A new ammonite fauna from the Oxfordian of the Pinar del Río province, western Cuba

ABSTRACT: The paper deals with ammonite fauna recorded for the first time from the Oxfordian of the Pinar del Río province in western Cuba. The ammonites found in the Jagua Fm. (Pimienta Member) in the Sierra de los Organos, and the Francisco Fm. in the Sierra del Rosario belong to the genera: Ochetoceras Haug, 1885, Glochiceras Hyatt, 1900, Eucaspideroceras Spath, 1931, Cubaspideroceras gen. n., and Mirospinctes Schindewolf, 1926. Seven new species and three new subspecies are described and the possibility of distinguishing several other new species is suggested. The ammonite-bearing strata are assumed to be of late Middle Oxfordian and possibly earliest Late Oxfordian age.

INTRODUCTION

In Cuba up to the present the Oxfordian ammonites were known from the Jagua Formation of the Sierra de los Organos in the Pinar del Río province (Text-fig. 1), or more precisely, the strata assigned to the Jagua Vieja member by Herrera (1961). The Jagua Vieja Member comprises limestones with clay shale intercalations and calcareous concretions (“quesos”). The concretions yield numerous well-preserved ammonites which were the subject of studies by O’Connell (1920), Sánchez-Roig (1920, 1951), Jaworski (1940), Jaudoley & Furrazola-Bermúdez (1968) and recently by Wierzbowski (1976).

The ammonites described here belong to a younger Oxfordian ammonite assemblage recently discovered in Sierra de los Organos and Sierra del Rosario in Pinar del Río province, western Cuba (cf. Text-fig. 1). In Sierra de los Organos the ammonites were found in the Pimienta Member of the Jagua Fm., and in Sierra del Rosario — in the Francisco Fm. (cf. Pszczółkowski in: Kutek & al. 1876). Moreover, in the latter region the older ammonite assemblage corresponding to that known from the Jagua Fm. in Sierra de los Organos was found for the first time (cf. Myczyński & Pszczółkowski 1973). The investigated ammonites were found during the fieldworks connected with preparation of the Geological Map of Pinar
del Río Province by the Polish-Cuban team of the Polish Academy of Sciences and Cuban Academy of Sciences. In the course of these works the present author found a new ammonite fauna in the Jagua Fm. (R. Myczyński — “Nueva fauna de ammonites de la formacion Jagua colectada en la region Viñales” — communication presented at the Vth Scientific Session of the Cuban Academy of Sciences in Havana, May 31st, 1973). The ammonites were found in the vicinity of Viñales. Similar fauna was subsequently stated nearby Brujito NW of Sorco in Sierra del Rosario by A. Pszczółkowski (cf. Myczyński & Pszczółkowski 1973), in shaley-carbonate series with calcareous concretions and sometimes with sandstone intercalations, that separates the strata of San Cayetano and Artemisa formations. These strata, originally described as “transitional beds” by Pszczółkowski (1971), were subsequently interpreted as a separate lithostratigraphic unit, the Francisco Fm. (Pszczółkowski in: Kutik & al. 1976).

In discussion of the stratigraphy of the Jurassic of Sierra de los Organos the author accepted (Text-fig. 2) somewhat modified lithostratigraphic schema proposed by Herrera (1961), whose Pan Formation (= Azucar Fm. of Hatten, 1957) is here called as the lower member of the Jagua Fm. In order to avoid the existing confusion connected with the use of that name, this lithostratigraphic unit is here named as the Pan
Azucar Member (Wierzbowski 1976). Red shales with numerous ammonites, known from Sierra de los Organos (de la Nuez 1972, 1974), were recently interpreted as the lower part of the Jagua Fm. by Wierzbowski (1976).

Acknowledgements. Thanks are due to the Chief of the Institute of Geology and Paleontology of the Cuban Academy of Sciences in Havana for the loan of the ammonites described in the paper. Thanks are also due to Dr. A. Peçczółkowski for rendering the ammonites found in Sierra del Rosario and for discussion on some geological problems of that region. Warm thanks are due to Professor J. Znosko, Professor H. Makowski, Docent L. Malinowska, Docent J. Kutek, Dr. A. Wierzbowski, Dr. W. Brochwikiewicz-Lewiński for fruitful discussions on some paleontological problems and help in gathering the literature, and to Professor R. Enay for helpful comments concerning the paleontological and stratigraphic interpretation of the ammonites investigated. Thanks are also due to the staff of the Institute of Geology and Paleontology of the Cuban Academy of Sciences, and especially to Esteban Díaz Montesino and the late Bernardo Marcin for the help during the field works. Photographs of ammonites were taken by Miss E. Mulawa of the Institute of Paleozoology of the Polish Academy of Sciences, and the drawings of ammonites by J. Dzik, M. Sc. of the same Institution.

AMMONITE-BEARING SECTIONS IN SIERRA DE LOS ORGANOS

In the Sierra de los Organos (cf. Text-fig. 1) the ammonites were found in two regions: Mogote La Mina (Text-fig. 3) and Caiguanabo (Text-fig. 4).
MOGOTE LA MINA I

Mogote La Mina I section begins with shelly limestones of the Pan Azucar Member (Text-fig. 5) of the Jagua Fm. They are represented by thin-beded grey-bluish limestones with thin sandstone and coquina intercalations, about 5 m thick. They are overlaid by gray-bluish thin-beded limestones with clay shaly intercalations and with numerous calcareous concretions ("quesos") up to 30 cm in diameter; the limestones, shales and concretions yield numerous ammonites. These strata, about 40 m thick, belong to the Jagua Vieja Member. Above the Jagua Vieja Member there occur gray-bluish, sometimes spotty limestones with not numerous intercalations of clay-marly shales about 9 m thick. In these limestones there were found the following ammonites: *Euaspidocea* (*Euaspidocea*) cf. *costatum* (Dorn), *E. (E.) striatocostatiforme* sp. n., *Mirospinctes pinarensis pinarensis* sp. n., subsp. n., *M. pinarensis torrei* sp. n., subsp. n., *M. pinarensis choaffati* sp. n., subsp. n. Above there occurs 25-meter series of grey-bluish pelitic limestones passing upwards into dark-blue thick-beded, sometimes strongly silicified limestones. The limestones occurring above the Jagua Vieja member are assigned to the Pimienta Member. They are overlaid by massive limestone of the San Vicente Member of the Guasasa Formation (Viñales Limestones of Herrera, 1961).

MOGOTE LA MINA II

Mogote La Mina II section (Text-fig. 6) begins with red and brown shales bearing numerous poorly preserved ammonites and representing the Zacarias Member of the Jagua Fm. (see Wierzbowski 1976). The contact with the overlying limestones and shales (Jagua Vieja Member) is of tectonic nature. The latter deposits are strongly tectonically squeezed out attaining merely 3 m thickness. Above occur strata of the Pimienta Member of the Jagua Fm., represented by grey-bluish, medium-beded limestones with not numerous shaly intercalations and yielding: *Euaspidocea* (*Euaspidocea*) *imlayi* sp. n., *E. (E.)* cf.

![Location of the exposures: (1) Galión, and (2) Hoyo de la Sierra](image-url)
Calcareous breccia

- Cubaspidoceras caribbeanum gen. & sp.n
- Mirosphinctes minensis sp.n.
- Laminated limestone with infrequent ammonites
  Mirosphinctes cf. niedzwiedzki (Siemiradzki)

Limestones with frequent Mirosphinctes and Euaspidoceras

- Limestones and shales with calcareous concretions and ammonites (tectonically reduced)
- Shales with ammonites

JVM. - Jagua Vieja Member

--- Tectonic contact

Fig. 5. Lithostratigraphic column of the Jagua Formation at the exposure Mogote La Mina I

costatum (Dorn), Mirosphinctes spp. and aptychi identified as Lamellaptychus sp.
(Pl. 20, Fig. 7). The thickness of these strata is about 10 m. Upwards there occur
dark-blue thick-bedded limestones with not numerous ammonites. In the middle part
of that series the ammonite described here as Mirosphinctes minensis sp. n. and,
somewhat below, Mirosphinctes cf. niedzwiedzki (Siemiradzki) were collected. The
specimen assigned to Cubaspidoceras caribbeanum gen. n., sp. n. was found in the
upper part of the limestones (cf. Text-fig. 6). The section ends with limestone breccia and massive limestones of the San Vicente Member of the Guasasa Fm.

PANCHO LUIS

This locality is situated about 2.5 km SW of Mogote La Mina (Text-fig. 3) and 4 km NE of Viñales. The section begins with limestones and shales of the Jagua Vieja Member and grey-bluish limestones of the Pimienta Member resting on the former along a tectonic contact. Both the Jagua Vieja and Pimienta members are markedly tectonically reduced, being 10 and 8 m thick, respectively. The ammonites are very scarce and poorly preserved in the Pimienta Member; the best preserved specimen is determined as Mirosphinctes cf. niedzwiedzki (Siemiradzki).

GALALÓN

The Galalón locality is situated NE of Caiguanaabo (cf. Text-figs 1 and 4). The strata here exposed are heavily tectonically disturbed. The section begins with sandstones and shales of the San Cayetano Fm. These are overlied by limestones
and shales of the Jagua Vieja Member about 35 m thick, along a tectonic contact. The stratigraphically younger Pimienta Member is represented by 30 m series of thick-bedded dark-blue limestones and it seems that the lowermost part of the member has been tectonically squeezed out. A single, incomplete specimen identified as *Cubaspidocteras caribbeanum* gen. n., sp. n. was found in the upper part of the member close to its contact with limestone breccia. The section ends with massive limestones of the Guasasa Fm. beginning with limestone breccia with cherts (San Vicente Member).

**HOYO DE LA SIERRA**

This locality is situated about 3 km SW of Caiguanabo (Text-fig. 4). The strata of the Jagua Fm. are here strongly tectonically disturbed which makes recognition of the sequence difficult. The strata of the Pimienta Member, overlying the Jagua Vieja limestones and shales with calcareous concretions about 50 m in thickness, begin with dark-blue limestones yielding the following ammonites: *Glochiceras* (?*Lingulaticeras*) sp., *Cubaspidocteras caribbeanum* gen. n., sp. n., *Euaspidocteras (Euaspidocteras)* sp., *Mirospinctes* sp. D. These limestones pass upwards into dark-blue, strongly silicified limestones with very poorly preserved fauna. The Pi-
mienta Member attains about 45 m in thickness. The section ends with limestone breccia and massive limestones with cherts of the San Vicente Member of the Guasasa Fm. (Text-fig. 7).

