Ammonites from the Lower Jurassic (Sinemurian) of Tenango de Doria (Sierra Madre Oriental, Mexico). Part III: Echioceratidae

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Abstract
In the third part of our work dedicated to Liassic (Sinemurian) ammonites of Tenango de Doria (Hidalgo, Sierra Madre Oriental, Mexico) we describe the members of the family Echioceratidae. Additionally to the Mexican specimens some specimens from North America (Queen Charlotte Islands) and the lectotype of *Paltechioceras rothpletzi* (BÖSE) are illustrated for comparison.

Key-words
Ammonites, Early Jurassic, Sinemurian, Systematics, Mexico, Sierra Madre Oriental.

INTRODUCTION
The present paper constitutes the third part (of four) of a study of Mexican Lower Liassic (Sinemurian) ammonites collected by SCHMIDT-EFFING (1980) and SCHLATTER & SCHMIDT-EFFING (1984). The fourth part will include the biostratigraphy and palaeobiogeography. A general introduction is given in part one (BLAU et al., 2001) and will not be repeated here. For the localities and used abbreviations we refer to MEISTER et al. (2002).

SYSTEMATIC PALEONTOLOGY
Remark: Almost all the material described herein is crushed. Only the ammonites derived from nodules are calcareous inner molds and are well preserved. It must be underlined again, that the finding sites given in "local occurrence" may represent a larger number of beds, which are not separated further (see MEISTER et al., 2002, figs 1, 2). Consequently, the adopted taxonomy is very typologic.

Family Echioceratidae BUCKMAN, 1913

Discussion: TRUEMAN & WILLIAMS (1925) erected in the family Echioceratidae several genera, amongst them *Orthechioceras* and *Echioceratoides*, based on specimens coming from the Armatus Bed of Radstock. This bed includes a reworked and condensed fauna from the Raricostatum subzone (GETTY, 1972 : 34) or even the Densinodulum Subzone (see the faunal list in TUTCHER & TRUEMAN, 1925: 645) up to the Taylori Subzone. Recently EDMUNDS et al. (2003)
published a new section of the Armatum Bed which indicates partly a condensation of Raricostatum, Macdonnelli and Aplanatum Subzones. In this section EDMUNDS et al. (2003) recorded no ammonites of the Densinodulum Subzone.

Following the discussion in the literature, the differences between the genera Plesechioceras TRUEMAN & WILLIAMS and Echioceratoides TRUEMAN & WILLIAMS are not well expressed. Nevertheless, it seems possible to distinguish the two genera by their whorl-sections and the development of the keel. Both genera show a well developed keel but in Plesechioceras this is a true keel while Echioceratoides shows a filament-like keel ("Kiellinie" sensu SCHLATTER, 1991: 38). TRUEMAN (1925: 720) described the type species of Echioceratoides as having "a feeble but definite keel" on the last whorl. The whorl-section in Plesechioceras is oval to high-rectangular (Wh>Ww) while it is rounded to sub-rectangular (Wh<Ww) in Echioceratoides (HILLEBRANDT : 2002, 85; SCHLATTER, 1991 : 38). The difference between the two genera is underlined by the "crescent"-like ribs in Plesechioceras.

As a conclusion Echioceratoides comprises amongst others E. edmundi (DUMORTIER), E. regulare TRUEMAN & WILLIAMS, E. viticola (DUMORTIER), E. sp. 3 (in DOMMERGUES, 1993) and E. paisajensis HILLEBRANDT. These forms biostatigraphically represent old Echioceratidae (Densinodulum Subzone). The genus Echioceratoides is not represented in the Mexican fauna. All the biostatigraphically old Echioceratidae from our Mexican material are placed in the genus Plesechioceras. Following GETTY (1973), DONOVAN et al. (1981) placed Plesechioceras in synonymy of Paltechioceras. Herein we follow the opinion of DOMMERGUES (1982), who justified the genus Plesechioceras.

