Acta Geologica Polonica, Vol. 54 (2004), No. 4, pp. 433-445

A revision of the ammonite types described in F. ROEMER'S 'Die Kreidebildungen von Texas und ihre organischen Einschlüsse' (1852)

W. JAMES KENNEDY[1], JAKE M. HANCOCK[2], WILLIAM A. COBBAN[3] & NEIL H. LANDMAN[4]

[1]*Geological Collections, University Museum, Parks Road, Oxford, OX1 3PW, U.K.*
Email: Jim.Kennedy@earth.ox.ac.uk
[2]*Imperial College of Science, Technology and Medicine, Royal School of Mines, Prince Consort Road, London SW7 2BP, U.K.*
[3]*70 Estes Street, Lakewood, Colorado 80226, U.S.A.*
[4]*Department of Invertebrates, American Museum of Natural History, Central Park West at 79th Street, New York, New York 10024, U.S.A. Email: Landman@amnh.org*

ABSTRACT:

KENNEDY, W.J., HANCOCK, J.M., COBBAN, W.A. & LANDMAN, N.H. 2004. A revision of the ammonite types described in F. ROEMER's 'Die Kreidebildungen von Texas und ihre organischen Einschlüsse' (1852). *Acta Geologica Polonica*, **54** (4), 433-445. Warszawa.

The type material of the ammonites described in F. ROEMER'S 'Die Kreidebildungen von Texas und ihre organischen Einschlüsse' (1852) is revised, and referred to *Nowakites flaccidicosta* (ROEMER, 1852), *Texasia dentatocarinata* (ROEMER, 1852), *Placenticeras syrtale* (MORTON, 1834), *Texanites* (*Texanites*) *texanus texanus* (ROEMER, 1852), *Texanites* (*Texanites*) *roemeri* (YABE & SHIMIZU, 1923), *Mariella* (*Wintonia*) *brazoensis* (ROEMER, 1852), *Baculites asperoanceps* LASSWITZ, 1904, *Baculites* sp., and *Scaphites* (*Scaphites*) *semicostatus* ROEMER, 1852.

Key words: Ammonites, Texas, C.R. Roemer, Cretaceous, Type material.

INTRODUCTION

'The most extensive and detailed of the early works on Texas geology grew out of the movement for the German colonization of the State. Among these were maps published by G.A. SCHERPF in 1841 and by Prince CARL SOLMS-BRAUNFELS in 1846. To this movement must be credited also FERDINAND ROEMER's two important works, "Texas" (1849) and "Die Kreidebildungen von Texas" (1852)' (SELLARDS & *al.* 1966). ROEMER's second work included descriptions of numerous fossils from Texas (some referred to, but *nomina nuda*, in ROEMER 1849), the Cretaceous ammonites including taxa such as *Ammonites texanus* ROEMER, 1852, type species of the genus *Texanites* SPATH, 1932. *Ammonites texanus* has been erroneously cited from Europe by authors such as SCHLÜTER (1867, 1871-1876), DE GROSSOUVRE (1894, 1901) and others, and erroneously taken as index fossil for the lowest zone of the Santonian stage in Europe (see discussion in KENNEDY 1987). ROEMER's work provided the earliest systematic account of Texas Cretaceous fossils, and the material survives in the Paläontologisches Institut der Rheinischen Friedrich-Wilhelms-Universität, Bonn. Poor casts of some of these specimens are preserved in a number of collections, including the Texas Memorial Museum in Austin, but most of the type material has never been adequately reillustrated or discussed; this is the purpose

of the present article, the completion of which was stimulated by Professor Richard REYMENT (Uppsala) during his recent Royal Society/Swedish Academy of Sciences Exchange Programme visit to Oxford, and his publication of a biographical essay on ROEMER (REYMENT 1996; see also LANGER 1991 and SCHROEDER & STEIN 1991). As REYMENT notes:

"He received his doctorate in 1842 at the ripe age of 24 for a palaeontological thesis entitled *De Astartum genere,* which was dedicated to LEOPOLD VON BUCH".

"Anxious to expand his geological knowledge, ROEMER was open to any interesting research proposition and it was with delight he accepted an opportunity to engage in a field-project sponsored by the Berlin Academy of Sciences, for research in North America and designed to range over two years. This was under the patronage of Alexander VON HUMBOLDT who provided the grantee with an excellent letter of recommendation to be presented to American scientific organizations. The thesis dedication paid off literally and Leopold VON BUCH made a generous financial donation to the undertaking. More than a year was spent working in Texas in mainly the Cretaceous sequences and it is the results of this pioneering feat that have made his name well-known today to all workers on Upper Cretaceous invertebrates..... ROEMER was not just interested in rocks and fossils. He had an agile, enquiring mind and made notes on anything he deemed to be of interest to other scientists and, in particular, the fate of German immigrants to Texas. In 1849 he published an account of his travels in a book simply entitled *Texas*. This was followed in 1852 by a thesis presented in Bonn for the higher German doctorate (*Habilitation*) on "the Cretaceous formations of Texas and their fossil contents".

THE BACKGROUND TO ROEMER'S WORK ON THE CRETACEOUS GEOLOGY OF TEXAS.

ROEMER's work on the geology of Texas is that of an energetic and cultured young German gentleman looking at all aspects of the local science. His more detailed work was centred on places with a German immigrant population: New Braunfels and Fredericksburg have retained their German names, unlike the German settlements around Llano where he visited the San Saba River. His geological map shows that he explored widely in central Texas, but trans-Pecos Texas was still dangerous from Apache and Comanche Indians. His perambulations on the Cretaceous extended as far north as the Caddo Indian Village in what is now northern Hill County.

The localities from which he collected ammonites were:

'Wasserfall der Guadalupe unterhalb Neu-Braunfels': In spite of the use of the word 'Wasserfall', ROEMER's description makes it clear that these were rapids rather than full-scale waterfalls. YOUNG (1963, p.81) says these were "at the lower rapids of the Guadalupe River, now within the city limits of New Braunfels and about 100 feet downstream from the Missouri Pacific Railroad bridge." YOUNG placed this exposure in his 'division B' of the Austin Chalk, now the Vinson Chalk Member (Upper Coniacian and Lower Santonian). However, ROEMER refers to a locality two miles from the ford at New Braunfels which suggests a higher horizon further to the south-east. The section should be re-described in detail because ROEMER found 5 examples of *Ammonites texanus* from here and nobody has found any since. Note this exposure is not the type locality of *Ammonites texanus* in spite of a belief to the contrary.

'Furt bei Neu-Braunfels': The ford at New Braunfels was presumably close to the center of the town, probably on the Coniacian Atco Chalk Member.

'bei Austin': ROEMER's description fails to make clear where this locality was in relation to the present-day Austin where there are many exposures of Upper Cretaceous. Since this exposure is the type locality of the lectotype of *Texanites texanus*, which is believed to have come from theupper part of the Vinson Chalk Member, the place may be in Little Walnut Creek, about 80 m south of the Cameron Road bridge over this river. In the top 0.6 m of the Vinson Chalk at this locality *Cladoceramus undulatoplicatus* (ROEMER) is common and texanitid ammonites occur.

This would be Lower Santonian.

'bei Friedrichsburg . . . des Pedernales-Flusses': The Pedernales River runs east-west some 5 km south of Fredericksburg through the Hensell Sand of the Travis Peak Formation. This is probably Aptian.

'In graulich-weissen Kalkschichten an einer etwa 30 englische Meilen oberhalb *Torrey's Trading house* auf dem linken Ufer des Brazos gelegenen Stelle': Torrey's Trading Post was on Tehuacana Creek on the northern limits of the present-day Waco. This places locality 5 somewhere under the present-day Whitney Lake Reservoir which has drowned the original course of the Brazos River. The formations in this area range from Middle Albian to Lower Cenomanian.

ROEMER's collecting was haphazard. He found at least 6 specimens of texanitids, a relatively scarce

ammonite family in Texas, but no examples of mortoniceratids or brancoceratids which are both common in the Albian. The preservation of the originals of *Nowakites flaccidicosta* (ROEMER, 1852) and *Mariella brazoensis* (ROEMER, 1852) indicate that they were picked up loose, and this may be true of all his collecting away from the rapids south-east of New Braunfels. This is not a criticism of ROEMER who had to cope with a Texas very different from that of to-day: from New Braunfels to Whitney Lake was more than 260 km of rough country.

ROEMER'S PALAEONTOLOGICAL PHILOSOPHY

ROEMER's European and learned background enabled him to bring a taxonomic philosophy which was unusual in the 19th century. Most geologists had no experience outside their own continent, many not even outside their own country. ROEMER not only knew the European literature but also the work of American geologists, such as MORTON. This broad background enabled him to point out similarities between the Cretaceous of Texas and that of Europe. He wrote, rather grandly, of comparisons with England, France, Germany, the Pyrenees, the Caucasus, north Africa, lower Egypt, even Venezuela, as well as other Cretaceous districts in the U.S.A.

He subdivided the Cretaceous fossils of Texas into three groups:

(i) well-known species, identical between Texas and Europe.

(ii) species which have analogous forms in the Cretaceous of Europe.

(iii) endemic species ('Entschieden eigenthümliche Arten')

In the light of a later fashion for regarding ammonite species as cosmopolitan, it is interesting that ROEMER placed only the two baculitid species in group i. Group iii included *Ammonites dentato-carinatus* and *Ammonites guadalupae*. In group ii he believed that his *Ammonites texanus* was analogous to *Ammonites rhotomagensis* BRONGNIART, *Scaphites texanus* to *Scaphites equalis* J. SOWERBY. Note also that he did not classify the other species of ammonites which he described into any of this three groups, although he later suggested that his *Turrilites brazoensis* was an analogue of *T. costatus*. His actual correlations were crude and often wildly inaccurate: the most extreme example is possibly his assignment of the Albian rudists of Texas to the upper Turonian.

