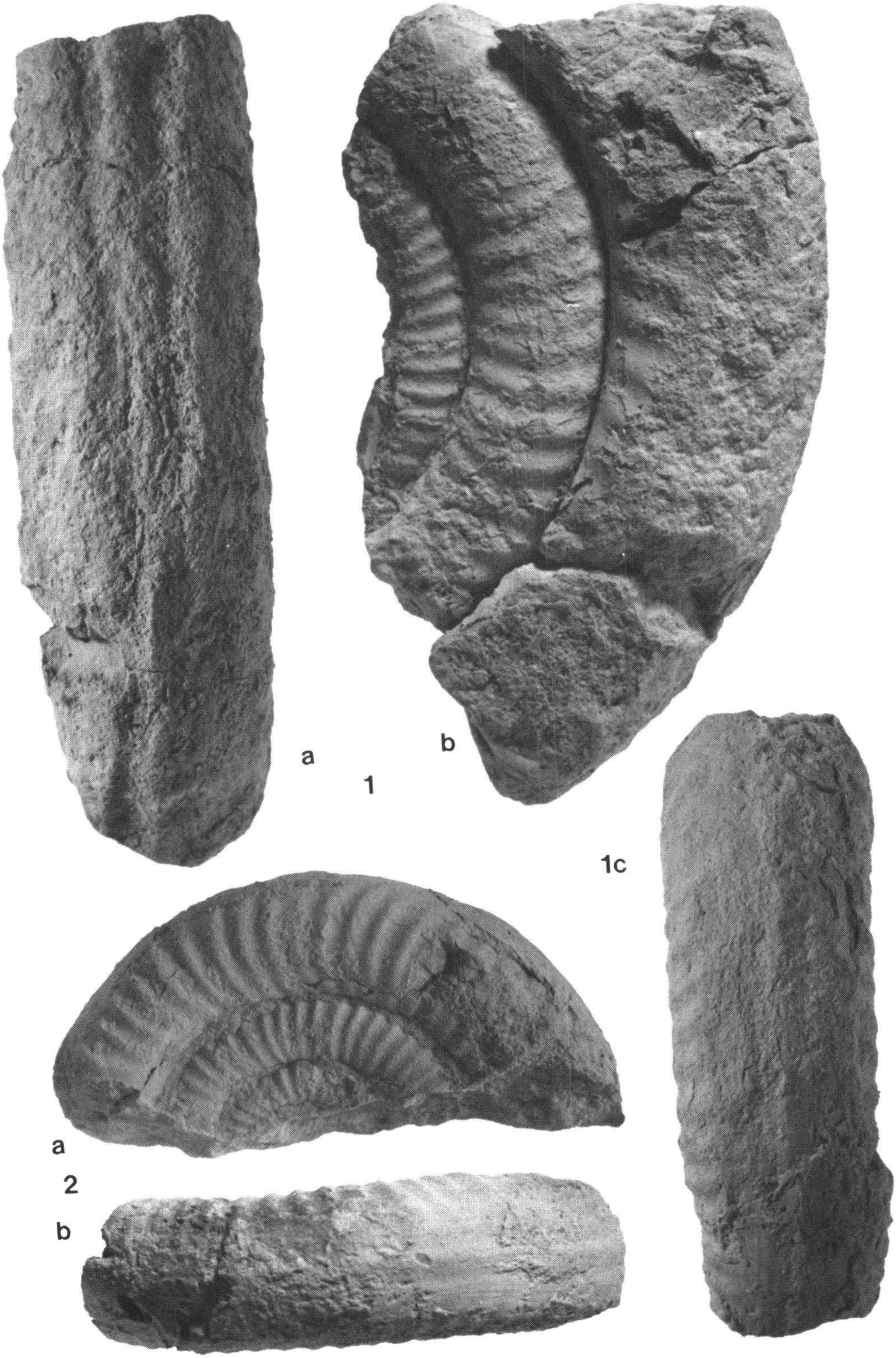
Manuscrit reçu le 8 octobre 1990

PLATE 1, p. 218
Figures 1,2. *Paracaloceras* cf. *grunowi* (HAUER)
Fig. 1a-c. Specimen B7045/1, entirely septate. Provenance: Shoshone Mountains, First Canyon; float specimen probably from Canadense Zone.
Fig. 2a,b. Specimen B6826/1, entirely septate. Provenance: Shoshone Mountains, float specimen probably from Canadense Zone.