OTHER LOCALITIES

The specifically unidentifiable *Mirospinctes* were found in the vicinity of Guane in silicified limestones of the Pimienta Member of the Jagua Fm. cropping out along the road cut between Guane and Tumbadero. A single *Mirospinctes* sp. was found in limestones of the Pimienta Member, c. 2 m above the Jagua Vieja Member in the Luis Lazo Valley.

![Lithostratigraphic column of the Pimienta Member, Jagua Formation, at the exposure Hoyo de la Sierra](image)

**Fig. 7.** Lithostratigraphic column of the Pimienta Member, Jagua Formation, at the exposure Hoyo de la Sierra

**AMMONITE-BEARING SECTIONS IN SIERRA DEL ROSARIO**

In Sierra del Rosario the ammonite fauna was found in the Francisco Fm. cropping out at Loma Esquina, Loma Calabrote and Macaqual (Text-figs 8 and 9) by Dr. A. Pszczółkowski. The Francisco Fm. is here developed as shales with calcareous concretions.

At Loma Esquina (Brujito; Text-fig. 8) the Francisco Fm. attains c. 20 m in thickness (Pszczółkowski in: Kutek & al. 1976). The ammonites collected from calcareous concretions occurring in the waste are represented by: *Ochetoceras* sp., *Glôchiceras* (*Glôchiceras*) aff. *subclausum* (Oppel), *G*. (?) *Glôchiceras* aff. *carinatum* Aguilera & Castillo, *Euaspïdoceras* (*Euaspïdoceras*) cf. *costatum* (Dorn), *E. (E.)* sp. *A*, *Cubaspïdoceras* *carribeanum* gen. *n.*, sp. *n.*, *Perisphinctes* (?) *Otoïspïnctes* wier-
bowelski sp. n., *Mirospinctes pinarensis pinarensis* sp. n., subsp. n., and *M. pinarensis choffati* sp. n., subsp. n.

On south-western slopes of the Loma Calabrote hill, c. 1.5 km NW of Loma Esquina (Brujito) occur small ammonite-bearing calcareous concretions that contain *Euaaspidoceeras* (*Euaaspidoceeras*) cf. *costatum* (Dorn).

The Macaqual locality is situated along the road from San Diego de los Baños to Las Mill Cumbres, east of Macaqual (Text-fig. 9). Here crop out strongly tectonically disturbed strata of the Francisco Fm. represented by clay shales and

![Diagram](image1)

**Fig. 8**
Location of the exposures: (1) Brujito, and (2) Loma Calabrote

![Diagram](image2)

**Fig. 9**
Location of the exposure Macaqual

marly limestones with calcareous concretions bearing not numerous ammonites. The thickness of the Francisco Fm. is estimated here at about 15–20 m. The contact of these strata and sandstones of the San Cayetano Fm. is tectonic. There were found the ammonites of the genera *Euaaspidoceeras*, *Cubaspidoceeras* gen. n. (including the holotype of *Cubaspidoceeras kuteki* gen. & sp. n.) and *Mirospinctes*. 
The field studies have shown the following succession of the ammonites in the Pimienta Member of the Jagua Fm. (Sierra de los Organos).

In the lowermost part there occur: *Euaspidoceras (Euaspidoceras)* cf. *costatum* (Dorn), *E. (E.)* *imlayi* sp. n., *E. (E.)* striatocostatiforme sp. n., *E. (E.)* sp., *Mirospinctes pinarensis pinarensis* sp. n., subsp. n., *M. pinarensis torrei* sp. n., subsp. n., *M. pinarensis choffati* sp. n., subsp. n., and *Cubaspidoceras carribeanum* gen. n., sp. n.

In the middle part there occur: *Mirospinctes minensis* sp. n. and *M. cf. niedzwiedzki* (Siemiradzki); and in the upper part: *Glochiceras (?Lingulaticeras)* sp., *Cubaspidoceras carribeanum* gen. n., sp. n. and *Mirospinctes* sp. D.

In the lowermost strata of Francisco Fm. (Sierra del Rosario) there were found: *Ochetoceras* sp., *Euaspidoceras (Euaspidoceras)* cf. *costatum* (Dorn), *E. (E.)* sp. A, *Cubaspidoceras kuteki* gen. n., sp. n., *Perisphinctes (?Otosphinctes) wietzbowskii* sp. n., *Mirospinctes pinarensis pinarensis* sp. n., subsp. n., *M. pinarensis torrei* sp. n., subsp. n., and *M. pinarensis choffati* sp. n., subsp. n. In upper part of that formation there were found: *Cubaspidoceras carribeanum* gen. n., sp. n., and *Glochiceras* (Glochiceras) aff. *subclausum* (Oppel).

The fauna gathered in the Jagua Fm. (Pimienta Member) in Sierra de los Organos, and in Francisco Fm. in Sierra del Rosario comprises:

<table>
<thead>
<tr>
<th>Ammonite taxa</th>
<th>Jagua Fm.</th>
<th>Pimienta Member</th>
<th>Francisco Fm.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ochetoceras sp.</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Glochiceras /Lingulaticeras/ sp.</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Glochiceras /sp. aff. subclausum/Oppel/</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Euaspidoceras /Euaspidoceras/ sp.</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Euaspidoceras /Euaspidoceras/ <em>costatum</em> (Dorn)</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Euaspidoceras sp.</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Cubaspidoceras <em>kuteki</em> gen. n. &amp; sp. n.</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Cubaspidoceras carribeanum gen. n. &amp; sp. n.</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Perisphinctes (?Otosphinctes) <em>wietzbowskii</em> sp. n.</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Mirospinctes pinarensis pinarensis sp. n. &amp; subsp. n.</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Mirospinctes pinarensis torrei sp. n. &amp; subsp. n.</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Mirospinctes choffati sp. n. &amp; subsp. n.</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Mirospinctes minensis sp. n.</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Mirospinctes cf. niedzwiedzki /Siemiradzki/</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Mirospinctes sp. A</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Mirospinctes sp. B</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Mirospinctes sp. C</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Mirospinctes sp. D</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Mirospinctes sp. E</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>
SYSTEMATIC DESCRIPTIONS

The ammonites described in this paper are generally well-preserved, usually being represented by moulds sometimes with shell fragments. The most abundant and best preserved ammonite fauna was gathered in Loma Esquina (Brujito), La Mina I and La Mina II localities.

All the dimensions are given in mm, and the following measurements were taken: $D$ — shell diameter, $H$ — whorl height, $b$ — thickness of the last whorl, $u$ — umbilical diameter, $Wh$ — ratio of the height of the last whorl to diameter, $Wb$ — ratio of the thickness of the last whorl to diameter, $Ud$ — ratio of umbilical diameter to diameter of the specimen, $NR$ — number of umbilical ribs per whorl, $NR_{1/2}$ — number of umbilical ribs per half of whorl, $NS$ — number of external ribs per whorl, $NS_{1/2}$ — number of external ribs per half of whorl.

The numbers under which the specimens are listed refer to the collections of the Paleontological Museum of the Institute of Geology and Paleontology of the Cuban Academy of Sciences in Havana.

Family Oppeliidae Bonarelli, 1894
Genus OCHETOCERAS Haug, 1885

Ochetoceras sp.
(Pl. 2, Fig. 1)

Material. — A single, small, somewhat deformed specimen (No. 2510t).

<table>
<thead>
<tr>
<th>Specimen No.</th>
<th>$D$</th>
<th>$h$</th>
<th>$u$</th>
<th>$Wh$</th>
<th>$Ud$</th>
<th>$NR_{1/2}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>2510t</td>
<td>25.0</td>
<td>11.0</td>
<td>4.5</td>
<td>.44</td>
<td>.18</td>
<td>.07</td>
</tr>
</tbody>
</table>

Discussion. — The specimen displays uncinarian ventricle typical of the genus Ochetoceras Haug, 1885. However, it is deformed and too small for specific identification.

Occurrence. — Francisco Fm. strata exposed at Esquina hill N of Brujito, Sierra del Rosario.

Family Haploceratidae Zittel, 1884
Genus GLOCHICERAS Hyatt, 1900
Subgenus GLOCHICERAS Hyatt, 1900

Glochiceras (Glochiceras) aff. sub classifier (Oppel, 1862)
(Pl. 2, Figs 3–6)

Material. — Five specimens (No. 2672a, b, c, d, e).

<table>
<thead>
<tr>
<th>Specimen No.</th>
<th>$D$</th>
<th>$h$</th>
<th>$b$</th>
<th>$u$</th>
<th>$Wh$</th>
<th>$Wb$</th>
<th>$Ud$</th>
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</thead>
<tbody>
<tr>
<td>2672a</td>
<td>18.0</td>
<td>6.0</td>
<td>5.5</td>
<td>5.0</td>
<td>.44</td>
<td>.30</td>
<td>.17</td>
</tr>
<tr>
<td>2672b</td>
<td>17.5</td>
<td>7.8</td>
<td>5.0</td>
<td>4.0</td>
<td>.44</td>
<td>.29</td>
<td>.22</td>
</tr>
<tr>
<td>2672c</td>
<td>19.0</td>
<td>9.0</td>
<td>6.0</td>
<td>5.0</td>
<td>.47</td>
<td>.31</td>
<td>.26</td>
</tr>
<tr>
<td>2672d</td>
<td>16.5</td>
<td>7.2</td>
<td>—</td>
<td>7.5</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>2672e</td>
<td>10.0</td>
<td>5.0</td>
<td>—</td>
<td>2.4</td>
<td>.50</td>
<td>.24</td>
<td></td>
</tr>
</tbody>
</table>

Description. — Whorls weakly convex, thickest at the mid-height. Spiral furrow passing somewhat below the mid-height, becoming markedly deeper at the body
chamber. Umbilicus moderately wide, and deep; umbilical margin somewhat rounded. Ventral side narrow. Peristome accentuated with constriction; peristomal margin concave in ventrolateral part, directly obliquely backward in dorsolateral part; lappets small.

Remarks. — The specimens are very close to *Glochiceras* (Glochiceras) subclavatum (Oppel) and its representatives described and illustrated by Ziegler (1956) and Malinowska (1963), differing in furrow situated somewhat lower on whorl side and in slightly narrower ventral side. They differ from *G. (G.) ampicanaliculatum* of Wierzbowski (1976) in spiral furrow narrower and disappearing earlier and in rounded ventral side.

Occurrence. — Francisco Fm., Esquina hill N of Brujito, Sierra del Rosario.

