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VERSITA

Scaphitid ammonites from the Upper Cretaceous of KwaZulu-Natal and Eastern Cape Province, South Africa

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ABSTRACT:

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Scaphitid ammonites are described and illustrated from the Upper Cretaceous of the coastal region of north-eastern South Africa. *Scaphites kieslingswaldensis* Langenhan and Grundey, 1891, *Scaphites manasoaensis* Collignon, 1965, and *Yezoites concinna* sp. nov. occur in the Coniacian part of the St Lucia Formation in northern KwaZulu-Natal. A further *Yezoites* sp. may also be from this level. *Argentoscaphites corrugatus* sp. nov. occurs in the Santonian to Lower Campanian Mzamba Formation on the northernmost coast of Eastern Cape Province. *Yezoites australis* sp. nov. occurs in the Upper Santonian part of the St Lucia and Mzamba formations of these areas, and *Scaphites reesidei* Collignon, 1969, is recorded from the Lower Campanian part of the Mzamba Formation. The scaphitid assemblage includes species previously described from Western Europe and Madagascar, together with *Argentoscaphites*, previously known only from Patagonia (and possibly South India). Dimorphism is recognised in *Scaphites reesidei*, *Yezoites concinna* sp. nov. and *Y. australis* sp. nov. *Argentoscaphites corrugatus* sp. nov. and *Yezoites* sp. are represented by microconchs only. Dimorphism has not been recognised in *Scaphites kieslingswaldensis*.

Keywords: Scaphitid ammonites; Cretaceous; South Africa.

INTRODUCTION

Scaphitid ammonites are a distinctive element of mid- and late Cretaceous ammonite faunas, and extended, albeit briefly, into the Palaeocene (Machalski 2005). In the Boreal Realm of Western Europe, and in the Western Interior, Gulf Coast and Atlantic Seaboard of North America, they are abundant at some levels and localities, as well as being key biostratigraphic indicators. Elsewhere, they are a widely distributed, but typically minor element of many faunas. Exceptions include limited intervals in the Albian and Cenomanian marl sequences of Algeria, Tunisia and Madagascar, and the Lower Campanian terrigenous-clastic facies of Madagascar. Previous workers (Woods 1906; Van Hoepen 1921; Spath 1921, 1922; Venzo 1936; Klinger and Kennedy 1996; Cooper and Greyling 1996) recorded around a dozen specimens only.

We describe below a total of six species, based on over 70 whole and fragmentary specimens. We have documented the regional stratigraphy and provided detailed locality details elsewhere (Kennedy and Klinger 1975;

Klinger and Kennedy 1980a), to which the reader is referred. The present material comes from two formations and areas. The Mzamba Formation crops out on the northern coast of Eastern Cape Province, the key localities being north and south of the Mzamba Estuary (locality 1 of Kennedy and Klinger 1975 and Klinger and Kennedy 1980a), 230 km southwest of Durban. The sequence rests unconformably on Ordovician (?) quartzites of the Table Mountain Group, is up to 25 m thick, and ranges from low in the Santonian to low in the Campanian. Three species of scaphite are present. *Scaphites reesidei* Collignon, 1969, is based on museum specimens and is imprecisely dated. *Argentoscaphites corrugatus* sp. nov. is well-dated as Lower Campanian on the basis of the records in Klinger and Kennedy (1980a) and Cooper and Greyling (1996); this is compatible with the type occurrence in Madagascar. *Yezoites australis* sp. nov. is well-dated as Upper Santonian on the basis of co-occurrence with *Eulophoceras natalense* Hyatt, 1903. The second area that has yielded scaphites extends from Umkwelane Hill, south of Mtubatuba, 200 km northwest of Durban to the Mzinene River, some 66 km to the north-north-east (Kennedy and Kinger 1975, figs 1–3). In this area, the Lower Coniacian to Upper Maastrichtian St Lucia Formation rests unconformably on Cenomanian Mzinene Formation. The Middle Coniacian part of the sequence has yielded *Scaphites kieslingswaldensis* Langenhan and Grundey, 1891, and *Yezoites concinna* sp. nov.; the Upper Santonian part yielded *Yezoites australis* sp. nov. A further species of *Yezoites*, left in open nomenclature, is probably Coniacian, while *Scaphites manasoaensis* Collignon, 1965, comes from either the Lower or Middle Coniacian.

CONVENTIONS

The suture terminology is that of Korn *et al*. (2003): E = external lobe; A = adventive lobe (= lateral lobe, L, of Kullmann and Wiedmann, 1970); U = umbilical lobe; I = internal lobe; P = pseudolobe.
OUM: Oxford University Museum of Natural History.
SAM: The South African Museum, Cape Town.
SGNP: Servicio Nacional Minero y Geólogico, Buenos Aires.

SYSTEMATIC PALAEONTOLOGY

Suborder Ancyloceratina Wiedmann, 1966
Superfamily Scaphitoidea Gill, 1871
Family Scaphitidae Gill, 1871
Subfamily Scaphitinae Gill, 1871
Genus *Scaphites* Parkinson, 1811

TYPE SPECIES: *Scaphites equalis* J. Sowerby, 1813, p. 53, pl. 18, figs 1–3, by original designation by Meek 1876, p. 413.