ROEMER described ten ammonite species in 1852. His original names, and their present interpretation are as follows:

1. *Ammonites texanus* ROEMER, 1852, p. 31, pl. 3, fig. 1a = *Texanites* (*Texanites*) *texanus texanus* (ROEMER, 1852) (p. 31 *pars*, pl. 3, figs 1a, 1b, 1c only), and *Texanites* (*Texanites*) *roemeri* YABE and SHIMIZU, 1923 (ROEMER, 1852, p. 31 *pars*, pl. 3, figs 1d, 1e only).
2. *Ammonites guadalupae* ROEMER, 1852, p. 32, pl. 2, figs 1a, 1b = *Placenticeras syrtale* (MORTON, 1834).
3. *Ammonites flaccidicosta* ROEMER, 1852, p. 33, pl. 1, figs 1a, 1b = *Nowakites flaccidicosta* (ROEMER, 1852)
4. *Ammonites dentato - carinatus* ROEMER, 1852, p. 33, pl. 1, figs 2a, 2b, 2c = *Texasia dentatocarinata* (ROEMER, 1852).
5. *Ammonites pedernalis* L. VON BUCH; ROEMER, 1852, p. 34, pl. 1, fig. 3a ,b, c = *Engonoceras* sp.
6. *Scaphites texanus* ROEMER, 1852, p. 35, pl. 1, figs 4a, 4b, 4c = *Scaphites* (*Scaphites*) *semicostatus* ROEMER, 1852, macroconch phragmocone.
7. *Scaphites semicostatus* ROEMER, 1852, p. 35, pl. 1, figs 5a, 5b = *Scaphites* (*Scaphites*) *semicostatus* ROEMER, 1852, microconch body chamber.
8. *Baculites asper* MORTON; ROEMER, 1852, p. 36, pl. 2, figs 2a, 2b, 2c, 2d = *Baculites* sp.
9. *Baculites anceps* LAMARCK; ROEMER, 1852, p. 36, pl. 2, figs 3a-3g = *Baculites asperoanceps* LASSWITZ, 1904.
10. *Turrilites brazoensis* ROEMER, 1852, p. 37, pl. 3, fig. 2 = *Mariella* (*Wintonia*) *brazoensis* (ROEMER, 1852).

CONVENTIONS

PIB = Palaeontological Institute, Bonn University

All dimensions are given in millimeters; D = diameter, Wb = whorl breadth, Wh = whorl height, U = umbilicus. Figures in parentheses are dimensions as a percentage of diameter. The suture terminology is that of WEDEKIND (1916), as propounded by KULLMANN & WIEDMANN (1970).

SYSTEMATIC PALEONTOLOGY

Order Ammonoidea ZITTEL, 1884
Suborder Ammonitina HYATT, 1889
Superfamily Desmoceratacea ZITTEL, 1895
Family Pachydiscidae SPATH, 1922
Genus *Nowakites* SPATH, 1922

TYPE SPECIES: *Pachydiscus carezi* DE GROSSOUVRE, 1894, p. 190, pl. 25, fig. 3; pl. 37, fig. 5, by original designation by SPATH, 1922, p. 124.

DISCUSSION: See KENNEDY *in* KENNEDY, BILOTTE & MELCHIOR (1995) for a review of the genus.

Nowakites flaccidicosta (ROEMER, 1852)
(Pl. 1, Figs 5-8)

1852. *Ammonites flaccidicosta* ROEMER, p. 33, pl. 1, figs 1a, b.
1872. *Ammonites flaccidicosta* ROEMER; SCHLÜTER, 1872, p. 34.
1889. *Ammonites flaccidicosta* ROEMER; THOMAS & PERON, p. 24.
1928. *Nowakites* (?) *flaccidicosta* (ROEMER); ADKINS, p. 221.
1966. *Nowakites flaccidicostus* (RÖMER); MATSUMOTO, p. 296, pl. 32, fig. 1; text-fig. 1.
1966. *Pseudojacobites texanus* MATSUMOTO; p. 299, pl. 32, fig. 2.
1994. *Nowakites flaccidicostus* (ROEMER); EMERSON, EMERSON, AKERS & AKERS, p. 73, unnumbered figs on p. 74.
1995. *Nowakites flaccidicosta* (ROEMER, 1852); KENNEDY & KAPLAN, p. 28, pl. 5, figs 1-3.

TYPES: The lectotype, by the subsequent designation of MATSUMOTO, 1966, p. 296, is the larger of the two specimens registered as PIB 47 (Pl. 1, Figs 7, 8); paralectotype is the smaller specimen registered as PIB 47 (Pl. 1, Figs 5, 6); it is also the holotype of *Pseudojacobites texanus* MATSUMOTO, 1966.

DESCRIPTION: The lectotype (Pl. 1, Figs 7, 8) is very worn on one flank, and comprises a 240° sector of composite mold of outer whorl with 120° of phragmocone preserved. At D = 79.5 (100), Wb = - (-), Wh = 35.5 (44.7), U = 18.0 (22.6). Umbilicus small, moderately deep, with rounded umbilical wall and shoulder. Ornament very worn. On the phragmocone, traces of umbilical bullae give rise to one or more narrow primary ribs, with one or more long or short intercalated ribs. Ribs are straight on the inner flank, but flexed forward and markedly concave on outer flank and ventrolateral shoulder, crossing the venter in a broad convexity. They are interrupted by a narrow smooth zone at mid-venter. The whorl surface is impressed at the mid-point of the phragmocone fragment, seemingly into a broad constriction. On the body chamber, nine narrow, coarse, widely-separated primary ribs arise at the umbilical seam and strengthen across the flanks. Single intercalated ribs arise both high and low on the flanks; all ribs sweep forwards, and are concave on outer flank and ventrolateral shoulder, crossing venter in a broad convexity.

Paralectotype (Pl. 1, Figs 5, 6) is a composite mold of a rather worn half whorl only 62 mm in diameter. Maximum preserved whorl height 26.5 mm, whorl breadth to height ratio 0.94, whorl section reniform, with deep umbilicus with flattened wall and broadly rounded umbilical shoulder. Ornament poorly preserved. Four coarse umbilical bullae survive on the fragment, and give rise to one to three narrow primary ribs, with both long and short intercalated ribs between. Ribs straight on inner flank, sweeping forward on outer flank, where they strengthen and cross the venter in a broad convexity, interrupted by a narrow (~3 mm), smooth siphonal band. There are traces of 3 deep, broad constrictions. At various points on ribs adjacent to the siphonal smooth zone, as well as on the flanks, there are small conical protuberances of brown calcite. Some are no more than the infills of terminations of septal elements, notably on E/L, and the external saddle, weathered free of matrix.

DISCUSSION: KENNEDY (in KENNEDY & *al.* 1995) revised the type species of *Nowakites*, and the European species; *flaccidicosta* clearly belongs to the genus. MATSUMOTO (1966) referred the paralectotype (fig. 2) to *Pseudojacobites* SPATH, 1922 (type species *Pachydiscus farmeryi* CRICK, 1910, p. 345, pl. 17, figs 1, 2, by original designation) (SPATH, 1922, p. 121) as a new species, *texanus*. Reference to *Pseudojacobites* was based on the interpretation of the calcite-filled protuberances on the holotype as tubercles. We have examined the holotype carefully, and conclude them to be artefacts of diagenesis and weathering of the specimen, which has an identical style of ornament to the lectotype of *flaccidicosta*.

YOUNG (1963, p. 55, pl. 16, figs 5, 6; pl. 76, fig. 5; text-fig. 10b) described and illustrated, as *Nowakites* (?) sp. cfr. *flaccidicostus*, an individual 130 mm in diameter that lacks the inner whorls and as a consequence cannot be confidently attributed to this species, which remains poorly understood.

OCCURRENCE: "Am Wasserfalle der Guadalupe unterhalb Neu-Braunfels". This was the source of several of ROEMER's ammonite species. In spite of the use of the word 'Wasserfall', ROEMER's description makes it clear that these were rapids rather than full scale waterfalls. "Around two English miles from this place on the ford, on the track further downstream on the Guadalupe, beside a small waterfall, or more correctly a cataract, there occurs a fossiliferous white limestone on the outside quite similar (to the above mentioned)" (translation of ROEMER, 1852, p. 12). The Guadalupe has now been dammed and it may be difficult to know if today's rapids are the same as in ROEMER's day. If the ford at that time was close to the German settlement, ROEMER's fossil locality would have been close to the boundary between Comal and Guadalupe Counties. This would place the locality in the upper part of the Austin Chalk Group, which would be in the Dessau Chalk (YOUNG, 1986), which is almost entirely Upper Santonian.

YOUNG (1963, p. 81) confidently identified ROEMER's locality "at the lower rapids of the Guadalupe River, now within the city limits of New Braunfels and about 100 feet downstream from the Missouri Pacific Railroad bridge. It [*Texanites texanus*] most certainly came from formation B" (= Vinson Chalk, Upper Coniacian and

Lower Santonian). YOUNG has published a section (YOUNG & WOODRUFF, 1985, fig. 21), showing Dessau Chalk resting directly and disconformably on Vinson Chalk; the Jonah Chalk (approximately Middle Santonian) is missing. There are three reasons to doubt this as ROEMER's 'Wasserfall' locality: (i) it would place the ford in "Neu Braunfels" somewhere around where the current loop road 337 crosses the Guadalupe at the northern limits of New Braunfels of today; (ii) ROEMER found five specimens of *Texanites* (*T. roemeri*), yet in 1963 YOUNG had found no texanitids at this locality; by 1985 he had found one specimen from the Vinson Chalk; (iii) *T. roemeri* is a Dessau Chalk species.

The problem can possibly only be resolved by comparing the micro-facies of ROEMER's types with a record of the micro-facies succession in the Guadalupe River.

Family Muniericeratidae WRIGHT, 1952
Genus *Texasia* REESIDE, 1932
(= *Lehmaniceras* COLLIGNON, 1966, p.50)

TYPE SPECIES: *Ammonites dentato-carinatus* ROEMER (1852, p. 33, pl. 1, fig. 2), by subsequent designation by WRIGHT, 1957, p. L432.

DISCUSSION: WRIGHT (1996, p. 107) regarded *Lehmaniceras* COLLIGNON, 1966, p. 50, type species, by original designation, *L. sornayi* COLLIGNON (1966, p. 50, pl. 475, fig. 1933) as a synonym of *Texasia*. The original figures of *L. sornayi* are poor, and we reillustrate the holotype here as Pl. 2, Figs 4, 5; it has no differentiating characters from those of *Texasia*, as WRIGHT correctly concluded.

Texasia dentatocarinata (ROEMER, 1852)
(Pl. 2, Figs 1-2, 6-7)

1852. *Ammonites dentato-carinatus* ROEMER, p. 33, pl. 1, fig. 2.
1963. *Texasia dentatocarinata* (RÖMER, 1852); YOUNG, p. 119, pl. 72, figs 1-3, 6, 7; pl. 73, figs 1-3, 5, 6, 10; text-figs 10h, p, q; 11b (with synonymy).
1969. *Texasia dentata* (RÖMER); MATSUMOTO, p. 30, figs 1, 2.
1994. *Barroisiceras* (*Texasia*) *dentatocarinata* (ROEMER, 1852); EMERSON, EMERSON, AKERS & AKERS, p. 214, 215 (unnumbered figs).
1996. *Texasia dentatocarinata* (ROEMER); WRIGHT, p. 107, fig. 82.3.