*Glochiceras* (?*Glochiceras*) aff. *carinatum* Aguilera & Castillo, 1895

(Material. — Two specimens (No. 2513a, b).

<table>
<thead>
<tr>
<th>Specimen No.</th>
<th>D</th>
<th>h</th>
<th>b</th>
<th>u</th>
<th>wh</th>
<th>Wh</th>
<th>Ud</th>
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</thead>
<tbody>
<tr>
<td>2513a</td>
<td>19.0</td>
<td>8.0</td>
<td>6.0</td>
<td>5.0</td>
<td>.42</td>
<td>.31</td>
<td>.26</td>
</tr>
<tr>
<td>2513b</td>
<td>10.5</td>
<td>5.0</td>
<td>3.8</td>
<td>3.0</td>
<td>.47</td>
<td>.36</td>
<td>.28</td>
</tr>
</tbody>
</table>

Description. — Coiling involute; whorl sides convex. Peristome with lappets; peristomal margin poorly preserved, presumably obliquely inclined backward in dorsolateral part. Ventral side rounded, narrow. Umbilicus narrow, deep; umbilical margin steep; umbilical wall steep. Spiral furrow wide, shallow, passing somewhat below the mid-height.

Remarks. — The specimens resemble *Glochiceras* (Coryceras) *carinatum* Aguilera & Castillo, known from the Lower Kimmeridgian of Mexico, differing in narrower and not so steep circum-umbilical area and in the development of dorsolateral part of the peristome; the latter species belongs to the subgenus *Coryceras* (cf. Ziegler 1956) whereas the Cuban specimens rather belong to the subgenus *Glochiceras*.

Occurrence. — The specimens were found together with *Mirospinctes* and *Euaspidoceras* in the Francisco Fm. at Esquina hill N of Brujito, Sierra del Rosario.

*Glochiceras* (?*Lingulaticeras*) sp.

(Material. — A single poorly-preserved specimen.

<table>
<thead>
<tr>
<th>Specimen No.</th>
<th>D</th>
<th>h</th>
<th>b</th>
<th>u</th>
<th>Wh</th>
<th>Wb</th>
<th>Ud</th>
</tr>
</thead>
<tbody>
<tr>
<td>2532</td>
<td>27.0</td>
<td>11.0</td>
<td>7.0</td>
<td>.40</td>
<td>.60</td>
<td>.25</td>
<td></td>
</tr>
</tbody>
</table>

Description. — Whorl sides slightly convex. Umbilical wall vertical; umbilicus wide, shallow. Inner whorls smooth. Wavy, as a rule biplicate ribs appear from
the middle of the last whorl; point of flexion situated at the mid-height; the ribs become somewhat swollen and slightly prorsiradiate near ventral margin and close to the peristome. Peristome lappeted; peristomal margin somewhat inclined towards the posterior in the dorsolateral part, concave in ventrolateral part.

Remarks. — The specimen resembles Glochiceras (Lingulaticeras) nudatum (Oppel) in shape and dimensions of the shell, differing from the type specimen and specimens assigned to that species by Ziegler (1968, p. 133, Pl. 12, Figs 6–11, Text-figs 44–46) in ribs less wavy and not so prorsiradiate near the venter. The specimen is, however, insufficiently preserved for any unequivocal specific identification.

Occurrence. — Below the beds yielding Mirospinoceras, Pimienta Member, Jagua Fm., Hoyo de la Sierra locality, Sierra de los Organos.

Family Aspidoceratidae Zittel, 1895
Subfamily Euaspidoceratinæ Spath, 1931
Genus EUASPIDOCERAS Spath, 1931

Euaspidoceras (Euaspidoceras) aff. costatum (Dorn, 1923)
(Pl. 3; Figs 3a–b, 4; Pl. 4, Figs 1–4; Pl. 5, Figs 1–7)

Material. — About 20 specimens (see Table) and some fragments (No. 2516b, 2606, 2611b, 2682a–2682).

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Description. — Coiling evolute; whorl section subrectangular; whorls weakly overlapping. Whorl sides flattened; maximum whorl thickness somewhat above umbilical wall. Umbilicus wide, deep; umbilical margin somewhat rounded; umbilical wall almost vertical. Inner whorls ornamented with numerous fine riblets united in bunches at the umbilical margin. First thicker ribs with characteristic swellings at umbilical margin appear at about 9 mm diameter of whorl. External tubercles of the type of parabolic nodes appear at about 10 mm diameter, and umbilical tubercles...
at about 16–46 mm diameter. The ornamentation consists of strong ribs somewhat bent downwards and fine riblets at about 55 mm diameter, and blunt, poorly visible internal tubercles situated at the umbilical margin and blunt, external tubercles situated at the ventral margin and somewhat extending towards the anterior, connected with the former with somewhat prorsiradial ribs weakening at the midpoint; the venter is almost smooth at about 40 mm diameter. At larger diameters, the internal tubercles and ribs are poorly marked whereas the external tubercles become sharper and elongate.

Remarks. — The specimens mostly represent inner whorls which makes difficult their specific identification. They resemble *Euaspidoceras* (*Euaspidoceras*) *costatum* (Dorn) (cf. Dorn 1931, pp. 22, 25) in the type of sculpture and whorl section, differing in somewhat smaller strength of the sculpture and dimensions. Numerous fine ribs from the innermost whorls and, partly, whorl section and dimensions, bring these specimens close to *Euaspidoceras* (*Euaspidoceras*) *douvillei* Collot (cf. Collot 1917, p. 1, Fig. 3; Arkell 1940, p. 261, Pl. 63, Figs 3–4, Text-figs 96–98; Jeannet 1961, p. 211, Pl. 92, Figs 4, and especially Pl. 96, Fig. 3, Pl. 100, Figs 1–2, Text-figs 406–408; Haas 1965, p. 176, Pl. 28, Figs 46–50 and especially Fig. 47) differing from the holotype of that species (Collot 1917, p. 9, Pl. 1, Fig. 3) in more flattened whorl sides, deeper umbilicus and earlier onset of tubercles. The specimens appear also somewhat similar to *E. (E.) bicornatum* Zieten, especially those figured by Dorn (1931, p. 12, Pl. 17, Figs 1, 2a–c, 3 and especially 6) and Jeannet (1961, p. 217, Pl. 103, Figs 1–2, Text-fig. 509) differing from the latter in more prorsiradial ribs and more elongate internal tubercles. They differ from Cuban species *"E. o'connelli"* of Sánchez Roig (1930, p. 30, Pl. 13, Figs 1, 1a; 1951, p. 70, Pl. 33, Figs 1–2) in narrower umbilicus, whorl section and weaker ribs and tubercles and and from *E. (E.) vignalese* Spath, described by Spath (1931, p. 592) and Sánchez Roig (1951, pp. 66–70), in sculpture, dimensions and whorl section. However, the comparison is limited to the diagnosis of that species given by Spath, as the holotype is poorly illustrated. According to Wierzbowski (1976), the specimens assigned to the latter species by Judoley & Furrazola-Bermúdez (1969, Pls 72–76) belong to another species.

Occurrence. — Francisco Fm., Esquina hill N of Brujito, and Loma Calabrote (specimens No. 2682, 2682a–b, 2682c–d, 2683), Sierra del Rosario.

*Euaspidoceras* (*Euaspidoceras*) *striatocostatiforme* sp. n.

(Pl. 8; Pl. 9, Fig. 1a–c)

Holotype: specimen No. 2280, figured in Pl. 8, Fig. 1a–c; housed in the Paleontological Museum of the Institute of Geology and Paleontology, Cuban Academy of Sciences, Havana.

Type horizon: Pimienta Member of Aguja Fm., Oxfordian.

Type locality: Mogote La Mina I locality, Sierra de los Organos, Pinar del Rio province, Cuba.

Derivation of the name: from the similarity to the species *Euaspidoceras* (*Euaspidoceras*) *striatocostatum* (Dorn).

Paratypes: specimens No. 2289, 2286, 2287, 2285, 2280a.

Diagnosis. — Coiling evolute; whorl section subrectangular. Inner whorls ornamented with numerous fibrous ribs; and outer whorls with weaker umbilical, and stronger external tubercles connected by weak ribs; numerous fine striae parallel to the ribs. External tubercles somewhat obliquely elongated, about 13 per a half of whorl at 30 mm diameter. Long spines directed towards the umbilicus extend from the umbilical tubercles.
Material. — Six more complete (No. 2260, 2261, 2266, 2266a, 2265a, 2256) and four fragmentary (No. 2266, 2251, 2255a, 2255b) specimens.

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Description. — Coiling evolute; whorl section subrectangular; whorls weakly overlapping one another. Umbilical wall steeply inclined; umbilicus wide, moderately deep. Inner whorls ornamented with numerous fibrous riblets connected in bunches (consisting of 3 or 4 riblets) and often comma-shaped close to umbilical margin. Outer whorls ornamented with wavy ribs and two rows of tubercles; tubercles of inner whorl poorly marked, ending with spines; tubercles of outer whorl stronger than the former.

First umbilical tubercles appear at about 20 mm diameter, and first external tubercles — at about 33–15 mm diameter. The external tubercles, situated at ventral margin, are obliquely elongated towards the posterior; some of them, and especially those occurring at smaller diameters, achieve the shape of parabolic nodes. Wavy ribs begin at umbilical margin, reach the external tubercles and enter the ventral side where they become markedly prorsiradiate and weaker; ribs about 15 in number per half of whorl at 45 mm diameter. Numerous fine strae parallel to the ribs occur between them.

Remarks. — The specimens resemble the representatives of *E. (E.) striatocostatum* (Dorn) (cf. Dorn 1931, p. 37, Figs 4–7 and especially Figs 4, 5 and 7; Christ 1960, p. 112, Pl. 7, Fig. 6) in the style of sculpture, coiling and somewhat in dimensions. One of the specimens assigned to this species by Dorn (1931, Pl. 20, Figs 6a, b) differs from the remaining ones (Dorn 1931, Pl. 20, Figs 4–6, 7a, b) as well as from those figured by Christ and these described here in inner whorls ornamented with strong ribs and strong external tubercles and not fine riblets. The Cuban specimens differ from those assigned to *E. (E.) striatocostatum* (Dorn) in thinner whorls and their more regularly subrectangular section, steeper umbilical wall, umbilical tubercles situated lower on whorl side and in some other details of sculpture (ribs more wavy and more prorsiradiate on the venter).