Scaphites reesidei Collignon, 1969
(Text-figs 1A–M, 2A–H, 3A–H)

1906. *Scaphites* sp. Woods, p. 343, pl. 44, fig. 8.
1921. *Scaphites* sp. Van Hoepen, p. 29, pl. 5, figs 8, 9.
1922. *Hoploscaphites* sp. (cf. *similaris*, Stoliczka?); Spath, p. 136.
1969. *Scaphites scalaris* Collignon, p. 15, 16, pl. 518, figs 2038, 2039.
1969. *Scaphites reesidei* Collignon, p. 51, 53, pl. 553, figs 2098, 2099.
1969. *Scaphites aquisgranensiformis* Collignon, p. 53, 54, pl. 533, figs 2100–2103.
1996. *Scaphites aquisgranensiformis* Collignon, 1969; Cooper and Greyling, p. 17 (*pars*), text-fig. 7G, H, ? A, B.
2014. *Scaphites reesidei* Collignon, 1969; Walaszczyk *et al.,* p. 118, fig. 32B. C.

NAME OF THE SPECIES: We regard *Scaphites scalaris* Collignon, 1969, p. 15, pl. 518, figs 2038, 2039, the holotype of which is a macroconch, as a synonym of *Scaphites reesidei* Collignon, 1969, p. 51, pl. figs 2098, 2099, the holotype of which is also a macroconch, with *Scaphites aquisgranensiformis* Collignon, 1969, p. 53, figs 2100–2103, the holotype of which is a microconch as a further synonym, and as first revising authors select *reesidei* as the name of the species.

TYPE: The holotype is the original of Collignon 1969, p. 51, pl. 533, fig. 2098, from the Lower Campanian *Scaphites reesidei* Subzone of the *Karapadites karapadensis* Zone, gisement 712 of Collignon's Ampamba-Antsirasira (Belo sur Tsiribihina) section, Madagascar, housed in the collections of the Université de Bourgogne, Dijon.

MATERIAL: SAM PCZ22273 and SAM 4826 (the original of Woods 1906, p. 343, pl. 44, fig. 8), from the Santonian to Lower Campanian Mzamba Formation at locality 1 of Kennedy and Klinger 1975: cliff and foreshore exposures 1 km north of the mouth of the Mzamba River, Eastern Cape Province, 31° 05' 50'' S, 30° 10' 30'' E.

DESCRIPTION: SAM 4826 (Text-fig. 1D–F), the original of Woods 1906, pl. 44, fig. 8, is a microconch. It lacks the adapical recurved section of the adult body chamber; the maximum preserved length is 23 mm. The phragmocone is 15.5 mm in diameter. Coiling is involute, with a small, deep umbilicus. The whorl section has been deformed by *post-mortem* compaction, but appears to have been depressed, with a narrowly rounded umbilical shoulder, broadly rounded flanks and venter. An estimated 15 primary ribs arise at the umbilical seam, and strengthen markedly on the umbilical shoulder. They are strong, straight to feebly convex and prorsiradiate across the flanks, bifurcate on the outer flank, where shorter ribs intercalate or are feebly linked to the primary ribs. As a result, there are three times as many ribs at the ventrolateral shoulder as on the inner flank. The shaft is narrow, the umbilical wall markedly concave, the umbilicus not occluded. Ribbing like that on the phragmocone extends onto the adapical part of the shaft, and is succeeded by five strong, coarse, straight, prorsiradiate primary ribs with well-developed umbilical bullae and strong, conical to feebly clavate ventral tubercles. These are linked across the venter by pairs of secondary ribs, with additional intercalated ribs between.

SAM-PCZ 22273 (Text-fig. 1G–J) is an internal mould of the body chamber of a macroconch, with a maximum preserved length of 31.2 mm. The whorl section at the adapical end of the body chamber is depressed reniform, the whorl breadth to height ratio is 1.2. The whorl breadth increases markedly from the adapical to the adapertural end of the shaft. The profile of the umbilical seam indicates that it partially occluded the umbilicus of the spire. On the adapical part of the spire, narrow prorsiradiate primary ribs bifurcate on the outer flank, where single ribs intercalate, the ribs narrow and sharp, passing near-transverse across the venter, and looping in pairs between the primaries. A broad constriction separates the adapical part of the shaft from the adapertural part, and the ornament undergoes profound change. A coarse primary rib gives rise to coarse secondaries, which, together with intercalated ribs, are feebly convex across the venter. On the beginning of the final, curved sector, a coarse circular ventrolateral tubercle appears on one flank. It is followed by coarse circular umbilicolateral tubercles, two of which are preserved, linked by a pair of ribs to slightly weaker circular ventrolateral tubercles. These are linked over the venter by groups of two or three coarse feebly convex ribs. The final, adapertural part of the curved sector is missing.

DISCUSSION: SAM-4826 (Text-fig. 1D–F) differs in no significant respects from the holotype of *Scaphites aquisgranensiformis* Collignon, 1969 (Text-fig. 1A–C) and other specimens he referred to the species (Text-fig. 2A–E). SAM-PCZ22273 (Text-fig. 1G–J) differs in no significant respects from the holotype of *Scaphites reesidei* Collignon, 1969 (Text-fig. 1K–M) and other specimens he referred to the species (Text-fig. 2F–H). We have examined more than 100 specimens collected from a narrow interval in the Lower Campanian of the section between Antsirasira and Ampolipoly, Madagascar; they clearly constitute a dimorphic pair, showing exactly the same type of dimorphism as the group of *Scaphites leei* Reeside, 1927 – *hippocrepis* DeKay, 1827, as demonstrated by Cobban (1969) in his benchmark paper on dimorphism in scaphites, to which group *Scaphites reesidei* clearly belongs. This relationship was recognised by Collignon (1969), and *Scaphites reesidei* most closely resembles *Scaphites hippocrepis* III of Cobban (1969, p. 21, pl. 3, figs 1–25; pl. 4, figs 35–49; pl. 5, figs 36–40; text-figs 2, 4, 10, 11). It differs in the fewer coarser primary ribs on the body chamber of microconch *reesidei*, and the coarser ribs and coarser rounded and generally fewer tubercles on body chambers of macroconchs. The specimen figured by Cooper and Greyling (1996, text-fig. 7G, H) is a microconch of the present species; their second specimen (text-fig. 7A, B) is indeterminate in our view.