Orthechioceras for us comprises characters of Plesechioceras like the serpenticone coiling and of Paltechioceras with bisulcation to real tricarination of the ventral part. This kind of morphology is represented in the Aplanatum Subzone in Paltechioceras rectiradiatum [TRUEMAN & WILLIAMS (sic!) = Orthechioceras recticostatum TRUEMAN & WILLIAMS (DOMMERGUES, 1993, pl. 8, fig 4), in the Raricostatum Subzone in Orthechioceras recticostatum TRUEMAN & WILLIAMS and Orthechioceras sp. nov. (?) (SCHLATTER, 1991, pl. 4, figs 1-5), from the Densinodulum Subzone with Orthechioceras incaguaensis HILLEBRANDT and O. sp. A (HILLEBRANDT, 2002, pl. 9, figs 1-19; pl. 10, figs 1-4) and "forms indistinguishable from Orthechioceras radiatum TRUEMAN & WILLIAMS" (GETTY, 1973 : 23) and the Mexican species described herein.

When creating the genus Orthechioceras, TRUEMAN & WILLIAMS (1925) included species based on type specimens from the Armatus Bed. The type species Orthechioceras recticostatum TRUEMAN & WILLIAMS shows a well developed tricarinate ventral area whereas in Orthechioceras radiatum TRUEMAN & WILLIAMS sulci are not well expressed. Consequently, the biostatigraphical range and the taxonomy of the genus are not well known and are treated controversially in the literature. The different morphologies may represent two different genera as suggested by DOMMERGUES (1993: 137) but as the "... mingling of faunas of different date [in the Armatus Bed] renders it impossible to determine the stratigraphy of the phenotypes and to use the specimens from this bed in working out the phylgeny of the Echioceratidae" (GETTY, 1972: 36). EDMUNDS et al. (2003) confirm the presence of Orthechioceras recticostatum TRUEMAN & WILLIAMS in the Aplanatum Subzone and the species is considered by them to belong to the genus Paltechioceras, supporting the idea of DOMMERGUES (1993). In the present paper Orthechioceras is seen in the more typologic view of TRUEMAN & WILLIAMS (1925).

The presence of tricarinate forms in the Mexican fauna belonging probably to Densinodulum Subzone lead us to consider Orthechioceras in a broad sense and with probably a large biostatigraphical range.

**Genus Plesechioceras TRUEMAN & WILLIAMS, 1925**

**Type species:** Echioceras delicatum BUCKMAN, 1914.

**Plesechioceras cihuacoatlae** (ERBEN, 1956)  
Pl. 1, figs 1-4, 5

* 1956. Vermiceras ophioides (D’ORBIGNY) cihuacoatlae ERBEN, p. 200, pl. 26, figs 19-20, pl. 33, figs 10-11.

? 1956. Vermiceras edmundi (DUMORTIER).- ERBEN, p. 204, pl. 33, fig. 12, pl. 25, fig. 22.

**Material:** 11 specimens.

**Description:** Plesechioceras cihuacoatlae (ERBEN) is densely ribbed throughout the ontogeny. The maximum diameter is about 75 mm. The whorl section is rounded to slightly subquadrate and the width/height ratio is 0.9 to 1.0. The ribs are slightly arched and proradiate. They end mostly on the ventro-lateral part but sometimes they pass the sulci and reach the keel. The external area is rounded with a narrow but well expressed keel. The keel is bordered by two narrow and very shallow sulci. The inner whorls are very closely ribbed until a diameter of about 25 mm and then become little more spaced.
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D (mm)  25  37  50  79
Ribs/Half whorl  15  16  17  27

**Remarks:** The sulci seem to be a little bit exaggerated in the drawing of ERBEN, but this can be seen also in some of our specimens. *Plesechioceras arcticum* (FREBOLD, 1975) and *Echioceratoides paisajensis* HILLEBRANDT are closely allied species. *Both* differ from *Plesechioceras cihuacoatlae* (ERBEN) by a more spaced ribbing. In *Plesechioceras arcticum* (FREBOLD) the ribs are perhaps more inclined forward.