TYPES: ROEMER (1852, p. 34) referred to three specimens, of which two survive in the Bonn Collections. PIB 48a (Pl. 2, Figs 6-7) was designated lectotype by MATSUMOTO (1969, p. 300), and appears to be the basis of ROEMER's Figures. Paralectotype PIB 48b is a smaller individual (Pl. 2, Figs 1-3).

DESCRIPTION: Lectotype (Pl. 2, Figs 6, 7) has the following dimensions U= 47.0 (100), Wh = 17.2 (36.6), Wh = 35.7 (0.76), U = 18.5 (39.4). Coiling moderately evolute; 60% of previous whorl covered. Umbilicus small, shallow, with flattened wall and narrowly rounded umbilical shoulder. Whorl section compressed; Wb: Wh = 0.48, with greatest breadth at the umbilical shoulder in intercostal section, and at umbilical bulla in costal section. Venter acutely fastigiate. Six rounded tubercles perch on the umbilical shoulder. They give rise to one or two low, broad, straight prorsiradiate ribs. Intercalated ribs arise both low and high on the flank, to give a total of fourteen ribs on the last half whorl. All ribs bear blunt, feebly clavate ventral tubercles, and strong, sharp, high siphonal clavi. Suture moderately subdivided, with broad, bifid E/L; L deeply incised with narrow opening; L/U_2 smaller, bifid; U_2 small, trifid. Paralectotype PIB 48b has the following dimensions U = 40.5 (100), Wb = 11.8 (29.5), Wh = 19.0 (46.9), U = 9.0, Wb: Wh = 0.62.

DISCUSSION: ROEMER's figure is a restoration, based on the lectotype. See REESIDE (1932), YOUNG (1963), and MATSUMOTO (1969) for discussions of this species.

OCCURRENCE: ROEMER's specimens came from "Am Wasserfalle der Guadalupe unterhalb Neu-Braunfels". All the well-located specimens listed by YOUNG (1963) came from the base or the main part of the Dessau Chalk. This corresponds to the *Uintacrinus socialis* and *Marsupites* Zones of the Upper Santonian: ammonite zones of *Texanites shiloensis* and *Submortoniceras tequesquitense* of YOUNG (1963). Two of REESIDE's specimens (1932, pl. 3, figs 1-8) came from what is probably ROEMER's locality in Comal County, Texas.

Superfamily Hoplitaceae H. DOUVILLÉ, 1890
Family Placenticeratidae HYATT, 1900
Genus *Placenticeras* MEEK, 1876

TYPE SPECIES: *Ammonites placenta* DEKAY, 1828, p. 278, pl. 5, fig. 2 (not 5), by original designation by MEEK, 1876, p. 462.

Placenticeras syrtale (MORTON, 1834)
(Pl. 2, Fig. 8; Pl. 3)

1834. *Ammonites syrtalis* MORTON, p. 40, pl. 16, fig. 4.
1852. *Ammonites guadalupae* ROEMER, p. 32, pl. 2, fig. 1, fig. 7.

1963. *Stantonocras guadalupae* (RÖMER). YOUNG, p. 62, pl. 21, figs 2, 3, 6.
1964. *Stantonoceras pseudocostatum* JOHNSON; SCOTT & COBBAN, pl. 8.
1967. *Placenticeras syrtale* (MORTON, 1834); WOLLEBEN, p. 1161 (with additional synonymy).
1967. *Placenticeras syrtale syrtale* (MORTON, 1834); WOLLEBEN, p. 1161, pl. 150, fig. 5; Pl. 151, figs 1 , 2, 5-7; text-fig. 7e, f.
1967. *Placenticeras syrtale adkinsi* WOLLEBEN, p. 1164, pl. 151, figs 8, 9; pl. 152, figs 1, 2, 5-8; text-fig. 89.
1967. *Placenticeras syrtale rooneyi* WOLLEBEN, p. 1164, pl. 150, figs 6, 7; pl. 151, figs 3, 4: Pl. 152, figs 3, 4; text-fig. 7d, g.
1976. *Placenticeras (Stantonoceras) guadalupae* ROEMER; COBBAN, p. 125, pl. 2, fig. 7.
1991a. *Placenticeras syrtale* (MORTON, 1834); KENNEDY & COBBAN, p. 176, figs 7.1-7.4, 11.5.
1993. *Placenticeras syrtale* (MORTON, 1834); KENNEDY & COBBAN, p. 835, figs 5.4-5.6.
1995. *Placenticeras syrtale* (MORTON, 1834); KENNEDY, JOHNSON & COBBAN, pl. 2, figs 1, 2.

TYPES: Holotype, by monotypy, is the original of MORTON, 1834, p. 40, pl. 16, fig. 4, from the "older Cretaceous" of Greene Couty, Alabama. It was refigured by HYATT (1903, pl. 27, fig. 15, pl. 28, figs 1, 2) and is no. 282 in the collection of the Academy of Natural Sciences of Philadelphia. The holotype, by monotypy, of *Ammonites guadalupae* ROEMER (1852, p. 32, pl. 2, fig. 1), is PIB 46 (Pl. 2, Fig. 8; Pl. 3).

DESCRIPTION: PIB 46 (Pl. 2, Fig. 8; Pl. 3) is a battered and slightly distorted, wholly septate composite mold 160 mm in diameter, with costal dimensions as follows: D = 160 (100), Wb = 60 (37.5), Wh = 68.0 (42.5), Wb: Wh = 0.88, U = 50.0 (31.3); intercostal dimensions are: Wb = 51.0 (31.9), Wh = 68 (42.5), Wb:Wh = 0.75. Coiling moderately evolute, with 68% of the previous whorl covered; no umbilical wall. Umbilical shoulder feebly convex, inclined outward. Whorl section compressed ovoid in intercostal section, with greatest breadth below mid-flank. Costal section compressed polygonal, with greatest breadth at lateral tubercles. Twelve low, broad, straight prorsiradiate ribs arise at the umbilical shoulder, strengthening into massive conical umbilicolateral tubercles, whence arise pairs of low, broad, straight prorsiradiate ribs that link to equal or slightly smaller conical inner ventrolateral tubercles, twenty-two per whorl. From these, low, broad, transverse ribs lead to low, blunt outer ventrolateral tubercles on either side of the narrow, tabulate venter.

DISCUSSION: The Santonian-Campanian *Placenticeras* of the Gulf Coast region were referred to a plethora of species and varieties by HYATT (1903). WOLLEBEN (1967) recognized a single, variable species showing pronounced morphological changes and variation in incidence of morphotypes through time. He recognized three successive subspecies, and a nomenclature that contravened the *Rules* of zoological nomenclature (KENNEDY & COBBAN, 1991a, p. 175). It is not, however, possible to place a single specimen of the present type into WOLLEBEN's sequence.

OCCURRENCE: "Am Wasserfall der Guadalupe unterhalb Neu-Braunfels". The species ranges from Upper Santonian to Lower Campanian, with records from northern Mexico, Texas, Alabama and Mississippi; Lower Campanian only of New Mexico, Colorado, Wyoming and Montana in the U.S. Western Interior, New Jersey, Maryland and Delaware. Most Texas specimens are Upper Santonian.

Family Engonoceratidae HYATT, 1900
Genus *Engonoceras* NEUMAYR & UHLIG, 1881

TYPE SPECIES: *Ammonites pierdenalis* VON BUCH, 1848, p. 31, pl. 6, figs 8-10, by subsequent designation by PERVINQUIÈRE, 1907, p. 200.

Engonoceras sp.
(Pl. 1, Fig. 4)

1852. *Ammonites pedernalis* ROEMER, 1852, p. 34, pl. 1, figs 3 a-c.

MATERIAL: Four fragments: two single camerae (PIB 49.1, 49.2), a fragment of four camerae, badly abraded on one side (PIB 49.4), and a larger fragment with parts of 9 camerae (PIB 49.3: Pl. 1, Fig. 4).

DESCRIPTION: Fragments have whorl heights of up to 50 mm. Whorl breadth to height ratio 0.48, whorl section lanceolate, with narrowly rounded, blunt venter. Coiling appears very involute, shell form approaching stout oxycone. Suture imperfectly preserved, with ventralmost saddles entire, dorsal ones feebly bifid, the lobes little-incised.

DISCUSSION: These poor fragments bear little resemblance to ROEMER's figure of a perfectly preserved wholly septate individual 80mm in diameter; it is presumably a reconstruction. The material is specifically indeterminate.

OCCURRENCE: "Bei Friedrichsburg. Der Name der Art bezieht sich auf die Lage von Friedrichsburg im

Thale des Pedernales-Flusses". The present day Pedernales River flows from west to east some 6 km south of Fredericksburg, Gillespie County, through Upper Aptian sediments.

Superfamily Acanthocerataceae DE GROSSOUVRE, 1894
Family Collignoniceratidae WRIGHT & WRIGHT, 1951
Subfamily Texanitinae COLLIGNON, 1948
Genus and Subgenus *Texanites* SPATH, 1932

TYPE SPECIES: *Ammonites texanus* ROEMER (1852, p. 31, pl. 3, fig. 1), by original designation by SPATH (1932, p. 379).

Texanites (*Texanites*) *texanus texanus* (ROEMER, 1852)
(Pl. 4, Figs 13, 14)

1852. *Ammonites texanus* ROEMER, 1852, p. 31 (*pars*) pl. 3, figs 1a, 1b, 1c only.
1948. *Texanites texanus* ROEMER; COLLIGNON, p. 65 (20), text-fig. 1 (with synonymy).
1963. *Texanites texanus texanus* (RÖMER); YOUNG, p. 80, pl. 38, figs 1, 2; pl. 40, figs 1-3; pl. 41, fig. 4; text-figs 21g, 22e, 25d.
1970. *Texanites* (*Texanites*) *texanus* (ROEMER, 1852); MATSUMOTO, text-fig. 18.
non1980. *Texanites texanus* s.l. (ROEMER, 1852); KLINGER & KENNEDY, p. 162, figs 123-125.
1987. *Texanites* (*Texanites*) *texanus* (ROEMER, 1852); KENNEDY, p. 772, text-fig. 1.
2000. *Texanites* (*Texanites*) *texanus* (ROEMER, 1852); KENNEDY & KAPLAN, p. 80, pl. 32, fig. 1, pl. 25.