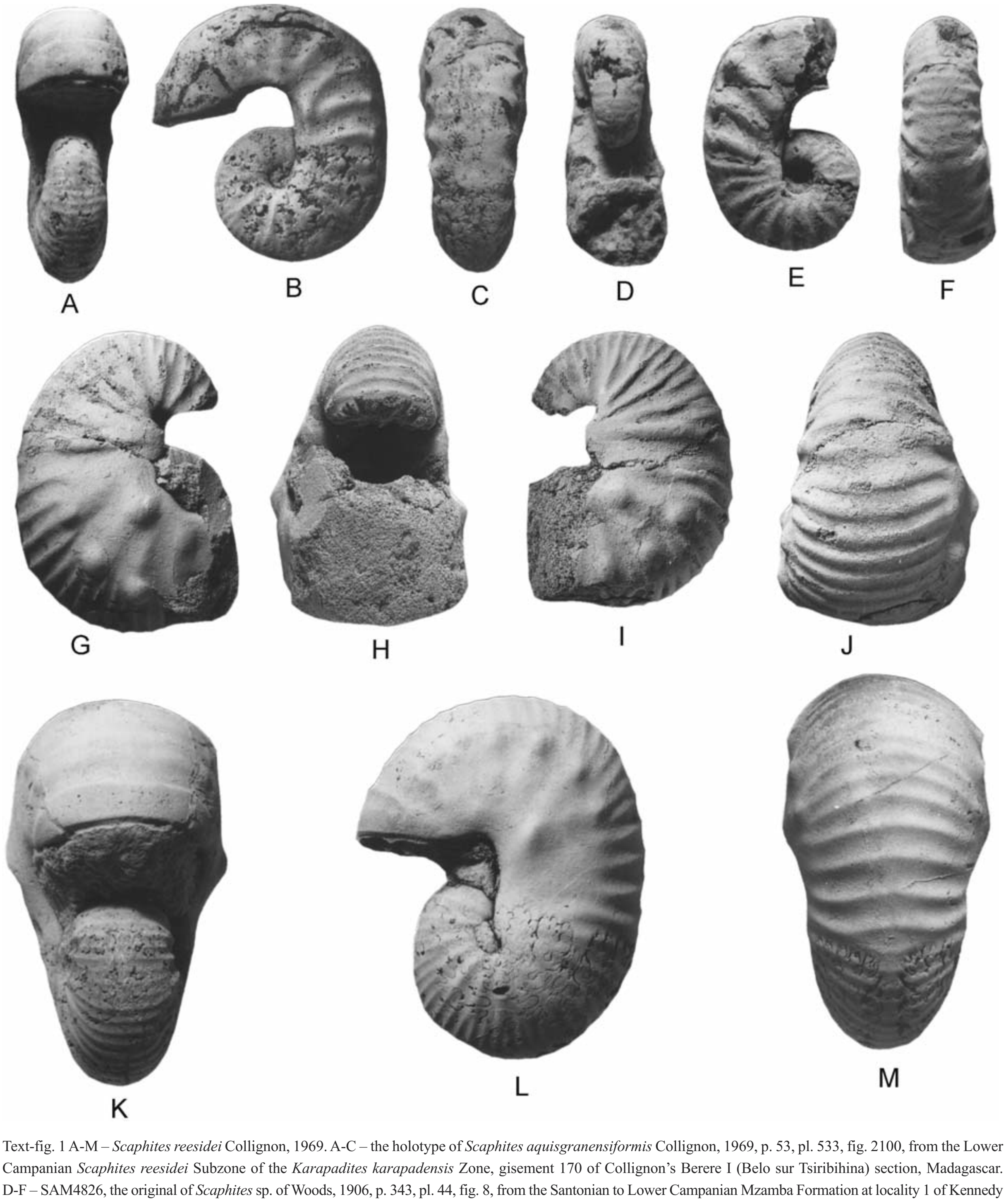
Scaphites scalaris Collignon, 1969 (p. 15, pl. 518, figs 2038, 2039; see Text-fig. 3A–H) was separated from *S. reesidei* on the basis of the stronger ornament on the spire and shaft. Individuals corresponding to *scalaris* co-occur with typical *reesidei* in large collections from Madagascar we have studied, and we regard it as a synonym.

OCCURRENCE: The Mzamba material is well dated as Lower Campanian on the basis of the records in Klinger and Kennedy (1980a) and Cooper and Greyling (1996). In Madagascar, Collignon (1969) recognised an upper, *Scaphites reesidei* Subzone to the second zone, of *Karapadites karapadensis*, in his Lower Campanian sequence. Recent collections from Madagascar (Walaszczyk *et al*. 2014) indicate that it occurs in flood abundance at this level, and also occurs more rarely below.

