DEPARTMENT OF THE INTERIOR
Hubert Work, Secretary

U. S. GEOLOGICAL SURVEY
George Otis Smith, Director

Professional Paper 150

SHORTER CONTRIBUTIONS TO GENERAL GEOLOGY

1927

W. C. MENDENHALL, CHIEF GEOLOGIST

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON
1928

THE SCAPHITES, AN UPPER CRETACEOUS AMMONITE GROUP

By JOHN B. REESIDE, Jr.

INTRODUCTION

This paper presents a summary of the principal publications dealing with the scaphites, an estimate of the generic divisions proposed, and a catalogue of the species recorded in the literature available to the writer.

The scaphites are an especially important group of ammonites because of their wide distribution and relative abundance in many of the Upper Cretaceous faunas of the world. In some areas the succession of species affords a more useful basis for faunal subdivision of the strata than any other single group of fossils, and in many other areas it is a very valuable auxiliary to the other groups. A fairly satisfactory intercontinental correlation has been based on the scaphites alone.

The literature dealing with the scaphite group includes a large part of the papers that describe Upper Cretaceous cephalopods, though many such papers do not treat the scaphites to any greater extent than to describe or record species and do not enter into the m[illegible] questions of classification and phylogeny.

The wr[illegible]realizes, from the errors in the delimitation and chronologic assignment of American species noted in the works of European writers, that he assu[illegible]nsiderable risk of falling into similar errors in attempting to deal with European species with which he has little or no first-hand acquaintance. He has had the temerity to essay in the appended catalogue of species a decision between conflicting statements in the European literature, both as to identity and as to chronologic assignment of various species, and bespeaks a kindly indulgence for such errors as may be included.

TAXONOMIC HISTORY OF THE SCAPHITES

Parkinson [1] in 1811 applied the name *Scaphites* to "a fossil concamerated shell, commencing with spiral turns, the last of which, after being elongated, is reflected back toward the spiral part." He figured an example of the genus which was afterward referred to the species *aequalis* Sowerby, thereby making this species the genotype.

For many years afterward all forms of Mesozoic cephalopods that began with a normal ammonitic coil, departed from it, and bent back again to form a hook without leaving the original plane of coiling were referred to *Scaphites* Parkinson, though it was recognized by many students that such species as *ivanii* Puzos differed notably from the genotype. D'Orbigny,[2] for example, separated the species known in 1840 into two sections:

> Elongati, whose spire is composed of nonembracing whorls, completely uncovered, and whose crook is very long. (*S. ivanii.*)
>
> Breves, whose spire is composed of embracing whorls, almost entirely covered, and whose crook is very short. (*S. aequalis, compressus, constrictus, hugardianus.*) [Translated.]

With the advance in knowledge of ammonites, due to the labors of numerous students, and the resultant efforts to arrive at a classification expressive of genetic relationship, various assignments have been given to the scaphites by different authors—indeed, are still given—for there is by no means complete agreement concerning the problems involved.

Neumayr [3] in 1875 considered the scaphites, with the exception of *S. ivanii*, to be a natural group and on the form of the aptychus and presence of auxiliary lobes in the suture to belong to the perisphinctid stem. On the form of the inner whorls he considered the group to have been derived from *Olcostephanus* Neumayr.

Meek [4] in 1876 discussed in detail the genus *Scaphites*, referring it as the sole genus to the family Scaphitidae Meek but not indicating any relationship to other groups. He had already [5] proposed the subgenus *Discoscaphites* to include certain forms that presented differences from the typical species, and he now proceeded to further elaboration. Meek proposed the subgenus *Macroscaphites* for the group of *Scaphites ivanii* Puzos, and it has been considered since under that name by most students as entirely distinct from the scaphites. He restricted *Scaphites*, in its

[1] Parkinson, James, Organic remains of a former world, vol. 3, p. 145, pl. 10, fig. 10, 1811.

[2] D'Orbigny, Alcide, Paléontologie française, 1st ser., Terrain crétacé, vol. 1, p. 514, 1840.

[3] Neumayr, Melchior, Die Ammoniten der Kreide und die Systematik der Ammonitiden: Deutsche geol. Gesell. Zeitschr., vol. 27, p. 924, 1875.

[4] Meek, F. B., Invertebrate Cretaceous and Tertiary fossils of the upper Missouri country: U. S. Geol. Survey Terr. Rept., vol. 9, pp. 413–417, 1876.

[5] Meek, F. B., A preliminary list of fossils collected by Dr. Hayden in Colorado, New Mexico, and California: Am. Philos. Soc. Proc., vol. 11, p. 429, 1870.

95489°—28——3

narrower sense, to the rank of a subgenus with three sections—(*a*) group of *Scaphites aequalis* Sowerby, with coiled part relatively small, narrow umbilicus, round venter, and a single row of nodes, if any, on the margin of the living chamber; (*b*) group of *Scaphites nodosus* Owen, with coiled part relatively large, deflected part short, venter more or less flattened, with a row of nodes on the margin, and a second row of nodes near the umbilicus; (*c*) group of *Scaphites trinodosus* and *S. tridens* Kner, with three rows of nodes on the rounded periphery. Under the subgenus *Discoscaphites* Meek proposed to place two sections—(*a*) group of *Scaphites conradi* Morton, with narrow umbilicus, coiled part forming most of the much compressed shell, flattened periphery, and four to nine rows of nodes on each flank, the outer row being the largest; (*b*) group of *Scaphites cheyennensis* Owen, much like section *a* but with relatively wide umbilicus and little-deflected body chamber. Meek in his specific descriptions includes in *Discoscaphites* species that do not possess the numerous rows of nodes, relying on other characters for the assignment. He remarks that some of his groups might appropriately be made separate genera.

Zittel [6] in 1885 placed the genus *Scaphites* under the Stephanoceratidae of Neumayr but apparently was doubtful of its exact relationship, for he separated the discussion of this genus and *Crioceras* Léveillé from that of the other members of the family by a rule. Zittel put into *Scaphites* "with the exception of *Macroscaphites*, whose suture agrees completely with *Lytoceras*, * * * all uncoiled Cretaceous ammonites distinguished by a hook-shaped, reflected living chamber, and whose suture shows auxiliary lobes." [Translated.]

H. Douvillé,[7] according to Grossouvre,[8] assigned *Scaphites* on the basis of the sutures to the family Pulchellidae Douvillé and compared the young of certain species to *Stoliczkaia dispar* (D'Orbigny) Neumayr. Douvillé, because of the presence of tubercles on the shell, rejected an assignment to the family Lytoceratidae Neumayr favored by some students on account of the bifid lobes of the adult suture.

Grossouvre [9] in 1894 placed the genus in his family Acanthoceratidae on the basis of the suture and the sculpture. He consolidated Douvillé's two groups Pulchellidae and Acanthoceratidae and therefore followed Douvillé in his assignment. Grossouvre included in the genus

forms which in youth resemble *Stoliczkaia dispar*, have a narrow umbilicus, embracing whorls, rounded on the periphery, ornamented with simple ribs which increase on the external region of the flanks by intercalation or by bifurcation. The last whorl separates from the others, forms a straight part, then bends back into a crook in such a way that the coiled part faces the mouth; the latter is ordinarily a little contracted, supplied with a ventral apophysis, dorsal apophysis, and sometimes lateral lappets. On the straight part and the bend, the ornamentation is often modified and becomes nodose; this character is especially accentuated in the latest forms. [Translated.]

Logan [10] in 1899 discussed *Scaphites*, accepting the genus as a member of the Stephanoceratidae and regarding it as a progressive rather than a decadent or retrogressive group, because the sutures do not show degeneration but progression if it is assumed that the later scaphites descended from the earlier. Logan studied the ontogeny of *Scaphites nodosus* Owen and thought he saw in it evidence of a development through *Anarcestes*, *Tornoceras*, *Glyphioceras*, *Gastrioceras*, *Paralegoceras*, and *Pronorites*. Later stages he thought to resemble *Scaphites warreni*, and at the end of the fourth whorl the adult *nodosus* form is reached.

Hyatt [11] in 1900 accepted the genera *Scaphites* Parkinson and *Discoscaphites* Meek and proposed *Anascaphites* with *Scaphites ventricosus* Meek and Hayden as the genotype and *Jahnites* with *Scaphites geinitzi* D'Orbigny var. *binodosus* Roemer of Jahn [12] as the genotype. Hyatt gave no diagnoses of the genera but assigned them to the family Scaphitidae Meek and placed them between the family Macroscaphitidae Hyatt and the family Lytoceratidae Neumayr. Hyatt defined the family as follows:

> Two or more rows of tubercles developed in the ephebic or gerontic stage; costae continuous across the venter; aperture evenly constricted on the sides and with a slight, broad rostrum on the venter, caused by a recession of the lateral curves. There is a dorsal lappet, but this is long and bent only in *Jahnites*. The young and sometimes ephebic stages of *Scaphites* possess the costae, form, and general aspect of *Pachydiscus*, and there are species transitional between them.

J. P. Smith [13] in 1901 expressed the opinion that the genus *Scaphites* is polyphyletic and that some of the species seem to have come from a *Hoplites*-like ancestor, though others have larval stages similar to those of *Lytoceras* and *Baculites* and probably have a common origin with them.

W. D. Smith [14] in 1905 published the results of his work on the young stages of *Scaphites nodosus* Owen and *S. condoni* Anderson. He does not accept Logan's views on the derivation of *Scaphites*, holding that the sutures alone are insufficient proof of derivation, and does not see the resemblances which Logan

[6] Zittel, K. A., Handbuch der Palaeontologie, vol. 2, p. 480, 1885.

[7] A definite citation is not given but is probably Douvillé, Henri, Notes pour le cours de paléontologie professé à l'École de mines en 1889–1890, given a limited circulation in 1890.

[8] De Grossouvre, Albert, Les ammonites de la craie supérieure: Carte géol. France Mém., Recherches sur la craie supérieure, pt. 2, Paléontologie, p. 238, 1894.

[9] Idem, p. 238.

[10] Logan, W. N., Contributions to the paleontology of the Upper Cretaceous series: Field Mus. Nat. Hist. Pub. 36, Geol. ser., vol. 1, pp. 207–211, pls. 22, 23, 1899.

[11] Hyatt, Alpheus, Cephalopoda, in Eastman, C. R., Textbook of paleontology by Karl von Zittel, 1st ed., vol. 1, p. 572, 1900.

[12] Jahn, Jaroslav, Ein Beitrag zur Kenntniss der Fauna der Priesener Schichten der böhmischen Kreideformation: K.-k. geol. Reichsanstalt Jahrb., vol. 41, pp. 179–184, text figs. 1–5, 1892.

[13] Smith, J. P., The larval coil of *Baculites:* Am. Naturalist, vol. 35, p. 45, 1901.

[14] Smith, W. D., The development of *Scaphites:* Jour. Geology, vol. 13, pp. 635–654, 1905.

finds. He likewise considers the genus a degenerate group, not progressive, because it unrolls, has a reduced number of sutural elements, and is spinose in many species. Smith finds from his study of the form of the whorls, sculpture, and sutural characters that "the *Scaphites nodosus* group is to be considered as having come from some member of the Stephanoceratidae." [15] The young of this species show a development from a triaenidian first lateral lobe to a dicranidian, and there is a constriction at the end of the first whorl. Regarding the group of *Scaphites condoni*, Smith, from the character of the young stages, believes it to have a common ancestor with *Baculites* and *Lytoceras*, or with *Baculites* to have descended from *Lytoceras*. He says: "The likeness of the young stages of *S. condoni* * * * to the young of *Baculites* and *Lytoceras* is more in the general aspect of the shell rather than in any specific characters." [16] The *condoni* group differs from the *nodosus* group chiefly in having bifid lobes throughout, whereas in the *nodosus* group the first lateral lobe of the suture is supposed to develop from a trifid to a bifid form, and in having a wide umbilicus and suppressed ribs as compared with the narrow umbilicus and prominent ribs of the *nodosus* group. The genus therefore, according to Smith, is polyphyletic, the degenerate, phylogerontic descendant of several stocks.

Pervinquière [17] in 1907 considered scaphites of the type of *Scaphites aequalis* Sowerby on the basis of form, sculpture, and suture to have been derived from *Olcostephanus* Neumayr or *Holcodiscus* Uhlig, thus reverting to the opinion of Neumayr. He rejected an attachment to the Lytoceratidae because of the presence of several auxiliary lobes in the external suture and several lobes in the internal suture, and to *Stoliczkaia* Neumayr because of the form of the young. For the group like *Scaphites cunliffei* Forbes, Pervinquière favored an assignment to the Lytoceratidae. *Scaphites cunliffei* has a discoid form, a wide umbilicus, a suture whose first lateral lobe passes directly from the simple to the bifid stage, and a first whorl with a constriction like that of *Baculites* and *Lytoceras*. The features antagonistic to the assignment are the strong sculpture, at least in comparison with *Lytoceras*, and the presence of several internal lobes in the suture. Pervinquière noted that some of the species of *Discoscaphites* Meek have a discoid form and wide umbilicus, but he was unwilling to accept Meek's name because the development of the American forms was not known. He was unwilling also to include in it *S. cunliffei* because the living chamber of the *cunliffei* group had not been found.

[15] Smith, W. D., op. cit., p. 648.

[16] Idem, p. 651.

[17] Pervinquière, Léon, Études de paléontologie tunisienne, pt. 1, Céphalopodes des terraines secondaires, p. 116, Paris, 1907.

Yabe [18] in 1910 proposed the genus *Yezoites* to include scaphites with a suture possessing a single-pointed internal lobe and a very high internal saddle next to it. The external suture, form, and other characters are like those of the normal scaphites. Yabe considered the internal suture to be the most significant criterion in determining the relationship of scaphites. He rejected Hyatt's classification, primarily because of the lack of elaboration of the genera. The full diagnosis of *Yezoites* is as follows:

> Shell as in *Scaphites* Parkinson, consisting of more or less widely umbilicate spiral whorls and of a free, at first straight and then reflected last whorl. Border of the aperture either only thickened or with a constriction and lateral lappets. The external part of the suture as in *Scaphites;* the internal part with high saddle and small notches in it.
>
> Here belong three species, from the *Scaphites* beds of Hokkaido, which may be grouped in two sections:
>
> 1. Umbilicus of the spiral whorls mostly covered by the flanks of the loose whorl; border of the aperture simply thickened.
>
> 2. Umbilicus of the spiral whorls entirely open; border of the aperture with constriction and lateral lappets. [Translated.]

Yabe did not assign a systematic position to either *Scaphites* or *Yezoites*.

Nowak [19] in 1911 reviewed briefly the work of many previous students of the scaphites. He did not consider *Yezoites* Yabe a valid genus, believing from the work of Pervinquière and W. D. Smith, cited above, that a high internal saddle may be present in groups that by other characters give strong evidence of different derivation. Nowak expressed no opinion as to the ideas of Meek and Hyatt regarding *Scaphites*. Contrary to Yabe's opinion, Nowak believed that although the form of internal suture should not be neglected in studying scaphites, as has so often been done, it is not the most important criterion but must be considered in conjunction with the form of the shell, the sculpture, and the external suture. The primary feature to be considered in determining relationship is the ontogenetic development as a whole. Nowak compared *Scaphites aequalis* Sowerby, *S. tridens* Kner, and *S. constrictus* Sowerby with the representatives of other genera and concluded that at least three evolutionary series are represented, similar only in possessing an abnormal living chamber—the group of *S. aequalis*, derived from *Holcostephanus;* the group of *S. tridens*, derived from *Acanthoceras;* and the group of *S. constrictus*, derived from *Hoplites*. For these groups Nowak proposed the names *Holcoscaphites*, *Acanthoscaphites*, and *Hoploscaphites*, respectively. The diagnoses of these genera given by

[18] Yabe, Hisakatsu, Die Scaphiten der Oberkreide von Hokkaido: Beitr. Paläontologie Oesterr.-Ungarns u. des Orients, vol. 23, pp. 159–174, pl. 15, 1910.