TYPES: ROEMER (1852, p. 31) refers to five specimens from the 'Wasserfalle der Guadalupe unterhalb Neu-Braunfels', and figured two of these. ROEMER's largest specimen, from Austin (ROEMER 1852, pl. 3, figs 1a, b, c), Pl. 4, Figs 13, 14 herein, was referred to as the 'type original' by COLLIGNON (1948, p. 68 (23), explanation of fig. 1), and hence validly designated as lectotype under ICZN Article 74. The two surviving paralectotypes (ROEMER 1852, pl. 3, fig. 1e, d) are PIB 45 b-c (Pl. 1, Figs 1-3, 9-11), and are the types of *Texanites* (*Texanites*) *roemeri* (YABE & SHIMIZU, 1923).

DESCRIPTION: The lectotype (fig. 9) is a wholly septate composite mold with the following dimensions: D = 142.0 (100); Wb = 29.5 (20.8); Wh = 46.5 (32.7); Wb: Wh = 0.63; U = 63.3 (44.5). The unfigured side is highly corroded, as are most of the inner whorls on the side illustrated. Coiling very evolute: U = 44.5%. Umbilical wall low, concave; umbilical shoulder narrowly rounded. Intercostal section compressed oval, Wb: Wh 0.63, greatest breadth at the umbilical shoulder. Costal section polygonal; greatest breadth at the lateral tubercle. Fifteen ribs are preserved on the outer whorl, 12 on last half whorl. Ribs arise from coarse bullae at the umbilical shoulder; they are low, blunt, straight, prorsiradiate, widely separated on the flanks, with coarse, blunt, lateral bullae closer to the umbilicus than to weaker, conical submarginal tubercles. Weak marginal clavi are close to strong external clavi, the latter linked by low, blunt ribs to blunt ridges flanking a broad ventral groove; siphonal keel blunt, coarse. Wide interspaces between ribs bear much weaker nontuberculate riblets.

DISCUSSION: *Texanites* (*Texanites*) *texanus* used to be one of the most widely, and misleadingly cited Upper Cretaceous ammonites, as the annotated synonymy in COLLIGNON (1948) indicates. The name *texanus* was attributed to a range of European forms by authors from SCHLÜTER (1867) onwards, while DE GROSSOUVRE (1901, pp. 795, 830) introduced a lower Santonian zone of *Mortoniceras texanum* that was taken as a standard for more than half a century (e.g. ARKELL & *al.* 1957). COLLIGNON (1948) recognized that *T. texanus* had not been found in Europe and introduced two varieties for European *texanum* of authors: *gallicus* and *hispanicus*. They are here regarded as of specific rank. *T.* (*T.*) *gallicus* COLLIGNON, 1948 (see revision by KENNEDY in KENNEDY & *al.* 1995, p. 420, pl. 22, fig. 11; text-fig. 25) has 50% more ribs per whorl, the ribs crowded, and arising in pairs on the inner whorl. *T.* (*T.*) *hispanicus* COLLIGNON, 1948, was differentiated from *T.* (*T.*) *texanus* on the basis of the higher rib density, the ribs arising on the umbilical wall. It is only doubtfully distinguishable from *T.* (*T.*) *gallicus*. YOUNG (1963, p. 81) noted that he was aware of only seven individuals in addition to the holotype, and that *T.* (*T.*) *texanus texanus* had not been subsequently collected near New Braunfels. *Texanites texanus twiningi* YOUNG, 1963 (p. 82, pl. 38, fig. 5; pl. 39, fig. 1; pl. 41, figs 2, 5; pl. 48, fig. 4) was differentiated from the nominate subspecies by the presence of four to six more ribs per whorl, the ribs sharper and less rounded in section. It is only doubtfully separable in our view.

OCCURRENCE: Although ROEMER refers to several localities near Austin, it is not clear which of these is the type locality. His use of 'bei' rather than 'in' suggests that the exposure was near, rather than in the Austin of his day. There are exposures at several places in the Austin district at the present day where *T. texanus* might be found, e.g. Waller Creek on the campus of the University of Texas; Little Walnut Creek, about 80 m south of the Cameron Road bridge.

According to YOUNG & WOODRUFF (1985) the occurrence of *T. texanus* is in the middle and upper parts of the Vinson Chalk. It occurs only rarely with *Cladoceramus undulatoplicatus* (ROEMER, 1852), whose lowest occurrence is the provisional definition of the base of the Santonian stage. The main concentration of this inoceramid is lower than the levels with *T. texanus*. The horizon of *T. texanus* would therefore be Santonian, but not lowest Santonian.

Texanites (*Texanites*) *roemeri* (YABE & SHIMIZU, 1923)
(Pl. 1, Figs 1-3, 9-11)

1852. *Ammonites texanus* ROEMER, p. 31 (*pars*), pl. 3, figs 1d, 1e only.
1857. *Ammonites texanus* ROEMER; Conrad, p. 159 (pars), pl. 16, figs 1a-c *Texanites* (*Texanites*) *texanus* (ROEMER, 1852).
1904. *Schloenbachia texana* ROEMER; LASSWITZ, p. 250(30) (*pars*), pl. 19 (7), fig. 2.
1923. *Mortoniceras roemeri* YABE & SHIMIZU, p. 30.
1925. *Mortoniceras roemeri* YABE & SHIMIZU; YABE & SHIMIZU, p. 128.
1928. *Mortoniceras roemeri* YABE & SHIMIZU; ADKINS, p. 84.
1933. *Mortoniceras texanus* (LASSWITZ); ADKINS, p. 453.
1948. *Texanites roemeri* YABE & SHIMIZU; COLLIGNON, p. 70(25), text-fig. 3a-c; 4.
1963. *Texanites roemeri* (YABE & SHIMIZU); YOUNG, p. 84, pl. 43, fig. 1.
1970. *Texanites* (*Texanites*) *roemeri* (YABE and SHIMIZU); MATSUMOTO, text-fig. 19.

TYPES: *Mortoniceras roemeri* was introduced as a *nomen novum* for the smaller specimens illustrated by ROEMER (YABE & SHIMIZU, 1923, p. 30; 1925, p. 128). ROEMER (1852, explanation of pl. 3), stated that his pl. 2, fig. 1d was based on 'ein junges Exemplar von der Seite gesehen', and his pl. 2, fig. 1e on 'ein anderes junges Exemplar von vorn gegen eine Kammerwand gesehen'. These specimens are thus unequivocally syntypes of the species. The original of ROEMER's pl. 3, fig. 1e shows the apertural view of a specimen 62 mm in diameter, with the last septal face shown as perfectly preserved; fig. 1d shows a side view of a specimen 59 mm in diameter. The original of fig. 1e appears to be the inner whorls of PIB 45b, some 65.5 mm in diameter (Pl. 1, Fig. 9). The original of ROEMER's pl. 3, fig. 1d is less certainly established; but for ROEMER's statement that his figs 1d and e were based on different specimens, we would have concluded that fig. 1d was also based on the inner whorls of PIB 45b (Pl. 1, Fig. 10), rather than the smaller specimen PIB 45C (Pl. 1, Figs 1-3). COLLIGNON (1948, p. 71(26)) referred to both of these specimens as the 'type'. YOUNG (1963, p. 84) designated the original of COLLIGNON's fig. 3, 3a as holotype, while MATSUMOTO (1970, p. 270) referred to both specimens as syntypes. It is our view that the statements of COLLIGNON and YOUNG do not rank as a valid lectotype designation as set out under ICZN Article 74, and we accordingly here designate PIB 45b as lectotype of *Mortoniceras roemeri*. It, and the paralectotype, are from the rapids on the Guadalupe River below New Braunfels.

DESCRIPTION: Lectotype PIB 45b is a wholly septate composite mold, with the following dimensions: D = 79.1 (100), Wh = 29.1 (36.7), U = 31.0 (39.1); at D = 65.5 (100), Wb = 26.7 (40.7), Wh = 24.9 (38.0), Wb: Wh = 1.07, U= 23.9 (36.5). Coiling very evolute, marginal tubercles of preceding whorl housed in notches in umbilical wall of succeeding whorl. Umbilicus broad, shallow, with flattened umbilical wall and broadly rounded umbilical shoulder. Whorl section depressed, rounded – trapezoidal in intercostal section, with greatest breadth just outside umbilical tubercle. Costal section polygonal, with greatest breadth at lateral tubercle. Nineteen to twenty coarse bullae per whorl perch on the umbilical shoulder. Ribs arise singly or in pairs from bullae, totalling 21-22 per whorl at the ventrolateral shoulder. Ribs strengthen and broaden across the flank. Lateral and marginal tubercles small, conical; marginal row closer to coarser marginal clavi. Broad ribs link marginal clavi to larger, closely spaced external clavi, separated by a broad groove from a coarse siphonal keel.

DISCUSSION: *Texanites* (*Texanites*) *roemeri* is easily separated from *T.* (*T.*) *texanus texanus* and subspecies *twiningi* by its depressed whorl section and much coarser ornament, the ribs more numerous and relatively crowded, rather than distant at large diameters. See YOUNG (1963) for further discussion.

OCCURRENCE: Santonian, Texas and Mississippi. YOUNG (1963) placed the species in his lowest Campanian zone of *Submortoniceras tequesquitense*, now known to be largely or wholly Santonian, as the base of the Campanian is now defined (GALE & *al.* 1996; HANCOCK & GALE 1996).

Suborder Ancyloceratina WIEDMANN, 1966
Superfamily Turrilitaceae GILL, 1871
Family Turrilitidae GILL, 1871
Genus *Mariella* NOWAK, 1916

TYPE SPECIES: *Turrilites bergeri* BRONGNIART, 1822, p. 395, pl. 7, fig. 3, by original designation by NOWAK, 1916, p. 10.

Subgenus *Wintonia* ADKINS, 1928
(= *Plesioturrilites* BREISTROFFER, 1953)

TYPE SPECIES: *Wintonia graysonensis* ADKINS, 1928, p. 213, pl. 23, figs 7-9, by original designation; = *Turrilites bosquensis* ADKINS, 1920, p. 76, pl. 3, figs 3, 7.

Mariella (*Wintonia*) *brazoensis* (ROEMER, 1852)
(Pl. 2, Fig. 9)

1852. *Turrilites brazoensis* ROEMER, p. 37, pl. 3, fig. 2.
1965. *Mariella* (*Plesioturrilites*) *brazoensis brazoensis* (ROEMER); CLARK, p. 45, pl. 14, figs 3-5; pl. 16, figs 1, 6 (with full synonymy).
1994. *Mariella* (*Wintonia*) *brazoensis brazoensis* (ROEMER); EMERSON, EMERSON, AKERS & AKERS, p. 300, 301 (unnumbered figs, not those after STOLICZKA).