**Local occurrence:** Ten 1.

**Geographical distribution:** The species is hitherto known only from Mexico (Huayacocotla Basin).

**Age:** ? Densinodulum Subzone.

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**Plesechioceras cf. domeykoense** HILLEBRANDT, 2002

Pl. I, figs 6-9, 11

*cf.* 1956. *Pleurechioceras subdeciduum* ERBEN, p. 320, pl. 38, fig. 6.


**Material:** 11 specimens.

**Description:** *Plesechioceras cf. domeykoense* HILLEBRANDT reaches a diameter of about 80 mm. The whorl section is subquadrate and the width/height ratio is 1.0. The species is coarser ribbed than *Plesechioceras cihuacoatlae* (ERBEN). The ribs are slightly arched and subradiate. The development of the ribs and ventral area is similar as in *P. cihuacoatlae* (ERBEN), the main differences are the rib density, the projection of the ribs and the smaller adult size of the latter species. Two of the specimens of *Vermiceras bavaricum* (BÖSE) pauper ERBEN (1956 , pl. 36 , figs 2-3) are close to our specimens. They differ from ERBEN’s holotype (ibid. pl. 36, fig. 4) by more straight and radial ribs, a character we can observe in *Plesechioceras domeykoense* HILLEBRANDT.

The ontogenetic trajectories (Fig. 1) show a clear difference for the rib density between *P. cf. domeykoense* HILLEBRANDT and the very closely ribbed *P. cihuacoatlae* (ERBEN). Note that the differentiation starts between a diameter of 20-25 mm.

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Genus *Orthechioceras* TRUEMAN & WILLIAMS, 1925 sensu lato

**Type species:** *Orthechioceras recticostatum* TRUEMAN & WILLIAMS, 1925.

*Orthechioceras jamesdanae* (BARCENA) sensu ERBEN, 1956

Pl. I, figs 10, 12-17, 19-22; Pl. II, figs 1-8, 10, 13-15


**Material:** 45 specimens.

**Description:** This ammonite is evolute with a spaced rib pattern. The relief of the ribs is high and crescent shaped. They are blunt (*Echioceras*-like) with the maximum height on the middle of the flanks. At the ventrolateral edge the rib height abruptly diminishes. The whorl section is subrounded. The ventral part is rounded and bisulcate with a prominent keel.

Based on the shape of the ribs and the bisulcate venter, we place the species in *Orthechioceras* TRUEMAN & WILLIAMS.
**Discussion:** The material to BARCENA (1877) is lost (see ERBEN, 1956, p. 324). Unfortunately the drawings of BARCENA, mainly fig. 27, are misleading for the coiling of the conch, even the proportions (e.g., whorl height) and the rib drawing are different between fig. 27 and 29 of BARCENA (1877). This poor precision of the drawing of BARCENA's figures lead us to base our determination on ERBEN's illustrations. Nevertheless, we cannot omit, that BARCENA'S species is conspecific, because some of our specimens (Pl. 11, fig. 29 of BARCENA (1877). This poor precision of the drawing of BARCENA's figures lead us to base our

**Comparisons:** Amongst the Echioceratidae with spaced ribbing, *Orthechioceras ? congruens* (TRUEMAN & WILLIAMS) and *Paltechioceras studeri* (HUG) are morphologically close to *O. jamesdaneae* (BARCENA) sensu ERBEN. Both differ in the shape of the ribs which are more arched in the European species.

**Local occurrence:** T/V 4, T/V 5, T/V 6, ex situ.

**Age:** ? densinodulum/Raricostatum Subzones.

**Geographical distribution:** The species is hitherto known only from Mexico (Huayacocotla Basin).

*Orthechioceras pauper* (ERBEN, 1956)

Pl. II, figs 9, 11-12; Pl. III, figs 1-3, 6, 9

* pars 1956. *Verniceras havaricum* (BÖSE) pauper ERBEN, p. 205, pl. 36, figs 1, 2, 4 (holotype), non 3.