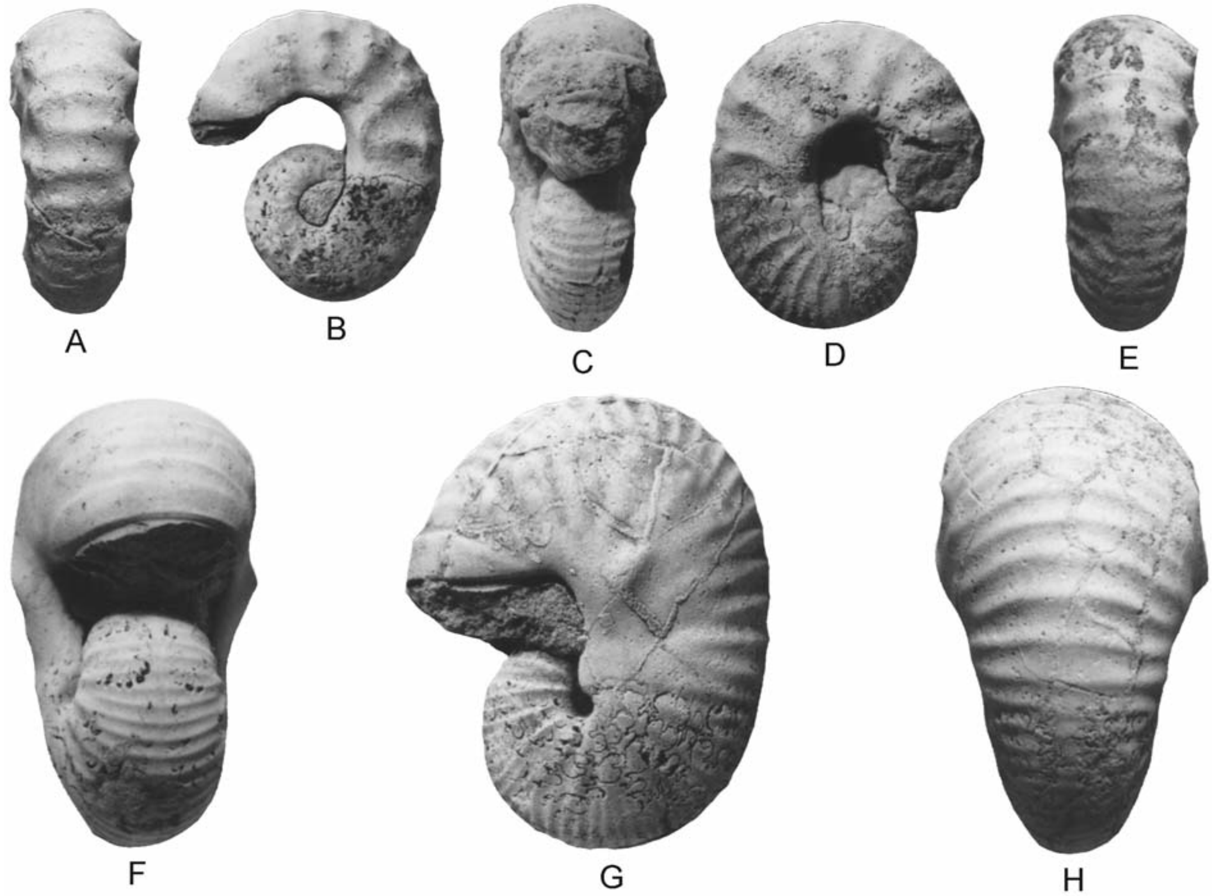
Scaphites kieslingswaldensis Langenhan and Grundey, 1891
(Pl. 1, Figs 1–29; Pl. 2, figs 1–9, 14–17; Pl. 3, Figs 1–17; Text-fig. 6C)

1891. *Scaphites Kieslingswaldensis* Langenhan and Grundey, p. 9, pl. 1, fig. 1.
1894. *Scaphites Meslei* De Grossouvre, p. 239, pl. 32, figs 4, 7.
1894. *Scaphites Lamberti* De Grosssouvre, p. 241, pl. 32, figs 1, 5.
1894. *Scaphites Poitieri* De Grossouvre, p. 242, pl. 22, fig. 3.
1907. *Scaphites Lamberti* De Grossouvre; Boule *et al*., p. 31, pl. 6, figs 7, 8.
1936. *Scaphites Meslei* De Gross.; Venzo, p. 110, pl. 10, fig. 6.

1965. *Scaphites meslei* De Gross. var. *masiaposensis* Collignon, p. 16, pl. 420, fig. 1739.
1965. *Scaphites arnaudiformis* Collignon, p. 17, pl. 420, fig. 1743.
1984. *Scaphites* (*Scaphites*) *meslei* De Grossouvre, 1894; Kennedy, p. 148, pl. 31, figs 1–19; text-fig. 42C, D (with full synonymy).
1987. *Scaphites kieslingswaldensis kieslingswaldensis* Langenhan and Grundey, 1891; Kaplan *et al*., p. 14, pl. 4, figs 3–6; pl. 5, figs 1–5 (with additional synonymy).



Text-fig. 1 A-M – *Scaphites reesidei* Collignon, 1969. A-C – the holotype of *Scaphites aquisgranensiformis* Collignon, 1969, p. 53, pl. 533, fig. 2100, from the Lower Campanian *Scaphites reesidei* Subzone of the *Karapadites karapadensis* Zone, gisement 170 of Collignon's Berere I (Belo sur Tsiribihina) section, Madagascar. D-F – SAM4826, the original of *Scaphites* sp. of Woods, 1906, p. 343, pl. 44, fig. 8, from the Santonian to Lower Campanian Mzamba Formation at locality 1 of Kennedy and Klinger (1975). G-J – SAM-PCZ22273, from the same horizon and locality as D-F. K-M – the holotype of *Scaphites reesidei* Collignon, 1969 p. 51, pl. 533, fig. 2098, from the Lower Campanian *Scaphites reesidei* Subzone of the *Karapadites karapadensis* Zone, gisement 712 of Collignon's Ampamba-Antsirasira (Belo sur Tsiribihina) section, Madagascar. All figures are ×1.5.