[19] Nowak, Jan, Untersuchungen über die Cephalopoden der oberen Kreide in Polen, pt. 2, Die Skaphiten: Acad. Sci. Cracovie Bull. internat., année 1911, sér. B, pp. 547–588, 1912.

Nowak will perhaps present in briefest possible form his reasons for their institution:

Genus *Holcoscaphites*.—Shell with narrow umbilicus; umbilicus broader in youth, narrower in age; whorls stout, last living chamber abnormal. The sculpture of the normal whorls, especially in the young stages, like *Holcostephanus*. [That is, the ribs pass without nodes from the umbilicus, end at the edge of the venter with a nodose thickening, and then split into weaker secondary ribs. Later the ribs of the venter and flank are equal.] Lobes and saddles in external part [of suture] gradually smaller from the outside [of the whorl] inward; the same in the internal part but in the opposite direction. The bifid lobes develop out of trifid; the internal lobe trifid. Species: *H. hugardianus* D'Orbigny, *aequalis* Sowerby, *geinitzi* D'Orbigny, *fritschi* Grossouvre, *geinitzi* var. *lamberti* Grossouvre (Jahn), *?compressus* D'Orbigny, *auritus* Schlüter, *hippocrepis* De Kay, cf. *meslei* Grossouvre (Pervinquière), *inflatus* Roemer, *texanus* Roemer, *nodosus*, Owen, and most of Yabe's species.

Genus *Acanthoscaphites*.—Whorls always somewhat higher than wide, last living chamber abnormal. Sculpture consists of straight or only slightly bent ribs; in youth there are principal ribs which begin at the umbilicus with a nodose thickening and pass over the venter to the other side and auxiliary ribs which are intercalated between these on the venter. Later the auxiliary ribs become longer and, like the principal ribs and the umbilical nodes, disappear. In adult specimens there are [ventral] nodes. The suture possesses an external lobe, two lateral lobes, and one to two auxiliary lobes. The external lobe is longest; next in length comes the first lateral, which is bifid; the trifid second lateral and the following lobes are strikingly shorter than the first lateral. Three internal saddles, the first highest and broadest, the others progressively smaller. The bifid lobes develop out of trifid. Lobes and saddles strongly incised. Species: *A. tridens* Kner, *?gibbus* Schlüter, *roemeri* D'Orbigny, *cunliffei* Forbes, *?ornatus* Roemer. Species falling within this genus are certainly much more numerous, but their suture lines are mostly unknown.

Genus *Hoploscaphites*.—Flat forms with involute whorls; the umbilicus in youth broader, then narrower. Sculpture consists of arched ribs, which at the middle of the flank and on the venter are bent forward; they fork at different heights on the flank without forming nodes. Increase in the number of ribs occurs also by intercalation. Suture consists of an external lobe, two lateral lobes, and two to three auxiliary lobes. The first lateral lobe is usually highest, the external lobe next, and then the second lateral lobe, which reaches scarcely one-third the height of the first lateral lobe. The first internal saddle small and narrow, the second very broad and higher than the first. The lobes and saddles are not much divided and incised. The bifid lobes have arisen from trifid lobes. Species: *H. rochatianus* D'Orbigny, *?africanus* Pervinquière, *thomasi* Pervinquière, *?aquisgranensis* Schlüter, *?monasteriensis* Schlüter. *pungens* Binckhorst, *constrictus* Sowerby.

Whether scaphites do not occur also in other ammonite genera and families may be established only by further investigation, [Translated.]

J. P. Smith [20] in 1913 accepted the genera *Scaphites* Parkinson, *Discoscaphites* Meek, and *Jahnites* Hyatt, placing them in the subfamily Scaphitinae Meek of the family Cosmoceratidae Zittel. He gives a diagnosis of the subfamily only, as follows:

Whorl closely coiled in youth, opening out at maturity into a hook-shaped body chamber. Form robust, thick-set, involute, surface highly ornamented with ribs and knots. Septae finely digitate, usually with several auxiliary lobes.

Frech [21] in 1915 sought to group the scaphites of the European and American Cretaceous into form groups characteristic of the successive zones and exhibiting a progressive increase in size and in complexity of sculpture from the older beds to the younger. The form groups do not imply community of descent. Frech makes out a case of nearly perfect parallelism between the two sides of the Atlantic, proposing to unite under the same names a number of species previously separated. His grouping is as follows:

1. Group of *S. aequalis*. Small species with threadlike ventral ribs and fewer but stronger lateral ribs: *S. aequalis, geinitzi, larvaeformis, warreni*, and *warreni* var. *silesiaca*. Cenomanian and Turonian.
2. Group of *S. vermiformis*. Medium-sized species with coarse sculpture whose lateral ribs end in nodes: *S. lamberti, meslei, kieslingswaldensis, vermiformis*. Emscherian and lower Senonian.
3. Group of *S. binodosus*. Forms with two rows of lateral nodes on each flank and with ventral ribs, which are partly obliterated: *S. binodosus, inflatus, binodosus* (*nodosus*) var. *brevis*, var. *quadrangularis*, var. *plenus*. Lower Senonian. Possibly also *S. gibbus* of the upper Senonian.
4. Group of *S. constrictus* (*Discoscaphites*), presenting only slight modifications from the *binodosus* group. Compressed forms with narrow venter and high sides; dichotomous lateral ribs on the inner whorls, two rows of nodes on the living chamber (umbilical and external), in some species accompanied by suppression of the ribs.
   (*a*) Ribs on the septate whorls; living chamber smooth except for two rows of nodes: *S. hippocrepis, aquisgranensis*. Lower Senonian.
   (*b*) Ribs on the septate and unseptate whorls; the two rows of nodes irregularly developed, in some species distinct throughout (*S. compressus* Roemer), in others with umbilical row suppressed (*S. constrictus, roemeri, conradi, abyssinus*). Middle and upper Senonian.
5. Group of *S. pulcherrimus*, with three to four rows of nodes on each flank, one row on the ventral margin; numerous ribs. Upper Senonian.
   (*a*) Most species have the four rows of nodes (*S. spiniger, pulcherrimus*), though some have more numerous *Trachyceras*-like rows of nodes (*S. cheyennensis, spinosissimus*).
   (*b*) One species, reaching the largest size, has between the two rows of lateral nodes a third row of less numerous but very strong nodes in the plane of symmetry (*S. tridens*).

Nowak [22] in 1916 dealt with the importance of the scaphites in the subdivision of the Upper Cretaceous. He disagreed with Frech as to the desirability of Frech's form groups, because the similarities used by Frech are largely superficial and take no account of genetic relationships. Nodes appear in different groups at different times and with different intensity, and the maximum development occurs at different times. Nowak considered the high point of develop-

[20] Smith, J. P., Ammonoidea, in Eastman, C. R., Textbook of paleontology by Karl von Zittel, vol. 1, 2d ed., p. 670, 1913.

[21] Frech, Fritz, Ueber Scaphites: Centralbl. Mineralogie, Jahrg. 1915, No. 18, pp. 553–568; No. 21, pp. 617–621, 1915.

[22] Nowak, Jan, Zur Bedeutung von *Scaphites* für die Gliederung der Oberkreide: K.-k. Geol. Reichsanstalt Verh., Jahrg. 1916, No. 3, pp. 56–67, 1916.

ment to have come in his *Holcoscaphites* in the Cenomanian, in his *Acanthoscaphites* in the middle of the *Mucronatus* zone (upper Campanian), and in his *Hoploscaphites* in the very late Cretaceous (Maestrichtian). Some of the species of *Acanthoscaphites* reach much larger size than any of the later *Holcoscaphites*.

Concerning the relation between the European and American species, Novak added to the *aequalis* group, besides *S. larvaeformis* Meek and Hayden and *S. warreni* Meek and Hayden, *S. gillisi* Anderson, *S. klamathensis* Anderson, *S. condoni* Anderson, and the Emscherian *S. vermiformis* Meek and Hayden. Nowak did not accept Frech's consolidation of *S. binodosus* Roemer and *S. nodosus* Owen but assigned *S. nodosus* var. *plenus* Meek to *S. tridens* Kner var. *quadrispinosus* Geinitz, and *S. nodosus* var. *quadrangularis* Meek and Hayden to *S. roemeri* D'Orbigny. He did not accept Frech's combination of *S. roemeri* D'Orbigny and *S. nicolleti* Meek nor of *S. inflatus* Roemer and *S. nodosus* Owen var. *brevis* Meek. He accepted the identity of *S. conradi* var. *intermedius* Meek with *S. constrictus* and also assigned to it *S. nicolleti* Meek, *S. mandanensis* (Morton), and *S. abyssinus* (Morton). Nowak on the basis of the scaphites and other fossils correlated the American Fox Hills sandstone with the Maestrichtian and the upper part of the Pierre shale with the upper Campanian, a more definite correlation than that made by Frech.

In tabular form Nowak's grouping is as follows:

Distribution of the scaphites according to J. Nowak

Age		Holcoscaphites	Acanthoscaphites	Hoploscaphites
Senonian.	Maestrichtian.			constrictus, tenuistriatus. [=nicolleti, conradi intermedius, mandanensis, abyssinus.] cheyennensis. conradi.
	Campanian.		cunliffei. tridens, trinodosus. [=nodosus plenus.] roemeri. [=nodosus quadrangularis.] pulcherrimus. spiniger.	monasteriensis. gibbus.
		inflatus.		aquisgranensis.
	Santonian.	hippocrepis.		binodosus.
Coniacian-Emscherian.		meslei. lamberti.		potieri. arnaudi.
Turonian.		auritus. geinitzii [=gillisi]. warreni. larvaeformis. vermiformis.		
Cenomanian.		aequalis [=? condoni]. [=pseudoaequalis.]		?rochatianus. ?africanus.
Upper Gault. [Vraconian.]		hugardianus.		

Spath [23] in 1922 recognized Nowak's three genera as valid. He suggested that possibly some Campanian members of the genera *Hoploscaphites* and *Acanthoscaphites* have been derived from a group of desmoceratids to which he gave the name *Menuites* Spath (including *Ammonites menu* Forbes, *A. stüri* Redtenbacher, *A. portlocki* Sharpe). He believed that other late Senonian scaphites now included in Nowak's genera have come from the group of *Hoplites vari* Schlüter (*Hoplitoplacenticeras* Paulcke).

The writer, in recent papers,[24] has accepted Nowak's divisions of the scaphites as valid, though not accepting his names *Holcoscaphites* and *Hoploscaphites* (see below, p. 27), and has proposed *Desmoscaphites* to include scaphites with the following features: Shell of moderate size with stout, well-rounded whorls; umbilicus small; sculpture on earlier whorls of stout rounded ribs, which increase both by forking and by intercalation and are more or less arched forward on the venter, and whose orderly sequence is interrupted by six to eight constrictions per whorl; sculpture on later whorls without constrictions and finer; suture has large siphonal lobe, first lateral saddle about same size as siphonal lobe and unsymmetrically trifid, first lateral lobe a little shorter than the siphonal lobe and symmetrically trifid, remaining elements small. *Desmoscaphites*, on the basis of the constrictions on the early whorls and the suture, is believed to have come from a desmoceratid stock.

[23] Spath, L. F., On the Senonian ammonite fauna of Pondoland: Roy. Soc. South Africa Trans., vol. 10, pp. 123, 136, 1922.

[24] Reeside, J. B., jr., The cephalopods of the Eagle sandstone and related formations in the Western Interior of the United States: U. S. Geol. Survey Prof. Paper 151, pp. 20–21, 1927; Cephalopods from the lower part of the Cody shale of Oregon Basin, Wyo.: U. S. Geol. Survey Prof. Paper 150, pp. 5–6, 1927.

PRESENT STATUS OF THE GROUP

The summary of the more important papers relating to the scaphites given above shows that, *Macroscaphites* not included, nine generic names have been proposed:

Scaphites Parkinson, 1811.
Discoscaphites Meek, 1870.
Anascaphites Hyatt, 1900.
Jahnites Hyatt, 1900.
Yezoites Yabe, 1910.
Holcoscaphites Nowak, 1912.
Acanthoscaphites Nowak, 1912.
Hoploscaphites Nowak, 1912.
Desmoscaphites Reeside, 1927.

Scaphites Parkinson was sufficiently comprehensive in its original definition to include all the later names and has the species *aequalis* Sowerby as the genotype. (See pl. 10, figs. 13–15.)

Discoscaphites Meek was established on the basis of the compressed form of the shell and the presence of numerous rows of nodes on the ribs, though in the actual application of the name by Meek species without nodes on the flanks were included in the genus. The genotype is the species *conradi* Morton. (See pl. 9, figs. 2–7.)

Anascaphites Hyatt was defined only by the citation of the species *ventricosus* Meek and Hayden as the genotype. It is a very stout shell, without nodes but with numerous relatively fine, sharp ribs, and attains a large size for the group. The writer [25] has studied and described typical examples of the species and believes that the suture, the various stages in the development of the shell, and the adult features ally it closely with *Scaphites aequalis* and that it does not deserve generic rank. (See pl. 10, figs. 1, 2.)

Jahnites Hyatt was based on *Scaphites geinitzi* D'Orbigny var. *binodosus* Roemer as elaborated by Jahn, who found it to have a relatively long, bent dorsal lappet, apparently the fundamental character which Hyatt had in mind in establishing the genus. (See pl. 10, fig. 3.) However, a dorsal lappet occurs in species of seemingly distinct derivation, differing in them only in length. The species *ventricosus, warreni, stantoni, nodosus, nicolleti* and some European species show a distinct dorsal lappet, bent much as Jahn's figures show it, though shorter. The feature is therefore hardly of generic value.

Yezoites Yabe was based on scaphites like *S. aequalis* in most characters but possessing an internal suture with a long single-pointed dorsal lobe; a very high, somewhat dissected saddle next to it; and a small second internal lobe and saddle. The species *planus* Yabe was used by Yabe as the chief basis for his discussion and is to be taken as the genotype. (See pl. 10, figs. 4–9.) As Nowak has shown, the distinctive features occur in scaphites that from other characters seem to have had differing derivations, and it is unwise to ignore everything but the internal suture in seeking generic characters.

Holcoscaphites Nowak was founded upon *Scaphites aequalis*, which, though not so designated, must be taken as the genotype. It includes chiefly smaller shells with narrow umbilicus; stout whorls; ribs that form a nodose thickening or actual node at the margin of the venter and split into finer ribs on the venter; suture with parts gradually smaller from the median plane of the shell to the line of involution and with bifid lateral lobes in the adult stages derived from trifid embryonic lobes; suture only moderately incised. (See pl. 9, fig. 1.) This generic group certainly appears to be valid, but inasmuch as *Scaphites* Parkinson was previously founded on the same genotype it is not in accord with the usual practice to drop the earlier name, which should rather be restricted to the scope of the later definition. This group should therefore be designated *Scaphites* Parkinson emended. It is interesting to note that this restricted genus has nearly the compass of Meek's section *a* of *Scaphites* s. s. (See p. 22.)

Acanthoscaphites Nowak, founded on the species *tridens* Kner, includes shells that generally attain a large size for the group, with whorls somewhat higher than wide; ribs straight, with nodose thickening near the umbilicus, intercalated secondary ribs, and in the adults lateral and ventral nodes; suture with long external lobe, long bifid first lateral lobe, and much shorter second lateral and auxiliary lobes; three internal saddles, decreasing regularly from the dorsal lobe to the line of involution; bifid lobes in the adult suture developed from trifid embryonic lobes; suture much incised. (See pl. 11, figs. 1, 2.) This generic group appears to be valid. Meek long ago had set it apart as his sections *b* and *c* of *Scaphites* s. s. (See p. 22.)