The sculpture of inner whorls (numerous, commonly fine riblets set in bunches) is very close to that of other whorls of forms assigned here to *Mirospinctes pinarensis torrei* sp. n., subsp. n. One representative of that subspecies (specimen No. 2267) was found together with the holotype of *E. (E.) striatocostatiforme* sp. n. (specimen No. 2268). Moreover, *E. (E.) striatocostatiforme* sp. n. display external tubercles of the parabolic node type on its inner whorls. The similarity of sculpture of inner whorls of ammonites belonging to the genera *Mirospinctes* and *Euaspidoceras* is widely known (Haas 1955, p. 168; Arkell 1957; Barthel 1957; Christ 1960). The similarity of inner whorls, the development of parabolic nodes and a joint occurrence of the genera *Mirospinctes* Schindewolf, and *Euaspidoceras* Spath, indicate that these genera may comprise sexual dimorphs.
Occurrence. — Pimienta Member of Jagua Fm. in Sierra de los Organos, Mogote La Mina I locality. The species E. (E.) striatocostatum (Dorn), to which these specimens are somewhat similar, is known from the Euaspidoceras hypselum Subzone (Upper Oxfordian) of the Franconian Alb (Dorn 1931) and the Oxfordian of Sicily (Christ 1960).

Euaspidoceras (Euaspidoceras) imlayi sp. n.
(Text-figs 10–11; Pl. 7, Fig. 1a–b)

Holotype: specimen No. 2529, figured in Pl. 7, Fig. 1a–b; housed in the Paleontological Museum of the Institute of Geology and Paleontology, Cuban Academy of Sciences, Havana.

Type horizon: Pimienta Member of Jagua Fm., Oxfordian.

Type locality: Mogote La Mina II locality, Sierra de los Organos, Pinar del Rio province, Cuba.

Derivation of the name: in honour of E. W. Imlay, the student of Cuban ammonites.

Diagnosis. — An Euaspidoceras characterized by subtrapezoidal whorl section, weakening of sculpture on outer whorls and umbilical tubercles situated very low at umbilical margin.

Material. — A single specimen.

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Description. — Coiling evolute; whorls very weakly overlapping, thickest at the umbilical margin; whorl section subtrapezoidal, with rounded ventral side. Umbilical wall almost vertical; umbilicus deep. Whorl sides flattened. Inner whorl ornamented with strong ribs, blunt umbilical tubercles situated very low at the umbilical margin and rounded external tubercles. Ribs disappear at ventral margin. On outer whorls the ribs and external tubercles become weaker and less distinct and the location of umbilical tubercles does not change.

Fig. 10. Ratio of whorl height (H) to diameter (D) in (1) Euaspidoceras (Euaspidoceras) imlayi sp. n. (specimen No. 2529), and (2) Euaspidoceras (Euaspidoceras) sp. (specimen No. DD-1)

Remarks. — The specimen markedly differs from the representatives of Euaspidoceras oconnellae (Sánchez Roig) figured by Sánchez Roig (1920, p. 30, Pl. 13, Figs 1, 1a; 1951, p. 70, Pl. 13, Figs 1–2) and Judoley & Furrázola-Bermúdez (1968, p. 114), in more numerous ribs, whorl section and umbilical tubercles
situated lower on whorl side. It differs from *E. vignalense* Spath (see also remarks on that species) in whorl section, somewhat less numerous ribs and location of umbilical tubercles on the whorl side. The specimen resembles those assigned here to *Cubaspidoceas* gen. n. in the weakening of ornamentation on outer whorls, differing in subtrapezoidal whorl section, stronger ornamentation on inner whorls and more evolute coiling. Its inner whorls somewhat resemble *Euaspidoceas* (*Euaspidoceas*) *costatum* of Dorn (1831, p. 25, Pl. 22, Fig. 7) from which it differs in umbilical tubercles situated lower on whorl side, subtrapezoidal whorl section, dimensions as well as in the trend to weakening of sculpture on outer whorls.

**Occurrence.** — As the type locality.

**Euaspidoceas** (*Euaspidoceas*) *sp. A*  
(Pl. 3, Figs 5—6)

**Material.** — Two specimens (No. 2673 and 2682Q).

**Description.** — Coiling evolute; whorls weakly overlapping one another; whorl section subrectangular; whorl sides flattened; ventral side slightly rounded; umbilicus wide. Ornamentation consisting of two rows of tubercles connected by ribs; the ribs fine and numerous on inner whorls, converge in bunches close to umbilical margin.

**Remarks.** — The specimens are somewhat close to those described here as *Euaspidoceas* (*Euaspidoceas*) *aff. costatum* (Dorn) and *E. (Euaspidoceas)* *sp.*, differing however in ornamentation and dimensions.

**Occurrence.** — Francisco Fm., Esquina hill N of Brujito (specimen No. 2673) and Loma Calabrote (specimen No. 2682Q), Sierra del Rosario.
Euaspidoceras (Euaspidoceras) sp.
(Text-figs 10–11; Pl. 7, Fig. 2a–b)

Material. — A single well-preserved specimen (DD-1).

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Description. — Coiling evolute; whorls weakly overlapping; whorl section subrectangular; ventral side somewhat rounded, smooth; whorl sides weakly convex. Umbilical margin rounded; umbilical wall steep; umbilicus wide, deep. Inner whorls ornamented with riblets varying in strength. First umbilical tubercles appear close to the umbilical margin at about 15 mm diameter. External tubercles in the form of spines set parallel to whorl side presumably appear earlier than the umbilical ones. The umbilical and external tubercles are connected by numerous weakly marked ribs. Shell surface covered with numerous fine striae.

Remarks. — The specimen somewhat resembles those assigned here to Euaspidoceras (Euaspidoceras) aff. costatum (Dorn), differing in the sculpture of inner whorls, ribs more numerous on outer whorls, more convex whorl sides and, partly, in dimensions. It differs from Euaspidoceras oconnellae (Sánchez Roig) in more numerous and finer ribs, and in dimensions (cf. Sánchez Roig 1961, Judoly & Furrazola-Bermúdez 1968), and from Euaspidoceras vignales Spath in whorl section, weaker and somewhat denser ribbing, and dimensions (cf. Spath 1931, p. 692; Sánchez Roig 1961, pp. 69–70). It presumably represents a new species of the genus Euaspidoceras Spath, 1931.

Occurrence. — Oxfordian strata of Jagua Fm., Sierra de los Organos.

Genus CUBASPIDOCERAS gen. n.

Type species: CubaspidoceTas kuteki sp. n.

Derivation of the name: from Cuba.

Diagnosis. — Inner whorls Euaspidoceras-like; outer whorls markedly involute, strongly compressed. Umbilical tubercles in the form of long spine directed towards the umbilicus. External tubercles disappearing at larger diameters. Whorl sides ornamented with fine striae diverging from umbilical spines.

Species assigned: — CubaspidoceTas kuteki sp. n., C. carribeanum sp. n.

Occurrence. — Oxfordian, Sierra de los Organos and Sierra del Rosario, Pinar del Río provence, Cuba.

Discussion. — The specimens allocated in CubaspidoceTas gen. n. essentially differ from all the hitherto known representatives of the subfamily Euaspidocerotinae Spath, 1931. Their inner whorls appear similar to those of the genera Euaspidoceras Spath, 1931, and Neaspidoceras Spath, 1931, in the development of two rows of tubercles linked with flattened ribs, the outer of which is situated close to ventral margin. The genus CubaspidoceTas gen. n. differs from Euaspidoceras Spath, 1931, in whorl section (high-ovate, narrow, with markedly rounded ventral side), more involute coiling and ornamentation of outer whorls (replacement of umbilical tubercles by long spines directed towards the umbilicus and disappearance of ribs and external tubercles). The genus CubaspidoceTas gen. n. differs from Neaspidoceras Spath (cf. Spath 1931, p. 613; Arkell 1949; Jeannet 1951) in high-ovate section of outer whorls, involute coiling, and ornamentation consisting of fine striae diverging in
bunches from umbilical spines and characterized by disappearance of external tubercles at larger diameters, whereas some large Neaspidoceras bear external tubercles (cf. Choffat 1893, p. 66, Pl. 15, Figs 1–3; Spath 1931, p. 613).

Fig. 12. Cubaspidoceras kuteki gen. n., sp. n.; specimen No. 2693ca (holotype)
   a side view, b front view

The genus Cubaspidoceras gen. n. differs from Glabrophysodoceras Scott (cf. Scott 1943, p. 62; Arkell 1937, p. L338) in umbilical tubercles situated lower on whorl sides, less involute coiling and in inner whorls ornamented and not smooth. It differs from Aspidoceras Zittel, 1868, in the mode of coiling, whorl section, and Euaspidoceras-like external tubercles situated much higher on sides of inner whorls. The Cuban specimens somewhat resemble Physodoceras Hyatt, 1900 (cf. Arkell 1937, p. L338) in the sculpture of outer whorls consisting of umbilical spines and bunches of fine striae spreading from the spines, differing in markedly compressed whorl section and less involute coiling. The specimens here assigned to Cubaspidoceras gen. n. seem to display features transitional between those of the genera Euaspidoceras Spath, 1931, and Physodoceras Hyatt, 1900.

It should be noted that Cubaspidoceras gen. n. somewhat resembles Aspidoceras (Pseudowaagenia) haynaldii Neumayr, 1873, the type species of the subgenus Pseudowaagenia Spath, 1931, as well as some specimens assigned to that subgenus, e.g. Pseudowaagenia sp. figured by Brochowiec-Lewinski (1976, Pl. 5, Fig. 2) or other taxa, e.g. Neaspidoceras tietzei (Neumayr) presented by Miller (1968, Pl. 6, Fig. 6) in the development of outer whorls, differing in more Euaspidoceras-like outer whorls, external tubercles situated somewhat higher on whorl side, at the ventral margin, and much more compressed and higher outer whorls. Although umbilical tubercles
are poorly preserved on these representatives of *Pseudousagenia* and their possible allies, it may be stated that they were not developed in the form of long spines partly obscuring the umbilicus, which are typical of *Cubaspidoceras* gen. n.

**Cubaspidoceras kuteki** sp. n.

*(Text-fig. 12; Pl. 10; Pl. 11, Figs 1–3)*

*Holotype:* specimen No. 2692oa, figured in Pl. 10, Fig. 1a–c, housed in the Paleontological Museum of the Institute of Geology and Paleontology, Cuban Academy of Sciences, Havana.

*Type horizon:* Francisco Fm., Oxfordian.

*Type locality:* Macagua locality, Sierra del Rosario, Pinar del Rio Province, Cuba.

