

30. CRETACEOUS AMMONITES (VALANGINIAN TO CENOMANIAN) FROM DEEP SEA DRILLING PROJECT CORES, SOUTHEASTERN GULF OF MEXICO¹

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ABSTRACT

Sites 535, 537, and 540, DSDP Leg 77, recovered ammonites. Core 537-4 yielded ammonites undiagnostic for dating. Core 540-44 yielded latest late Albian (Vraconian) ammonites. Three cores from Site 535 yielded ammonites producing good dates. Core 535-74 yielded *Bochianites* sp. indet., and *Karakaschiceras* sp. aff. *K. victoriense*; the date is either the early part of the late Valanginian or the late part of the early Valanginian. *Scaphites* n. sp. aff. *S. simplex* and *Stomohamites* sp. cf. *S. virgulatus* indicate the latest late Albian for Core 535-45, and *Acompsoceras* sp. dates Core 535-31 as middle Cenomanian.

INTRODUCTION

Early in 1981 (27 December 1980 to 30 January 1981), Leg 77 of the drilling program of *Glomar Challenger* was completed (Schlager et al., 1984). Cretaceous ammonites from cores at the three sites are reported herein.

From Leg 77 Sites 535, 537, and 540, several genera of Cretaceous ammonites were recovered. Only one level yielded ammonites at Site 537; it was in Sample 537-4-1, 1-3 cm (40 m sub-bottom depth). Two genera are represented. One of these is the long-ranged genus, *Hypophylloceras*; the other is probably a holcodiscid. Both specimens are extremely small, barely over 0.5 cm in greatest dimension, and identifications are not the best.

Ammonites were also recovered from one level at Site 540: Sample 540-44-2, 0-8 cm (440-450 m sub-bottom depth), with *Turrilitoides* sp. juv. aff. *T. toucasi*, and Sample 540-44-1, 76-78 cm, with *Scaphites* sp. n. aff. *S. simplex*.

The most complete set of ammonites is from Site 535. Ammonites were first recovered from Core 535-31 (310 m sub-bottom depth) and were sporadically recovered to a depth of 790 m (Core 535-79). The forms recognized are listed in Table 1, but again, most of the specimens are extreme juveniles, difficult to compare to most of the much larger, similar forms described in the literature.

STRATIGRAPHY

With only isolated samples from cores, instead of continuous core, it was not possible for me to date the core throughout. However, with so few ammonites and with such juvenile specimens, it probably would not have been possible to do better had the entire core been available. The intervals in Table 2 contain datable ammonites. These dates do not often agree with, but do not depart greatly from, those of the site chapter (Sites 535 and 540), this volume.

Table 1. Ammonites from Site 535.

Core-Section (interval in cm)	Species	Comments
31-1, 84-88	<i>Acompsoceras</i> sp. juv.	Since my dating here does not agree with the microfossils, and since there were several meters of no recovery, the geologists at the drill site suggest that two nodules containing these specimens probably came from uphole during nonrecovery and from some level above the base of Core 535-43. I can only verify that the samples appear to be from a hardground.
33-1, 35-37	<i>Acompsoceras</i> (?) sp. juv.	
45,CC (5-8)	<i>Scaphites</i> n. sp. aff. <i>S. simplex</i>	
	<i>Stomohamites</i> sp. cf. <i>S. virgulatus</i>	
47-2, 20-24	<i>Hypophylloceras</i> sp. juv. cf. <i>H. guillanoti</i>	This specimen would appear to be from the smallest end of the straight part of a shaft of a ptychoceras, perhaps <i>Hamiticeras</i> sp. indet. Its age could be anywhere from late Hauterivian to early Aptian.
54-4, 67-68	Neocomitine, genus and species indeterminate	
60-21, 101-105	Unidentified heteromorph	
73-3, 30-31	Neocomitine, genus and species indeterminate	Especially the form figured by Cantu Chapa, 1974, as <i>Leopoldia</i> sp. cf. <i>victoriensis</i> Imlay, 1938, but which he correctly dated as Valanginian.
74-3, top of section	<i>Karakaschiceras</i> sp. cf. <i>K. victoriense</i>	
79-1, 117-119	<i>Bochianites</i> sp. cf. <i>B. oosteri</i> Eodesmocerine, genus and species indeterminate	

TECHNIQUES

Most of the fossils were either external molds or casts. An attempt to better prepare one fossil resulted in its complete destruction, so I refrained from trying to improve on the remainder. Rubber latex casts from the external molds were utilized for more natural photography.