**Material:** 11 specimens.

**Description:** *Orthechioceras pauper* (ERBEN) is very evolute. The inner whorls bear very dense and fine ribs which are radial to slightly retroverse becoming more spaced and slightly provers on the outer whorls. The ribbing is constant throughout and the ribs are straight and start in the innermost whorls. Near the ventrolateral end they become slightly weaker to strengthen again at the ventrolateral end, thus suggesting very small «nodes». With increasing growth the ribs have the same height all over the flancs and become weak on the ventral area being projected and end besides the sulci. The whorl section is more subquadraic (W/H = 0.9) at this stage. Up to a diameter of 25 mm to 35 mm the ventral area is almost flat to slightly rounded with a feeble keel, sulci are not present at this stage. Later sulci develop and the venter becomes tricarinate.

All specimens were collected from a concretion layer and the variability inside the population is very small. In fact the variability mainly lies in the strength of the «nodes», which might be well expressed or even absent. To a minor degree, the variability is also expressed in the rib density, the ribs might be more or less spaced. The suture line (Fig. 2) corresponds well to the suture lines provided by HILLEBRANDT (2002, fig. 18).

**Comparisons:** At the ventrolateral edge the ribs in some specimens show a spiny-like habitus which is produced by the structure of the ribs which are cut at their maximum height. This can be seen in some *Orthechioceras inconguasiense* HILLEBRANDT. Both, the South American and the Mexican specimens show the same ontogeny with *Plesechioceras*-like inner whorls and tricarinate *Paltechioceras*-like adult stage. The *Plesechioceras*-stage (paedomorphic character) is more or less extended during the ontogeny. In the Mexican *Orthechioceras inconguasiense* the *Plesechioceras*-stage is less extended for most part of the specimens than in the South American ones.

The comparison of the ontogenic trajectories of *O. jamesdaneae* (BARCENA) sensu ERBEN, *O. pauper* (ERBEN), and *O. inconguasiense* HILLEBRANDT (Fig. 3) for the rib density (N/2) allow us to separate clearly *O. pauper* (ERBEN) by its high rib frequency during the whole ontogeny. *O. jamesdaneae* (BARCENA) sensu ERBEN and *O. inconguasiense* HILLEBRANDT show more or less the same rib density but the trajectories differ. Between 10-20/5 mm diameter *O. pauper* (ERBEN) the tracing shows a concavity while there is a convexity in *O. inconguasiense* HILLEBRANDT. In the
adult stage of *O. jamesdanae* (BARCENA) sensu ERBEN we see a large variability in rib density with a very coarse pole (e.g., Pl. I, fig. 10) and more densely ribbed one (e.g., Pl. II, fig. 4).

**Local occurrence:** Ten 1 (single specimen: Pl. III, fig. 4), T/V 5 (concretion layer).

**Age:** According to HILLEBRANDT (2002), the stratigraphic range of *Orthechioceras incaguasiense* HILLEBRANDT is correlated to the upper part of the Densinodulum Subzone.

**Geographical distribution:** The species is hitherto known from Mexico (Huayacocotla Basin) and South America.

**Orthechioceras ? sp. 1**
Pl. III, fig. 21

**Remark:** Amongst the *Orthechioceras* from the nodular layer in T/V 5, the generic position of a single specimen is uncertain due to the non-preservation of the ventral part. The style of coiling is very similar to *Orthechioceras pauper* (ERBEN), therefore we place this specimen with doubt in *Orthechioceras*. On the other hand, the rib pattern with a very high rib density in the innermost whorls is a common feature in *Pleschioceras* or even in *Paltechioceras*.

**Local occurrence and age:** *Orthechioceras ? sp. 1* is associated with *Orthechioceras incaguasiense* HILLEBRANDT in the concretion layer of T/V 5, therefore we correlate it to the upper part of the Densinodulum Subzone.

**Genus Paltechioceras BUCKMAN, 1924**

**Type species:** *Paltechioceras elicitum* BUCKMAN (1924) by original definition.

**Paltechioceras tardecrescens** (HAUER, 1856)
Pl. I, fig. 18 (sp. juv. aff.); Pl. III, figs 20, 22, 24–27; Pl. IV, figs 1, 2, 4, 5

* 1856. *Ammonites tardecrescens* HAUER, 20, pl. 3, figs 10–12.