*Derivation of the name:* in honour of Docent J. Kutek, the student of the Upper Jurassic of Poland and Cuba.

*Paratypes:* specimens No. 2516, 2692cc, 2692cd.

*Diagnosis.* — Inner whorls *Cubaspidoceras*-like; whorl section slightly compressed, high-ovate from c. 65 mm diameter; umbilical tubercles are replaced by long spines directed towards the umbilicus, external tubercles disappear, and ribs are replaced by fine striae spreading from umbilical spines and fading out higher on whorl side from about 40 mm diameter.

*Material.* — Four more complete (No. 2692oa, 2692cc, 2692cd) and five fragmentary (No. 2528, 2521, 2692bc, 2692ch, 2692cl) specimens.

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*Description.* — Coiling initially evolute, later involute; whorl section subrectangular becoming finally high-ovate; whorl sides flattened, becoming convex from the middle of the last whorl; ventral rounded. Umbilical margin overhanging; umbilicus moderate in size, deep. Inner whorls ornamented with feebly umbilical and stronger external tubercles directed towards the posterior; umbilical and external tubercles connected with slightly prorsistradiate ribs, about 11 in number at 54.0 mm diameter. Umbilical tubercles situated at umbilical margin, and external — at ventral margin. The ornamentation changes on outer whorl: ribs are replaced by fine striae, external tubercles become less distinct and presumably disappear at larger diameters, and umbilical tubercles are replaced by spines about 6.5 mm in length, directed towards the umbilicus. Wide, weak constrictions seem to be marked on inner whorls.

*Discussion.* — The species *Cubaspidoceras kuteki* sp. n. differs from *C. caribbeanum* sp. n. in more ovate and thicker whorls, not so early replacement of ribs by striae, and somewhat wider umbilicus. It somewhat resembles the specimen described as *Aspidoceras* (*Intranodites*) *spathi* by Collignon (1909, Pl. 64, Fig. 362; Pl. 95, Fig. 363), differing in trend to disappearance external tubercles, development of ribs, dimensions and coiling.
Occurrence. — Francisco Fm., Macagual Locality (specimens No. 2692ca, 2692cc, 2692cd, 2692cf, 2692ch, 2692cl), Sierra del Rosario; Jagua Fm. (Pimiento Member), Hoyo de la Sierra locality (specimens No. 2618, 2626, 2621; accompanied by the genera *Euaspidooceras* and *Mirosphinctes*), Sierra de los Organos.

*Cubaspidooceras carribeanum* sp. n.
(Text-fig. 13a—b; Pl. 9, Figs 2a—b, 3; Pl. 11, Figs 4—5)

_Holotype:_ specimen No. 2602, figured in Pl. 9, Fig. 2a—b, housed in the Paleontological Museum of the Institute of Geology and Paleontology of the Cuban Academy of Sciences, Havana.

![Diagram of *Cubaspidooceras carribeanum* sp. n.](image)

Fig. 13. *Cubaspidooceras carribeanum* gen. n., sp. n.; specimen No. 2502 (holotype)

_a_ side view, _b_ front view

_Type horizon:_ Pimiento Member of Jagua Fm., Oxfordian.
_Type locality:_ Mogote La Mina II locality, Sierra de los Organos, Pinar del Rio province, Cuba.
_Derivation of the name:_ from the Caribbean Sea.
_Paratypes:_ specimens No. 2602, 2415, 2428.
Diagnosis. — Inner whorls with feebly tuberculation and ribbing; outer whorls high-ovate, compressed in cross-section, ornamented with umbilical spines and fine striae; ribs and external tubercles disappearing very early.

Material. — Eight specimens (No. 2503, 2506, 2415, 2428, 2421, 2419, 2676; 2544).

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Description. — Coiling involute; whorl section high-ovate, compressed; whorl sides slightly convex; ventral side rounded, narrow. Umbilical margin slightly rounded, overhanging; umbilicus narrow and deep. Inner whorls ornamented with feeble ribs beginning with small swellings at umbilical margin, reaching fine ventrolateral tubercles situated at the margin of the ventral side, and disappearing at the venter. The ribs and ventrolateral tubercles disappear on outer whorls which are ornamented with long umbilical spines and fine striae.

Discussion. — Differences in respect to CubaspidoceTa kuteki sp. n. as given above.

Occurrence. — Jagua Fm., Pimienta Member, Mogote, La Mina II locality (specimen No. 2502), Hoyola de la Sierra (specimens No. 2415, 2421 and 2428) and Galalon (specimen No. 2544), Sierra de los Organos; Francisco Fm., Esquina Hill N of Brujito (specimens No. 2503, 2676), Sierra del Rosario.

Family Perisphinctidae Steinmann, 1890
Genus PERISPHINCTES Waagen, 1869
Subgenus OTOSPHINCTES Buckman, 1926
Perisphinctes (?Otosphinctes) wierzbowski sp. n.
(Text-figs 14-15; Pl. 11, Fig. 6a-b)

Holotype: specimen No. 2674 figured in Pl. 31, Fig. 6a-b; housed in the Paleontological Museum of the Institute of Geology and Paleontology of the Cuban Academy of Sciences, Havana.

Type locality: Francisco Fm., Oxfordian.
Type locality: Esquina hill N of Brujito, Sierra del Rosario, Pinar del Rio province, Cuba.

Derivation of the name: in honour of Dr. A. Wierzbowski, the student of the Oxfordian of Poland and Cuba.

Diagnosis. — A Perisphinctes characterized by almost rectangular whorl section and parabolic nodes.

Material. — The holotype only.

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Description. — Coiling evolute; whorl section almost rectangular (Text-fig. 14); whorls weakly overlapping; whorl sides and venter weakly flattened. Umbilical
wall steep, umbilicus wide and shallow. Ribs numerous, prorsiradiate; point of furcation covered by the successive whorl. Outer whorl ornamented with biplicate and, occasional, simple ribs. Simple ribs, directed backwards, sometimes diverge from the biplicate at umbilical margin. From the middle of the last whorl the ribs become more regular, slightly prorsiradiate, passing the venter with a forward twist; a weak siphonal furrow sometimes visible. Parabolic nodes small. Narrow, moderately deep constrictions, about 8 in number per whorl, marked on all the whorls.

Discussion. — The specimen resembles *Perisphinctes (Otosphinctes) siemiradzkii* of Enay (1966, p. 458, Pl. 26, Figs 1–3) in ornamentation of inner whorls, differing in almost rectangular whorl section, smaller thickness of the outer whorl and narrower umbilicus. The sculpture of the venter of *P. (Otosphinctes) wierzbowskii* sp. n. is very similar to that of the specimen described as *P. (Otosphinctes) crotalinus* Siemiradzkii by Enay (1976, Pl. 26, Figs 5c–d); the latter species is, however, characterized by stronger and less numerous ribs. The investigated specimen is somewhat close to those described as *Perisphinctes (Otosphinctes) birmensdorffensis* (Moesch) by Enay (1976, p. 463, Pl. 27, Figs 1–5; Text-figs 134–136) and recently allocated by Brochwicz-Lewinski (1973, Pl. 14, Figs 1–6).

Passendorferia of Nebrodites, differing in whorl section, less dense ribbing and less evolute coiling.

Occurrence. — Francisco Fm., Esquina hill N of Brujito, Sierra del Rosario.

Genus *MIROSPHINCTES* Schindewolf, 1926

*Mirospinctes pinarensis pinarensis* sp. n., subsp. n.

(Text-figs 16–17; PIs 12–15)

*Holotype:* specimen No. 2874, figured in Pl. 26, fig. 2, housed in the Paleontological Museum of the Institute of Geology and Paleontology, Cuban Academy of Sciences, Havana.

*Type horizon:* Francisco Fm., Oxfordian.
NEW AMMONITE FAUNA FROM THE PINAR DEL RIO PROVINCE

Type locality: Esquina hill N of Brujito, Sierra del Rosario, Pinar del Rio province, Cuba.

Derivation of the name: from Pinar del Rio province where the holotype was found.

Paratypes: specimens No. 2274b, 2219a, 2264b, 2266b, 2277b, 2507b, 2307d, 2309b, 2375a, 2376a, 2674b, 2675b.

Diagnosis. — Whorl section high-ovate; whorl sides strongly flattened; ventral side somewhat flattened, sometimes with shallow siphonal furrow. Inner whorls ornamented with coarse and some finer ribs. Primary ribs crescent-like, bent towards the posterior, moderately thick.

Material. — Twenty specimens (No. 2507a, 2274b, 2219a, 2264b, 2266b, 2277a, 2275a, 2276a, 2277b, 2507b, 2307d, 2309b, 2375a, 2376a, 2674b, 2675b) including three fragmentary.

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Description. — Coiling evolute; whorl section high-ovate, sometimes subrectangular; whorls overlapping to a quarter of their height, thickest somewhat above umbilical margin. Umbilicus wide, moderately deep; umbilical wall almost vertical. Ventral side slightly flattened. Inner whorls ornamented with strong, sometimes comma-shaped, slightly prorsiradiate ribs, sometimes accompanied by finer ribs; on inner whorls the ribs sometimes unite in pairs at the umbilical margin.

Fig. 16. Rib-curves of Miosphinctes pinarensis pinarensis sp. n., subsp. n.
1 specimen No. 2507a (holotype), 2 No. 2274b, 3 No. 2219a, 4 No. 2264b, 5 No. 2266b, 6 No. 2277a, 7 No. 2275a

From the middle of the last whorl the ornamentation becomes more regular and heavier, consisting of bi- or sometimes triplicate, crescent ribs; the trend of ribs to unite in pairs at the umbilical margin is here displayed by some primary ribs. The point of furcation is situated close to the ventral margin; the secondaries,
weakly prospiradrate, passing across the venter with some weakening; shallow, siphonal furrow is sometimes marked at the venter. The number of primaries and secondaries variable, ranging from 14 to 16 and 30 to 37 per a half of the last whorl, respectively. Distinct parabolic nodes are marked somewhat above the point of furcation up to the middle of the last whorl; one parabolic node occurs per every 2 to 4 secondary ribs. The ornamentation becomes weaker in subumbilical zone. Peristome with lappet 5–8 mm long. Weak constrictions, 6 in number per whorl, are sometimes visible. Suture line close to that of "Miroosphinctes bukowski" (Choffat).