SYSTEMATIC PALEONTOLOGY

Phylum MOLLUSCA
Class CEPHALOPODA
Order AMMONOIDEA
Suborder PHYLLOCERINA Arkell, 1950
Superfamily PHYLLOCERACEAE von Zittel, 1884
Family PHYLLOCERIDAE von Zittel, 1884
Genus *HYPOPHYLLOCERAS* Salfeld, 1924

Synonymy as in Wiedmann (1962, p. 139).

Type species: *Phylloceras onoense* Stanton, 1895.

¹ Buffler, R. T., Schlager, W., et al., *Init. Repts. DSDP, 77*: Washington (U.S. Govt. Printing Office).

Table 2. Ages of samples with datable ammonites.

Hole- Core-Section (interval in cm)	Age
533-31-1, 84-88	middle Cenomanian
535-33-1, 35-37	middle Cenomanian(?)
535-45, CC (0-8 cm)	late Albian, <i>Stoliczkaia dispar</i> and/or <i>Arrhaphoceras substuderi</i> zones; geologists on board during drilling believe that these are samples of rubble caved from a level above the base of Core 535-43 during a long interval of no recovery.
535-74-3, top of section	early part of late Valanginian or late part of early Valanginian, probably <i>Saynoceras verrucosum</i> zone; this age is well within the ranges of <i>C. angustiforata</i> (Perch-Nielsen, 1979) and <i>Calpionellopsis</i> (Pop, 1976, Dragatzan et al., 1975; Blauser and McNulty, 1980; Chevalier et al., 1975; Thierstein, 1975).
537-4-1, 1-3	Neocomian(?)
540-44-2, 0-8	late Albian, <i>Stoliczkaia dispar</i> and/or <i>A. substuderi</i> zones; the same level, biostratigraphically, as 535-45, CC, 5-8 cm.

Hypophylloceras sp. juv. indet.
(Plate 1, Fig. 13)

Remarks. This small, incomplete specimen could belong to any of the species with rounded flanks or with flanks that diverge umbilicad. It is not more than a centimeter in greatest dimension, and, therefore, defies exact, specific identification.

Age. This fossil occurs with the juvenile that might be a holcodiscid, which is also not datable, but does agree with the earlier Cretaceous (Neocomian) determination by micropaleontology. WSA-18426² is from Sample 537-4-1, 1-3 cm.

Hypophylloceras sp. cf. *H. guillautoni* (Collignon, 1932)
(Plate 1, Figs. 15, 17-18)

? = *H. androiavense* (Besairie, 1936)

Remarks. *Hypophylloceras guillautoni* (Collignon) is from the early part of the late Albian, and *H. androiavense* (Besairie) is from the late part of the middle Albian. They differ from the species group of *H. velledae* (Michelin) and the species group of *H. serisetense* (Pervinquier) in their more open umbilicus. In addition, species of the species group of *H. velledae* have more rounded flanks, whereas the flanks of the species group of *H. serisetense* are flattened, as are those of *H. androiavense* and *H. guillautoni*. WSA-18430 lacks the constrictions of Early Cretaceous species of *Holcophylloceras* (Thomel, 1980) and has a wider umbilicus than either *Hypophylloceras ponticuli* (Rousseau) or *H. serum* (Oppel) (Thomel, 1980).

Although micropaleontologic evidence suggests the sample is Bedoulian, the ammonites from Cores 535-46 and 535-47 do appear more like the Albian forms; it is possible that part of their shape is the result of sedimentary compaction.

Age. I do not feel that these forms are sufficiently well known to argue with the Bedoulian determination of the micropaleontologists. Many of the Early Cretaceous species of *Hypophylloceras* may have closely similar shapes, and no ornamentation is preserved on the forms illustrated herein. The genus ranges to below the Barremian. One specimen, WSA-18430, the better preserved, is from Sample 535-46-1, 95-100 cm. The other, WSA-18429, is from Sample 535-47-2, 20-24 cm.