Text-fig. 2. A-H – *Scaphites reesidei* Collignon, 1969. A, B – the original of *Scaphites aquisgranensiformis* Collignon, 1969 p. 54, pl. 533, fig. 2102; C-E – the original of fig. 2101, from the Lower Campanian *Scaphites reesidei* Subzone of the *Karapadites karapadensis* Zone, gisement 712 of Collignon's Ampamba-Antsirasira (Belo sur Tsiribihina) section, Madagascar. F-H – the original of *Scaphites reesidei* Collignon, 1969 p. 53, pl. 533, fig. 2099, from the Lower Campanian *Scaphites reesidei* Subzone of the *Karapadites karapadensis* Zone, gisement 712 of Collignon's Ampamba-Antsirasira (Belo sur Tsiribihina) section, Madagascar. All figures are ×1.5

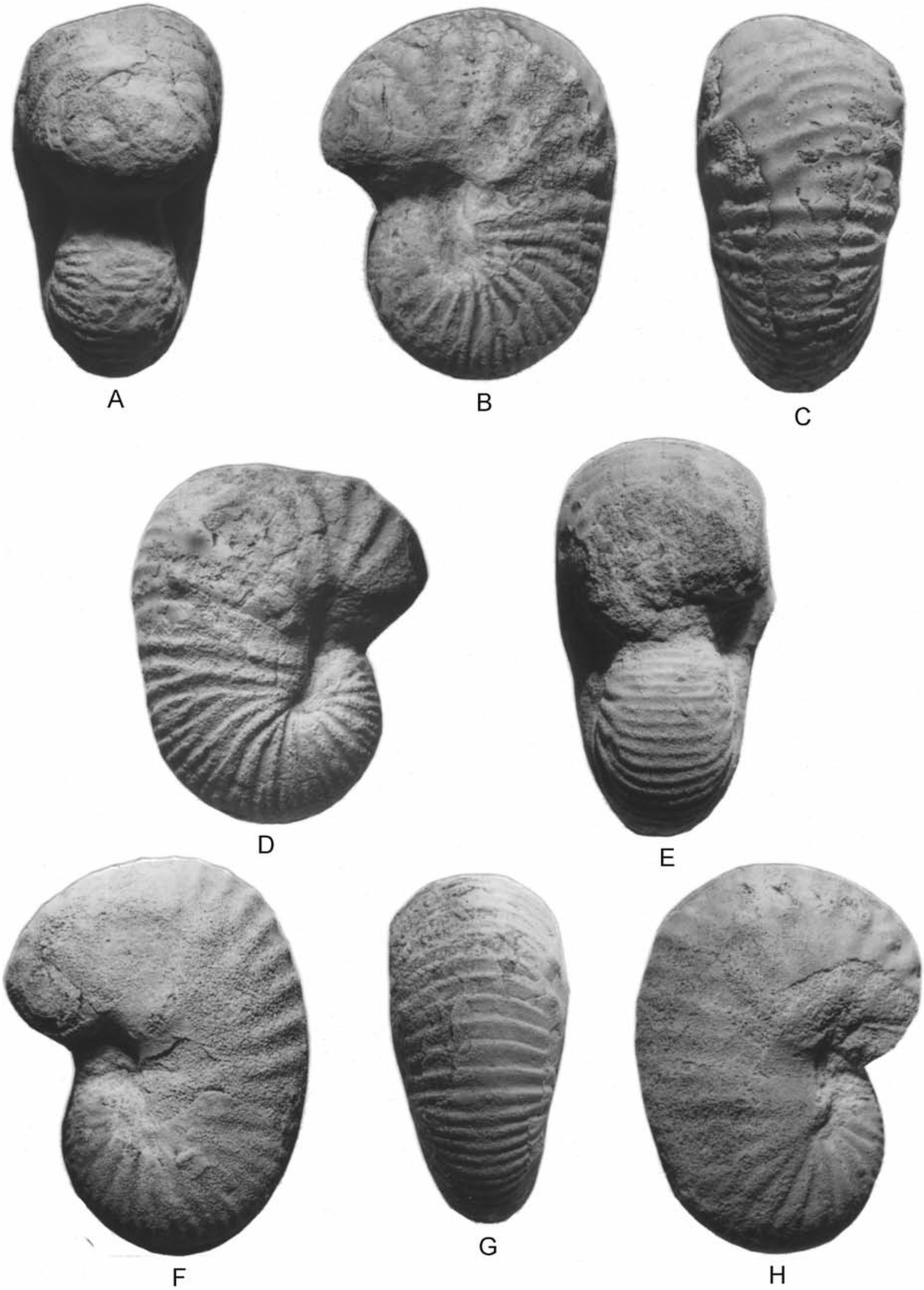
1991\. *Scaphites kieslingswaldensis kieslingswaldensis* Langenhan and Grundy, 1891; Kennedy and Christensen, p. 222, pl. 3, fig. 2; pl. 4, figs 2, 6; pl. 5, fig. 1.

1994\. *Scaphites kieslingswaldensis kieslingswaldensis* Langenhan and Grundy, 1891; Kaplan and Kennedy, p. 60, pl. 40, figs 9–14; pl. 41, figs 1–13.

2004\. *Scaphites kieslingswaldensis kieslingswaldensis* Langenhan and Grundy, 1891; Walaszczyk *et al*., p. 548, text-fig. 10, E, F.