**Synonymy**
1924. *Leptechioceras aplanatum* (HYATT).- BUCKMAN, pl. 482.
1925. *Euechioceras insigne* TRUEMAN & WILLIAMS, 727, pl. 3, fig. 3.

Pacific synonymy

1956. *Arnioceras tus tonaii* ERBEN, p. 279, pl. 31, fig. 7.
1981. *Paltechioceras tardecrescens* (HAUER).- SMITH, pl. 6, figs 2, 3.
1981. *Paltechioceras tardecrescens* (HAUER).- SMITH, pl. 6, fig. 4.
2002. *Paltechioceras cf. tardecrescens* (HAUER).- HILLEBRANDT, pl. 11, fig. 23, pl. 12, figs 1-10.

Other synonymy

1879. *Ammonites tardecrescens* HAUER.- REYNES, pl. 13, fig 8-10 [= specimen to HAUER, 1856, pl. 3, figs 10-12].
1926. *Euechioceras nobile* TRUEMAN & WILLIAMS.- BUCKMAN, pl. 482.
1961. *Paltechioceras aplanatum* (HYATT).- DEAN, DONOVAN & HOWARTH, p. 461, pl. 68, fig. 2.
1965. *Paltechioceras aff. aplanatum* (HYATT).- ZEISSL, pl. 2, fig. 8.
1973. *Paltechioceras tardecrescens* (HAUER).- GETTY, pl. 4, fig. 2a, b.
1978. *Paltechioceras aplanatum* (HYATT).- OATES, pl. 2, fig. 4.
1987. *Paltechioceras aff. nobile* TRUEMAN & WILLIAMS.- DOMMERGUES & MEISTER, p. 320, pl. 4, fig. 5.
1989. *Paltechioceras tardecrescens* (HAUER).- DOMMERGUES & MEISTER, pl. 4, figs 1, 3.
1990. *Paltechioceras gr. tardecrescens* (HAUER) - *insigne* (TRUEMAN & WILLIAMS).- DOMMERGUES & MEISTER, pl. 1, figs 8-10, pl. 2, figs 1, 4.

1993. *Paltechioceras tardecrescens* (HAUER).- DOMMERGUES, pl. 8, fig. 5.
1993. *Paltechioceras tardecrescens* forme *nobile* TRUEMAN & WILLIAMS.- DOMMERGUES, pl. 8, fig. 56.
1994. *Paltechioceras tardecrescens* (HAUER).- RAKUS, pl. 5, fig. 4.
1998. *Paltechioceras tardecrescens* (HAUER).- BLAU, p. 212, pl. 10, figs 1-6, p. 9, pl.14, fig. 4.

2000. *Paltechioceras sp.? tardecrescens* (HAUER).- SCHLOGL, AUBRECHT & TOMASOVYCH, pl. 1, fig. 2.
2002. *Paltechioceras tardecrescens* (HAUER).- FAURE, pl. 2, fig. 11.
2003. *Paltechioceras tardecrescens* (HAUER).- EDMUNDS, VARAH & BENTLEY, fig. 5.2.
2003. *Paltechioceras flexicostatum* (T. & W.).- EDMUNDS, VARAH & BENTLEY, fig. 5.3.

Material: 10 specimens.

Remarks: This evolute Paltechioceras is characterized by quite compressed tricarinate whorl section and slightly prosiradate ribs. The Mexican specimens show a disparity in rib-density mainly in the intermediate and adult stages. The poles are figured in Pl. IV, figs 1, 5. The innermost stages in most of our specimens are similar and are very closely ribbed.

Comparisons: One of our specimens (Pl. IV, fig. 5) compares very well to the specimens figured by HILLEBRANDT (2002, pl. 12, fig. 7) from Chile.

Local occurrence: Ten 1, Ten 3.

Age and geographical distribution: *P. tardecrescens* (HAUER) is known from the Euroboreal, the Tethyan and the Southern Pacific. This quite ubiquitous species indicates the toptmost Sinemurian.
Paltechioceras rothpletzi (BÔSE, 1894)
Pl. IV, figs 3, 6-8, 10-11; Pl. V, figs 2-3, 6 (cf.), 7

* 1894. Arietites rothpletz BÔSE, pl. 56, figs 5-6.