Suborder LYTOCERINA Hyatt, 1889
Superfamily LYTOCERACEAE Neumayr, 1875
Family LYTOCERIDAE Neumayr, 1875
Subfamily LYTOCERINAE Neumayr, 1875
Lytocericid, genus and species indeterminate
(Plate 1, Fig. 9)

Remarks. Whether the repressed zone around the ventrolateral area of this specimen is original or sedimentologic cannot be determined.

Age. WSA-18424 is from Sample 535-45, CC (5-8 cm) and immediately overlies fossils that are latest Albian.

Superfamily TURRILITACEAE Meek, 1876
Family ANCYLOCERIDAE Meek, 1876
Genus HAMITICERAS Anderson, 1938

Hamiticeras (?) sp. indet.
(Plate 1, Fig. 4)

Remarks. Small specimens of species of *Hamites*, *Protanisoceras*, *Hamulinites*, and *Hamiticeras* may have reasonably straight shafts and no or little tuberculation, especially in the earlier growth stages (Thomel, 1964). Species of *Hamulinites* usually have costation at an oblique angle to the shaft. Accompanying microfossils indicate that this specimen is from below the Gargasian, and *Hamiticeras* sp. is therefore indicated.

Age. WSA-18432 is from Sample 535-60-21, 101-105 cm. Micropaleontology data indicate a late Hauterivian age.

Family HAMITIDAE Hyatt, 1900
Genus STOMOHAMITES Breistroffer, 1940

Type species: *Hamites virgulatus* Brongniart, 1822.

Stomahamites sp. cf. *S. virgulatus* (Brongniart, 1822)
(Plate 1, Fig. 3)

Remarks. Small, straight fragments of shafts are not particularly diagnostic in the Hamitidae. Several late Albian species have ribs aligned more or less at right angles to the shaft. Most of these occur in the *Stoliczkaia dispar* Subzone (Spath, 1941). Some, like *Stomahamites virgulatus* (Brongniart, 1822), have ribs effacing over the dorsum; others, like *S. venetianus* (Pictet in Pictet and Roux, 1847), show ribbing over the dorsum. Some are more finely costate as in *S. duplicatus* (Pictet and Campiche, 1861) and *S. charpentieri* (Pictet in Pictet and Roux, 1847). The present specimen in these features appears to be intermediate between *S. duplicatus* and *S. venetianus*, but ribbing is more uneven than in those two species and is effacing over the dorsum as in *S. virgulatus*.

Age. WSA-18422, ascribed to *Stomahamites* sp. cf. *S. virgulatus* (Brongniart), is from Sample 535-45, CC (5-8 cm); it occurs with *Scaphites* n. sp. aff. *S. simplex* Jukes-Browne and most likely represents the *Stoliczkaia dispar* and/or *Arrhaphoceras substuderi* Subzones of the latest Albian (Vraconian).

Family TURRILITIDAE Meek, 1876
Genus TURRILITOIDES Spath, 1923

Type species: *Turrilites hugardianus* d'Orbigny, 1842

Turrilitoides sp. juv. cf. *T. toucasi* (Hébert and Munier-Chalmas, 1875)
(Plate 1, Fig. 10)

Remarks. *Turrilitoides* is the late Albian genus of helicoid ammonites with continuous, relatively inornate ribbing. By its lack of tubercles it differs from *Mariella*, *Plesioturrilites*, *Ostlingoceras*, and *Euturrilites*. As Spath (1937, p. 529) points out, juvenile specimens of *Turrilitoides toucasi* (Hébert and Munier-Chalmas) cannot always be differentiated from those of *T. hugardianus* (d'Orbigny). The ribs of the present specimen do not seem as flexuous as those of the type of *T. toucasi* but straighter, as in *T. hugardianus*. Therefore, the identification is not tight. Spath insists that *T. hugardianus* does not range into the *Stoliczkaia dispar* Subzone (Spath, 1937, p. 529). The range of *T. toucasi* is not accurately known, but it is later late Albian.

² WSA numbers throughout this list and plate caption refer to museum numbers of specimens at the Texas Memorial Museum at The University of Texas, Austin, Texas.

Age. *Turrilitoides* sp. juv. cf. *T. toucasi* (Hébert and Munier-Chalmas), WSA-18421, is from Sample 540-44-2, 0-8 cm, where it occurs with *Scaphites* n. sp. aff. *S. simplex* Jukes-Browne; it is latest Albian, perhaps Vraconian, *Stoliczkaia dispar* and/or *Arrhaphoceras substuderi* Subzones.