Hoploscaphites Nowak, founded on the species *constrictus* Sowerby, includes compressed shells with involute whorls, mostly of moderate size for the group; ribs curved, increasing in number by intercalation and by forking; nodes few or numerous on the flanks; suture usually with first lateral lobe longest, external lobe next in length, and second lateral and auxiliaries much shorter; first internal saddle narrow, second wide; suture only moderately incised; bifid lobes in the adult arise from trifid embryonic lobes. (See pl. 9, figs. 8–10.) This group also seems to be valid, but inasmuch as Nowak puts into it all of Meek's species of *Discoscaphites*, it seems to the writer that Meek's earlier name has

[25] Reeside, J. B., jr., Cephalopods from the lower part of the Cody shale of Oregon Basin, Wyo.: U. S. Geol. Survey Prof. Paper 150, pp. 6–7, pls. 1–8, 1927.

precedence. There appears to be no doubt that Nowak is correct in associating the discoscaphites with his *Hoploscaphites*, and as Frech previously had used the generic name *Discoscaphites* for the species *constrictus*, the usage of the name for the whole group may be considered established.

Desmoscaphites Reeside, with the species *bassleri* Reeside as the genotype, includes moderately large shells with constrictions on the early whorls and with a symmetrically trifid first lateral lobe in the adult suture. It is therefore distinct from the other divisions and is a valid genus. (See pl. 10, figs. 10–12.)

Of the nine names proposed there are, in short, four apparently valid. These designate four genera, which represent three families and four subfamilies:

Stepheoceratidae:
  Scaphitinae:
    Scaphites Parkinson (*Holcoscaphites* Nowak, *Anascaphites* Hyatt, *Jahnites* Hyatt, *Yezoites* Yabe).
Desmoceratidae:
  Silesitinae:
    Desmoscaphites Reeside.
Cosmoceratidae:
  Hoplitinae:
    Discoscaphites Meek (*Hoploscaphites* Nowak).
  Acanthoceratinae:
    Acanthoscaphites Nowak.

The following assignment of species to generic groups is based for the European species largely on Nowak's assignments and for the American species in part on Nowak's assignments but in larger part on long-accepted assignments and comparisons such as those made by Meek. Whether all the forms customarily placed in the species *nodosus* Owen belong to *Acanthoscaphites* may be doubted, but this comprehensive species needs extensive revision before much can be said of it with confidence, and in the meanwhile it may be left as Nowak assigned it.

Scaphites: aequalis, aequalis var. turonensis, aquilaensis, aquilaensis var. costatus, aquilaensis var. nanus, auritus, compressus?, condoni, condoni var. appressus, evolutus, formosus, fritschi, geinitzi, geinitzi var. intermedia, gillisi, gracilis, hilli, hippocrepis, hippocrepis var. crassus, hippocrepis var. pusillus, hippocrepis var. tenuis, hugardianus, inermis, inflatus, kieslingswaldensis, kingianus, klamathensis, lamberti, larvaeformis (Meek and Hayden), larvaeformis (Frech), leei, leei var. parvus, levis, meriani?, meslei, mullananus, obliquus, peroni, peroni var. inornatus, perrini, planus (Roman and Mazeran), planus (Yabe), planus var. gigas, pseudoaequalis, puerculus, puerculus var. teshioensis, rochatianus, roguensis, semicostatus, septemcostatus, similaris, similis, stantoni, tenuicostatus, texanus, thomasi, ventricosus, ventricosus var. stantoni, ventricosus var. depressus, ventricosus var. oregonensis, ventricosus var. interjectus, vermiformis, vermiformis var. binneyi, warreni, warreni var. silesiaca, yonekurai, yokoyamai.

Desmoscaphites: bassleri, novimexicanus.

Discoscaphites: abyssinus, africanus?, angulatus, aquisgranensis, arnaudi, binodosus, cheyennensis, conradi, conradi var. gulosus, conradi var. intermedius, conradi var. petechialis, constrictus, constrictus var. crassus, constrictus var. quiriquinensis, constrictus var. vulgaris, diversesulcatus, gibbus, haugi?, iris?, mandanensis, monasteriensis, nicolleti, niedzwiedzkii, nodosus (Lopuski)?, potieri, pungens, tenuistriatus, verneuilli?.

Acanthoscaphites: cunliffei, nodosus (Owen), nodosus var. brevis, nodosus var. plenus, nodosus var. quadrangularis, pulcherrimus, quadrispinosus, reesidei?, roemeri (D'Orbigny), spiniger, subglobosus?, tridens, tridens var. bispinosus, trinodosus, trispinosus, varians.

Unassigned "Scaphites": brahminicus, idoneus?, ornatissimus, ornatus, pavana, plicatellus, pygmaeus, roemeri (Brauns), spinosissimus, tuberculatus, verrucosus, worthensis?.

CATALOGUE OF THE SPECIFIC NAMES APPLIED TO SCAPHITES

The following catalogue of the specific names applied to scaphites includes all that the writer has met in a perusal of the literature at his disposal. For some of the species no generic assignment is given, owing to the facts that the data given in the literature are insufficient and that the writer lacks adequate material on which to base a conclusion.

Synonyms and abandoned names are shown in italics; valid names are shown in heavy-face type.

abyssinus (Morton) Meek. **Discoscaphites.**

Ammonites abyssinus, Morton, S. G., Description of some new species of organic remains of the Cretaceous group of the United States: Acad. Nat. Sci. Philadelphia Jour., vol. 8, p. 209, pl. 10, fig. 4, 1841.

Scaphites abyssinus, Meek, F. B., and Hayden, F. V., Smithsonian check list, 1860.

Scaphites (Discoscaphites) abyssinus, Meek, F. B., Invertebrate Cretaceous and Tertiary fossils of the upper Missouri country: U. S. Geol. Survey Terr. Rept., vol. 9, p. 441, pl. 35, figs. 2, 4, 1876.

Fox Hills sandstone. [Maestrichtian.]

aequalis Sowerby. **Scaphites.**

Sowerby, James, Mineral conchology of Great Britain, vol. 1, p. 53, pl. 18, figs. 1–3, 1813.

Cenomanian.

aequalis Sowerby var. **turonensis** Roman and Mazeran. **Scaphites.**

Roman, Frédéric, and Mazeran, Pierre, Monographie paléontologique de la faune turonienne du bassin d'Uchaux et de ses dépendances: Mus. hist. nat. Lyon Archives, vol. 12, Mém. 2, pp. 12–13, pl. 4, figs. 10–14, 1920.

Turonian.

africanus (Pervinquière). **Discoscaphites?**

Scaphites africanus, Pervinquière, Léon, Études de paléontologie tunisienne, pt. 1, Céphalopodes des terraines secondaires, p. 123, pl. 4, figs. 34, 35, 1907.

Hoploscaphites? africanus, Nowak, Jan, Untersuchungen über die Cephalopoden der oberen Kreide in Polen, pt. 2, Die Skaphiten: Acad. sci. Cracovie Bull. internat., année 1911, sér. B, p. 566, 1912.

Cenomanian.

?andoorensis (Stoliczka) Kossmat.

Ammonites andoorensis, Stoliczka, Ferdinand, Fossil Cephalopoda of the Cretaceous rocks of southern India, Ammonitidae, vol. 1, p. 94, pl. 47, fig. 3, 1865.

Scaphites? andoorensis, Kossmat, Franz, Untersuchungen über die südindische Kreideformation: Beitr. Paläontologie Oesterr.-Ungarns u. des Orients, vol. 11, p. 139, pl. 17, fig. 3, 1897.

Upper Trichinopoly [Santonian?].

angulatus (Lopuski). **Discoscaphites.**

Scaphites angulatus, Lopuski, Geslaw, Contribution à l'étude de la faune crétacée du plateau de Lublin: Soc. sci. Varsovie Compt. rend., année 4, pt. 3, p. 136, pl. 3, figs. 8–10, 1911.

Maestrichtian.

[=*Hoploscaphites constrictus* var. *tenuistriatus* according to Nowak, Jan, Untersuchungen über die Cephalopoden der oberen Kreide in Polen, pt. 2, Die Skaphiten: Acad. sci. Cracovie Bull. internat., année 1911, sér. B, p. 586, 1912.]

aquilaensis Reeside. **Scaphites.**

Reeside, J. B., jr., The cephalopods of the Eagle sandstone and related formations in the Western Interior of the United States: U. S. Geol. Survey Prof. Paper 151, p. 25, pl. 18, figs. 15–27; pl. 19, figs. 1–7, 1927.

Lower Campanian.

aquilaensis Reeside var. **costatus** Reeside. **Scaphites.**

Reeside, J. B., jr., The cephalopods of the Eagle sandstone and related formations in the Western Interior of the United States: U. S. Geol. Survey Prof. Paper 151, p. 25, pl. 19, figs. 8–13, 1927.

Lower Campanian.

aquilaensis Reeside var. **nanus** Reeside. **Scaphites.**

Reeside, J. B., jr., The cephalopods of the Eagle sandstone and related formations in the Western Interior of the United States: U. S. Geol. Survey Prof. Paper 151 p. 26, pl. 19, figs. 14–21; pl. 20, figs. 1–6. 1927.

Lower Campanian.

aquisgranensis (Schlüter) Frech. **Discoscaphites.**

Scaphites aquisgranensis, Schlüter, Clemens, Cephalopoden der oberen deutschen Kreide, p. 81, pl. 24, figs. 7–9, Cassel, 1871.

Hoploscaphites? aquisgranensis (Schlüter), Nowak, Jan, Untersuchungen über die Cephalopoden der oberen Kreide in Polen, pt. 2, Die Skaphiten: Acad. sci. Cracovie Bull. internat., année 1911, sér. B, p. 566, 1912.

Scaphites (*Discoscaphites*) *aquisgranensis* (Schlüter), Frech, Fritz, Ueber *Scaphites:* Centralbl. Mineralogie, Jahrgang 1915, No. 21, p. 555, 1915.

Lower Quadratenkreide [Lower Campanian].

arnaudi (De Grossouvre). **Discoscaphites.**

Scaphites arnaudi, De Grossouvre, Albert, Les ammonites de la craie supérieure: Carte géol. France Mém. Recherches sur la craie supérieure, pt. 2, Paléontologie, p. 242, pl. 32, fig. 8, 1894.

Hoploscaphites arnaudi (De Grossouvre), Nowak, Jan, Zur Bedeutung von *Scaphites* für die Gliederung der Oberkreide: K.-k. geol. Reichsanstalt Verh., Jahrg. 1916, No. 3, p. 66, 1916.

Middle Coniacian.

auritus Schlüter. **Scaphites.**

Schlüter, Clemens, Cephalopoden der oberen deutschen Kreide, p. 77, pl. 23, figs. 5–11, Cassel, 1871.

Scaphitenpläner. [Turonian.]

aff. **auritus** Schlüter.

Burckhardt, Carlos, Faunas cretácicas de Zumpango del Río: Inst. geol. México Bol. 33, pp. 95, 96, pl. 22, figs. 5–10, 1919.

Turonian.

auritus Fritsch and Schloenbach (not Schlüter). See *fritschi* De Grossouvre.

bassleri Reeside. **Desmoscaphites.**

Reeside, J. B., jr., The cephalopods of the Eagle sandstone and related formations in the Western Interior of the United States: U. S. Geol. Survey Prof. Paper 151, p. 16, pl. 21, figs. 17–21; pl. 22, figs. 8–12, 1927.

Santonian.

binodosus (Roemer). **Discoscaphites.**

Scaphites binodosus, Roemer, F. A., Die Versteinerungen des norddeutschen Kreidegebirge, p. 90, pl. 13, fig. 6, 1841.

Hoploscaphites binodosus (Roemer), Nowak, Jan, Zur Bedeutung von *Scaphites* für die Gliederung der Oberkreide: K.-k. geol. Reichsanstalt Verh., Jahrg. 1916, No. 3, p. 66, 1916.

Upper marl at Dülmen. [Santonian according to Nowak.]

brahminicus (Stoliczka) Kossmat.

Ammonites brahminicus, Stoliczka, Ferdinand, Fossil Cephalopoda of the Cretaceous rocks of southern India, Ammonitidae, vol. 1, p. 169, pl. 81, fig. 7, 1865.

Scaphites brahminicus, Kossmat, Franz, Untersuchungen über die südindische Kreideformation: Beitr. Paläontologie Oesterr.-Ungarns u. des Orients, vol. 11, p. 137, 1897.

Upper Trichinopoly (?) beds. [Coniacian-Santonian?]

cheyennensis (Owen) Meek. **Discoscaphites.**

Ammonites cheyennensis, Owen, D. D., Description of new and imperfectly known genera and species of organic remains, collected during the geological surveys of Wisconsin, Iowa, and Minnesota, p. 578, pl. 7, fig. 2, 1852.

Scaphites cheyennensis, Meek, F. B., and Hayden, F. V., Smithsonian check list, p. 23, 1864.

Scaphites (*Discoscaphites*) *cheyennensis*, Meek, F. B., Preliminary paleontological report: U. S. Geol. Survey Terr. Second Ann. Rept., p. 297, 1872; Invertebrate Cretaceous and Tertiary fossils of the upper Missouri country: U. S. Geol. Survey Terr. Rept., vol. 9, p. 437, pl. 35, fig. 3, 1876.

Fox Hills. [Maestrichtian.]

compressus D'Orbigny. **Scaphites?**

D'Orbigny, Alcide, Paléontologie française, 1st ser., Terrain crétacé, vol. 1, p. 517, pl. 128, figs. 4, 5, 1841.

Craie chloritée. [Senonian?]

aff. **compressus** (D'Orbigny) Bonarelli and Nágera.

Bonarelli, Guido, and Nágera, J. J., Observaciones geológicas en las inmediaciones del Lago San Martín (Territorio de Santa Cruz): Ministerio de Agricultura (Argentina), Dirección general de minas, geología é hidrología, Bol. 27, ser. B, p. 28, 1921.

compressus Roemer (not D'Orbigny). See *roemeri* D'Orbigny.

comprimis Owen. [=*Scaphites nicolleti* (Morton).]

Owen, D. D., Description of new and imperfectly known genera and species of organic remains collected during the geological surveys of Wisconsin, Iowa, and Minnesota, p. 580, pl. 7, fig. 4, 1852.

condoni Anderson. **Scaphites.**

Anderson, F. M., Cretaceous deposits of the Pacific coast: California Acad. Sci. Proc., 3d ser., Geology, vol. 2, p. 111, pl. 2, figs. 58–63, 1902.

Lower Chico. [Cenomanian.]

condoni Anderson var. **appressus** Anderson. **Scaphites.**

Anderson, F. M., Cretaceous deposits of the Pacific coast: California Acad. Sci. Proc., 3d ser., Geology, vol. 2, p. 112, pl. 2, figs. 64–66, 1902.

Lower Chico. [Cenomanian.]

conradi (Morton) Meek. **Discoscaphites.**

Ammonites conradi, Morton, S. G., Synopsis of the organic remains of the Cretaceous group of the United States, p. 39, pl. 16, figs. 1, 3, 1834.

Scaphites conradi, D'Orbigny, Prodrome de paléontologie, p. 214, 1850.