Pacific synonymy
non 1956. Vermiceras aff. rothpletzi (BÔSE).- ERBEN, pl. 36, figs 8-9.
1981. Paltechioceras rothpletzi (BÔSE).- SMITH, pl. 5, figs 5, 6, pl. 6, fig. 1.
1981. Paltechioceras harbledownense (CRICKMAY).- SMITH, pl. 4, figs 9, 10, pl. 5, figs 1, 4.
non 1985. Paltechioceras cf. rothpletzi (BÔSE).- PRINZ, pl. 4, fig. 3 [= Paltechioceras cf. liciense BLAU, see HILLEBRANDT, 2002].
1991. Paltechioceras harbledownense (CRICKMAY).- TIPPER, SMITH, CAMERON, CARTER, JAKOBS & JOHNS, p. 211, pl. 2, fig 5.

cf. 1991. Paltechioceras cf. rothpletzi (BÔSE).- PALFY, pl. 13, fig. 5.
1992. Paltechioceras harbledownense (CRICKMAY).- in WESTERMANN, pl. 2, fig. 5 [= refigured from TIPPER et al., 1991, pl. 2, fig. 5]
2001. Paltechioceras harbledownense (CRICKMAY).- TAYLOR, GUEX & RAKUS, pl. 8, fig. 1.

Other synonymy
aff. 1902. Vermiceras rothpletzi (BÔSE).- FUCINI, pl. 12, fig. 12.
? 1923. Arietites rothpletzi BÔSE.- SIEMIRADZKI, pl. 7, fig. 6.
? 1931. Vermiceras rothpletzi (BÔSE).- ANDRU-SOV, fig. 49/3.
? 1965. Paltechioceras rothpletzi (BÔSE).- BREMER, pl. 13, fig. 4.

Material: 7 specimens.

Description: This slender Paltechioceras is characterised by very regular ribs and differs from all other Paltechioceras by its high rib frequency with dense and sharp fine ribs. The rib density is constant throughout and therefore particularly the inner whorls show a very close and fine ribbing. In all growth stages the ribs are strongly inclined forward (prorsiradiate). The whorl section of the lectotype (Pl. V, fig. 2) is high rectangular and the venter is tricarinate and narrow. In comparison to P. tardecrescens (HAUER) the species is more involute due to the faster increase of the whorl-height. One small specimen (Pl. V, fig. 6) which is not well preserved is placed with cf. in P. rothpletzi (BÔSE) because in the very innermost whorls the ribs are not strongly bending forward. For comparison and to clarify our concept of the species we reillustrate the lectotype of P. rothpletzi (BÔSE) and some North American specimens of this species collected during the field trips of the 5th International Symposium on the Jurassic System (1998) in Vancouver (Graham Island, Queen Charlotte Islands, Canada).


Age: Following BLAU & MEISTER (2000) we attribute this fauna to the topmost Raricostatum Subzone (Liciense/Rothpletzi Horizon).

Geographical distribution: P. rothpletzi (BÔSE) is known from the Tethyan and Pacific (North America, Mexico) areas.

Paltechioceras aff. mexicanum (ERBEN, 1956)
Pl. IV, fig. 9

* aff. 1956. Arnioceras ceratitoides (QUENSTEDT) mexicanum ERBEN, p. 254, pl. 29, fig. 3 (holotype).

Material: 1 specimen.

Description: This evolute ammonite (D = 85 mm) has a subelliptic (W/H = 0.86) whorl section in the outer whorls and rounded flanks. The ventral area is tricarinate with low lateral ridges. The keel is relatively broad and the sulci are small and not deep. The specimen is closely ribbed on the innermost whorls and becomes gradually more spaced ribbed on the outer whorls. The specimen shows a slightly proradiate ribbing during the ontogeny.