Discussion. — The species "Miroosphinctes pinaTensis" sp. n. is close to some representatives of "Miroosphinctes bukowski" (Choffat). Choffat (1989) did not however select the type specimen of "M. bukowski", and the specimens assigned by him to that species are so variable in shell morphology that he distinguished two "mutations", α and β and one "variety", cabritoensis. Choffat (1989, p. 61) also noted certain variability in values of whorl height/shell diameter and umbilical/shell diameter ratios for this species. Therefore it appears that this species shows a remarkable intraspecific variability. Enay (1986) rejected the varieties and all the specimens assigned to the species "Miroosphinctes bukowski" (Choffat). The representatives of "M. pinaTensis" sp. n. somewhat resemble those described as the latter species by Choffat (1989, p. 60; Pl. 6, Figs 19–31; and especially Figs 21–23, 25, 26 and 31), Siemiradzki (1989, p. 122; Pl. 20, Fig. 10), and Enay (1986, p. 26, Pl. 4, Fig. 16a–b; 1986, p. 574, Pl. 40, Figs 11–18) in sculpture, shape and dimensions of shell, markedly differing from them in more subrectangular whorl section, somewhat thicker whorls, more flattened whorl sides and weaker and denser ribbing. The differences seem sufficient for treating the Cuban forms as representatives of a separate species.

The Cuban specimens differ from those figured as "Miroosphinctes regularis" (Noetling) by Haas (1955, p. 156; Pl. 26, Figs 24–40; Pl. 26, Figs 1–19) in more flattened whorl sides, smaller number of ribs per whorl and somewhat narrower umbilicus. They differ from the holotype of "Miroosphinctes frickenensis" (Moesch) figured by Enay (1986, p. 160, Fig. 4) in more flattened sides and the style of sculpture. The differences in relation to the specimens described as "M. syriacus" (Noetling) by Haas (1955, p. 153; Pl. 24, Figs 19–48; Pl. 25, Figs 1–13) and "M. kobyti" (de Loric) (cf. Haas 1955, p. 162; Pl. 26, Figs 20–47) are also remarkable.

The variability in morphology of the specimens here referred to the species "Miroosphinctes pinaTensis" sp. n. appears so high as in the case of those from the Mostejunto Beds of Portugal, assigned to the species "Perisphinctes bukowski" by Choffat (1989). The differentiation is sufficient for distinguishing three subspecies of "M. pinaTensis" sp. n.: "M. pinaTensis pinaTensis" subsp. n., "M. pinaTensis torrei" subsp. n. and "M. pinaTensis choffati" subsp. n. The subspecies markedly differ in coiling, sculpture and whorl section. The occurrence of specimens displaying some transitional features supports the view that we are not dealing here with different species but different subspecies.
The nominative subspecies differs from *M. pinarensis torrei* subsp. n. and *M. pinarensis choffatii* subsp. n. in whorl section, ornamentation of the outer whorl and coarser ribbing on inner whorls.

**Occurrence.** — Pimienta Member of Jagua Fm., Mogote La Mina I locality in Sierra de los Organos (specimens No. 2280b and 2256); Francisco Fm., Esquina hill N of Brújito in Sierra del Rosario (all the remaining specimens).

**Mirosphinctes pinarensis torrei** sp. n., subsp. n.

(Text-figs 18–19, Pls 16–17)

*Holotype:* specimen No. 2287, figured in Pl. 16, Fig. 1a–c; housed in the Paleontological Museum of the Institute of Geology and Paleontology, Cuban Academy of Sciences, Havana.

*Type horizon:* Pimienta Member of Jagua Fm., Oxfordian.

*Type locality:* Mogote La Mina 1 locality, Sierra de los Organos, Pinar del Río province, Cuba.

*Derivation of the name:* In honour of Dr. A. de la Torre, the Cuban paleontologist.

*Paratypes:* specimen No. 2280t, 2270, 2260c, 2271d, 2280e, 2277a.

*Diagnosis.* — Whorl section high-ovate, rounded; whorl sides and venter flattened; ribbing fine and dense on inner whorls; a marked trend to the development of aliform furrow on the venter.

*Material.* — Four more complete (No. 2281, 2280e, 2280c and 2277d) and four fragmentary specimens.

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**Description.** — Coiling evolute; whorl section high-ovate, rounded; whorl sides somewhat convex; whorls the thickest at one-third of their height. Ventral side with rounded margins, somewhat flattened, narrow. Umbilicus wide, shallow.

![Rib-curves of *Mirosphinctes pinarensis torrei* sp. n., subsp. n.](image)

1 specimen No. 2287 (holotype), 2 No. 2290, 3 No. 2277d

Inner whorls ornamented with numerous fine ribs united in pairs or fours at umbilical margin; some ribs are stronger than the remaining ones. Coarser, wavy ribs first appear at the last whorl; they begin at umbilical margin, often attain comma-like shape, shift backwards in the middle of the whorl and divide into two or,
sometimes, three secondary ribs close to the ventral margin. One of secondaries follows the course of the parent primary rib whereas others are bend backwards. The secondary ribs pass the venter with some weakening. A distinct siphonal furrow is sometimes marked on the venter. Parabolic nodes occur along ventral margin up to the middle of the last whorl. Ornamentation disappears close to the peristome provided with small lappets.

![Figure 19](image)

**Discussion.** — The characteristic fine, fibrous ribbing of inner whorls of the specimens assigned to *M. pinarrensis torrei* sp. n., subsp. n. brings them close to the specimen described as *Perisphinctes cf. mirus* by Bukowski (1887, Pl. 28, Fig. 10a) and subsequently allocated in *Miroosphinctes bukowskii* (Choffat) by Enay (1966, p. 576). The Cuban specimens differ from the latter somewhat in dimensions, flattened whorl sides and venter, as well as in ornamentation of the last whorl. It should be mentioned that Bukowski’s specimen seems to be mature, characterized by ornamentation not disappearing nearby peristome.

The Cuban specimens somewhat resemble *Miroosphinctes interrogationis* of Slemiradzki (1968, p. 417; Pl. 21, Figs 16–17) in comma-shaped ribs, differing in less distinct ornamentation and less convex sides of the last whorl. They differ from *M. kobyi* (de Loriol) presented by Haas (1905, p. 162; Pl. 26, Figs 26–47), characterized by weak ornamentation of inner whorls, in stronger ornamentation of both inner and outer whorls. The differences in respect to *M. pinarrensis pinarrensis* sp. n., subsp. n., as given above.

The subspecies *Miroosphinctes pinarrensis torrei* subsp. n. differs from *M. pinarrensis choffatti* sp. n., subsp. n. in whorl section, ornamentation of inner whorls, a marked disappearance of ornamentation near the peristome and weakening of ornamentation on the ventral side.

**Occurrence.** — Jagua Fm. (Pimienta Member), Mogote La Mina I locality (specimens No. 2280c, 2280t, 2270, 2270 and 2281), Sierra de los Organos; Francisco Fm., Esquina locality (specimens No. 2675d, 2669e), Sierra del Rosario.

*Fig. 19*

**Ratio of whorl height** (*H*) **to diameter** (*D*) **in *Miroosphinctes pinarrensis torrei* sp. n.,** subsp. n.

1. specimen No. 2270 (holotype), 2. No. 2270, 3 No. 2281

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*Miroosphinctes pinarrensis choffatti* sp. n., subsp. n.

*(Text-figs 20–21; Pl. 18, Figs 1–3; Pl. 19, Figs 1–4)*

**Holotype:** specimen No. 2270, figured in Pl. 18, Fig. 1a–c; housed in the Paleontological Museum of the Institute of Geology and Paleontology, Cuban Academy of Sciences, Havana.

**Type horizon:** Pimienta Member of Jagua Fm., Oxfordian.

**Type locality:** Mogote La Mina I locality, Sierra de los Organos, Pinar del Rio province, Cuba.

**Derivation of the name:** in honour of P. Choffat, the student of ammonite faunas of Portugal.

**Paratypes:** specimens Nos. 2285a, 2285b, 2270, 2274, 2508, 25071, 2272, 2669.

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Diagnosis. — Whorl section subrectangular; numerous ribs broken somewhat above the middle of whorl side.

Material. — Nine specimens including four fragmentary.

Description. — Coiling evolute; whorls weakly overlapping; whorl section almost rectangular, ventral side weakly rounded. Umbilicus wide, shallow. Whorl sides flattened; whorls thickest at the umbilical margin. Inner whorls ornamented with finer and coarse ribs. Outer whorl ornamented with wavy ribs sharply broken somewhat above the mid-height. Above the break the ribs divide into two, three or sometimes four secondary ribs bent forward in crescent-like manner. Numerous fine ribs sometimes occur between primary ribs in subperistomial whorl part. Peristome lappetted.

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Discussion. — The subspecies Mirosphinctes pinarenensis choffati subsp. n. is close to M. pinarenensis pinarenensis subsp. n. in whorl section. The development of numerous fine ribs between primary ribs in subperistomial zone, noted on some specimens of M. pinarenensis choffati subsp. n. were also found on the specimens described as Grossovia? (Mirosphinctes) cf. Interrogationis (Siemiradzki) by Christ (1968, p. 94; Pl. 8, Fig. 3) and G.? (M.) sp. cf. kobyi (Loricil) by the same author.
(Christ 1960, p. 95; Pl. 6, Fig. 4a–b). The two Christ's specimens differ from those from Cuba in some morphological details and whorl section. The differences between *M. pinarensis choffati* subsp. n. and other subspecies proposed here are discussed above.

**Occurrence.** — Jagua Fm. (Piemiento Member), Mogote La Mina I locality (specimens No. 2275, 2255a, 2255b, 2207f, 2208, 2274); Mogote La Mina II locality (specimens No. 2272 and 2273), Sierra de los Organos; Francisco Fm., Esquina locality (specimen No. 2692), Sierra del Rosario.

**Mirospininctes minensis** sp. n.

(Pl. 20, Fig. 2a–b)

**Holotype:** specimen No. 3252, figured in Pl. 20, Fig. 2a–b; housed in the Paleontological Museum of the Institute of Geology and Paleontology, Cuban Academy of Sciences, Havana.

**Type horizon:** Jagua Fm. (Piemiento Member), Oxfordian.

**Type locality:** Mogote La Mina II locality, Sierra de los Organos, Pinar del Rio province, Cuba.

**Derivation of the name:** from the name of the type locality, Mogote La Mina.

**Diagnosis.** — A *Mirospininctes* with flat-sided whorls initially ovate and later rectangular in cross-section and with numerous bidischotomous ribs.