TYPE: The lectotype, designated by CLARK (1965), is PIB 54, the original of ROEMER (1852, pl. 3, fig. 2), from 'graulich-weissen Kalkschichten an einer etwa 30 englische Meilen oberhalb *Torrey's Trading house* auf dem linken Ufer des Brazos gelegenen Stelle'. Preservation suggests the specimen to be from the Main Street Limestone. The locality on the Brazos River is now drowned by the reservoir of Lake Whitney, in Hill or Bosque County.

DESCRIPTION: The lectotype, PIB 54, is a slightly distorted composite mold 97.5 mm long, a fragment of the adapical end of the body chamber. The maximum preserved whorl height is 68 mm. The upper whorl face shows a deep, concave impressed zone, notched to accommodate tubercles on the base of preceding whorl. The upper part of the outer whorl face is broadly convex; the lower part flattened. Sixteen ribs are preserved on the fragment; they are coarse and concave on the upper part of upper whorl face, and are narrower than the interspaces. Ribs sweep forward to the junction of upper and outer whorl face, there strengthening into coarse bullae. Effaced ribs connect to a second row of weaker tubercles in the middle of the outer whorl face, then flex back to a third, much coarser, clavate row low on the outer whorl face. A pronounced spiral groove separates tubercles in the third row from a fourth, smaller row at the junction of outer and lower whorl faces. Coarse radial ribs extend across the lower whorl face from the lowest row of tubercles to umbilicus.

DISCUSSION: See CLARK (1965) for the most recent discussion of this species, and an account of differences from other North American representatives of the genus.

OCCURRENCE: *Mariella* (*Wintonia*) *brazoensis* is the index of an uppermost Albian or lower Cenomanian zone that can be recognized widely in north and south-central Texas, where it chiefly occurs in the Main Street Formation; records from the Weno Formation belong to some other taxon. CLARK (1965) also records the species from the Grayson Formation in the same area, the basal Del Rio Formation and the Espy Formation in Trans-Pecos Texas. PERKINS (1960) records the species from the lower Cenomanian of Coahuila, Mexico.

Family Baculitidae GILL, 1871
Genus *Baculites* LAMARCK, 1799

TYPE SPECIES: *Baculites vertebralis* LAMARCK, 1801, p. 103, by subsequent designation by MEEK, 1876, p. 391.

Baculites asperoanceps LASSWITZ, 1904
(Pl. 4, Figs 3-12)

1852. *Baculites anceps* LAMARCK; ROEMER, p. 36, pl. 2, figs 3a-g (*non* LAMARCK).
1904. *Baculites aspero-anceps* LASSWITZ, p. 236(16), pl. 3(15), fig. 1.
1996. *Baculites asperoanceps* LASSWITZ, 1904; KLINGER, COBBAN & KENNEDY, p. 100, pl. 1 (with full synonymy).

TYPES: Lectotype, by the subsequent designation of KLINGER, COBBAN & KENNEDY, 1996, p. 100 is the original of LASSWITZ (1904, pl. 3 (15), fig. 1), from 'Austin', Texas.

MATERIAL: PIB 53c, the original of *Baculites anceps* of ROEMER (1852, pl. 2, figs 3a-3g); PIB 53a-d, labelled 'Neu-Braunfels'.

DESCRIPTION: PIB 53C (Pl. 4, Figs 4, 7, 8) comprises two fragments. The smaller fragment (Pl. 4, Fig. 4) is embedded in matrix, and is 36 mm long, with a rib index of 5. The larger fragment (Pl. 4, Figs 7, 8) is 30.5 mm long, almost wholly septate, with a maximum preserved whorl height of 10 mm, the whorl section ovoid, the rib index 3. The ribs are weak, effaced, feebly convex over the dorsum, strengthening into coarse, concave, crescentic ribs on the dorsal half of the flanks, projected forwards, straight and markedly prorsiradiate on the ventral half of flanks, weakening, and crossing the venter in a narrow linguoid peak. PIB 53d (Pl. 4, Fig. 3; mentioned ROEMER, 1852, p. 37) is 22 mm long, with maximum preserved whorl height of 10.5 mm; it has a rib index of 3. PIB 53 b is the original of ROEMER, 1852, pl. 2, figs 3b, c; it is wholly septate, 63 mm long, markedly distorted by *post-mortem* compaction, producing a triangular whorl section. The apparent rib index is 2. PIB 53a (Pl. 4, Fig. 12) is the original of ROEMER, 1852, pl. 2, fig. 3d. It is

wholly septate, 69.5 mm long, and deformed into a curve. The whorl section is ovoid, the venter more narrowly rounded than the dorsum; the maximum preserved whorl height is 18 mm; the whorl breadth to height ratio 0.75. Rib index 3, ribs coarse, crescentic on dorsal two-thirds of flank, giving rise to delicate ribs on ventral third, where intercalated ribs develop, all ribs crossing the venter in a narrow linguoid peak.

DISCUSSION: These poor fragments overlap in size with the lectotype of *Baculites asperoanceps* (KLINGER & *al.* 1996, pl. 1), and show the crowded coarse crescentic ribs to extend to small diameters. See KLINGER & *al.* (1996, p. 100) for a full discussion of this species.

OCCURRENCE: Santonian, "Am Wasserfalle der Guadalupe unterhalb Neu Braunfels" and "im Bette des Cibolo an dem Uebergangspunkte des Weges von Neu-Braunfels nach SanAntonio de Bexar", Texas.

Baculites sp.
(Pl. 4, Figs 9-11)

1852. *Baculites asper* MORTON; ROEMER, p. 36, pl. 2, figs 2a-d.

MATERIAL: PIB 52, the original of ROEMER, 1852, pl. 2, fig. 2, "Am Wasserfalle der Guadalupe unterhalbe Neu-Braunfels".

DESCRIPTION: PIB 52 is an internal mold 68 mm long, with patches of replaced shell, mostly body chamber, with traces of two widely separated septa at the adapical end. Whorl breadth to height ratio 0.64 at adapical end; 0.68 at adapertural end. Whorl section oval to feebly ovoid. Three strong crescentic dorsolateral bullae present, one close to the adapical end, two, relatively widely separated, at the adapertural end. Interspaces are ornamented by delicate crescentic riblets on the dorsal flanks, projected forwards as delicate lirae on the ventral flanks, and crossing venter in a linguoid peak.

DISCUSSION: The affinities of this fragment are problematic. The lectotype of *Baculites asperoanceps* LASSWITZ, 1904 (KLINGER & *al.* 1996, pl. 1) shows a transition from an early growth stage with crowded crescentic flank ribs to a later growth stage with crescentic lateral bullae like those of the present specimen, but they are much more closely spaced. The fragment may well be no more than a variant of *asperoanceps*; the differences between this specimen and the lectotype are no greater than those between intraspecific variants of, for example, *Baculites codyensis* REESIDE, 1927 (e.g. KENNEDY & COBBAN 1991b, pl. 15, figs 1-27).

OCCURRENCE: As for material.

Superfamily Scaphitaceae GILL, 1871
Family Scaphitidae GILL, 1871
Subfamily Scaphitinae GILL, 1871
Genus and subgenus *Scaphites* PARKINSON, 1811

TYPE SPECIES: *Scaphites equalis* J. SOWERBY, 1813, p. 53, pl. 8, figs 1-3, by subsequent designation by MEEK, 1876, p. 413.

Scaphites (*Scaphites*) *semicostatus* ROEMER, 1852
(Pl. 4, Figs 1, 2, 5, 7)

1852. *Scaphites semicostatus* ROEMER, p. 35, pl. 1, figs 5a, b.
1852. *Scaphites texanus* ROEMER, p. 35, pl. 1, figs 4a-c.

TYPE: Holotype, by monotypy, is PIB 51 (pl. 4, figs 1, 2), the original of ROEMER, 1852, p. 35, pl. 1, fig. 5, from the "fischzahnreichen Schicht an der Furt bei Neu Braunfels"; = the bed rich in fish-teeth at the ford near New Braunfels.

NAME OF THE SPECIES: As first revising authors, we select the name *semicostatus* for the species, of which we regard *texanus* of ROEMER, 1852, as a synonym, because the holotype of *semicostatus* exhibits more critical characters of specific significance in *Scaphites* than does the holotype of *texanus*.

DESCRIPTION: PIB 51, the holotype, is a phosphatic internal mold of the shaft and final curved sector of a microconch phragmocone 21 mm long, with a maximum preserved whorl height 9.5 mm. The whorl section is slightly compressed trapezoidal, with flattened flanks; the venter is broadly arched. Small bullae, perched on the umbilical shoulder, give rise to pairs of low, effaced ribs. Shaft with strong ventral clavi, final curved sector with weaker conical tubercles. Traces of feeble lateral tubercles present. Ventrolateral tubercles and clavi give rise to groups of 2-3 narrow, wiry riblets, with 1 or 2 intercalated ribs between.

PIB 50 (Pl. 4, Figs 5, 6) is the holotype, by monotypy of *Scaphites texanus* ROEMER, 1852, p. 35, pl. 1, fig. 4a-c. The specimen is a wholly septate, slightly distorted phosphatic internal mold of a macroconch phragmocone, 21 mm in diameter. Coiling very involute, with tiny deep umbilicus. Whorl breadth to height ratio 0.92, slightly compressed, reniform, with greatest breadth just outside the umbilical shoulder. Coarse, blunt, prorsiradiate ribs, six per half whorl, extend from umbilical shoulder to outer flank, developing into an incipient tubercle, there

branching into 2-3 secondary ribs, with additional intercalated ribs between groups of secondaries; ribs delicate, feebly concave on outermost flank and feebly convex on venter. Suture simple, with broad, little-incised E/L.

DISCUSSION: *Scaphites* (*Scaphites*) *semicostatus* ROEMER, 1852, is a member of the European *S.* (*S.*) *meslei* DE GROSSOUVRE, 1894 group (see KENNEDY *in* KENNEDY & *al.* 1995, for a recent review), not previously recognized from North America. More and better material is needed to fully characterize the species.

OCCURRENCE: ROEMER's types are from the 'fischzahnreichen Schicht an der Furt bei Neu Braunfels'. Specimens in the Renfro Collection, currently housed in the U.S. Geological Survey, Denver, are from the Austin Chalk Group of Texas and are associated with *Peroniceras*, suggesting a middle Coniacian horizon in the lower part of the Atco Chalk.

Acknowledgments

We thank P.of. Dr. M. SANDER (Bonn) for allowing us to study specimens in the ROEMER Collection in his care, and H.C. KLINGER (Cape Town), U. KAPLAN (Gütersloh), H. SUMMESBERGER (Vienna), and J.W.M. JAGT (Maastricht) for critical reviews. KENNEDY acknowledges the financial support of the Natural Environment Research Council (U.K.) and the technical assistance of the staff of the Department of Earth Sciences, Oxford and the Geological Collections, University Museum, Oxford.