Scaphites (*Discoscaphites*) *conradi* (Morton), Meek, F. B., A preliminary list of fossils collected by Dr. Hayden: Am. Philos. Soc. Proc., vol. 11, p. 429, 1871; Preliminary paleontological report: U. S. Geol. Survey

conradi (Morton) Meek. **Discoscaphites**—Continued.
Terr. Second Ann. Rept., p. 297, 1872; Invertebrate Cretaceous and Tertiary fossils of the upper Missouri country: U. S. Geol. Survey Terr. Rept., vol. 9, p. 430, pl. 36, fig. 2, 1876.
Fox Hills sandstone. [Maestrichtian.]

conradi (Morton) var. **gulosus** Morton. **Discoscaphites.**
Ammonites conradi var. *gulosus*, Morton, S. G., Synopsis of the organic remains of the Cretaceous group of the United States, p. 39, pl. 16, fig. 2, 1834.
Scaphites conradi var. *gulosus*, Gabb, W. M., Synopsis of the Mollusca of the Cretaceous formations, p. 32, 1861.
Scaphites (*Discoscaphites*) *conradi* var. *gulosus*, Meek, F. B., Invertebrate Cretaceous and Tertiary fossils of the upper Missouri country: U. S. Geol. Survey Terr. Rept., vol. 9, p. 432, pl. 36, fig. 1, 1876.
Fox Hills sandstone. [Maestrichtian.]

conradi (Morton) var. **intermedius** Meek. **Discoscaphites.**
Meek, F. B., Invertebrate Cretaceous and Tertiary fossils of the upper Missouri country: U. S. Geol. Survey Terr. Rept., vol. 9, p. 433, pl. 34, fig. 3, 1876.
Fox Hills sandstone. [Maestrichtian.]

conradi (Morton) var. **petechialis** Morton. **Discoscaphites.**
Ammonites conradi Morton var. *petechialis*, Morton, S. G., Synopsis of the organic remains of the Cretaceous group in the United States, p. 39, pl. 16, fig. 1, 1834.
Scaphites conradi Morton var. *petechialis* Morton, Gabb, W. M., Synopsis of the Mollusca of the Cretaceous formations, p. 32, 1861.

constrictus (Sowerby) Frech. **Discoscaphites.**
Ammonites constrictus, Sowerby, James, Mineral conchology of Great Britain, p. 189, pl. 184 A, fig. 1, 1817.
Scaphites constrictus D'Orbigny, Alcide, Paléontologie française, 1st ser., Terrain crétacé, vol. 1, p. 522, pl. 129, figs. 8–11, 1841.
Hoploscaphites constrictus (Sowerby), Nowak, Jan, Untersuchungen über die Cephalopoden der oberen Kreide in Polen, pt. 2, Die Skaphiten: Acad. sci. Cracovie Bull. internat., année 1911, sér. B, p. 580, text figs. 15, 16, 1912.
Scaphites (*Discoscaphites*) *constrictus* (Sowerby), Frech, Fritz, Ueber *Scaphites:* Centralbl. Mineralogie, Jahrg. 1915, No. 18, p. 554, 1915.
Maestrichtian.

constrictus (Sowerby) var. **crassus** Lopuski. **Discoscaphites.**
Lopuski, Geslaw, Contribution à l'étude de la faune crétacée du plateau de Lublin: Soc. sci. Varsovie Compt. rend., année 4, pt. 3, p. 134, pl. 2, figs. 5, 6; pl. 3, figs. 1, 2, 1911.
Maestrichtian.

constrictus (Sowerby) var. **quiriquinensis** Wilckens.
Wilckens, Otto, Revision der Fauna der Quirquiná-Schichten: Neues Jahrb., Beilage-Band 18, pp. 189–193, p. 17, figs. 3–8, 1904.
Senonian. [Campanian?]

constrictus (Sowerby) var. **tenuistriatus** Kner. See *tenuistriatus* Kner.

constrictus (Sowerby) var. **vulgaris** Nowak. **Discoscaphites.**
Hoploscaphites constrictus (Sowerby) var. *vulgaris*, Nowak, Jan, Untersuchungen über die Cephalopoden der oberen Kreide in Polen, pt. 2, Die Skaphiten: Acad. sci. Cracovie Bull. internat., année 1911, sér. B, p. 583, pl. 32, fig. 6; pl. 33, figs. 8–12, 1912.
[Campanian?]

costatus Mantell. [=*Scaphites aequalis* Sowerby.]
Mantell, G. A., Geology of Sussex, pl. 22, figs. 3–12, 1822.

cottae (Roemer).
Ammonites cottae Roemer, F. A., Die Versteinerungen des norddeutschen Kreidegebirges, p. 86, pl. 13, fig. 4, 1840.
Scaphites cottae Gümbel, C. W., Geognostische Beschreibung des Königreiches Bayern, vol. 2, p. 764, 1868.
[=*Scaphites binodosus* according to Fritsch, Anton, and Schlönbach, Urban, Cephalopoden der böhmischen Kreideformation, p. 42, 1872.]
[=*Scaphites auritus* according to Schlüter, Clemens, Cephalopoden der oberen deutschen Kreide, p. 77, 1872.]
[=*Scaphites geinitzi* according to De Grossouvre, Albert, Recherches sur la craie supérieure, pt. 1, Stratigraphie générale, fasc. 2, p. 652, 1901.]

cunliffei (Forbes) Nowak. **Acanthoscaphites.**
Ammonites cunliffei, Forbes, Edward, Fossil invertebrates of south India: Geol. Soc. London Trans., 2d ser., vol. 7, p. 109, pl. 8, fig. 2, 1845.
Scaphites cunliffei, Stoliczka, Ferdinand, India Geol. Survey Records, vol. 1, p. 35, 1868.
Acanthoscaphites cunliffei (Forbes), Nowak, Jan, Untersuchungen über die Cephalopoden der oberen Kreide in Polen, pt. 2, Die Skaphiten: Acad. sci. Cracovie Bull. internat., année 1911, sér. B, p. 565, 1912.
Valudayur beds. [Upper Campanian.]

cuvieri Morton [=*Scaphites hippocrepis* (DeKay) Morton].
Morton, S. G., Description of two new species of fossil shells of the genera *Scaphites* and *Crepidula:* Acad. Nat. Sci. Philadelphia Jour., 1st ser., vol. 6, p. 109, pl. 7, fig. 1, 1828.

diversesulcatus (Alth). **Discoscaphites.**
Ammonites diversesulcatus, Alth, Alois, Geognostisch-palaeontologische Beschreibung der nächsten Umgebung von Lemberg: Naturw. Abh. (W. Haidinger), vol. 3, pt. 2, No. 9, p. 204, pl. 10, fig. 28, 1850.
[=*Hoploscaphites constrictus* var. *tenuistriatus* according to Nowak, Jan, Untersuchungen über die Cephalopoden der oberen Kreide in Polen, pt. 2, Die Skaphiten: Acad. sci. Cracovie Bull. internat., année 1911, sér. B, p. 586, 1911.]
[=*Scaphites roemeri* according to Schlüter, Clemens, Cephalopoden der oberen deutschen Kreide, p. 89, 1871.]
[Maestrichtian.]

evolutus Pervinquière. **Scaphites.**
Pervinquière, Léon, Sur quelques ammonites du crétacé algérien: Soc. géol. France Mém. 42, p. 25, pl. 2, figs. 3–9, 1910.
Cenomanian.

?falcifer Gümbel.
Gümbel, C. W., Geognostische Beschreibung des bayrischen Alpengebirge, p. 574, 1861.
[=*Scaphites constrictus* Sowerby according to Böhm, Johannes, Die Kreidebildungen des Furbergs und Sulzbergs bei Siegsdorf in Oberbayern: Palaeontographica, vol. 38, p. 48, 1891.]

formosus Yabe. **Scaphites.**
Yabe, Hisakatsu, Die Scaphiten aus der Oberkreide von Hokkaido: Beitr. Paläontologie Oesterr.-Ungarns u. des Orients, vol. 23, p. 166, pl. 15, fig. 8, 1910.
[Cenomanian.]

fritschi De Grossouvre. **Scaphites.**
Scaphites auritus, Fritsch, Anton, and Schlönbach, Urban, Cephalopoden der böhmischen Kreideformation, p. 44, pl. 13, figs. 9, 11, 14, 15; pl. 14, fig. 12, 1872.

fritschi De Grossouvre. **Scaphites**—Continued.
Scaphites fritschi, De Grossouvre, Albert, Les ammonites de la craie supérieure: Recherches sur la craie supérieure, pt. 2, Paléontologie, p. 243, 1894.
[Turonian?]

geinitzi D'Orbigny. **Scaphites.**
D'Orbigny, Alcide, Prodrome de paléontologie, p. 214, 1850.
Turonian.

geinitzi D'Orbigny var. *binodosus* Roemer of Fritsch and Schloenbach (not *S. binodosus* Roemer). See *lamberti* De Grossouvre.

geinitzi D'Orbigny var. **intermedia** Scupin. **Scaphites.**
Scupin, Hans, Die Löwenberger Kreide und ihre Fauna: Palaeontographica, suppl. 6, pt. 2, p. 98, 1913.
Priesenerschichten. [Turonian.]

aff. **geinitzi** D'Orbigny. **Scaphites.**
Burckhardt, Carlos, Faunas cretácicas de Zumpango del Río: Inst. geol. México Bol. 33, p. 93, pl. 22, figs. 1–4, 1919.
Turonian.

aff. **geinitzi** Jahn, not (D'Orbigny) Schlüter. **Scaphites.**
Burckhardt, Carlos, Faunas cretácicas de Zumpango del Río: Inst. geol. México Bol. 33, p. 96, pl. 22, fig. 12, 1919.
Turonian.

gibbus (Schlüter). **Discoscaphites.**
Scaphites gibbus, Schlüter, Clemens, Cephalopoden der oberen deutschen Kreide, p. 87, pl. 26, figs. 6–9, 1871.
Hoploscaphites gibbus (Schlüter), Nowak, Jan, Zur Bedeutung von *Scaphites* für die Gliederung der Oberkreide: K.-k. geol. Reichsanstalt Verh., Jahrg. 1916, No. 3, p. 66, 1916.
Mucronatenkreide. [Maestrichtian.]

gillisi Anderson. **Scaphites.**
Anderson, F. M., Cretaceous deposits of the Pacific coast: California Acad. Sci. Proc., 3d ser., Geology, vol. 2, p. 110, pl. 3, figs. 85–88, 1902.
Lower Chico. [Cenomanian.]

gracilis Yabe. **Scaphites.**
Yabe, Hisakatsu, Zur Stratigraphie und Paläontologie der oberen Kreide von Hokkaido und Sachalin: Deutsche geol. Gesell. Zeitschr., vol. 61, p. 421, 1909.
Yabe, Hisakatsu, Die Scaphiten aus der Oberkreide von Hokkaido: Beitr. Paläontologie Oesterr.-Ungarns u. des Orients, vol. 23, p. 166, pl. 15, figs. 9, 10, 1920.
[Cenomanian.]

haugi (De Grossouvre). **Discoscaphites?**
Scaphites haugi, De Grossouvre, Albert, Les ammonites de la craie supérieure: Recherches sur la craie supérieure, pt. 2, Paléontologie, p. 244, pl. 31, fig. 5, 1894.
Middle Campanian.

hilli Adkins and Winton. **Scaphites.**
Adkins, W. S., and Winton, W. M., Paleontological correlation of the Fredericksburg and Washita formations in north Texas: Texas Univ. Bull. 1945, p. 36, pl. 7, figs. 3–6, 1919.
Lower beds of Pawpaw formation (upper Washita). [Cenomanian.]

hippocrepis (DeKay) Morton. **Scaphites.**
Ammonites hippocrepis, DeKay, J. E., Report on several fossil multilocular shells from the State of Delaware: New York Lyceum Nat. Hist. Annals, vol. 2, pp. 273–277, pl. 5, fig. 2, 1827.
Scaphites hippocrepis, Morton, S. G., Synopsis of the organic remains of the Cretaceous group in the United States, p. 41, pl. 7, fig. 1, 1834.
Merchantville clay of New Jersey. [Lower Campanian.]

hippocrepis (DeKay) var. **crassus** Reeside. **Scaphites.**
Reeside, J. B., jr., The cephalopods of the Eagle sandstone and related formations in the Western Interior of the United States: U. S. Geol. Survey Prof. Paper 151, p. 23, pl. 17, figs. 6–15, 1927.
Lower Campanian.

hippocrepis (DeKay) var. **pusillus** Reeside. **Scaphites.**
Reeside, J. B., jr., The cephalopods of the Eagle sandstone and related formations in the Western Interior of the United States: U. S. Geol. Survey Prof. Paper 151, p. 23, pl. 17, figs. 1–5, 1927.
Lower Campanian.

hippocrepis (DeKay) var. **tenuis** Reeside. **Scaphites.**
Reeside, J. B., jr., The cephalopods of the Eagle sandstone and related formations in the Western Interior of the United States: U. S. Geol. Survey Prof. Paper 151, p. 23, pl. 16, figs. 11–16, 1927.
Lower Campanian.

hugardianus D'Orbigny. **Scaphites.**
D'Orbigny, Alcide, Paléontologie française, 1st ser., Terrain crétacé, vol. 1, pp. 521, 525, 1841.
Upper Gault. [Vraconian.]

? idoneus (Stoliczka) Kossmat.
Ammonites idoneus, Stoliczka, Ferdinand, Fossil Cephalopoda of the Cretaceous rocks of southern India, Ammonitidae, vol. 1, p. 64, pl. 34, fig. 1, 1865.
Scaphites? idoneus, Kossmat, Franz, Untersuchungen über die südindische Kreideformation: Beitr. Paläontologie Oesterr.-Ungarns u. des Orients, vol. 11, p. 139, 1897.
Upper Trichinopoly beds. [Santonian?]

inermis Anderson. **Scaphites.**
Anderson, F. M., Cretaceous deposits of the Pacific coast: California Acad. Sci. Proc., 3d ser., Geology, vol. 2, p. 113, pl. 3, figs. 74–77, 1902.
[=*Yezoites puerculus* (Jimbo) Yabe according to Yabe, Hisakatsu, Die Scaphiten aus der Oberkreide von Hokkaido: Beitr. Paläontologie Oesterr.-Ungarns u. des Orients, vol. 23, p. 170, 1910.]
Chico formation. [Cenomanian.]

inflatus Roemer. **Scaphites.**
Roemer, F. A., Die Versteinerungen des norddeutschen Kreidegebirges, p. 90, pl. 14, fig. 3, 1841.
Upper marl at Dülmen. [Lower Campanian according to Nowak.]

iris (Conrad). **Discoscaphites?**
Scaphites iris, Conrad, T. A., Observations on a group of Cretaceous fossil shells found in Tippah County, Miss., with descriptions of fifty-six new species: Acad. Nat. Sci. Philadelphia Jour., 2d ser., vol. 3, p. 335, pl. 35, fig. 23, 1858.
[Ripley formation, Campanian or Maestrichtian.]

kieslingswaldensis Langenhan and Grundey. **Scaphites.**
Langenhan, Alwin, and Grundey, Max, Das Kieslingswalder Gestein: Jahresbericht des Glatzer Gebirgsvereins, vol. 10, p. 9, pl. 1, fig. 1, 1891. [Publication not seen.]
Emscherian-Coniacian.

kingianus Stoliczka. **Scaphites.**
Stoliczka, Ferdinand, Fossil Cephalopoda of the Cretaceous rocks of southern India, Ammonitidae, vol. 1, p. 169, pl. 81, fig. 7, 1865.
Ootator beds. [Cenomanian.]

klamathensis Anderson. **Scaphites.**
Anderson, F. M., Cretaceous deposits of the Pacific coast: California Acad. Sci. Proc., 3d ser., Geology, vol. 2, p. 115, pl. 3, figs. 78–81, 1902.
[Cenomanian.]

lamberti De Grossouvre. **Scaphites.**

Scaphites geinitzi D'Orbigny var. *binodosus* Roemer, Fritsch, Anton, and Schloenbach, Urban, Cephalopoden der böhmischen Kreideformation, p. 43, pl. 14, fig. 13, 1872.