TYPE: The holotype, by monotypy, is the original of Langenhan and Grundey 1891, pl. 1, fig. 1, from the Coniacian of Idzików (German Kieslingswalde), southeast of Kłodzko (German Glatz), Poland. It was refigured by Sturm (1901, pl. 3, fig. 6), and a cast was figured by Kaplan *et al*. (1987, pl. 5, fig. 5) and Kaplan and Kennedy (1984, pl. 41, figs 1–3).

MATERIAL: OUM KX17216–17219, from locality 13 of Kennedy and Klinger (1975, p. 283): Hill slopes below Riverview Compound, 750 m north of the cane railway bridge across the Mfolozi, south of Mtubatuba, 28° 26' 52" S, 32° 10' 48". OUM KX17227–17231, from locality 72 of Kennedy and Klinger (1975, p. 292): degraded river cliff and alluvial flats on the north side of the Mzinene River, 200–300 m east of the causeway across the river, 27° 51' 52" S, 32° 21' 34" E. SAM-PCZ22248-22251, 22253–22255, 22283, from locality 71 of Kennedy and Klinger (1975, p. 292), degraded river cliffs on the north bank of the Munywana Creek, 27° 51′ 48" S 32° 21' 08" E. SAM-PCZ 22256, from degraded river cliffs along the north bank of the Mzinene River NNE of Hluhluwe, 27° 52' 12" S 32° 24' 7" E. SAM-PCZ 22258, from locality 92 of Kennedy and Klinger (1975, p. 295), temporary exposures ESE of Hluhluwe, 28° 03' 07" S 32° 20' 10" E . SAM 22264–22268, from locality 93 of Kennedy and Klinger (1975, p. 295), hill slopes ESE of Hluhluwe, 28° 03' 19" S, 32°


A
B
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H

20' 00" E. SAM-PCZ 22259–62 are from between localities 92 and 93. All of these localities are in northern KwaZulu-Natal, in the St Lucia Formation, with associated faunas indicating a Middle Coniacian horizon.

DESCRIPTION: Spires vary from compressed (Pl. 1, Figs 1–3) to depressed (Pl. 1, Figs 5–7). In compressed spires the coiling is involute, the umbilicus comprising around 20% of the diameter. The umbilical wall is flattened, the umbilical shoulder quite narrowly rounded. The flanks are flattened and subparallel, the ventrolateral shoulders broadly rounded, the venter very feebly convex. Delicate feebly prorsiradiate primary ribs, 16–18 per half whorl, strengthen across the flanks and are feebly convex at mid-flank, where they bifurcate, flexing back and feebly concave on the outer flank and ventrolateral shoulder, crossing the venter in a very shallow convexity. The ribs vary from very weak, notably on the inner flank of the inner whorls of the spire, before strengthening on the outer whorl in some individuals (Pl. 1, Figs 2, 3, 14, 23); in others they are well-differentiated (Pl. 1, Figs 8, 10, 21). Stout spires have fewer, stronger ribs of comparable style (Pl. 1, Figs 11, 19, 25). Delicate bullae may develop at the point of rib bifurcation towards the adapertural end of the spire in both compressed (Pl. 1, Figs 14, 23) and more robust spires (Pl. 1, Figs 12, 19, 25). Adult specimens range from 28–38 mm in maximum length. There is no clear differentiation into macro- and microconchs on the basis of either size or body chamber shape. Specimens such as OUM KX17219 (Pl. 2, Figs 1, 2), and PCZ22266 (Pl. 2, Fig. 6) have a shaft that partially conceals the umbilicus of the spire, a character of macroconchs. Larger specimens, such as OUM KX17228 (Pl. 3, Figs 5, 6) and SAM-PCZ22247 (Pl. 3, Figs 16, 17) seem to have less of the umbilicus of the spire concealed, but the differences are slight, and perhaps illusory. There are from five to seven weak to strong primary ribs that arise on the umbilical wall and strengthen into markedly prorsirsdiate bullae that vary in strength between individuals. In any individual, the bullae are weakest at the adapical and adapertural ends of the shaft. The bullae give rise to coarse prorsiradiate ribs that link to strong ventrolateral clavi that have developed from the weaker bullae at the point of rib bifurcation on the spire. The clavi give rise to groups of two or three ribs that are feebly convex across the venter, looping to the clavi on the opposite flank. Additional ribs intercalate between these groups. Umbilical bullae efface, and ventral clavi decline around the final curved sector, and the last few ribs, which may be single or may bifurcate, lack tubercles. The adult aperture is preceded by a stronger rib, followed by a constriction. The suture (Text-fig. 6C) is little-incised, with broad, plump, asymmetrically bifid E/A and narrow, bifid A.

DISCUSSION: The European synonyms of *Scaphites kieslingswaldensis* are discussed at length by Kaplan *et al*. (1987) and Kaplan and Kennedy (1994); the species was previously recorded (as *Scaphites Meslei* De Grossouvre) from KwaZulu-Natal by Venzo (1936, p. 110, pl. 10, fig. 6). On the basis of the variability shown by the present collection, a number of taxa described from the Coniacian of Madagascar fall into synonymy. The holotype of *Scaphites arnaudiformis* Collignon, 1965 (p. 17, pl. 420, fig. 1743), is from his Lower Coniacian Zone of *Kossmaticeras theobaldi* and *Barroisiceras onilahyense* at his locality 335, Beantaly (Belo sur Tsiribihina), Madagascar (Pl. 1, Fig. 4). It is a spire that finds a match in specimens such as SAM-PCZ22265 and SAM-PCZ22263 (Pl. 1, Figs 5–7, 11, 12). The original of *Scaphites meslei* var. *masiaposensis* Collignon, 1965 (p. 16, pl. 420 fig. 1739) is from his Zone of *Peroniceras dravidicum*, that is to say the Middle Coniacian, of his locality 263, Masiaposa (Belo sur Tsiribihina, Madagascar (Pl. 3, Fig. 10). It was differentiated on the basis of finer, less prorsiradiate ribs and weaker ventral tubercles; similar forms occur in the present material (Pl. 3, Figs 5, 6).