Comparison: Our specimen shares the smoothness of the ribbing on the ventrolateral edge which can be observed in the holotype of ERBEN (1956, pl. 29, fig. 3). Due to this morphology we can exclude a taxonomic position within Arnioceras. The characters of compressed whorl section, quite high whorls associated with tricarination lead us to place the specimen in Paltechioceras. The shell of our specimen is broken (taphonomy) and some parameters (whorl height, umbilicus) of the undestroyed parts fit to those of the holotype of P. mexicanum (ERBEN). Nevertheless, the overall shell morphology seems to be more evolute.

Local occurrence: T/V 6


Geographical distribution: The species is known from Mexico only.

Paltechioceras ? harbledownense (CRICKMAY, 1929-1930)
Pl. V, figs 1, 4, 5
1929-30. *Melanhippites harbledownense* CRICKMAY, p. 61, pl. 3, pl. 4, figs a-d.


non 1981. *Paltechioceras harbledownense* (CRICKMAY).- SMITH, pl. 4, figs 9, 10, pl. 5, figs 1, 4 [= *Paltechioceras rothpletzi* (BÖSE)].


non 1991. *Paltechioceras harbledownense* (CRICKMAY).- TIPPER, SMITH, CAMERON, CARTER, JAKOBS, & JOHNS, p. 211, pl. 2, fig. 5 [= *Paltechioceras rothpletzi* (BÖSE)].


non 1992. *Paltechioceras harbledownense* (CRICKMAY).- in WESTERMANN, pl. 2, fig. 5 [= refigured from TIPPER et al., 1991, pl. 2, fig. 5].


non 2001. *Paltechioceras harbledownense* (CRICKMAY).- TAYLOR, GUEX & RAKUS, pl. 8, fig. 1 [= *Paltechioceras rothpletzi* (BÖSE)].

**Material**: 5 specimens.

**Description**: *P. ? harbledownense* reaches diameters up to 16 cm (14 cm for the type specimen). The specimen from Mexico reaches at least 12 cm in diameter. The rib density is stable throughout. The ribs start at the umbilical seam becoming immediately strong and blunt. The very first part of each rib is bend back and at the umbilical edge they become slightly concave and prorsiradiate. On the outer whors the ribs bend forward near the ventrolateral part and become smooth. This habitus is characteristic for the species.

The outermost whors (Pl. V, fig. 5) of the Mexican specimen are sub-elliptical and probably somewhat crushed. The ventral part shows shallow sulci and an acute keel. This matches to the description of CRICKMAY (1929-30, p. 61) and raises the question, if this is a true *Paltechioceras*.

Some smaller specimens are similar to the illustrations of the inner whors of *P. ? harbledownense* given by CRICKMAY (1929-3, pI. 4, figs a-d) and PALFY et al. (1994, pl. 1, fig. 4).

**Discussion**: Here we consider the illustration of the holotype by CRICKMAY (1929-30) and the refiguration of a plaster cast of the holotype by PALFY (1991) as the reference for the species. According to GETTY (1973), the holotype of *Melanhippites harbledownense* is lost. Therefore he proposed a neotype. But this specimen is fragmentary, small and uninformative for determining this species in comparison to the holotype.

**Comparison**: The ribbing of *P. ? harbledownense* (CRICKMAY) is comparable to that of *Paltechioceras flexicostatum* (TRUEMAN & WILLIAMS) but the latter species differs in being more evolute and strongly tricarinate in the outer whors at a comparable size. Some recent authors included in *P. ? harbledownense* (CRICKMAY) very densely ribbed *Paltechioceras* with a different style of rib-drawing. These specimens are here referred to *P. rothpletzi* (BÖSE). To show our concept of *P. ? harbledownense* (CRICKMAY) we illustrate additionally some specimens from North America (Graham Island, Queen Charlotte Islands, Canada).
Local occurrence: Ten 3.

Age: According to PALFY et al. (1994, fig. 4) *P. ? harbledownense* CRICKMAY belongs to the Harbledownenese Assemblage which spans an interval of unknown duration in the upper Sinemurian (Oxynotum and Raricostatum zones).

Geographical distribution: *P. ? harbledownense* (CRICKMAY) is known from North America and Mexico.