Scaphites lamberti, De Grossouvre, Albert, Les ammonites de la craie supérieure: Recherches sur la craie supérieure, pt. 2, Paléontologie, p. 24, pl. 32, figs. 1, 5, 1894.

Lower and middle Coniacian.

larvaeformis Meek and Hayden (not Frech). **Scaphites.**

Meek, F. B., and Hayden, F. V., Descriptions of new organic remains collected in Nebraska Territory in the year 1857 by Dr. F. V. Hayden: Acad. Nat. Sci. Philadelphia Proc., vol. 10, p. 58, 1859.

Meek, F. B., Invertebrate Cretaceous and Tertiary fossils of the upper Missouri country: U. S. Geol. Survey Terr. Rept., vol. 9, p. 418, pl. 6, fig. 6, 1876.

Carlile shale. [Upper Turonian.]

larvaeformis Frech (not Meek and Hayden). **Scaphites.**

Frech, Fritz, Über *Scaphites:* Centralbl. Mineralogie, Jahrg. 1915, No. 21, p. 556, fig. 2, 1915

Turonian.

leei Reeside. **Scaphites.**

Reeside, J. B., jr., The cephalopods of the Eagle sandstone and related formations in the Western Interior of the United States: U. S. Geol. Survey Prof. Paper 151, p. 26, pl. 20, figs. 17–22; pl. 21, figs. 1–7, 1927.

Lower Campanian.

leei Reeside var. **parvus** Reeside. **Scaphites.**

Reeside, J. B., jr., The cephalopods of the Eagle sandstone and related formations in the Western Interior of the United States: U. S. Geol. Survey Prof. Paper 151, p. 27, pl. 21, figs. 8–16, 1927.

Lower Campanian.

levis Reeside. **Scaphites.**

Reeside, J. B., jr., The cephalopods of the Eagle sandstone and related formations in the Western Interior of the United States: U. S. Geol. Survey Prof. Paper 151, p. 26, pl. 20, figs. 7–16, 1927.

Lower Campanian.

mandanensis (Morton) Meek. **Discoscaphites.**

Ammonites mandanensis Morton, S. G., Description of sone new species of organic remains of the Cretaceous group of the United States: Acad. Nat. Sci. Philadelphia Jour., 1st ser., vol. 8, p. 208, pl. 10, fig. 2, 1841.

Scaphites mandanensis (Morton) Meek, F. B., and Hayden, F. V., Descriptions of new fossil species of Mollusca collected by Dr. F. V. Hayden in Nebraska Territory: Acad. Nat. Sci. Philadelphia Jour., vol. 8, p. 281, 1857.

Scaphites (*Discoscaphites*) *mandanensis* (Morton), Meek, F. B., Preliminary paleontological report: U. S. Geol. Survey Terr. Second Ann. Rept., p. 297, 1872; Invertebrate Cretaceous and Tertiary fossils of the upper Missouri country: U. S. Geol. Survey Terr. Rept., vol. 9, p. 443, pl. 35, fig. 1, 1876.

Fox Hills sandstone. [Maestrichtian.]

meriani Pictet and Campiche. **Scaphites**?

Pictet, F. J., and Campiche, G., Description des fossiles du terrain crétacé des environs de Sainte Croix, pt. 2: Matériaux pour la paléontologie suisse, sér. 3, Mon. 2, p. 16, pl. 44, 1861.

Upper Greensand [Cenomanian].

meslei De Grossouvre. **Scaphites.**

De Grossouvre, Albert, Les ammonites de la craie supérieure: Recherches sur la craie supérieure, pt. 2, Paléontologie, p. 239, pl. 32, figs. 4, 7, 1894.

Lower and middle Campanian.

monasteriensis (Schlüter). **Discoscaphites.**

Scaphites monasteriensis, Schlüter, Clemens, Cephalopoden der oberen deutschen Kreide, p. 91, pl. 27, figs. 6, 7, 1871.

Hoploscaphites monasteriensis (Schlüter), Nowak, Jan, Untersuchungen über die Cephalopoden der oberen Kreide in Polen, pt. 2, Die Skaphiten: Acad. sci. Cracovie Bull. internat., année 1911, sér. B, p. 566, 1912.

Mucronatenkreide. [Maestrichtian.]

moreauensis Owen. [=*Discoscaphites cheyennensis* (Owen) Meek.]

Owen, D. D., Description of new and imperfectly known genera and species of organic remains, collected during the geological surveys of Wisconsin, Iowa, and Minnesota, p. 579, pl. 8, fig. 7, 1852.

Fox Hills sandstone. [Maestrichtian.]

mullananus (Meek and Hayden) Stanton. **Scaphites.**

Ammonites mullananus, Meek, F. B., and Hayden, F. V., Description of new Cretaceous fossils from Nebraska Territory collected by the expedition sent out by the Government under the command of Lieut. John Mullan: Acad. Nat. Sci. Philadelphia Proc., 1862, pp. 23–25.

Ammonites? mullananus, Meek, F. B., Invertebrate Cretaceous and Tertiary fossils of the upper Missouri country: U. S. Geol. Survey Terr. Rept., vol. 9, pp. 607–609, pl. 8, figs. 1a–c, 1876.

Scaphites mullananus, Stanton, T. W., The Colorado fauna: U. S. Geol. Survey Bull. 106, p. 187, pl. 44, figs. 2–4, 1893.

[Upper part of Colorado group, Coniacian.]

multinodosus Von Hauer (1858, not Von Hauer 1866).

Von Hauer, Franz, Über die Cephalopoden der Gosauschichten: Beitr. Paläontographie Oesterreich, vol. 1, p. 9, pl. 1, figs. 7, 8, 1858.

[=*Scaphites constrictus* D'Orbigny according to De Grossouvre, Albert, Les ammonites de la craie supérieure: Recherches sur la craie supérieure, pt. 2, Paléontologie, p. 248, 1894.]

[Maestrichtian?]

multinodosus Von Hauer (1866, not Von Hauer 1858).

Von Hauer, Franz, Neue Cephalopoden aus den Gosaubilden der Alpen: K. Akad. Wiss. Wien Sitzungsber., vol. 53, p. 7, pl. 1, figs. 7, 8, 1866.

[=*Scaphites pulcherrimus* Roemer according to De Grossouvre, Albert, Les ammonites de la craie supérieure: Recherches sur la craie supérieure, pt. 2, Paléontologie, p. 251, 1894.]

nebrascensis Owen. [=*Discoscaphites conradi* (Morton) Meek.]

Owen, D. D., Description of new and imperfectly known genera and species of organic remains, collected during the geological surveys of Wisconsin, Iowa, and Minnesota, p. 577, pl. 8, fig. 3; pl. 9, fig. 2; 1852.

nicolleti (Morton) Meek. **Discoscaphites.**

Ammonites nicolleti, Morton, S. G., Description of some new species of organic remains of the Cretaceous group of the United States: Acad. Nat. Sci. Philadelphia Jour., 1st ser., vol. 8, pt. 2, pt. 209, pl. 10, fig. 3, 1842.

nicolleti (Morton) Meek. **Discoscaphites**—Continued.

Scaphites nicolleti (Morton), Meek, F. B., and Hayden, F. V., Descriptions of new fossil species of Mollusca collected by Dr. F. V. Hayden in Nebraska Territory: Acad. Nat. Sci. Philadelphia Jour., vol. 8, p. 281, 1857.

Scaphites (*Discoscaphites*) *nicolleti* (Morton), Meek, F. B., Invertebrate Cretaceous and Tertiary fossils of the upper Missouri country: U. S. Geol. Survey Terr. Rept., vol. 9, p. 435, pl. 34, figs. 2, 4, 1876.

Fox Hills sandstone. [Maestrichtian.]

niedzwiedzkii (Uhlig). **Discoscaphites.**

Uhlig, Victor, Bemerkungen zur Gliederung der karpathischen Bildungen: K.-k. geol. Reichsanstalt Jahrb., vol. 43, p. 220, fig. 2, 1894.

[=*Scaphites constrictus* var. *niedzwiedzkii* according to Wisniowski, Thaddeus, Über die obersenone Flyschfauna von Leszczny: Beitr. Paläontologie Oesterr.-Ungarns u. des Orients, vol. 20, p. 104, 1907.]

Senonian. [Maestrichtian?]

nodosus (Owen) Nowak (not Lopuski). **Acanthoscaphites.**

Scaphites nodosus, Owen, D. D., Description of new and imperfectly known genera and species of organic remains, collected during the geological surveys of Wisconsin, Iowa, and Minnesota, p. 581, pl. 8, fig. 4, 1852.

Acanthoscaphites nodosus (Owen), Nowak, Jan, Zur Bedeutung von *Scaphites* für die Gliederung der Oberkreide: K.-k. geol. Reichsanstalt Verh., Jahrg. 1916, No. 3, p. 63, 1916.

Upper Pierre shale. [Upper Campanian.]

nodosus (Owen) var. **brevis** Meek. **Acanthoscaphites.**

Scaphites nodosus Owen var. *brevis*, Meek, F. B., Invertebrate Cretaceous and Tertiary fossils of the upper Missouri country: U. S. Geol. Survey Terr. Rept., vol. 9, p. 426, pl. 25, fig. 1, 1876.

Upper Pierre shale. [Upper Campanian.]

nodosus Owen var. *exilis* Meek and Hayden. [=*Scaphites nodosus* var. *quadrangularis* Meek and Hayden.]

Meek, F. B., and Hayden, F. V., Descriptions of new lower Silurian (Primordial), Jurassic, Cretaceous, and Tertiary fossils collected in Nebraska by the exploring expedition under the command of Capt. W. F. Raynolds: Acad. Nat. Sci. Philadelphia Proc., vol. 12, p. 420, 1862.

nodosus (Owen) var. **plenus** Meek and Hayden. **Acanthoscaphites.**

Meek, F. B., and Hayden, F. V., Descriptions of new organic remains from the Tertiary, Cretaceous, and Jurassic rocks of Nebraska: Acad. Nat. Sci. Philadelphia Proc., vol. 12, p. 177, 1861.

Meek, F. B., Invertebrate Cretaceous and Tertiary fossils of the upper Missouri country: U. S. Geol. Survey Terr. Rept., vol. 9, p. 429, pl. 26, fig. 1, 1876.

[=*Acanthoscaphites tridens-quadrispinosus* according to Nowak, Jan, Zur Bedeutung von *Scaphites* für die Gliederung der Oberkreide: K.-k. geol. Reichsanstalt Verh., Jahrg. 1916, No. 3, p. 59, 1916.]

Upper Pierre shale. [Upper Campanian.]

nodosus (Owen) var. **quadrangularis** Meek and Hayden. **Acanthoscaphites.**

Meek, F. B., and Hayden, F. V., Descriptions of new lower Silurian (Primordial), Jurassic, Cretaceous, and Tertiary fossils collected in Nebraska by the exploring expedition under the command of Capt. W. F. Raynolds: Acad. Nat. Sci. Philadelphia Proc., vol. 12, p. 420, 1862.

nodosus (Owen) var. **quadrangularis** Meek and Hayden. **Acanthoscaphites**—Continued.

Meek, F. B., Invertebrate Cretaceous and Tertiary fossils of the upper Missouri country: U. S. Geol. Survey Terr. Rept., vol. 9, p. 428, pl. 25, figs. 2–4, 1876.

[=*Acanthoscaphites roemeri* (D'Orbigny), according to Nowak, Jan, Zur Bedeutung von *Scaphites* für die Gliederung der Oberkreide: K.-k. geol. Reichsanstalt Verh., Jahrg. 1916, No. 3, p. 63, 1916.]

Upper Pierre shale. [Upper Campanian.]

nodosus Lopuski (not Owen). **Discoscaphites?**

Scaphites nodosus, Lopuski, Geslaw, Contribution à l'étude de la faune crétacée du plateau de Lublin: Soc. sci. Varsovie Compt. rend., année 4, pt. 3, p. 122, 1911.

Maestrichtian.

novimexicanus Reeside. **Desmoscaphites.**

Reeside, J. B., jr., The cephalopods of the Eagle sandstone and related formations in the Western Interior of the United States: U. S. Geol. Survey Prof. Paper 151, p. 17, pl. 11, figs. 1–4, 1927.

Santonian.

obliquus Sowerby. **Scaphites.**

Sowerby, James, Mineral conchology of Great Britain, vol. 1, p. 53, pl. 18, figs. 1, 2, 1813.

Cenomanian.

ornatissimus D'Orbigny.

D'Orbigny, Alcide, Prodrome de paléontologie, p. 214, 1850.

Senonian [of D'Orbigny].

ornatus (Roemer) Nowak (not Gümbel). **Acanthoscaphites?**

Scaphites ornatus, Roemer, F. A., Versteinerungen des norddeutschen Kreidegebirges, p. 91, pl. 13, fig. 8, 1841.

Acanthoscaphites? ornatus (Roemer), Nowak, Jan, Untersuchungen über die Cephalopoden der oberen Kreide in Polen: Acad. sci. Cracovie Bull. internat., année 1911, sér. B, p. 565, 1912.

Lower marl at Lemförd. [Campanian?]

ornatus Gümbel (not Roemer).

Gümbel, C. W., Geognostische Beschreibung des bayrischen Alpengebirge, p. 576, 1861.

[=*S. constrictus* Sowerby according to Böhm, Johannes, Die Kreidebildung des Furbergs und Sulzbergs bei Siegsdorf in Oberbayern: Palaeontographica, vol. 38, p. 48, 1891.]

pavana (Forbes) Kossmat.

Ammonites pavana, Forbes, Edward, Fossil invertebrates of South India: Geol. Soc. London, ser. 2, vol. 7, p. 110, pl. 7, fig. 5, 1846.

Scaphites pavana, Kossmat, Franz, Untersuchungen über die südindische Kreideformation: Beitr. Paläontologie Oesterr.-Ungarns u. des Orients, vol. 11, p. 138, 1897.

[=*S. cunliffei* var. *pavana* according to Pervinquière, Léon, Études de paléontologie tunisienne, pt. 1, Céphalopodes des terrains secondaires, p. 124, 1907.]

Valudayur beds. [Campanian.]

peroni Pervinquière. **Scaphites.**

Pervinquière, Léon, Sur quelques ammonites du crétacé algérien: Soc. géol. France Mém. 42, p. 26, pl. 2, figs. 10–13, 1910.

Cenomanian.

peroni var. **inornatus** Pervinquière. **Scaphites.**

Pervinquière, Léon, Sur quelques ammonites du crétacé algérien: Soc. géol. France Mém. 42, p. 26, pl. 2, figs. 14–16, 1910.

Cenomanian.

perrini Anderson. **Scaphites.**

Anderson, F. M., Cretaceous deposits of the Pacific coast: California Acad. Sci. Proc., 3d ser., Geology, vol. 2, p. 114, pl. 2, figs. 71–73, 1902.

Lower Chico. [Cenomanian.]

[=*Yezoites perrini* according to Yabe, Hisakatsu, Die Scaphiten aus der Oberkreide von Hokkaido: Beitr. Paläontologie Oesterr.-Ungarns u. des Orients, vol. 23, p. 172, pl. 15, figs. 28, 29, 1910.]

planus Roman and Mazeran (not Yabe). **Scaphites.**

Roman, Frédéric, and Mazeran, Pierre, Monographie paléontologique de la faune turonienne du bassin d'Uchaux et de ses dépendances: Mus. hist. nat. Lyon Archives, vol. 12, Mém. 2, p. 13, pl. 4, figs. 15–17, 1920.

Turonian.

planus Yabe (not Roman and Mazeran). **Scaphites.**

Scaphites planus, Yabe, Hisakatsu, Zur Stratigraphie und Paläontologie der oberen Kreide von Hokkaido und Sachalin: Deutsche geol. Gesell. Zeitschr., vol. 6, p. 415, 1909.