PLATE 2, p. 219
Figure 1a,b. *Paracaloceras* cf. *grunowi* (HAUER)
Specimen 5-55/1. Provenance: First Canyon, Canadense Zone;
0.75 m above base of bioclastic limestone beds. Shell diagenetically distorted.
Figures 2-4. *Paracaloceras subsalinarium* (WAEHNER)
Figure 2a,b. Specimen B6815/1; Example preserves body chamber of just over one volution. Provenance: Shoshone Mountains, First Canyon, Canadense Zone, 1.5 m below top of limestone-mudstone beds.
Figure 3a,b. Specimen B6815/2; Provenance: Shoshone Mountains, First Canyon, Canadense Zone, 1.5 m below top of limestone-mudstone beds.
Figure 4a,b. Specimen B6815/3; Provenance: Shoshone Mountains, First Canyon, Canadense Zone, 1.5 m below top of limestone-mudstone beds.

All figured specimens are those of the author and are deposited in the Northwest Museum of Natural History, Portland, Oregon. All figures are at natural size.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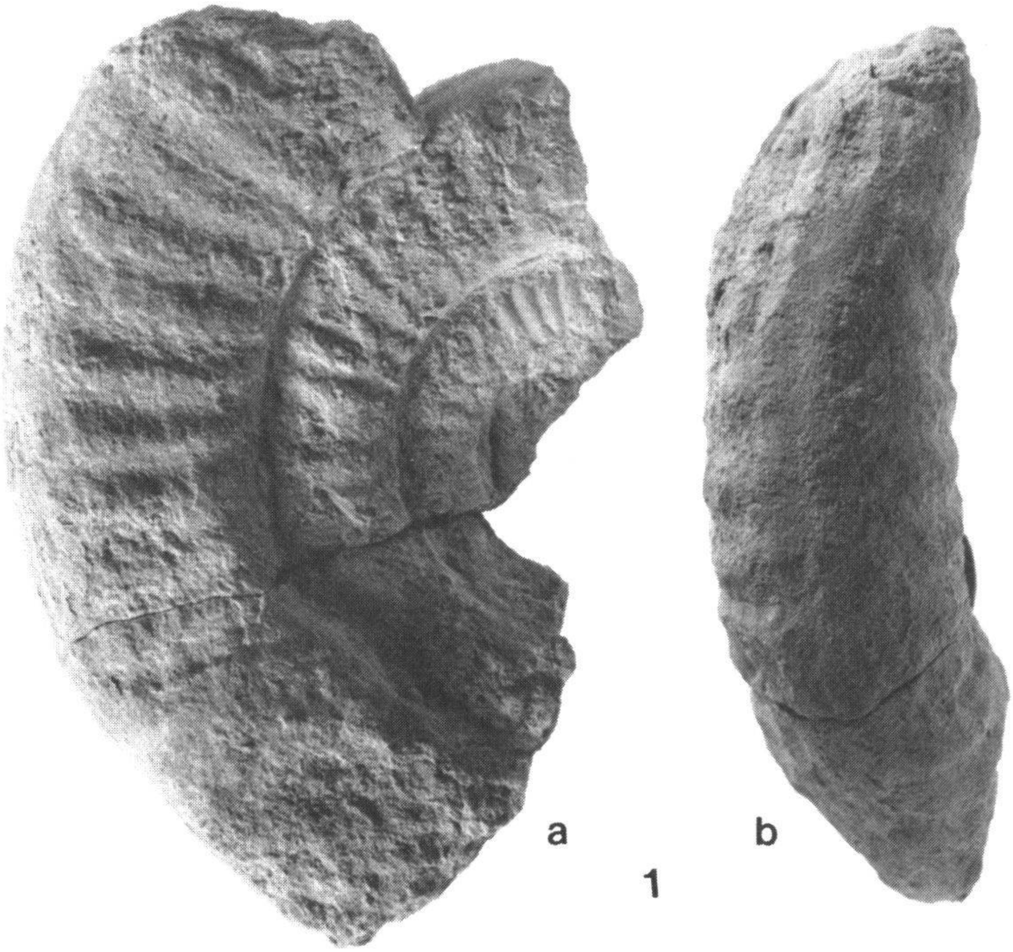

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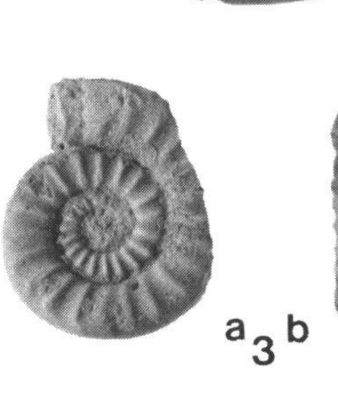

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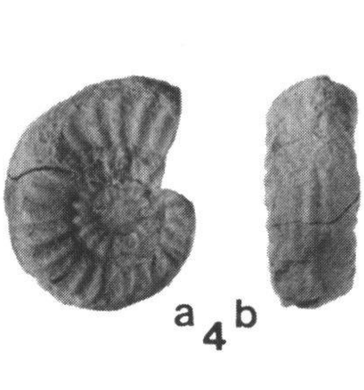

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