**Material.** — The holotype only.

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**Description.** — Coiling evolute; whorls weakly overlapping; whorl section initially rounded, becoming rectangular close to the peristome; whorl sides initially somewhat convex, later markedly flattened; venter flat. Umbilical wall vertical; umbilicus wide, shallow. Primary ribs beginning at umbilical margin, initially comma-shaped, fairly numerous and arcately bent backward from the middle of the last whorl; the ribs are sometimes united in pairs at umbilical margin, which is accentuated by some swelling. The primary ribs initially slightly prorsiradiate, later gently bent backward in the crescent-like manner. The primaries divide into two or, sometimes, three secondaries at ventral margin; the secondaries pass across the venter with some forward twist and certain weakening. Small conical tubercles sometimes found on the mould at the point of furcation correspond to long (about 3 mm long) parabolic nodes observable on preserved shell fragments. The ornamentation becomes slightly weaker near the peristome. Constrictions moderately deep, about 5 in number per whorl. Peristome with lappets about 4 mm long.

**Discussion.** — The specimen differs from the representatives of all the species of *Mirospininctes* hitherto known in whorl section, very flat whorl sides and peculiar, more irregular ornamentation on the body chamber. At the same time some features such as comma-shaped ribs, common bidischotomous division of ribs, inner whorls with rounded sides and venter and the shape of parabolic nodes bring it close to other Cuban representatives of this genus.

**Occurrence.** — As the type locality.
Mirosphinctes cf. niedzwiedziki (Siemiradzki, 1891)
(Pl. 20, Fig. 6)

**Material.** — Two poorly preserved specimens (No. 2250, 2263).

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**Remarks.** — The specimens somewhat resemble that of Bukowski (Bukowski, 1887, p. 160; Pl. 28, Fig. 7) selected as the lectotype of the species *M. niedzwiedziki* (Siemiradzki) by Enay (1966) in ornamentation of the outer whorl, whorl section and dimensions, but they are insufficiently preserved for any unequivocal identification.

**Occurrence.** — Jagua Fm., Pimienta Member, Mogote La Mina II (specimen No. 2250) and Pancho Luis (specimen No. 2263) localities, Sierra de los Organos.

Mirosphinctes sp. A
(Pl. 18, Fig. 4; Pl. 20, Fig. 3a—b)

**Material.** — A single specimen (No. 2692a).

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**Remarks.** — The specimen is characterized by a combination of features such as: subrectangular whorl section, weakly convex whorl sides and weakly flattened ventral side, deep, narrow umbilicus, ornamentation strong and irregular on inner whorls and more regular on outer whorl, which differs it from all the species of this genus hitherto known. The primary ribs bent crescent-like backward and the irregular ornamentation of inner whorls bring it close to *Mirosphinctes pinarensis pinarensis* sp. n., subsp. n. from which it differs in some other morphological details and wider whorls.

**Occurrence.** — Francisco Fm., Macagual locality, Sierra del Rosario.

Mirosphinctes sp. B
(Pl. 19, Fig. 6a—c)

**Material.** — A single specimen (No. 2976a).

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the remaining part of the outer whorl — with strong, wavy, sometimes bidischizo-
tomous ribs as well as strong tubercles of the parabolic node type and moderately
strong constrictions. This combination of features brings it somewhat close to
Mirosphinctes bukowski (Choffat) presented by Enay (1962, p. 26, Fig. 18a—b;
1966, p. 674, Pl. 40, Figs 11—18), from which it differs in stronger and more wavy
ribs, higher and more flattened whorls, and narrower umbilicus. The specimen also
somewhat resembles Mirosphinctes pinarenensis torei sp. n., subsp. n., differing in
dimensions and heavier ornamentation on outer whorl.

Occurrence. — Francisco Fm., Esquina locality, Sierra del Rosario.

Mirosphinctes sp. C
(Pl. 20, Fig. 7)

Material. — A single specimen (No. 2425).

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Description. — The specimen is characterized by moderately evolute coiling,
weakly convex whorl sides, wide and shallow umbilicus with slightly rounded
margin and outer whorl ornamented with shorter, slightly crescent primary ribs
dividing into two, three or sometimes four secondaries, and tubercle-like swollen
point of their furcation. This combination of features brings it somewhat close
Mirosphinctes pinarenensis pinarenensis sp. n., subsp. n. from which it differs in whorl
section, dimensions and some morphological details. The ornamentation of inner
whorls is obliterated which makes specific identification difficult.

Occurrence. — Jagua Fm (Pimienta Member), Hoyo de la Sierra locality,
Sierra de los Organos.

Mirosphinctes sp. D
(Pl. 20, Fig. 5a—b)

Material. — A single specimen (No. 2515).

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<td>13</td>
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</table>

Remarks. — The specimen is characterized by high-ovate, flat-sided whorls,
wide and shallow umbilicus, inner whorls ornamented with finer and coarser ribs
and outer whorls with weakly arcuate, bi- and triplicate ribs and weak parabolic
nodes. It somewhat resembles Mirosphinctes pinarenensis pinarenensis sp. n., subsp. n.
differing in dimensions, stronger primary ribs and orientation of secondaries on the
venter.

Occurrence. — Francisco Fm., Esquina hill N of Brujito, Sierra del Rosario.
?Miro sphinctes sp. E

Material. — A single poorly preserved specimen (No. 2652).

<table>
<thead>
<tr>
<th>Specimen</th>
<th>D.</th>
<th>b.</th>
<th>u.</th>
<th>Wh</th>
<th>Ud</th>
</tr>
</thead>
<tbody>
<tr>
<td>2652</td>
<td>27.0</td>
<td>10.0</td>
<td>10.0</td>
<td>.27</td>
<td>.27</td>
</tr>
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</table>

Remarks. — The specimen is characterized by ribbing initially irregular, becoming more regular, dischizotomous or bidischizotomous later. The ornamentation appears somewhat similar to that of Miro sphinctes pinaren sis pinaren sis sp. n., subsp n., but the preservation of the specimen is insufficient for any unequivocal identification.

Occurrence. — Found together with a representative of Cubasjoidoceras gen. n. in a loose boulder derived from the Francisco Fm. S of Brujito, Sierra del Rosario.

STRATIGRAPHY

Accepted in this paper (cf. Text-fig. 22) is the subdivision of the Oxfordian stage into: Lower (Quenstedticeras mariae and Cardioceras cordatum zones), Middle (Perisphinctes plicatilis, Gregoryceras transversarium and Perisphinctes bifurcatus zones) and Upper (Epipeltoceras bimammatum and Idoceras planula zones).

The strata of the Pimienta Member of the Jagua Formation from the Sierra de los Organos were assigned to the Upper Oxfordian by Herrera (1961) taking into account their superposition to the Jagua Vieja Member from which ammonites dated at the Late Oxfordian or more precisely early E. bimammatum Zone were known (cf. Arkell 1956, Judeloy & FurrAzola-Bermúdez 1968). The newly gathered ammonites seem to cast some light on the age of the Pimienta Member.

Ammonites of the genus Miro sphinctes Schindewolf were reported from the Lower Oxfordian of Poland, Syria, Tanganyka and Japan (cf. Yokoyama 1904, Haas 1955, Arkell 1956, Malinowska 1963); Middle Oxfordian (upper part of the Gregoryceras transversarium Zone) of France (Enay 1962, 1966; Korvé-Corvinius 1966), and uppermost Middle Oxfordian of Poland (Dr. W. Brochwicz-Lewiński, pers. inf.), as well as from the Montejunto Beds of Portugal (Choffat 1893, Ruget-Perrot 1961) also dated at the late Middle Oxfordian, the Perisphinctes bifurcatus Zone (Professor R. Enay, pers. inf.), and the Middle Oxfordian of Chile (Hillebrandt 1970). It seems therefore that the strata of the Jagua Fm. from the Sierra de los Organos and the corresponding strata of the lower and middle parts of the Francisco Fm. from the Sierra del Rosario, occurring below the beds with Miro sphinctes, are not younger than the Perisphinctes bifurcatus Zone of the Middle Oxfordian (cf. also Wierzbowski 1976).
In Europe, the lower part of the Upper Oxfordian, the *Epipeltoceras bimammatum* Zone, is characterized by the genus *Epipeltoceras* Spath, which evolved from *Mirosphinctes* according to Enay (1966). Up to date, the genus *Epipeltoceras* is known neither from Cuba nor any other regions of America. It may be mentioned that some *Mirosphinctes* display certain features in common with those of *Epipeltoceras* (e.g. slight siphonal furrow on the ventral side) but, nevertheless, it is difficult to interpret them as forerunners of the latter.

In Cuba, the Oxfordian strata with paleontological record are up to the present known from the Pinar del Río province only. The Cuban *Mirosphinctes* appear to be morphologically close to those reported from the Oxfordian of France (cf. Enay 1962, 1966) and Portugal (cf. Choffat 1893). Such ammonite assemblage as described here is not known from Mexico, and the youngest Oxfordian fauna from that country appears to be close to the older Oxfordian assemblage from the Jagua Vieja Member in Cuba.
The early Kimmeridgian ammonite assemblage of Mexico (cf. Burckhardt 1906, 1912), comprising the genera Glochiceras, Streblites, Aspidoceras, Idoceras, Nebrodites and Sutneria, is on the whole clearly younger than the investigated one. It should be stated, however, that the specimens described as Sutneria aff. cyclodorsata (Moesch) from the Lower Kimmeridgian of Mexico by Burckhardt (1906, Pl. 4, Figs 3-4, 8-12) seem to be very close to the Cuban specimens assigned to the genus Mirospininctes, and especially to those assigned to M. pinarensis torrei sp. n., subsp. n. The Mexican specimens differ from European representatives of Sutneria cyclodorsata (Moesch) and they do not match the diagnosis of the genus Sutneria (cf. Hölder & Ziegler 1959, Hölder 1964, Geyer 1969).

In the lower part of the Pimienta Member there occur ammonites close to the species Euaspidoceras (Euaspidoceras) striatocostatum (Dorn) and E. (E.) costatum (Dorn) which are known from the lower Upper Oxfordian of Europe (Enay 1966), and which suggest Late Oxfordian age of upper parts of that member.

The stratigraphic implications of Cubaspidoceras gen. n. are limited nowadays. This genus is not characterized by Aspidoceras-like but rather Euaspidoceras-like inner whorls and it may be considered as an off-shoot of the genus Euaspidoceras Spath. This would mean that its stratigraphic range does not overpass the early Late Oxfordian as it is the case of Euaspidoceras and its allies, which is consistent with the above dating.