Yezoites planus, Yabe, Hisakatsu, Die Scaphiten aus der Oberkreide von Hokkaido: Beitr. Paläontologie Oesterr.-Ungarns u. des Orients, vol. 23, p. 167, pl. 15, figs. 11–18, 1910.

[Cenomanian.]

planus Yabe var. **gigas** Yabe. **Scaphites.**

Yezoites planus var. *gigas*, Yabe, Hisakatsu, Die Scaphiten aus der Oberkreide von Hokkaido: Beitr. Paläontologie Oesterr.-Ungarns u. des Orients, vol. 23, p. 167, pl. 15, fig. 19, 1910.

[Cenomanian.]

plicatellus Roemer.

Roemer, F. A., Versteinerungen des norddeutschen Kreidegebirges, p. 91, pl. 13, fig. 7, 1841.

Lower marl at Lemförd. [Campanian?]

potieri De Grossouvre. **Discoscaphites.**

Scaphites potieri, De Grossouvre, Albert, Les ammonites de la craie supérieure: Recherches sur la craie supérieure, pt. 2, Paléontologie, p. 242, pl. 22, fig. 3, 1894.

Lower and middle Campanian.

pseudoaequalis Yabe. **Scaphites.**

Yabe, Hisakatsu, Zur Stratigraphie und Paläontologie der oberen Kreide von Hokkaido und Sachalin: Deutsche geol. Gesell. Zeitschr., vol. 61, p. 415, 1909.

Yabe, Hisakatsu, Die Scaphiten aus der Oberkreide von Hokkaido: Beitr. Paläontologie Oesterr.-Ungarns u. des Orients, vol. 23, p. 163, pl. 15, figs. 1–3, 1910.

[Cenomanian.]

puerculus Jimbo. **Scaphites.**

Scaphites puerculus, Jimbo, K., Beiträge zur Kenntniss der Fauna der Kreideformation von Hokkaido: Paleont. Abh. (Dames & Kayser), vol. 6, pt. 3, p. 37, pl. 5, fig. 4, 1894.

Yezoites puerculus, Yabe, Hisakatsu, Die Scaphiten aus der Oberkreide von Hokkaido: Beitr. Paläontologie Oesterr.-Ungarns u. des Orients, vol. 23, p. 170, pl. 15, figs. 20–22, 1910.

[Cenomanian.]

puerculus Jimbo var. **teshioensis** Yabe. **Scaphites.**

Yezoites puerculus var. *teshioensis*, Yabe, Hisakatsu, Die Scaphiten aus der Oberkreide von Hokkaido: Beitr. Paläontologie Oesterr.-Ungarns u. des Orients, vol. 23, p. 170, pl. 15, figs. 23–27, 1910.

[Cenomanian.]

pulcherrimus (Roemer) Nowak. **Acanthoscaphites.**

Scaphites pulcherrimus, Roemer, F. A., Versteinerungen des norddeutschen Kreidegebirges, p. 91, pl. 14, fig. 4, 1841.

pulcherrimus (Roemer) Nowak. **Acanthoscaphites**—Con.

Acanthoscaphites pulcherrimus (Roemer), Nowak, Jan, Zur Bedeutung von *Scaphites* für die Gliederung der Oberkreide: K.-k. geol. Reichsanstalt Verh., Jahrg. 1916, No. 3, p. 63, 1916.

Lower marl. [Upper Campanian.]

pungens (Binckhorst). **Discoscaphites.**

Ammonites pungens, Binckhorst, J. T., Monographie des gastéropodes et des céphalopodes de la craie supérieure du Limbourg, Classe des céphalopodes, p. 32, pl. $5a_3$, figs. 1 a–d, 1861.

Scaphites pungens, De Grossouvre, Albert, Description des ammonitides du crétacé supérieur du Limbourg belge et hollandais et du Hainaut: Mus. roy. hist. nat. Belgique Mém., vol. 4, p. 37, pl. 11, fig. 1, 2, 1908.

Hoploscaphites pungens (Binckhorst), Nowak, Jan, Untersuchungen über die Cephalopoden der oberen Kreide in Polen, pt. 2, Die Skaphiten: Acad. sci. Cracovie Bull. internat., année 1911, sér. B, p. 566, 1912.

Maestrichtian.

pygmaeus Holzapfel.

Holzapfel, Eduard, Die Mollusken der aachener Kreide, Abt. 1, Cephalopoda und Glossophora: Palaeontographica, vol. 34, p. 63, pl. 7, fig. 19, 1888.

Lower Senonian. [Lower Campanian.]

quadrispinosus (Geinitz) Nowak. **Acanthoscaphites.**

Scaphites quadrispinosus, Geinitz, H. B., Das Quadersandsteingebirge in Deutschland, p. 116, pl. 7, fig. 2; pl. 8, fig. 2, 1850.

[=*Scaphites tridens* Kner according to Schlüter, Clemens, Cephalopoden der oberen deutschen Kreide, p. 94, 1871.]

[=*Acanthoscaphites tridens* Kner var. *quadrispinosus* Geinitz, according to Nowak, Jan, Untersuchungen über die Cephalopoden der oberen Kreide in Polen, Teil 2, Die Skaphiten: Acad. sci. Cracovie Bull. internat., année 1911, sér. B, p. 577, 1912.]

[Upper Campanian.]

reesidei (Wade). **Acanthoscaphites?**

Scaphites reesidei, Wade, Bruce, The fauna of the Ripley formation on Coon Creek, Tenn.: U. S. Geol. Survey Prof. Paper 137, pp. 183–184, pl. 61, figs. 3–7, 1926.

Ripley formation. [Upper Campanian.]

reniformis Morton.

Scaphites reniformis Morton, S. G., Supplement to the "Synopsis of the organic remains of the ferruginous sand formation of the United States": Am. Jour. Sci., 1st ser., vol. 23, p. 291, 1833.

Scaphites reniformis Morton, S. G., Synopsis of the organic remains of the Cretaceous group of the United States, p. 42, pl. 2, fig. 6, 1834.

[=*Scaphites hippocrepis* according to Gabb, W. M., Synopsis of the Mollusca of the Cretaceous formation: Am. Philos. Soc. Proc., vol. 8, p. 33, 1861.]

rochatianus D'Orbigny. **Scaphites.**

D'Orbigny, Alcide, Prodrome de paléontologie, p. 147, 1850.

Cenomanian.

roemeri (D'Orbigny) Nowak (not Brauns). **Acanthoscaphites.**

Scaphites compressus, Roemer, F. A., Versteinerungen des norddeutschen Kreidegebirges, p. 91, pl. 15, fig. 1, 1841.

Scaphites roemeri, D'Orbigny, Alcide, Prodrome de paléontologie, p. 214, 1850.

Acanthoscaphites roemeri (D'Orbigny), Nowak, Jan, Zur Bedeutung von *Scaphites* für die Gliederung der Oberkreide: K.-k. geol. Reichsanstalt Verh., Jahrg. 1916, No. 3, p. 62, 1916.

Upper Campanian.

roemeri Brauns (not D'Orbigny).
Scaphites binodosus, Roemer, F. A., Die Quadratenkreide des Sudmerberges bei Goslar: Palaeontographica, vol. 13, p. 197, pl. 32, fig. 9, 1865.
Scaphites sp., Schlüter, Clemens, Cephalopoden der oberen deutschen Kreide, pl. 23, fig. 23, 1871.
Scaphites roemeri, Brauns, A., Über den Sudmerberg bei Ocker: Zeitschr. ges. Naturwiss., 1875, p. 342, pl. 8, figs. 4, 5.
Emscher. [Coniacian.]

roguensis Anderson. **Scaphites.**
Anderson, F. M., Cretaceous deposits of the Pacific coast: California Acad. Sci. Proc., 3d ser., Geology, vol. 2, p. 112, pl. 2, figs. 67–70, 1902.
Lower Chico. [Cenomanian.]

semicostatus Roemer. **Scaphites.**
Roemer, F. A., Die Kreidebildungen von Texas, p. 35, pl. 1, fig. 5, 1852.
Austin chalk. [Coniacian.]

septem-costatus Cragin. **Scaphites?**
Cragin, F. W., A contribution to the invertebrate paleontology of the Texas Cretaceous: Texas Geol. Survey Fourth Ann. Rept., pt. 2, p. 241, 1893.
Eagle Ford shales. [Turonian.]

similaris Stoliczka. **Scaphites.**
Scaphites aequalis, Stoliczka, Ferdinand, Fossil Cephalopoda of the Cretaceous rocks of southern India, p. 167, pl. 81, fig. 46, 1865.
Scaphites similaris, Stoliczka, Ferdinand, India Geol. Survey Records, vol. 1, p. 36, 1868.
Ootatoor. [Cenomanian or Turonian.]

similis Whitfield. **Scaphites.**
Whitfield, R. P., Gastropoda and Cephalopoda of the Raritan clays and greensand marls of New Jersey: U. S. Geol. Survey Mon. 18, p. 267, pl. 44, figs. 1, 2, 1892.
Merchantville clay. [Lower Campanian.]

spiniger (Schlüter) Nowak. **Acanthoscaphites.**
Scaphites spiniger, Schlüter, Clemens, Cephalopoden der oberen deutschen Kreide, p. 82, pl. 25, figs. 1–7, 1871.
Acanthoscaphites spiniger (Schlüter), Nowak, Jan, Zur Bedeutung von *Scaphites* für die Gliederung der Oberkreide: K.-k. geol. Reichsanstalt Verh., Jahrg. 1916, No. 3, p. 67, 1916.
Mucronatenkreide. [Upper Campanian.]

spinosissimus Frech.
Frech, Fritz, Über *Scaphites:* Centralbl. Mineralogie, Jahrg. 1915, p. 564, fig. 12, 1915.
Upper *Mucronatus* zone. [Upper Campanian.]

stantoni Reeside. **Scaphites.**
Reeside, J. B., jr., The cephalopods of the Eagle sandstone and related formations in the Western Interior of the United States: U. S. Geol. Survey Prof. Paper 151, p. 23, pl. 17, figs. 16–21; pl. 18, figs. 1–7, 1927.
Lower Campanian.

stephanoceroides Yabe.
Yabe, Hisakatsu, Zur Stratigraphie und Paläontologie der oberen Kreide von Hokkaido und Sachalin: Deutsche geol. Gesell. Zeitschr., vol. 61, p. 442, 1909.
[=*Yezoites perrini* according to Yabe, Hisakatsu, Die Scaphiten aus der Oberkreide von Hokkaido: Beitr. Paläontologie Oesterr.-Ungarns u. des Orients, vol. 23, p. 172, 1910.]

striatus Mantell (not Kner). [=*Scaphites aequalis* Sowerby.]
Mantell, G. A., Geology of Sussex, pl. 22, figs. 14, 15, 1822.

striatus Kner (not Mantell).
Kner, Rudolph, Versteinerungen des Kreidemergels von Lemberg und seiner Umgebung: Naturw. Abh. (W. Haidinger), vol. 3, pt. 2, No. 1, p. 10, 1850.
[=*Scaphites aequalis* Sowerby according to Alth, Alois, Geognostisch-palaeontologische Beschreibung der nächsten Umgebung von Lemberg: Naturw. Abh. (W. Haidinger), vol. 3, pt. 2, No. 9, p. 206, pl. 10, fig. 31, 1850.]
[=*Scaphites roemeri* D'Orbigny according to Schlüter, Clemens, Cephalopoden der oberen deutschen Kreide, p. 90, 1871.]
[=*Hoploscaphites constrictus* var. *tenuistriatus* (Kner) according to Nowak, Jan, Untersuchungen über die Cephalopoden der oberen Kreide in Polen, Teil 2, Die Skaphiten: Acad. sci. Cracovie Bull. internat., année 1911, sér. B, p. 585, 1912.]
Maestrichtian.

stüri Redtenbacher.
Scaphites? stüri, Redtenbacher, Anton, Cephalopodenfauna der Gosauschichten in den nordöstlichen Alpen: K.–k. geol. Reichsanstalt Abh., vol. 5, Heft 5, p. 129, pl. 30, fig. 10, 1873.
[=*Menuites stüri* according to Spath, L. F., On the Senonian ammonite fauna of Pondoland: Roy. Soc. South Africa Trans., vol. 10, p. 123, 1922.]

subglobosus (Whiteaves). **Acanthoscaphites?**
Whiteaves, J. F., Report on the Invertebrata of the Laramie and Cretaceous rocks of the vicinity of the Bow and Belly Rivers and adjacent localities in the Northwest Territory: Contr. Canadian Paleontology, vol. 1, p. 52, pl. 7, figs. 3, 8, 1885.
[=*Scaphites mullananus?* according to Stanton, T. W., The Colorado formation and its invertebrate fauna: U. S. Geol. Survey Bull. 106, p. 189, 1893.]
Bearpaw shale. [Upper Campanian.]

tenuicostatus Pervinquière. **Scaphites.**
Pervinquière, Léon, Sur quelques ammonites du crétacé algérien: Soc. géol. France Mém. 42, p. 28, pl. 2, figs. 17–19, 1910.
Middle Cenomanian.

tenuistriatus (Kner). **Discoscaphites.**
Kner, Rudolph, Versteinerung des Kreidemergels von Lemberg und seiner Umgebung: Naturw. Abh. (W. Haidinger), vol. 3, pt. 2, No. 1, p. 10, pl. 1, fig. 5, 1850.
[=*Scaphites constrictus* var. *tenuistriatus* according to De Grossouvre, Albert, Les ammonites de la craie supérieure: Recherches sur la craie supérieure, pt. 2, Paléontologie, p. 249, 1894.]
[=*Hoploscaphites constrictus* var. *tenuistriatus* according to Nowak, Jan, Untersuchungen über die Cephalopoden der oberen Kreide in Polen, pt. 2, Die Skaphiten: Acad. sci. Cracovie Bull. internat., année 1911, sér. B, p. 585, 1912.]
[Maestrichtian?]

cf. **teshioensis** (Yabe) Burckhardt.
Burckhardt, Carlos, Faunas cretácicas de Zumpango del Río: Inst. geol. México Bol. 33, p. 97, pl. 22, fig. 11, 1919.
Turonian.

texanus Roemer. **Scaphites.**
Roemer, F. A., Die Kreidebildungen von Texas und ihre organischen Einschlüsse, p. 35, pl. 1, fig. 4, 1852.
Austin chalk. [Emscherian.]

thomasi Pervinquière. **Scaphites.**

Pervinquière, Léon, Études de paléontologie tunisienne, pt. 1, Céphalopodes des terraines secondaires, p. 121, pl. 4, figs. 30, 31, 1907.

Cenomanian.

tridens (Kner) Nowak. **Acanthoscaphites.**

Scaphites tridens, Kner, Rudolph, Versteinerungen des Kreidemergels von Lemberg und seiner Umgebung: Naturw. Abh. (W. Haidinger), vol. 3, pt. 2, No. 1, p. 10, pl. 2, fig. 1, 1850.

Acanthoscaphites tridens (Kner), Nowak, Jan, Untersuchungen über die Cephalopoden der oberen Kreide in Polen, pt. 2, Die Skaphiten: Acad. sci. Cracovie Bull. internat., année 1911, sér. B, p. 570, pl. 32, fig. 4; pl. 33, figs. 27, 29, 1912.

[Upper Campanian.]

tridens (Kner) var. **bispinosus** Nowak. **Acanthoscaphites.**

Nowak, Jan, Untersuchungen über die Cephalopoden der oberen Kreide in Polen, pt. 2, Die Skaphiten: Acad. sci. Cracovie Bull. internat., année 1911, sér. B, p. 577, pl. 32, figs. 1–3, 1912.