REFERENCES

ADKINS, W.S. 1920. The Weno and Pawpaw Formations of the Texas Comanchean. *University of Texas Bulletin*, **1856**, 1-172, (misdated 1918).

— 1928. Handbook of Texas Cretaceous fossils. *University of Texas Bulletin*, **2838**, 385 p.

— 1933. Mesozoic Systems in Texas. *In:* E.H. SELLARDS, W.S. ADKINS, and F.B. PLUMMER, The Geology of Texas, vol. 1, Stratigraphy. *University of Texas Bulletin*, **3232**, (Fifth Printing, 1966), p. 239-518.

ARKELL, W. J., KUMMEL, B. & WRIGHT, C.W. 1957. Mesozoic Ammonoidea, p. L80-L465. *In* R.C. MOORE (*Ed.*), Treatise on invertebrate paleontology, part L, Mollusca 4, Cephalopoda Ammonoidea. xxii + 490 p. *Geological Society of America and University of Kansas Press*; New York and Lawrence.

BREISTROFFER, M. 1953. L' évolution des Turrilitidés Albiens et Cénomaniens. *Compte Rendu Hebdomadaire des Séances de l'Academie des Sciences. Paris*, (D), **237**, 1349-1351.

BRONGNIART, A. 1822. Sur quelques terrains de Craie hors du Bassin de Paris, 80-101. *In*: G. CUVIER & A. BRONGNIART. Description géologique des environs de Paris, 3rd edn., 428 p. *Dufour et d'Ocagne*; Paris.

BUCH, L. VON. 1848. Über Ceratiten. *Physikalische, Mathematische Abhandlungen der Königlichen Akademie der Wissenschaften zu Berlin for 1848*, 1-30 (issued in parts in 1848; volume published in 1850). Berlin.

CLARK, D.L. 1965. Heteromorph ammonoids from the Albian and Cenomanian of Texas and adjacent areas. *Geological Society of America Memoir*, **95**, 99 p.

COBBAN, W.A. 1976. Ammonite record from the Mancos Shale of the Castle Valley-Price-Woodside area, east-central Utah. *Brigham Young University Geology Studies*, **22**, 117-126.

COLLIGNON, M. 1948. Ammonites néocrétacées du Menabe (Madagascar). I. Les Texanitidae. *Annales Géologiques du Service des Mines. Madagascar*, **13**, 49-107 (1-63), **14**, 7-101 (64-120).

— 1966. Atlas des fossiles caractéristiques de Madagascar (Ammonites,. 14, Santonien. x + 134 p. *Service géologique*; Tananarive.

CRICK, G.C. 1910. Note on two cephalopods (*Pachydiscus farmeryi* n.sp., and *Heteroceras reussianum* [D'ORBIGNY]) from the Chalk of Lincolnshire. *Geological Magazine*, New Series, Decade 5, **7**, 345-348. London.

DEKAY, J.E. 1828. Report on several fossil multilocular shells from the state of Delaware: with observations on a second specimen of the new fossil genus *Eurypterus*. *Annals of the Lyceum of Natural History*, **2**, 273-278.

DOUVILLÉ, H. 1890. Sur la classification des Cératites de la Craie. *Bulletin de la Société Géologique de France*, (3), **18**, 275-292.

EMERSON, B.L., EMERSON, J.H., AKERS, R.E. & AKERS, T.J. 1994. Texas Cretaceous ammonites and nautiloids. *Texas Paleontology Series*, **5**, 439 p. *Houston Gem and Mineral Society*; Houston.

GALE, A.S., MONTGOMERY, P., KENNEDY, W.J., HANCOCK, J.M., BURNETT, J.A.. & MCARTHUR, J.M. 1996. Definition and global correlation of the Santonian-Campanian boundary. *Terra Nova*, **7** (for 1995), 611-622.

GILL, T. 1871. Arrangement of the families of Mollusks. *Smithsonian Miscellaneous Collections*, **227**, xvi + 49 p.

GROSSOUVRE, A. DE. 1894. Recherches sur la craie supérieure, 2, Paléontologie. Les ammonites de la craie supérieure. *Mémoires pour servir à l'explication de la Carte Géologique Détaillée de la France*, 264 p. (misdated 1893). *Imprimerie Nationale*; Paris.

— 1901. Recherches sur la craie supérieure, part 1, no. 2, Stratigraphie générale. *Mémoires pour servir a l'explication de la Carte Géologique Détaillée de la France*, 561-1013. *Imprimerie Nationale*; Paris.

HANCOCK, J.M. & GALE, A.S. 1996. The Campanian Stage. *Bulletin de l'Institut Royal des Sciences Naturelles de Belgique, Sciences de la Terre*, **66**, supplement, 103-109.

HYATT, A. 1889. Genesis of the Arietidae. *Smithsonian Contributions to Knowledge*, **673**, xi + 239 p.

— 1900. Cephalopoda, p. 502-604 *in* Von ZITTEL, K.A. 1896-1900, Textbook of Palaeontology, transl. C.R. EASTMAN. *Macmillan*; London and New York.

— 1903. Pseudoceratites of the Cretaceous. *U.S. Geolological Survey Monograph*, **44**, 351 p.

KENNEDY, W.J. 1987. Ammonites from the type Santonian and adjacent parts of northern Aquitaine, western France. *Palaeontology*, **30**, 765-782.

KENNEDY, W.J., BILOTTE, M. & MELCHIOR, C. 1995. Ammonite faunas, biostratigraphy and sequence stratigraphy of the Coniacian-Santonian of the Corbières (NE Pyrénées). *Bulletin des Centres de Recherches Exploration-Production Elf-Aquitaine*, **19**, 377-499.

KENNEDY, W.J. & COBBAN, W.A. 1991a. Upper Cretaceous (Upper Santonian) *Boehmoceras* fauna from the Gulf Coast region of the United States. *Geological Magazine*, **128**, 167-189.

— & — 1991b. Coniacian ammonite faunas from the United States Western Interior. *Special Papers in Palaeontology*, **45**, 96 p.

— & — 1993. Lower Campanian (Upper Cretaceous) ammonites from the Merchantville Formation of New Jersey, Maryland and Delaware. *Journal of Paleontology*, **67**, 828-849.

KENNEDY, W.J., JOHNSON, R.A. & COBBAN, W.A. 1995. Upper Cretaceous ammonite faunas of New Jersey. *Geological Association of New Jersey*, **12**, 24-55.

KENNEDY, W.J. & KAPLAN, U. 1995. *Pseudojacobites farmeryi* (CRICK, 1910), ein seltener Ammonit des westfälischen und englischen Ober-Turon. *Berliner Geowissenschaftliche Abhandlungen*, **E16**, 25-43.

KLINGER, H.C., COBBAN, W.A. & KENNEDY, W.J. 1996. The lectotype of *Baculites asperoanceps* LASSWITZ, 1904 (Cretaceous ammonite), with a discussion of the affinities of the species. *Acta Geologica Polonica*, **46**, 99-104.

KLINGER, H.C. & KENNEDY, W.J. 1980. Cretaceous faunas from Zululand and Natal, South Africa. The ammonite subfamily Texanitinae COLLIGNON, 1948. *Annals of the South African Museum*, **80**, 1-357.

KULLMANN, J. & WIEDMANN, J. 1970. Significance of sutures in phylogeny of Ammonoidea. *Paleontological Contributions. University of Kansas*, **44**, 1-32.

LAMARCK, J.P.B.A. DE M. DE. 1799. Prodrome d'une nouvelle classification des coquilles. *Mémoires de la Société d'Histoire Naturelle de Paris*, (**1799**), 63-90. Paris.

— 1801. Système des Animaux sans vertebrès. vii + 432 p., the author. *Deterville*; Paris.

LANGER, W. 1991. Der Paläontologe und Geologe Carl Ferdinand Roemer. *Natur und Museum*, **121**, 381-386.

LAMOLDA, M.A. & HANCOCK, J.M. 1996. The Santonian stage and substages. *Bulletin de l'Institut Royal des Sciences Naturelles de Belgique. Sciences de la Terre*, **66** (Supplement), 95-102.

LASSWITZ, R. 1904. Die Kreide-Ammoniten von Texas (Collection F. ROEMER). *Geologische und Paläontologische Abhandlungen, New Series*, **6**, 221-259.

MATSUMOTO, T. 1966. Notes on *Ammonites flaccidicosta* RÖMER from the Cretaceous of Texas. *Transactions and Proceedings of the Palaeontological Society of Japan, N.S.* **63**, 294-302.

— 9. A Monograph of the Collignoniceratidae from Hokkaido, Part III. *Memoirs of the Faculty of Science, Kyushu University, Series D, Geology*, **19**, 1-14.

— 1970. A Monograph of the Collignoniceratidae from Hokkaido, Part IV. *Memoirs of the Faculty of Science, Kyushu University, Series D, Geology*, **20**, 225-304.

MEEK, F.B. 1876. A report on the invertebrate Cretaceous and Tertiary fossils of the upper Missouri country. *In* F.V. HAYDEN. *United States Geological Survey of the Territories Report*, **9**, lxiv + 629 p. Washington D.C.

MORTON, S.G. 1834. Synopsis of the organic remains of the Cretaceous group of the United States. Illustrated by nineteen plates, to which is added an appendix containing a tabular view of the Tertiary fossils discovered in America. 88 p. *Key & Biddle*; Philadelphia.

NEUMAYR, M. & UHLIG, V. 1881. Ueber Ammoniten aus den Hilsbildungen Norddeutschlands. *Palaeontographica*, **27**, 129-203.

NOWAK, J. 1916. Über die bifiden Loben der oberkretazischen Ammoniten und ihre Bedeutung für die Systematik. *Bulletin International de l'Academie des Sciences et des Lettres Cracovie*, (B) **1915**, 1-13.

PARKINSON, J. 1811. Organic remains of a former world, **3**, 479 p. *J. Robson*; London.

PERKINS, B.F. 1960. Biostratigraphic studies in the Comanche (Cretaceous) Series of northern Mexico and Texas. *Geological Society of America Memoir*, **83**, 1-138.

PERVINQUIÈRE, L. 1907. Etudes de paléontologie Tunisienne. 1. Céphalopodes des terrains secondaires. *Carte géologique de Tunisie*, v + 438 p. *de Rudeval*; Paris.

REESIDE, J.B., Jr. 1927. Cephalopods from the lower part of the Cody Shale of Oregon Basin, Wyoming. *U.S. Geological Survey Professional Paper*, **150-A**, 1-19.

— 1932. The Upper Cretaceous ammonite genus *Barroisiceras* in the United States. *U.S. Geological Survey Professional Paper*, **170-B**, 9-29.