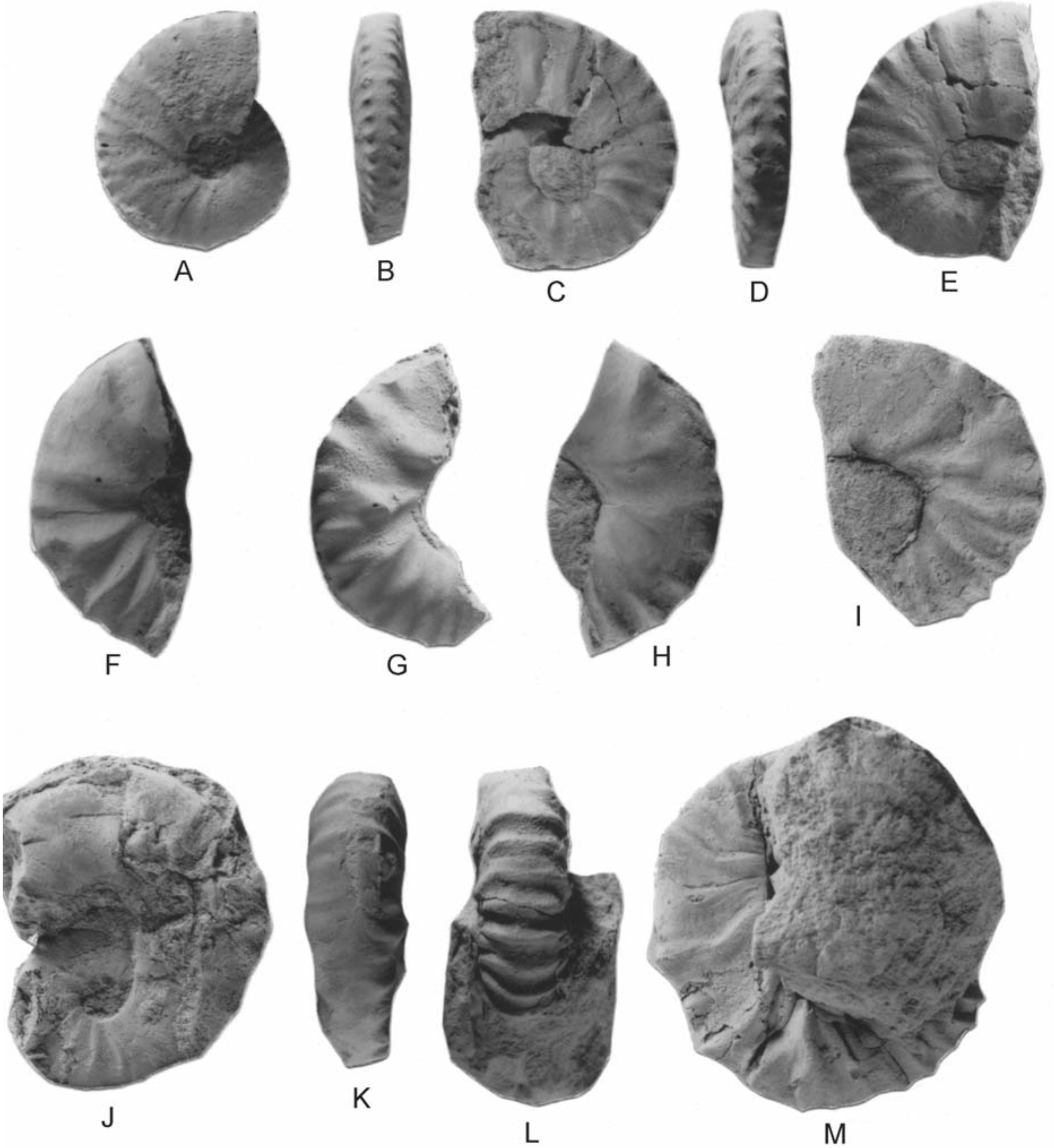
OCCURRENCE: Lower and Middle Coniacian where well dated. The geographic distribution extends from Poland to Germany, the Czech Republic, Austria, Romania (?), Loir-et-Cher, Charente-Maritime, Aude and Var in France to northern Spain, Madagascar and northern KwaZulu-Natal.

Scaphites manasoaensis Collignon, 1965
(Pl. 2, Figs 10–13)

1965. *Scaphites manasoaensis* Collignon, p. 16, pl. 420, fig. 1740.
?2004. *Scaphites* (*Scaphites*) cf. *manasoaensis* Collignon, 1965; Walaszczyk *et al*., text-fig. 10d.

TYPE: The holotype (Pl. 2, Fig. 10) is the original of Collignon, 1965, p. 16, pl. 420, fig. 1740 from the

Text-fig. 3. A-H – *Scaphites scalaris* Collignon, 1969. A-D – the holotype, the original of Collignon's p. 15, pl. 518, fig. 2038, from gisement 515; E-H – the original of pl. 518, fig. 2039, from gisement 718, both specimens from the Lower Campanian *Rabeiella orthogonina* Subzone of the *Menabites boulei* and *Anapachydiscus arrialoorensis* Zone of Collignon's Ampamba-Antsirasira (Belo sur Tsiribihina) section, Madagascar. All figures are ×1.5.