CONCLUSIONS

Within the present part, the taxonomic work on the Sinemurian ammonites of the Sierra Madre Oriental is completed. The biostratigraphic interval covered by our ammonites (part I-III) is comparable to that described by ERBEN (1956) and ranges from the Lower up to Uppermost Sinemurian.

We recognized only a small part of the taxa described by ERBEN (1956). According to the poor biostratigraphic data and quite confusing taxonomy provided by ERBEN (1956) it was impossible to revise his fauna exhaustively.

ERRATUM


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REFERENCES


BUCKMAN, S.S. (1909-1930) - Yorkshire Type Ammonites. (from vol. 3: Type Ammonites, 1-7: 709 pl.


Plate II

If not indicated otherwise, all figures are reproduced in natural size.

Figs 1-8, 10, 13-15: *Orthechioceras jamesdanae* (BARCENA) sensu ERBEN
1 (no. 0283a), 2 (no. 0283b), 4 (no. 0285), 5 (no 0282), 6 (no. 0274), 8 (no. 0275), 14 (no. 0303): T/V 6; 7 (no. 0307), 13 (no. 0276): T/V 5; 15 (no. 0271): T/V 4.

Figs 9, 11-12: *Orthechioceras pauper* (ERBEN)
9 (no. 0253), 11 (no. 0257), 12 (no. 0262): T/V 5.
Fig. 1: *Orthechioceras pauper* (ERBEN)  
1 (no. 0261), 2 (no. 0255), 3 (no. 0258), 6 (no. 0254), 9 (no. 0252): T/V 5.

Fig. 4: *Orthechioceras* cf. *incaguasiense* HILLEBRANDT (no. 0256): Ten 1.

Figs 5, 7, 8, 10-19, 23: *Orthechioceras incaguasiense* HILLEBRANDT  
5 (no. 0211), 7 (no. 0186), 8 (no. 0209), 10 (no. 0185), 11 (no. 0208), 12 (no. 0218), 13 (no. 0191), 14 (no. 0203), 15 (no. 0220), 16 (no. 0195b), 17 (no. 0195a), 18 (no. 0185), mold of the specimen to PI. III, fig. 10, 19 (no. 0201), 23 (no. 0196-0198): T/V 5.

Fig. 21: *Orthechioceras sp. I*  
(no. 0309); T/V 5.

Figs 20, 22, 24-27: *Paltechioceras tardecrescens* (HAUER)  
20 (no. 0264), 22 (no. 0233), 24 (no. 0234), 26 (no. 0236), 27 (no. 0231): Ten 3; 25 (no. 0045): Ten 1.

Plate III

If not indicated otherwise, all figures are reproduced in natural size.
Plate IV

If not indicated otherwise, all figures are reproduced in natural size.

Figs 1, 2, 4, 5: *Paltechioceras tardecrescens* (HAUER)
1 (no. 0041): Ten 1; 2 (no. 0236), 4 (no. 0263), 5 (no. 0229): Ten 3.

Figs 3, 6, 7, 8, 10, 11: *Paltechioceras rothpletzi* (BÖSE)
6 (no. 0267), 10 (no. 0265): Ten 7; 8 (no. 0266), 11 (no. 0269): T/V 4; 3, 7: Flagstone Quarry, Graham Island, Queen Charlotte Islands, Canada.

Fig. 9: *Paltechioceras aff. mexicanum* (ERBEN). 9a is the mold to fig. 9c.
(no. 0221): ex situ, between T/V 5 and T/V 6.

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Plate V

If not indicated otherwise, all figures are reproduced in natural size.

Figs 1, 4, 5: *Paltechioceras ? harbledownense* (CRICKMAY)
1, 4: Yakoun River, Graham Island, Queen Charlotte Islands, Canada; 5 (no. 0268): Ten 3.

Figs 2, 3, 7: *Paltechioceras rothpletzi* (BÖSE)
2: Cast of the specimen to BÖSE, 1894, pl. 56, fig. 5, lectotype, 3: Flagstone Quarry, Graham Island, Queen Charlotte Islands, Canada, 7 (no. 0305): Ten 7.

Fig. 6: *Paltechioceras cf. rothpletzi* (BÖSE)
6 (no. 0232): Ten 3.