Superfamily SCAPHITACEAE Meek, 1876

Family SCAPHITIDAE Meek, 1876

Subfamily SCAPHITINAE Meek, 1876

Genus *Scaphites* Parkinson, 1811

Type species: *Scaphites equalis* J. Sowerby, 1814, subsequently designated by Meek (1876).

***Scaphites* n. sp. aff. *S. simplex* Jukes-Browne, 1875**
(Plate 1, Figs. 1-2, 5)

Remarks. Three specimens, two from Core 540-44, and the other from Core 535-45, represent a finely costate species of *Scaphites*. The lack of elongate, umbilical bullae and the nearly smooth flanks near the umbilicus relate the species to *Scaphites simplex* Jukes-Browne (1875). It differs from *S. simplex* in its denser and finer costation and in the even smoother flanks, whereas costation is only reduced on the flanks of *S. simplex*. Already there is a faint bundling of ribs on the umbilical flanks of specimens of *S. simplex* illustrated by Wiedmann (1962). This is not apparent in the specimens illustrated on Plate 1, where the umbilical half of the flank is almost smooth. *S. hugardianus* (d'Orbigny) of the early Cenomanian has ribs bifurcating from elongate umbilical bullae (Young, 1979).

Age. *Scaphites simplex* Jukes-Browne is typical of the late Albian. The lack of elongate, umbilical bullae indicates that the specimens from Sites 535 and 540 are also late Albian. The specimen referred to *Scaphites simplex* by Collignon (1964, plate 319) is recorded by him to be from the earliest Cenomanian. However, in Texas, where it was described as *Scaphites hilli* by Adkins and Winton (1920) (Wiedmann, 1962, p. 213), it is latest Albian. One specimen (WSA-18423, Plate 1, Fig. 1) is from Sample 535-45, CC (5-8 cm). The other specimens (Plate 1, Figs. 2 and 5, respectively WSA-18434 and WSA-18416) are from Sample 540-44-1, 73-78 cm. They are latest Albian and probably represent the *Stoliczkaia dispar* and/or *Arrhaphoceras substuderi* Subzones. Furthermore, they render a fairly tight correlation of Core 535-45 with Core 540-44.

***Scaphites* sp. aff. *S. simplex* Jukes-Browne, 1875**
(Plate 1, Fig. 8)

Remarks. The specimen illustrated on Plate 1, Figure 8, is not described with those of Plate 1, Figures 1, 2, and 5, because the costation is different. The specimen is so finely lirate that the latex cast did not reproduce the ornamentation; it should have been photographed by the scanning electron microscope. It is lirate throughout the entire flank, unlike the specimen of Plate 1, Figure 1, which is smooth on the umbilical part of the flank. The lirae seldom bifurcate from the umbilicus but remain single completely to the umbilicus.

Age. Latest late Albian, from Sample 540-44-2, 20-22 cm. WSA-18425 also represents the *Stoliczkaia dispar* and *Arrhaphoceras substuderi* Subzones.

Suborder AMMONITINA Hyatt, 1889

Superfamily PERISPINCTACEAE Steinmann, 1890

Family BERRIASSELLIDAE Spath, 1922

Subfamily NEOCOMITINAE Spath, 1924

Genus *Karakaschiceras* Thieuloy, 1971

Type species: *Hoplites biassalensis* Karakasch, 1889.

***Karakaschiceras* sp. cf. *K. victoriense* (Imlay, 1938)**
(Plate 1, Figs. 12, 16)

Remarks. The specimen illustrated on Plate 1, Figures 12 and 16, has the dense, prosiradate, sometimes faintly sinuous ribbing of *Karakaschiceras victoriense* (Imlay, 1938). It is especially close to *K. sp. cf. K. victoriense* (Imlay) in Cantu Chapa (1976, plate 7, fig. 9, illustrated by him as *Leopoldia* sp. cf. *victoriensis*). The two figures on Plate 1 are of the same specimen but from opposite faces of a split core. Figure 12 shows the younger ornamentation, whereas Figure 16 shows the more mature ornamentation with ribbing reduced on the inner flanks as in *K. victoriense* (Imlay) and *K. biassalensis* (Karakasch,