[Upper Campanian.]

trinodosus (Kner) Nowak. **Acanthoscaphites.**

Scaphites trinodosus, Kner, Rudolph, Versteinerungen des Kreidemergels von Lemberg und seiner Umgebung: Naturw. Abh. (W. Haidinger), vol. 3, p. 2, No. 1, p. 11, pl. 2, fig. 2, 1850.

[=*Scaphites tridens* according to Schlüter, Clemens, Cephalopoden der oberen deutschen Kreide, p. 95, 1871.]

[=*Acanthoscaphites tridens* var. *trinodosus* according to Nowak, Jan, Untersuchungen über die Cephalopoden, der oberen Kreide in Polen, pt. 2, Die Skaphiten: Acad. sci. Cracovie Bull. internat., année 1911, sér. B. p. 576, 1912.]

[Upper Campanian.]

trispinosus (Geinitz) Nowak. **Acanthoscaphites.**

Scaphites trispinosus, Geinitz, H. B., Das Quadersandsteingebirge, p. 116, pl. 7, figs. 1 a–b, 1850.

[=*Acanthoscaphites tridens* var. *trispinosus* according to Nowak, Jan, Untersuchungen über die Cephalopoden der oberen Kreide in Polen, pt. 2, Die Skaphiten: Acad. sci. Cracovie Bull. internat., année 1911, sér. B, p. 578, 1912.]

Upper Campanian.

tuberculatus Giebel.

Giebel, Naturw. Ver. Halle Jahresber., 1849, p. 20. [Original publication not seen.]

[=*Scaphites compressus* Roemer (*S. roemeri* D'Orbigny) according to Frech, Fritz, Über *Scaphites:* Centralbl Mineralogie, Jahrg. 1915, No. 18, p. 556, text fig. 14, 1915.]

[Upper Campanian?].

varians (Lopuski) Nowak. **Acanthoscaphites.**

Scaphites varians, Lopuski, Geslaw, Contribution à l'étude de la faune crétacée du Plateau de Lublin: Soc. sci. Varsovie, Compt. rend., année 4, p. 137, pl. 4, figs. 1–3, 1911.

[*Ancanthoscaphites tridens* var. *varians* (Lopuski), Nowak, Jan, Untersuchungen über die Cephalopoden der oberen Kreide in Polen, pt. 2, Die Skaphiten: Acad. sci. Cracovie Bull. internat., année 1911, sér. B, p. 578, pl. 33, figs. 1–3, 1912.

Upper Campanian.

ventricosus Meek and Hayden. **Scaphites.**

Meek, F. B., and Hayden, F. V., Descriptions of new Cretaceous fossils from Nebraska Territory: Acad. Nat. Sci. Philadelphia Proc., vol. 14, p. 22, 1863.

Meek, F. B., Invertebrate Cretaceous and Tertiary fossils of the upper Missouri country: U. S. Geol. Survey Terr. Rept., vol. 9, p. 425, pl. 6, figs. 7, 8, 1876.

Upper Colorado formation. [Coniacian.]

ventricosus Meek and Hayden var. **stantoni** Reeside. **Scaphites.**

Reeside, J. B., jr., Cephalopods from the lower part of the Cody shale of Oregon Basin, Wyo.: U. S. Geol. Survey Prof. Paper 150, p. 7, pl. 3, figs. 19, 20; pl. 4, figs. 5–8, 1927.

Cody shale (Coniacian).

ventricosus Meek and Hayden var. **depressus** Reeside. **Scaphites.**

Reeside, J. B., jr., Cephalopods from the lower part of the Cody shale of Oregon Basin, Wyo.: U. S. Geol. Survey Prof. Paper 150, p. 7, pl. 5, figs. 6–10, 1927.

Cody shale (Coniacian).

ventricosus Meek and Hayden var. **oregonensis** Reeside **Scaphites.**

Reeside, J. B., jr., Cephalopods from the lower part of the Cody shale of Oregon Basin, Wyo.: U. S. Geol. Survey Prof. Paper 150, p. 7, pl. 6, figs. 11–15, 1927.

Cody shale (Coniacian).

ventricosus Meek and Hayden var. **interjectus** Reeside. **Scaphites.**

Reeside, J. B., jr., Cephalopods from the lower part of the Cody shale of Oregon Basin, Wyo.: U. S. Geol. Survey Prof. Paper 150, p. 7, pl. 5, figs. 1–5, 1927.

Cody shale (Coniacian).

vermicosus (Shumard) Adkins. [Misprint for *Scaphites verrucosus* Shumard?]

Adkins, W. S., The Weno and Pawpaw formations of the Texas Comanchean: Texas Univ. Bull. 1856, p. 84, 1918.

vermiculus Shumard.

Shumard, B. F., Description of new Cretaceous fossils from Texas: St. Louis Acad. Sci. Trans., vol. 1, p. 594, 1860

White, C. A., Contributions to invertebrate paleontology, No. 2, Cretaceous fossils of the Western States and Territories: U. S. Geol. and Geog. Survey Terr. Twelfth Ann. Rept., pt. 1, p. 39, pl. 18, fig. 8, 1883.

[=*Macroscaphites* according to Meek, B. F., Invertebrate Cretaceous and Tertiary fossils of the upper Missouri country: U. S. Geol. Survey Terr. Rept., vol. 9, p. 419, 1876.]

vermiformis Meek and Hayden. **Scaphites.**

Meek, F. B., and Hayden, F. V., Descriptions of new Cretaceous fossils from Nebraska Territory: Acad. Nat. Sci. Philadelphia Proc., vol. 14, p. 22, 1863.

Meek, F. B., Invertebrate Cretaceous and Tertiary fossils of the upper Missouri country: U. S. Geol. Survey Terr. Rept., vol. 9, p. 423, pl. 6, fig. 4, 1876.

Upper Colorado formation. [Coniacian.]

vermiformis Meek and Hayden var. **binneyi** Reeside. **Scaphites.**

Reeside, J. B., jr., Cephalopods from the lower part of the Cody shale of Oregon Basin, Wyo.: U. S. Geol. Survey Prof. Paper 150, p. 8, pl. 6, figs. 1–8, 1927.

Cody shale. (Coniacian.)

verneuili (D'Orbigny) De Grossouvre. **Discoscaphites**

Ammonites verneuili, D'Orbigny, Alcide, Paléontologie française, Terrain crétacé, Céphalopodes, p. 329, pl. 98, figs. 3–5, 1840.

Scaphites verneuilli, De Grossouvre, Albert, Les ammonites de la craie supérieure: Recherches sur la craie supérieure, pt. 2, Paléontologie, p. 253, pl. 26, fig. 2, 1894.

Upper Campanian.

verrucosus Shumard.

Shumard, B. F., Descriptions of new Cretaceous fossils from Texas: Boston Soc. Nat. Hist. Proc., vol. 8, p. 189, 1862.

Navarro formation. [Campanian.]

warreni Meek and Hayden. **Scaphites.**

Meek, F. B., and Hayden, F. V., Descriptions of new organic remains from the Tertiary, Cretaceous, and Jurassic rocks of Nebraska: Acad. Nat. Sci. Philadelphia Proc., 1860, p. 177.

Meek, F. B., Invertebrate Cretaceous and Tertiary fossils of the upper Missouri country: U. S. Geol. Survey Terr. Rept., vol. 9, p. 420, pl. 6, fig. 5; text figs. 61–63, 1876.

Carlile shale. [Upper Turonian.]

warreni Meek and Hayden var. **silesiaca** Frech. **Scaphites.**

Scaphites lamberti, Leonhard, Richard, Die Fauna der Kreideformation in Oberschlesien: Palaeontographica, vol. 44, p. 61, pl. 6, figs. 7, 8.

Scaphites warreni var. *silesiaca*, Frech, Fritz, Über *Scaphites:* Centralbl. Mineralogie, Jahrg. 1915, No. 21, p. 557, figs. 6, 8.

[Turonian.]

?worthensis Adkins and Winton. [*Macroscaphites*?]

Adkins, W. S., and Winton, W. M., Paleontological correlation of the Fredericksburg and Washita formations in north Texas: Texas Univ. Bull. 1945, p. 36, pl. 7, figs. 1, 2, 1919.

Lower Washita. [Cenomanian?]

wyomingensis Meek. [=*S. warreni* Meek and Hayden.]

Meek, F. B., Invertebrate Cretaceous and Tertiary fossils of the upper Missouri country: U. S. Geol. Survey Terr. Rept., vol. 9, p. 421, pl. 13, figs. 5–7, 1876.

yonekurai Yabe. **Scaphites.**

Yabe, Hisakatsu, Zur Stratigraphie und Paläontologie der oberen Kreide von Hokkaido und Sachalin: Deutsche geol. Gesell. Zeitschr., vol. 61, p. 421, 1909.

Yabe, Hisakatsu, Die Scaphiten aus der Oberkreide von Hokkaido: Beitr. Paläontologie Oesterr.-Ungarns u. des Orients, vol. 23, p. 165, pl. 15, figs. 4–7, 1910.

[Cenomanian?]

yokoyamai Jimbo. **Scaphites.**

Jimbo, K., Beiträge zur Kenntniss der Fauna der Kreideformation von Hokkaido: Paleont. Abh., vol. 6, No. 3, p. 37, pl. 5, fig. 3, 1894.

[Cenomanian?]

LIST OF SPECIES ARRANGED BY MAJOR CHRONOLOGIC DIVISIONS

Below is a list of species arranged by major chronologic divisions. A query (?) indicates doubt as to age. Under each division the species in group *a* are American; those in group *b* extra-American.

Maestrichtian:

(*a*) abyssinus, cheyennensis, conradi, conradi var. gulosus, conradi var. intermedius, conradi var. petechialis, ?iris, mandanensis, nicolleti.

(*b*) angulatus, constrictus, constrictus var. crassus, constrictus var. vulgaris, diversesulcatus, gibbus, monasteriensis, niedzwiedzkii, nodosus (Lopuski), tenuistriatus.

Upper Campanian:

(*a*) nodosus (Owen), nodosus var. brevis, nodosus var. plenus, nodosus var. quadrangularis, reesidei, subglobosus, verrucosus.

(*b*) ?compressus, ?constrictus var. quiriquinensis, cunliffei, haugi, ?ornatus, pavana, ?plicatellus, pulcherrimus, quadrispinosus, roemeri (D'Orbigny), spiniger, spinosissimus, tridens, tridens var. bispinosus, trinodosus, trispinosus, tuberculatus, varians, verneuilli.

Lower Campanian:

(*a*) aquilaensis, aquilaensis var. costatus, aquilaensis var. nanus, hippocrepis, hippocrepis var. crassus, hippocrepis var. pusillus, hippocrepis var. tenuis, leei, leei var. parvus, levis, similis, stantoni.

(*b*) aquisgranensis, inflatus, meslei, potieri.

Santonian:

(*a*) bassleri, novimexicanus.

(*b*) ?andoorensis, binodosus, ?idoneus.

Coniacian:

(*a*) mullananus, semicostatus, texanus, ventricosus, ventricosus var. depressus, ventricosus var. interjectus, ventricosus var. oregonensis, ventricosus var. stantoni, vermiformis, vermiformis var. binneyi.

(*b*) arnaudi, ?brahminicus, kieslingswaldensis, lamberti, roemeri (Brauns).

Turonian:

(*a*) larvaeformis, septemcostatus, warreni.

(*b*) aequalis var. turonensis, auritus, ?fritschi, geinitzi, geinitzi var. intermedius, planus (Roman and Mazeran), warreni var. silesiaca.

Cenomanian:

(*a*) condoni, condoni var. appressus, gillisi, hilli, inermis, klamathensis, perrini, roguensis.

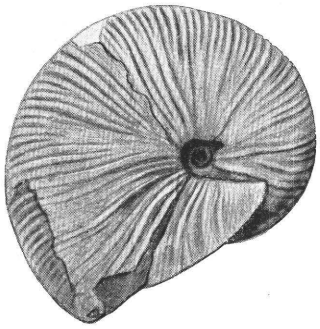
(*b*) aequalis, africanus, evolutus, formosus, gracilis, kingianus, obliquus, peroni, peroni var. inornatus, planus (Yabe), planus var. gigas, pseudoaequalis, puerculus, puerculus var. teshioensis, rochatianus, similaris, tenuicostatus, thomasi, yonekurai, yokoyamai.

Upper Gault:

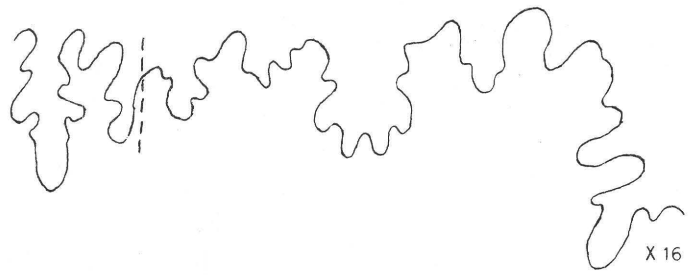
(*b*) hugardianus.