It therefore appears that the deposits of the Pimienta Member from the Sierra de los Organos and those of the Francisco Fm., characterized by the occurrence of the genera Mirospininctes, Euaspidoceras and Cubaspidoceras gen. n. belong to upper Middle Oxfordian (Perispinctes bifurcatus Zone), and possibly lower Upper Oxfordian (Epipeltoceras bimammatum Zone). The strata of the Francisco Fm. are overlaid by those of the Artemisa Fm., yielding Mirospininctes and Cubaspidoceras gen. n., and they are considered as not younger than early Late Oxfordian (Epipeltoceras bimammatum Zone) by Kutek & al. (1976).

The ammonite fauna discussed here is of some importance for the stratigraphy of the Oxfordian from both the Sierra de los Organos and Sierra del Rosario, and other regions of America, as it seems to cast some light on the problems connected with distinguishing the Upper Oxfordian substage and the Middle/Upper Oxfordian boundary in these regions (cf. Text-fig. 22).

The records of the genus Mirospininctes Schindewolf from the Oxfordian of Cuba and of Central and South America (cf. Hillebrandt 1970) indicate much wider geographic distribution of that genus than hitherto assumed. Further studies may cast some light on the evolution, sexual dimorphism, and stratigraphic and paleobiogeographic distribution of that
genus. It is also hoped that further studies will allow to reconstruct the history of the genera Euaspisoceras and Cubaspisoceras gen. n. and elucidate their mutual relationship.

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Warsaw, January 1976

REFERENCES

NEW AMMONITE FAUNA FROM THE PINAR DEL RIO PROVINCE


R. MYCZYŃSKI

NUEVA FAUNA DE LOS AMMONITES DEL OXFORDIANO DE LA PROVINCIA DE PINAR DEL RÍO, CUBA OCCIDENTAL

(Resumen)

En el trabajo fueron descritos los ammonites no conocidos anteriormente en los depósitos del Oxfordiano de Cuba. La fauna de los ammonites fue encontrada en la provincia de Pinar del Río en dos regiones geológicas: Sierra de los Organos y Sierra del Rosario (Fig. 1 y Lam.1). En la Sierra de los Organos la fauna fue encontrada por el autor en los depósitos del miembro Pimienta de la Formación Jagua (Fig. 2). En la Sierra del Rosario los ammonites fueron encontrados por el Dr. A. Pszczółkowski en los depósitos de la Formación Francisco. En la Sierra de los Organos los ammonites fueron colectados en los afloramientos (comp. Fig. 3-7) La Mina I y II, Mogote Pancho Luis, Hoyo de la Sierra y Galalón, en la Sierra del Rosario en los afloramientos (comp. Fig. 8-9), Loma Calabrote, Loma Esquina (Brujito) y Macagual. Los ammonites descritos (Fig. 10-21 y Lam. 2-20) pertenecen a los géneros Ochetoceras Haug, Glochiceras Hyatt, EuaspidoceTa Spath, CubaspidoceTa gen. n., y Mirospinctes Schindewolf. En este conjunto fueron establecidas siete nuevas especies y tres nuevas subspecies. Algunos ejemplares representan probablemente otras nuevas especies.

En el trabajo también se describe los depósitos que contienen la fauna estudiada. Los ammonites permitirían definir la edad de estos depósitos como la parte superior del Oxfordiano Medio y probablemente también la parte inferior del Oxfordiano Superior (Fig. 22). Anteriormente la edad de estos depósitos en la Sierra de los Organos fue considerada como Oxfordiano Superior. En la Sierra del Rosario los depósitos del Oxfordiano no fueron conocidos.
NOWA FAUNA AMONITOWA OKSFORDU Z PROWINCJI PINAR DEL RIO, ZACHODNIA KUBA

(Streszczenie)

Przedmiotem pracy jest opis fauny amonitowej z prowincji Pinar del Rio zachodniej Kuby (por. fig. 1–9 oraz pl. 3). W Sierra de los Organos faunę tę autor znalazł w utworach ogniwa Pimienta formacji Jagua, zaś w Sierra del Rosario została ona stwierdzona przez Dr. A. Pszczółkowskiego w utworach formacji Francisco. Opisane amonity (por. fig. 10–21 oraz 2–20) należą do rodzajów Ochetoceras Haug, Glochiceras Hyatt, Euaspidoceras Spath, Cubaspidoceras gen. n., oraz Mirospirinitec Schindewolf. W badanym zespole wyróżniono siedem oowych gatunków i trzy nowe podgatunki, wskazując także, iż kilka okazów reprezentuje prawdopodobnie jeszcze inne gatunki nowe. W pracy podano ponadto opis utworów zawierających badaną faunę. Zebrane amonity pozwoliły określić wiek tych utworów na górną część oksfordu środkowego i ewentualnie dolną część oksfordu górnego (por. fig. 22). Dotychczas rozważane utwory odnoszone były w Sierra de los Organos do oksfordu górnego, natomiast w Sierra del Rosario nie były w ogóle znane.
1 - Mogote landscape in the eastern part of the Viñales Valley

2 - A mogote cut off the Guasasa Formation, San Vicente Member; situated at Sumidero-Guane highway

3 - Mogote range Sierra de Viñales, situated north of the Viñales Valley: J Jagua Formation, G Guasasa Formation (San Vicente Member)
1 Ochotoceras sp.; specimen No. 2510t, × 1.5
2 Glochiceras (Lingulaticeras) sp.; specimen No. 2522, × 1.5
3-6 Glochiceras (Glochiceras) aff. subclausum (Oppel): 3a–c specimen No. 2673b, 4a–c No. 2673a, 5 No. 2673d, 6a–c No. 2673c; all specimens × 2.5
1–2 Glochiceros (?Glochiceras) aff. carinatum Aguilera Castillo: 1a–c specimen No. 2513a, 2a–c No. 2513b; both specimens X 2.5
3–4 Euaspidoceeras (Euaspidoeceras) aff. costatum (Dorn): 3a–c specimen No. 2682c, 4 No. 2516a; both specimens X 2
5–6 Euaspidoceeras (Euaspidoeceras) sp. A: 5 specimen No. 2682c, X 2.5; 6 No. 2873, X X 1.5
1–4 *Euaspidoceras* (Euaspidoceras) aff. costatum (Dorn)

1a–c specimen No. 2318b, X 1.5; 2a–c No. 2307b, X 2.5; 3a–c No. 2307j, X 2.5; 4a–b No. 2308b, X 2
1–7 Euaspidoceras (Euaspidoceras) aff. costatum (Dorn)
1a–b specimen No. 2511b, 2a–b No. 2511a, 3a–b No. 2682c, 4a–c No. 2582, 5a–c No. 2682a, 6a–b
No. 2517f, 7a–b No. 2682b; Figs 1–2 and 7 X 2.5, Figs 3–6 X 2
1–2 Euaspidoceras (Euaspidoceras) aff. costatum (Dorn)
1a–c specimen No. 2317a, 2a–c No. 2508a; both specimens × 2
1a—b Euaspidoceras (Euaspidoceras) imlayi sp. n.; specimen No. 2529 (holotype), nat. size
2a—b Euaspidoceras (Euaspidoceras) sp.; specimen No. DD-1, nat. size
1–5 Euaspidoceras (Euaspidoceras) striatocostatiforme sp. n.
1a–c specimen No. 2269 (holotype), X 3; 2 No. 2280a, X 2; 3 No. 2268, X 1.5; 4 No. 2285, X 2;
5 No. 2262, nat. size
1a–c Euaspidoceras (Euaspidoceras) striatocostiforme sp. n.; specimen No. 2258, × 2
2–3 Cubaspidoceras carribeanum gen. n., sp. n.: 2a–b specimen No. 2302 (holotype), nat. size; 3 No. 2344 × 2
1–2 Cubaspidoceras kuteki gen. n., sp. n.
1a–c specimen No. 2692ca (holotype), nat. size; 2a–b No. 2692cc, × 2
1–3 Cubaspidoceras kuteki gen. n., sp. n.; 1 specimen No. 2518, 2 No. 2692cf, 3 No. 2692cd; all specimens of nat. size
4–5 Cubaspidoceras caribeanum gen. n., sp. n.; 4 specimen No. 2503, 5 No. 2428; both specimens of nat. size
6a–b Perispinctes (?Otospinctes) wierzbowski sp. n.; specimen No. 2674 (holotype), × 2
1–3 *Mirospininctes pinarensis pinarensis* sp. n., subsp. n.
1a—c specimen No. 2507a (holotype), 2a—c No. 2513, 3a—c No. 2600; all specimens X 2
1–3 *Mirospinctes pinarensis pinarensis* sp. n., subsp. n.
1a–c specimen No. 3516, × 3.5; 2a–c No. 2375d, × 2; 3a–c No. 2599a, × 2
1–7 *Mirospininctes pinarensis pinarensis* sp. n., subsp. n.
1 specimen No. 2892b, 2a–b No. 2874b, 2a–c No. 2874c, 4a–b No. 2675d, 5a–c No. 2675d, 6a–c No. 2675d, 7 No. 2675c; all specimens × 2.5
1–7 *Miosphotrites pinarensis pinarensis* sp. n., subsp. n.
Ja–c specimen No. 2570b, 2a–c No. 2290b, 3a–b No. 2518a, 4 No. 2509g, 5 No. 2510; all specimens × 2
1–3 _Mirospininctes pinarensis choiati_ sp. n., subsp. n.
1a–c specimen No. 2275 (holotype), 2a–c No. 2935a (c plasticine cast), 3a–c No. 2507; all specimens X 2

4 _Mirospininctes_ sp. _A_; specimen No. 2692a, X 2
1–5 Mirospininctes pinarensis chojati sp. n., subsp. n.

1a–c specimen No. 2508, 2a–b No. 2272, 3a–b No. 2273, 4a–c No. 2274, 5a–b No. 2255b; all specimens X 2

6a–c Mirospininctes sp. B; specimen No. 2578a, × 2.5
1 Mirosphinctes sp. C; specimen No. 2425, $\times$ 1.5
2a-b Mirosphinctes minensis sp. n., specimen No. 2252 (holotype), $\times$ 2
3a-b Mirosphinctes sp. A; specimen No. 2692a, $\times$ 2
4 Mirosphinctes sp. E; specimen No. 2657, $\times$ 1.5
5a-b ?Mirosphinctes sp. D; specimen No. 2515, $\times$ 2.5
6 Mirosphinctes cf. niedzwiedzki Siemiradzki; specimen No. 2280, $\times$ 1.5
7 Lamellaptychus sp.; specimen No. A-1, $\times$ 1.5; locality Mogote La Mina II, Jagua Formation (Pimienta Member)