1889), which is the type species of *Karakaschiceras* Thieuloy (1971). *K. victoriense* (Imlay) may even be a synonym of *K. biassalensis* (Karakasch). *Leopoldia aenigmatica* (Sayn, 1907, plate 3, figs. 26a-b) has similar ribbing but a different venter. The umbilicus in Cantu Chapa's specimen (Cantu Chapa, 1976) and in the specimen described herein is wider than the umbilici of *K. biassalensis* (Karakasch) and *K. victoriense* (Imlay) but is similar in this respect to other species of *Karakaschiceras* illustrated by Kemper et al. (1981), from which it differs in its denser costation and reduced costation on the umilcead part of the flank. Without a visible venter assignment of most perispinctaceans is never completely satisfactory.

Age. With this specimen, the immediate question was whether it was a species of *Berriasella*, *Leopoldia*, *Karakaschiceras*, or *Thurmanniceras*. Micropaleontologic evidence suggests that the sample is older than early Hauterivian; therefore, *Leopoldia* is eliminated, even though Trejo (1975) has reported *Calpionellopsis* ranging into the early Hauterivian. His report probably results from the occurrence of *Calpionellopsis oblonga* with *Karakaschiceras victoriense*, which as *Leopoldia victoriensis* Imlay had for 40 years been considered early Hauterivian, largely because of its assignment to *Leopoldia*. Any dating of early Hauterivian and an assignment of this specimen to *Leopoldia* are largely eliminated for Section 535-74-3. Micropaleontologists would prefer an assignment of this specimen to *Berriasella*, to agree with their D₂ (Le Hégarat and Remane, 1968) assignment of the horizon to the late Berriasian; although, if the assignment to D₂ is on the basis of first appearances only, it could be suspect in this apparently thinned section represented by these samples from Site 535.

The occurrence of a fragment of *Bochianites*, sp. cf. *B. oosteri* (Sarasin and Schöndelmayer, 1902), further restricts the assignment. *Bochianites* generally ranges from the late part of the early Valanginian through most of the late Valanginian. *B. oosteri* Sarasin and Schöndelmayer is stated to be Hauterivian by Patruilov and Avram (1976), but they also date Valanginian species of *Karakaschiceras* as Hauterivian by assigning them to the genus *Leopoldia* as do Drushtchitz and Kudryatseva (1960) and Drushtchitz and Gorbatschik (1979). The general range of *Bochianites* would be from the *Thurmanniceras campylotoxum* Zone through the *Mortoniceras trinodosum* Zone. However, Allemann, Wiedmann, and Grün (1975) show *Bochianites baculoides* to range well down into the Berriasian. Thieuloy (1971) showed *Karakaschiceras* to range through the late Valanginian, but later he (1973) suggested its range was restricted to the zones of *T. campylotoxum* (late early Valanginian) and *Saynoceras verrucosum* (early late Valanginian). I still believe the best date for the top of Section 535-74-3, WSA-18428, is early late Valanginian, although late early Valanginian is not ruled out. Late Berriasian is a remote possibility.

Family BERRIASSELLIDAE Spath, 1922

Subfamily NEOCOMITINAE Spath, 1924

Holcodiscid, genus and species indeterminate

(Plate 1, Fig. 6)

Remarks. A small specimen, WSA-18427, is ribbed and has restrictions at a very early diameter. It could be a holcodiscid.

Age. WSA-18427 (Sample 537-4-1, 1-3 cm) is not diagnostic of age, but if a holcodiscid, would be Neocomian, an age in agreement with micropaleontologic data.

Neocomitine, genus and species indeterminate

(Plate 1, Fig. 19)

Remarks. An involute, densely costate form with prosiradate, straight ribs is not identifiable, partly because the ribs have been beaded by diagenesis.

Age. Micropaleontologic data suggest that WSA-18417 is late Valanginian to late Hauterivian. It is from Sample 535-54-4, 67-68 cm.

Neocomitine, genus and species indeterminate

(Plate 1, Fig. 14)

Remarks. Just overlying the core with *Karakaschiceras* sp. cf. *victoriense* (Imlay) was a core with a fragment of a small ammonite with intercalation or bifurcation of ribbing similar to that of *Kilianella* or *Odontodiscoceras*, and with reduced or absence of umbilical tubercles. Taxonomic assignment is difficult.