REYMENT, R.A. 1996. Carl Ferdinand ROEMER (1818-1891). *Terra Nova*, **8**, 298-300.

ROEMER, C.F. 1849. Texas. Mit besonderer Rücksicht auf deutsche Aus-wanderung und die physischen Verhältnisse des landes nach eigener beobachtung Geschildert von Dr Ferdinand ROEMER. 464 p. *A. Marcus*; Bonn.

— 1852. Die Kreidebildungen von Texas und ihre organischen Einschlüsse. 100 p. *Adolph Marcus*; Bonn.

SCHERPF, G.A. 1841. Entstehungsgeschichte und gegenwärtiger Zustand des neuen, unabhängigen, amerikanischen Staates Texas. Ein Beitrag zur Geschichte, Statistik und Geographie

dieses Jahrhunderts. Im Lande selbst gesammelt von G.A. Scherpf, vi, 154 p. Augsburg.

SCHLÜTER, C. 1867. Beitrag zur Kenntniss der jüngsten Ammoneen Norddeutschlands. 36 p. *A. Henry*; Bonn.

— 1871-1876. Cephalopoden der oberen deutschen Kreide. *Palaeontographica*, **21**, 1-24, (1871); **21**, 25-120, (1872); **24**, 1-144 + x, (1876).

SCHROEDER, R. & STEIN, H. 1991. Als Geologe bei deutschen Auswanderen in Texas. *Natur und Museum*, **121**, 387-400.

SCOTT, G.R. & COBBAN, W.A. 1964. Stratigraphy of the Niobrara Formation at Pueblo, Colorado. *U.S. Geological Survey Professional Paper*, **454**-L, L1-L 27.

SELLARDS, E.H., ADKINS, W.S. & PLUMMER, F.B. 1966. The Geology of Texas. Volume 1. Stratigraphy. *University of Texas Bulletin*, **3232**, 1007 p. (Fifth Printing, 1966, of the original 1933 imprint (misdated 1932)). Austin.

SOLMS-BRAUNFELS, C. 1846. Texas: Geschildert in Beziehung auf geographischen, socialen und übrigen Verhältnisse, mit besonderer Rücksicht auf die deutsche Colonisation. Ein Handbuch für Auswanderer nach Texas. Seinen deutschen Landsleuten gewidmet von Carl Prinzen zu Solms-Braunfels; nebst zwei Karten von Texas. Frankfurt-am-Main.

SOWERBY, J. 1812-1822. The mineral conchology of Great Britain. 383 Pls. *The author*; London.

SPATH L.F. 1922. On the Senonian ammonite fauna of Pondoland. *Transactions of the Royal Society of South Africa*, **10**, 113-147.

— 1932. A monograph of the Ammonoidea of the Gault. *Palaeontographical Society Monograph*, Part **9**, 379-410.

THOMAS, P. & PERON, A. 1889-1893. Description des mollusques fossiles des Terrains Crétacés de la région sud de la Tunisie recueillis en 1885 et 1886 par M. Philippe Thomas. *Exploration Scientifique de la Tunisie*, xii + 405 p. (xii + 1-103 (1889); 105-327 (1891); 328-405 (1893)). *Masson*; Paris.

WEDEKIND, R. 1916. Über Lobus, Suturallobus und Inzision. *Zentralblatt für Mineralogie, Geologie und Paläontologie*, for **1916**, 185-195.

WIEDMANN, J. 1966. Stammesgeschichte und System der posttriadischen Ammonoideen; ein Überblick. *Neues Jahrbuch für Geologie und Paläontologie Abhandlungen*, **125**, 49-79; **127**, 13-81.

WOLLEBEN, J.A. 1967. Senonian (Cretaceous) Mollusca from Trans-Pecos Texas and northeastern Chihuahua, Mexico. *Journal of Paleontology*, **41**, 1150-1165.

WRIGHT, C.W. 1952. A classification of the Cretaceous ammonites. *Journal of Paleontology*, **26**, 213-222.

— 1957. [Cretaceous Ammonoidea]. *In* R.C. MOORE (*Ed.*), Treatise on invertebrate paleontology, part L, Mollusca 4, Cephalopoda Ammonoidea, xxii + 490 p. *Geological Society of America and University of Kansas Press*; New York and Lawrence.

— 1996. Treatise on Invertebrate Paleontology. Part L, Mollusca 4: Cretaceous Ammonoidea (with contributions by J.H. CALLOMAN (*sic*) and M.K. HOWARTH). xx + 362 p. *Geological Society of America and University of Kansas*; Boulder, Colorado and Lawrence, Kansas.

WRIGHT, C.W. & WRIGHT, E.V. 1951. A survey of the fossil Cephalopoda of the Chalk of Great Britain. *Palaeontographical Society Monograph*, 1-40. London.

YABE, H. & SHIMIZU, S. 1923. A note on the genus *Mortoniceras*. *Japanese Journal of Geology and Geography*, **2**, 27-30.

— & — 1925. Japanese Cretaceous ammonites belonging to Prionotropidae. 1. *Scientific Reports Tohoku Imperial University*, (2) **7**, 125-138 (1-14).

YOUNG, K. 1963. Upper Cretaceous ammonites from the Gulf Coast of the United States. *University of Texas Publication*, **6304**, ix + 373 p.

— 1986. Cretaceous marine inundations of the San Marcos Platform, Texas. *Cretaceous Research*, 7, 117-140.

YOUNG, K. & WOODRUFF, C.M. Jr. 1985. Austin Chalk in its type area - stratigraphy and structure. *Austin Geological Society, Guidebook*, **7**, 88 p. *Austin Geological Society*; Austin.

ZITTEL, K.A. VON. 1884. Handbuch der Paläontologie. 1, Abt. 2; Lief. 3, Cephalopoda, p. 329-522. *R. Oldenbourg*; Munich and Leipzig.

— 1895. Grundzüge der Paläontologie (Paläozoologie). vii + 972 p. *R. Oldenbourg*; Munich and Leipzig.

Manuscript submitted: 10th January 2003
Revised version accepted: 20th September 2003

PLATE 1

1-3, 9-11 – *Texanites* (*Texanites*) *roemeri* (YABE & SHIMIZU, 1923); 1-3 – Paralectotype PIB 45c, from the Austin Chalk at the rapids on the Guadalupe River below New Braunfels, Comal County, Texas; 9-11 – Lectotype, PIB 45b, from the same horizon and locality as the original of Figs 1-3; 4 – *Engonoceras* sp. PIB 49.3, from near Fredericksburg, Gillespie County, Texas.

5-8 – *Nowakites flaccidicosta* (ROEMER, 1852); 5-6 – Paralectotype, PIB 47, the holotype of *Pseudojacobites texanus* MATSUMOTO, 1966. From the same horizon and locality as the original of Figs 1-3; 7-8 – Lectotype, PIB 47, from the same horizon and locality as the original of Figs 1-3.

All figures are natural size

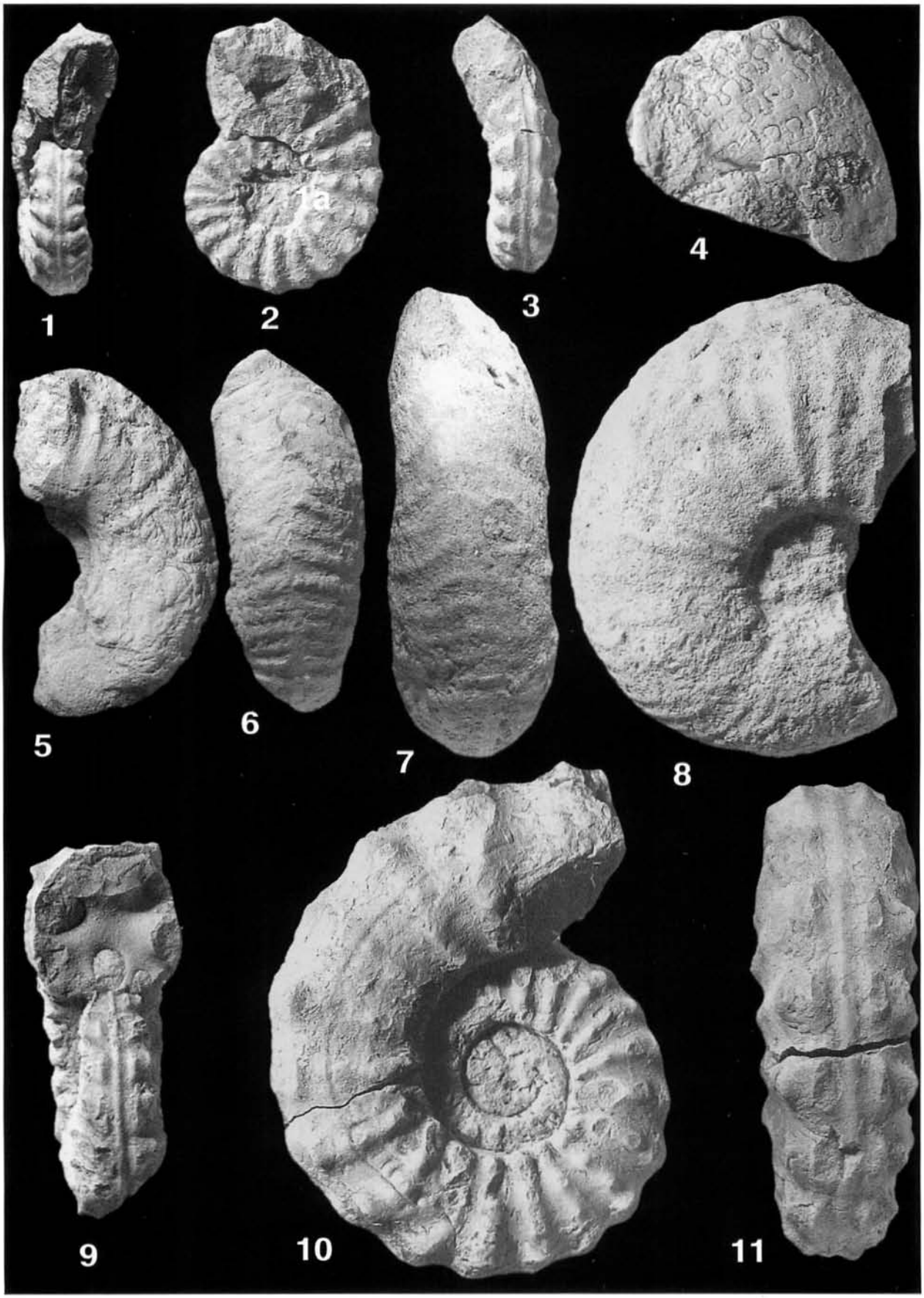

1
2
2a
3
4
5
6
7
8
9
10
11

PLATE 2

1-3, 6-7 – *Texasia dentatocarinata* (ROEMER, 1852); 1-3 – Paralectotype PIB 48b, from the Austin Chalk at the rapids on the Guadalupe River below New Braunfels, Comal County, Texas; 6-7 – Lectotype PIB 48a, from the same horizon and locality as the original of Figs 1-3.