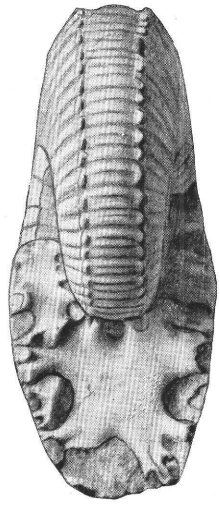
PLATES 9–11

PLATE 9

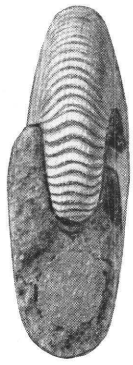


5

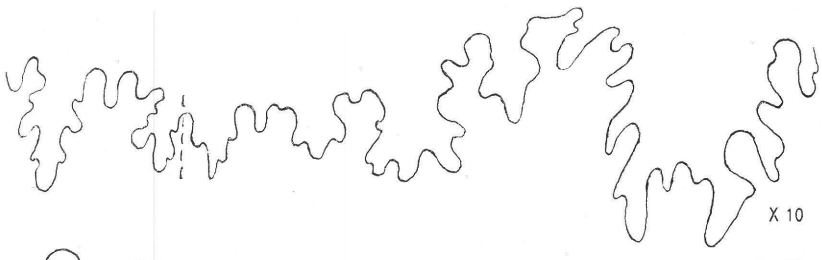


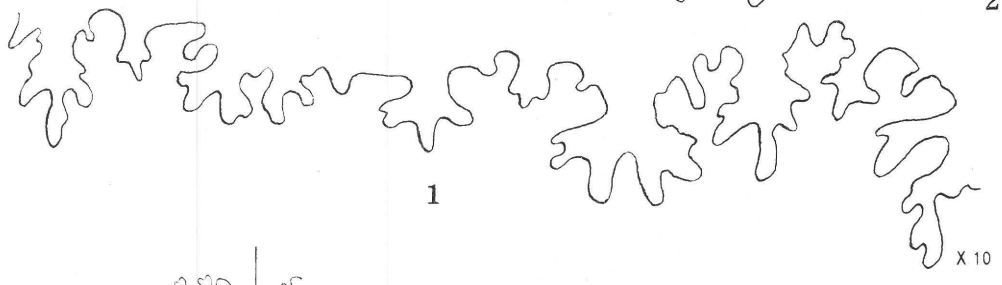


2

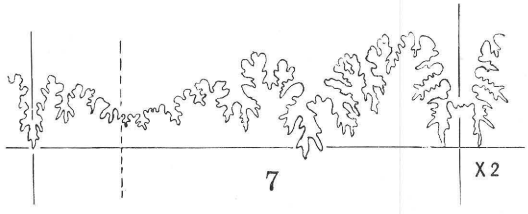


6

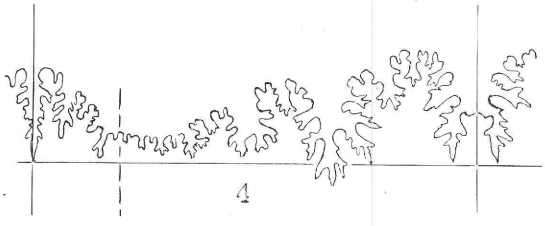




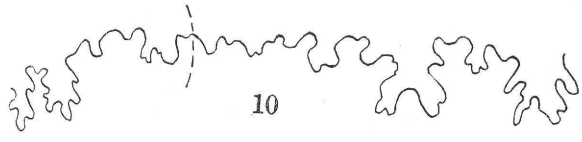
1



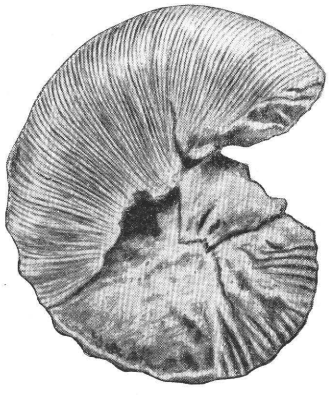
7



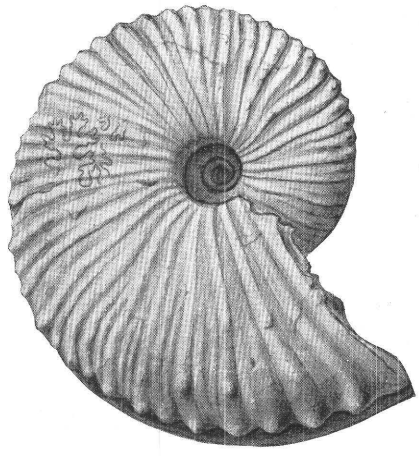
4



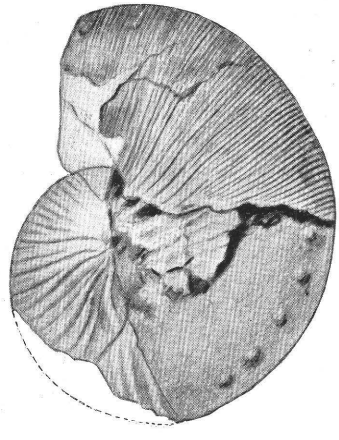
10



9

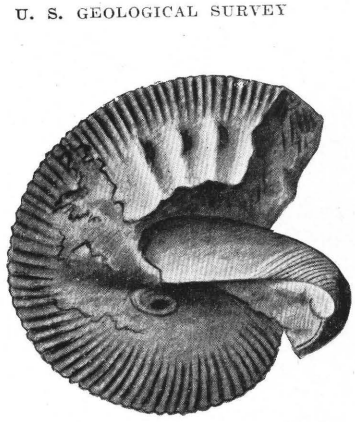


3

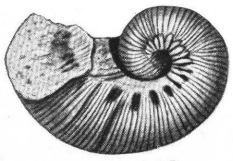


8

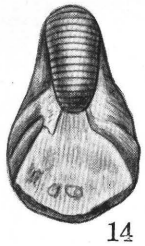
FIGURES ILLUSTRATING THE GENERA OF THE SCAPHITES



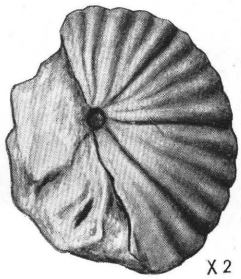
3



13

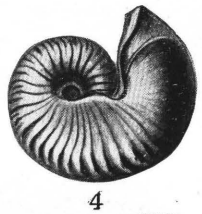


14



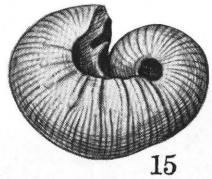
X2

12

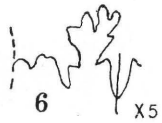


4

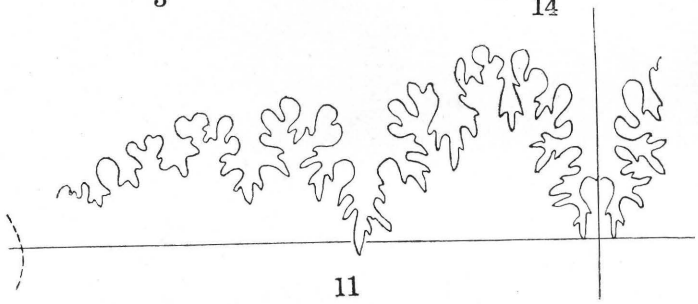
5



15

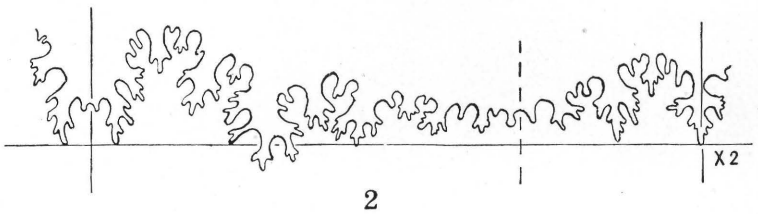


6 X5



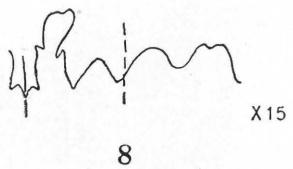
11

7 X5



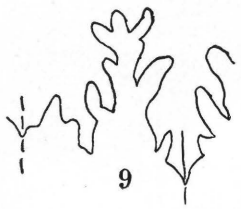
X2

2

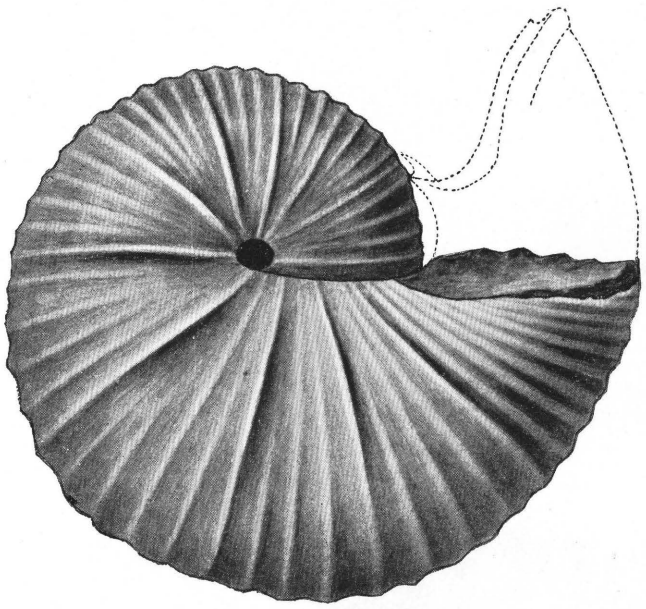


X15

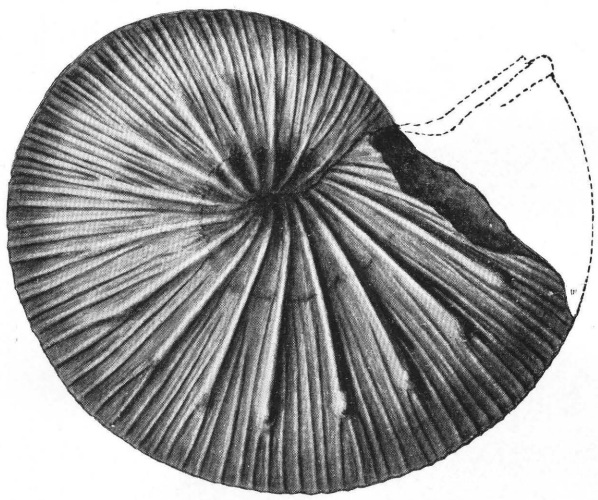
8



9



1



10

FIGURES ILLUSTRATING THE GENERA OF THE SCAPHITES

PLATE 10

Page

FIGURE 1. *Scaphites ventricosus* Meek and Hayden, from upper part of Colorado formation at Chippewa Point, near Fort Benton, Mont.; side view, after Meek, U. S. Geol. Survey Terr. Rept., vol. 9, pl. 6, fig. 7b, 1876. Hyatt's type of *Anascaphites* 22, 26

FIGURE 2. *Scaphites ventricosus* Meek and Hayden, from Cody shale in sec. 6, T. 51 N., R. 100 W., Wyo.; suture of a typical specimen 22, 26

FIGURE 3. *Scaphites geinitzi* D'Orbigny var. *binodosus* Roemer, from Priesen, near Laun, Bohemia; side view, after Jahn, K.-k. geol. Reichsanstalt Jahrb., vol. 41, text fig. 3, p. 181, 1892. Hyatt's type of *Jahnites* 22, 26

FIGURES 4, 5. *Scaphites planus* Yabe, from vicinity of Opiraushibets, Province of Teshio, Hokkaido, Japan; side and peripheral views, after Yabe, Beitr. Paläontologie Oesterr.-Ungarns u. des Orients, vol. 23, pl. 15, figs. 15a,b, 1910. Referred to *Yezoites* by Yabe 23, 26

FIGURES 6, 7. *Scaphites planus* Yabe, from same locality as Figures 4 and 5; dorsal and ventral sutures, after Yabe, op. cit., pl. 15, figs. 17, 18, 1910. Referred to *Yezoites* by Yabe 23, 26

FIGURE 8. *Scaphites puerculus* Jimbo, from same locality as Figures 4 and 5; dorsal suture with part of ventral suture, after Yabe, op. cit., pl. 15, fig. 22, 1910. Referred to *Yezoites* by Yabe 23, 26

FIGURE 9. *Scaphites* sp., from Lenentz, Laun, Bohemia; dorsal suture, after Yabe, op. cit., pl. 15, fig. 30, 1910. Referred to *Yezoites* by Yabe 23, 26

FIGURES 10–12. *Desmoscaphites bassleri* Reeside, from the Telegraph Creek formation in sec. 27, T. 1 S., R. 30 E., Mont.; side view and suture of adult and side view of early whorls 25, 27

FIGURES 13, 14. *Scaphites aequalis* Sowerby; from the Greensand of Yeovil, England; side and peripheral views of the type specimen, after Sowerby, Mineral conchology of Great Britain, pl. 18, figs. 1, 2, 1813 ..... 21, 26

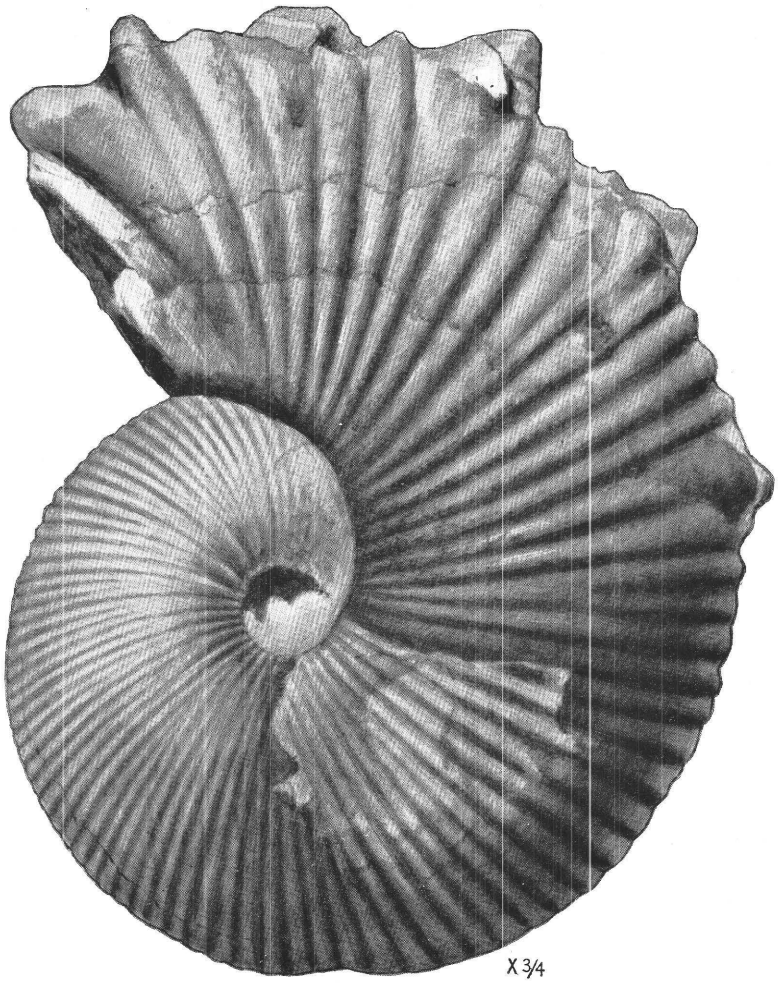
FIGURE 15. *Scaphites aequalis* Sowerby, from Dorsetshire, England; side view of the genotype specimen, *Scaphites* of Parkinson; after Parkinson Organic remains of a former world, pl. 10, fig. 10, 1811 ..... 21. 27

PLATE 11

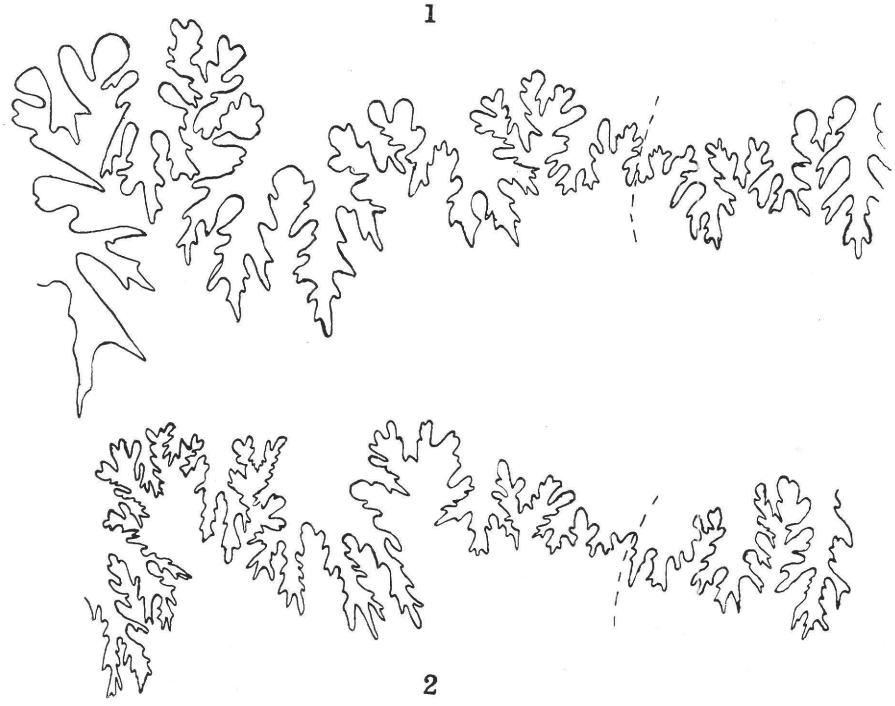
Page

FIGURE 1. *Acanthoscaphites tridens* (Kner) Nowak, var. *trispinosus* Geinitz, from Porszna, Poland; side view, after Nowak, Acad. sci. Cracovie Bull. internat., année 1911, sér. B, pl. 32, fig. 5, 1912 ..... 24, 27

FIGURE 2. *Acanthoscaphites tridens-trinodosus* (Kner) Nowak, from Kierniczki, Poland; two sutures, after Nowak, op. cit., text figs. 8, 9, p. 572, 1912 ..... 24, 27



1



2

FIGURES ILLUSTRATING THE GENERA OF THE SCAPHITES