Age. The most likely age for WSA-18418 would appear to be Valanginian. It is from Sample 535-73-3, 30-31 cm.

Superfamily DESMOCERACEAE von Zittel, 1895
Family DESMOCERIDAE von Zittel, 1895
Subfamily EODESMOCERINAE Wright, 1955
Genus and species indeterminate

Remarks. A small specimen, not illustrated, could belong to the genus *Barremites* or one of its predecessors, probably a predecessor because it occurs below the level of the late Valanginian.

Age. WSA-18431 is from Sample 535-79-1, 117–119 cm. By itself it is undiagnostic for age.

Superfamily ACANTHOCERACEAE Hyatt, 1900
Family ACANTHOCERIDAE Hyatt, 1900
Subfamily MANTELLICERINAE Hyatt, 1903
Genus *Acompsoceras* Hyatt, 1903

Type species: *Ammonites bochumensis* Schlüter, 1871.

Acompsoceras sp. juv.
 (Plate 1, Figs. 7, 11)

Remarks. *Acompsoceras* is a distinctive genus, typically with a row of ventrolateral clavae and a row of umbilical bullae, sometimes connected with ribs, and with all ornamentation tending to efface on the adults. The specimen of Plate 1, Figure 11, is certainly a juvenile of the genus *Acompsoceras*, and if the greater effacement of the lateral ribs is the result of sedimentary compaction, this individual could belong to the type species, *A. bochumense* (Schlüter). The specimen of Figure 7 is so small it is unidentifiable. Because it occurs just below and looks like the inner whorls of the specimen of Figure 11, it is assumed to be the same species.

Age. Middle Cenomanian; Sample 535-31-1, 84–88 cm (WSA-18419, Plate 1, Fig. 11) and Sample 535-33-1, 35–37 cm (WSA-18420, Plate 1, Fig. 7).

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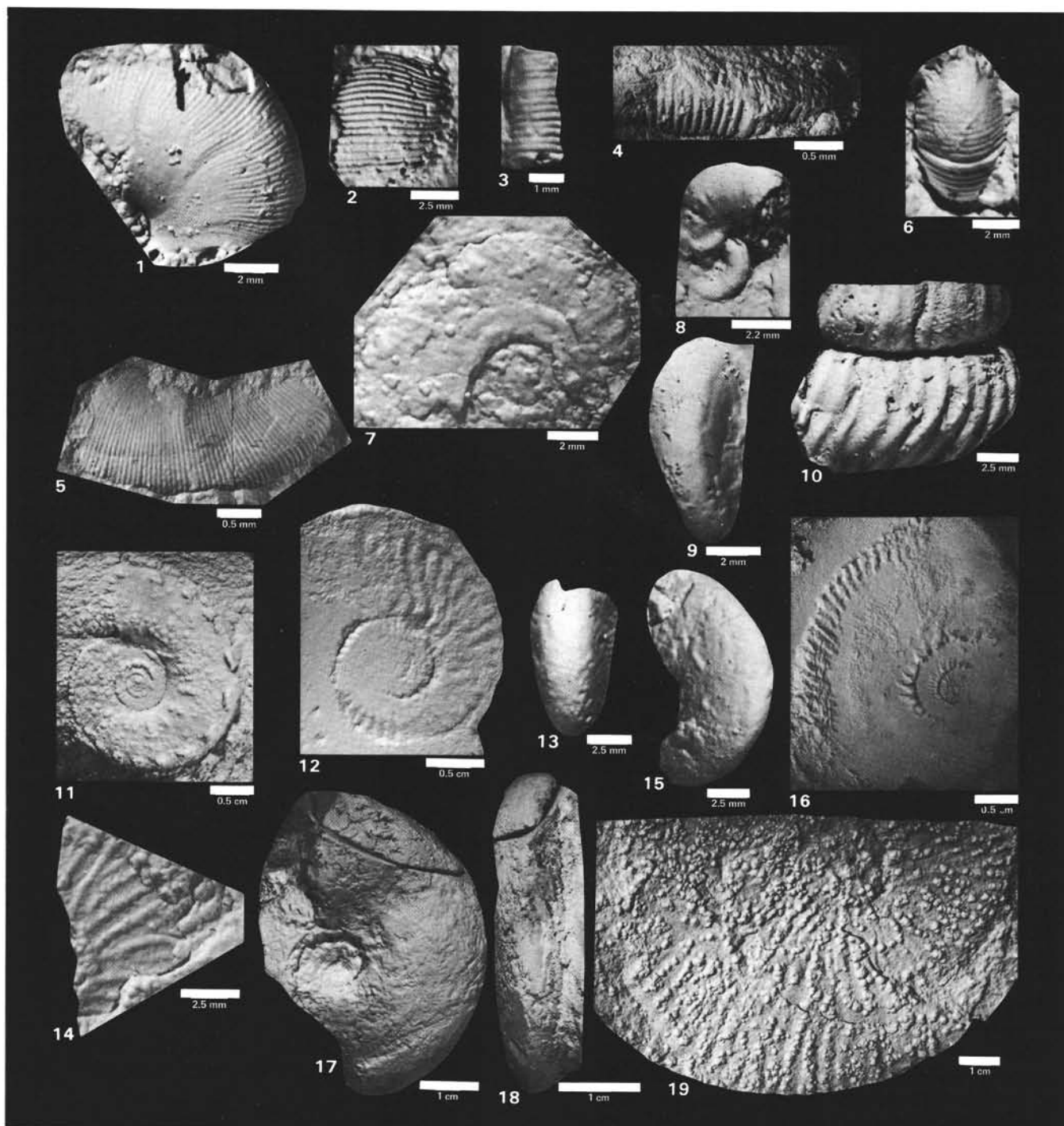