4-5 – *Texasia sornayi* (COLLIGNON, 1966). The holotype, the original of COLLIGNON, 1966, pl. 475, fig. 1933, from the Santonian of Beantaly-Souromaraino (Belo sur Tsiribihina), Madagascar. The original is in the collections of the Institut des Sciences de la Terre, Université de Bourgogne, Dijon.

8 – *Placenticeras syrtale* (MORTON, 1834). Apertural view of PIB 46, the holotype of *Ammonites guadalupe* ROEMER, 1852, from the Austin Chalk at the rapids on the Guadalupe River below New Braunfels, Comal County, Texas.

9 – *Mariella* (*Wintonia*) *brazosensis* (ROEMER, 1852). Lectotype, PIB 54, from "graulich-weissen Kalkschichten an einer etwa 30 englische Meilen oberhalb *Torrey's Trading House* auf dem linken Ufer des Brazos gelegenen Stelle".

All figures are natural size

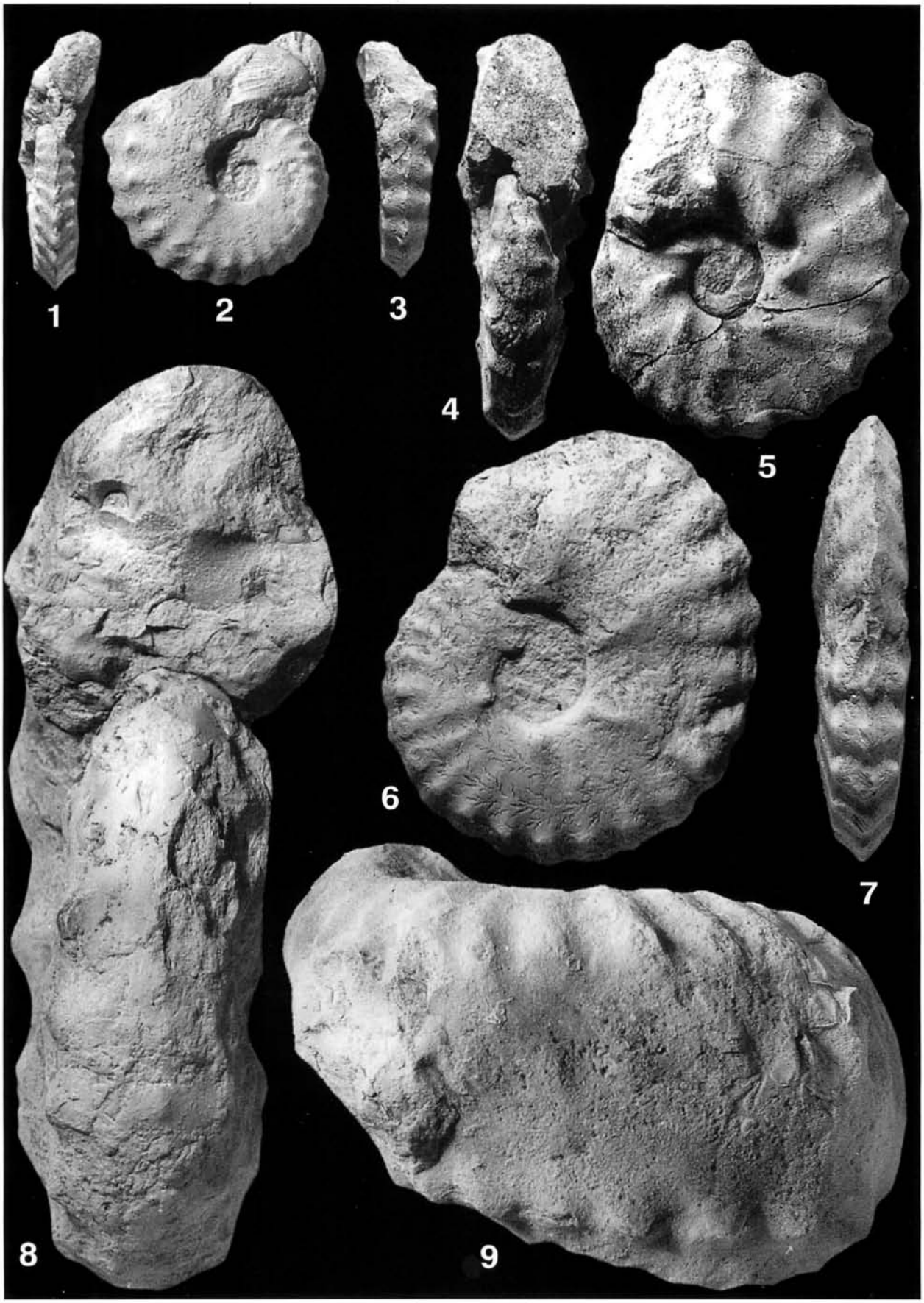

1
2
3
4
5
6
7
8
9

PLATE 3

1-2 – *Placenticeras syrtale* (MORTON, 1834). Side and ventral view of PIB 46, the holotype of *Ammonites guadalupe* ROEMER, 1852, from the Austin Chalk at the rapids on the Guadalupe River below New Braunfels, Comal County, Texas

All figures are natural size


1
2

PLATE 4

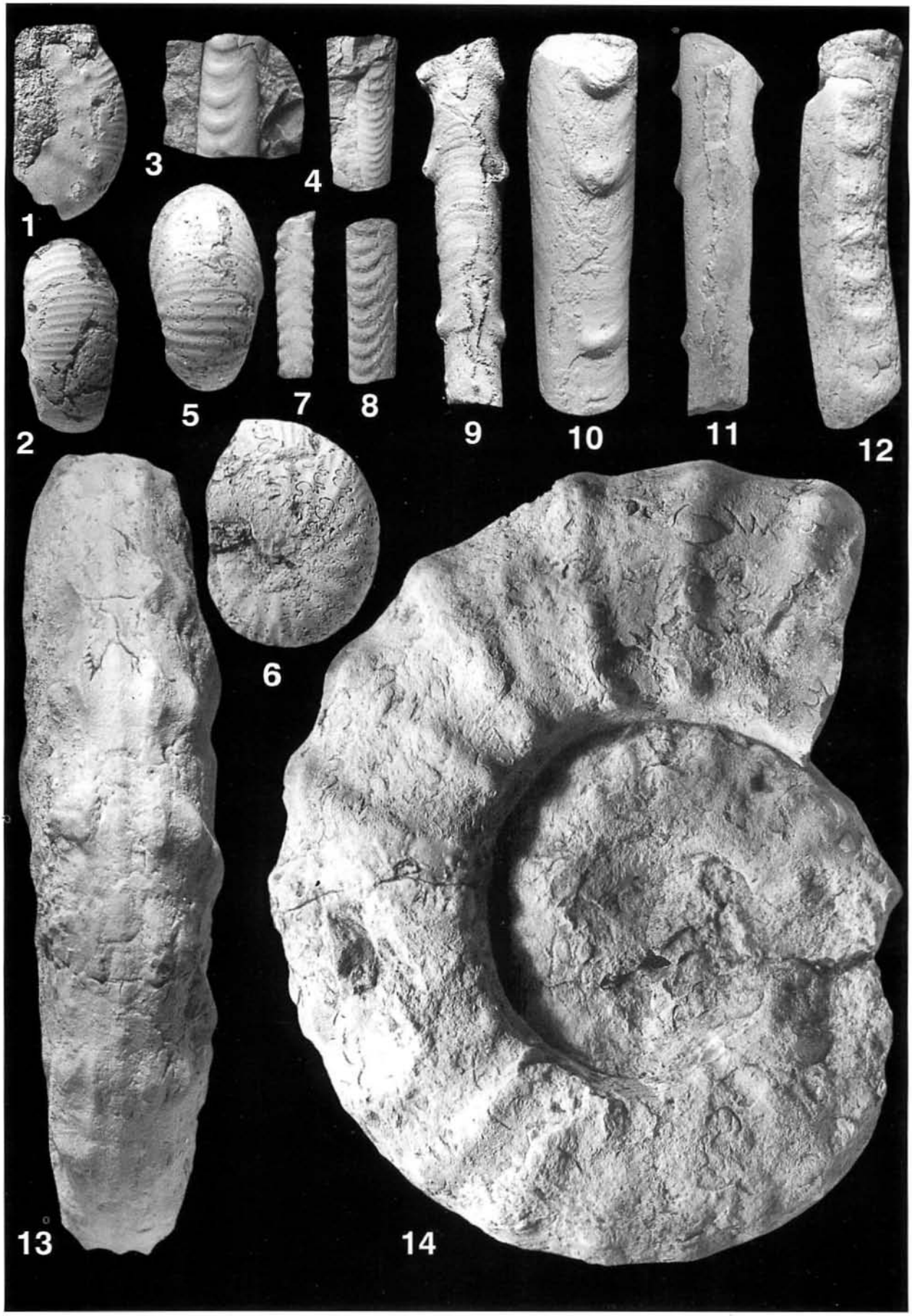
1, 2, 5, 6 – *Scaphites* (*Scaphites*) *semicostatus* ROEMER, 1852; 1-2 – The holotype, PIB 51, a microconch body chamber; 5-6 – PIB 50, the holotype of *Scaphites texanus* ROEMER, 1852 (a synonym), a macroconch phragmocone. Both specimens are from the "fischzahnreichen Schicht an der Furt bei Neu Braunfels".

3-4, 7-8, 12 – *Baculites asperoanceps* LASSWITZ, 1904; 3 – PIB 53d; 4, 7-8 – PIB 53c; 12 – PIB 53a; All specimens are from the Austin Chalk at the rapids on the Guadalupe River below New Braunfels, Comal County, Texas.

9-10-11 – *Baculites* sp. PIB 52, from the same horizon and locality as the originals of Figs 3-4, 7-8, 12.

13-14 – *Texanites* (*Texanites*) *texanus texanus* (ROEMER, 1852). Lectotype, PIB 45b, from the same horizon and locality as the originals of Figs 3-4, 7-8, 12.

Figures 1, 2, 5, 6 are × 2; the remainder are natural size.


1
2
3
4
5
6
7
8
9
10
11
12
13
14