Plate 1. 1, 2, 5. *Scaphites* n. sp. aff. *S. simplex* Jukes-Browne, latest late Albian, *Stoliczkaia dispar* or *Arrhaphoceras substuderi* Subzones, (1) WSA-18423, from Sample 535-45, CC (5–8 cm), (2, 5) Sample 540-44-1, 73–78 cm (2, WSA-18434, 5, WSA-18416). 3. *Stomohamites* sp. cf. *S. virgulatus* (Brongniart, 1822), latest late Albian, Sample 535-45, CC (5–8 cm), WSA-18422. 4. *Hamitoceras*(?) sp. indet.; micropaleontologic data indicate a Hauterivian age, WSA-18432 is from Sample 535-60-21, 101–105 cm. 6. Holcodiscid, genus and species indeterminate, Neocomian, WSA-18427 from Sample 537-4-1, 1–3 cm. 7, 11. *Acompsoceras* sp. juv., middle Cenomanian, (7) WSA-18420, from Sample 535-33-1, 35–37 cm, (11) WSA-18419, from Sample 535-31-1, 84–88 cm. 8. *Scaphites* sp. aff. *S. simplex* Jukes-Browne, latest late Albian, WSA-18425, from Sample 540-44-1, 20–22. 9. *Lytoceras*, genus and species indeterminate, latest Albian, WSA-18424, from Sample 535-45, CC (5–8 cm). 10. *Turritulitoides* sp. juv. cf. *T. toucasi* (Hébert and Munier-Chalmas), latest late Albian, *Stoliczkaia dispar* or *Arrhaphoceras substuderi* Subzones, WSA-18421, from Sample 540-44-2, 0–8 cm. 12, 16. *Karakaschiceras* sp. cf. *K. victoriense* (Imlay), early part of the late Valanginian, Collection Number UT-18418, from top of Section 535-74-3. 13. *Hypophylloceras* sp. indet., probably Neocomian on micropaleontologic evidence, WSA-18426, from Sample 537-4-1, 1–3 cm. 14. Neocomitine, genus and species indeterminate, probably Valanginian; WSA-18418, from Sample 535-73-3, 30–31 cm. 15, 17–18. *Hypophylloceras* sp. cf. *H. guillanoni* (Collignon), this species is long-ranged and little understood; micropaleontologic evidence indicates an age of Bedoulian; (15) WSA-18429, from Sample 535-47-2, 20–24 cm, (17–18) WSA-18430, from Sample 535-46-1, 95–100 cm. 19. Neocomitine, genus and species indeterminate, micropaleontologic evidence suggests an age somewhere from late Valanginian to late Hauterivian, WSA-18417, from Sample 535-54-4, 67–68 cm.