Text-fig. 4. A-N – *Argentoscaphites mutans* Blasco De Nullo, Nullo and Proserpio, 1980. A-C – SGNP15493, the original of Blasco De Nullo *et al*. 1980, pl. 1, figs 9-11. D-F – SGNP15491, the original of pl. 1, figs 15–18; G, I – SGNP15489, the original of pl. 1, fig. 12. H – SGNP15490bis, the original of pl. 1, figs 20–21. J – an unfigured topotype. K, L – the lectotype, SGNP15490, the original of pl. 1, fig. 19. M, N – paralectotype SGNP15489, the original of pl. 1, figs 5, 6. All specimens are in the collections of Servicio Nacional Minero y Geólogico, Buenos Aires, and are from the Upper Santonian-Lower Campanian of La Horquilla, Patagonia, Argentina. All figures are ×1.5

Lower Coniacian Zone of *Kossmaticeras theobaldi* and *Barroisiceras onilahyense* at his locality 462, Manasoa (Betioky), Madagascar, in the collections of the Université de Bourgogne, Dijon.

MATERIAL: SAM-PCZ22252, from Coniacian St Lucia Formation on the north bank of the Munywana Creek, on the farm Insleep, north of locality 71 of Kennedy and Klinger (1975, p. 292).

DESCRIPTION: The specimen is an internal mould of a body chamber and part of a spire, the latter lacking all of one flank and the venter (Pl. 2, Figs 11–13). The maximum preserved length is 29.6 mm. The coiling of the spire is involute, with a small, deep umbilicus. The ornament is only partially preserved. Coarse ribs arise on the umbilical wall, are straight and prorsiradiate on the inner to mid-flank, and bifurcate on the outer flank. The shaft has a depressed reniform whorl section. The umbilical seam is straight in profile. Four primary ribs arise on the umbilical wall and strengthen across the umbilical shoulder, and are coarse, feebly prorsiradiate, and widely separated on the inner and middle flank. They coarsen into incipient bullae and bifurcate on the outer flank, and pass near-straight across the venter. There are two intercalated ribs. The same style of bifurcating ribs extends around the curved sector of the body chamber, the secondary and intercalated ribs finer than on the shaft. The adult aperture is not preserved.

DISCUSSION: The specimen differs in no significant respects from the holotype, as can be seen from a comparison of Pl. 2, Fig. 10 and Pl. 2, Figs 11–13. These specimens differ from *Scaphites kieslingswaldensis* in the present collection in their lack of umbilical bullae and ventral clavi on the body chamber.

OCCURRENCE: Lower Coniacian of Madagascar; Lower or Middle Coniacian of northern KwaZulu-Natal.

Genus *Argentoscaphites* Blasco De Nullo, Nullo and Proserpio, 1980

TYPE SPECIES: *Argentoscaphites mutans* Blasco De Nullo, Nullo and Proserpio, 1980, *nom. correct*. Wright, 1996, p. 261, *pro mutantibus* Blasco De Nullo *et al*., from the Upper Santonian–Lower Campanian of La Horquilla, Patagonia, Argentina.

DIAGNOSIS: Initial coiled whorls with primary ribs that bifurcate at a weak to strong lateral bulla, the secondary and intercalated ribs bear small oblique ventral clavi that are offset across the venter. Body chamber of macroconch high-whorled, with strong Y-shaped ribs with variable bullae at point of branching on shaft. Microconch with narrow body chamber with coarse Y-shaped ribs with transverse ventral clavi that persist onto the adapical part of the recurved sector, but are thereafter lost. Suture relatively simple, with minor incisions.

DISCUSSION: The emended diagnosis assumes that *Argentoscaphites corrugatus* sp. nov., is the microconch of the genus, and that the type and other material (Text-fig. 4) of the type species, *Argentoscaphites mutans,* is the macroconch of the genus. Blasco De Nullo *et. al*. (1980, p. 478) did not designate a holotype for their new species, rather regarding two specimens in the collections of the Servicio Nacional Minero y Geólogico, Buenos Aires, SGNP15490, the original of their pl. 1, fig. 19 (Text-fig. 4K, L), and SGNP15489, the original of their pl. 1, figs 5–6 (Text-fig. 4M, N) as syntypes. We here designate SGNP15490 lectotype. The key diagnostic features of the genus are the presence of lateral bullae and ventral clavi on the phragmocone and shaft, the clavi offset rather than opposite across the venter, and the striking Y-shaped pattern of the ribs. The absence of lappets in the *Yezoites*-like microconch indicated Scaphitinae rather than Otoscaphitinae, but the similarity between the ribbing style of *Argentoscaphites* and *Yezoites* is striking (compare Text-fig. 5A–I and J–P), and it is conceivable that *Argentoscaphites* is a late member of the Otoscaphitinae in which the microconch has lost the lappets. All of the Argentinian specimens we have seen are macroconchs (Text-fig. 4), and it is not possible to either prove or disprove definitively the view that the South African microconch material (Text-fig. 5B–I) is congeneric on the basis of the material currently available to us. As an interim position, we describe the latter below as the new species *Argentoscaphites corrugatus*. *Ammonites Andoorensis* Stoliczka, 1864 (p. 94, pl. 47, fig. 3; Kossmat 1897, p. 32 (139), pl. 6 (17), fig. 3) from the Upper Trichinopoly Group of Andoor, south India, appears to be a macroconch *Argentoscaphites*, on the basis of the Y-shaped branching ribs and ventral tubercles, although the latter appear to be opposite rather than alternate.

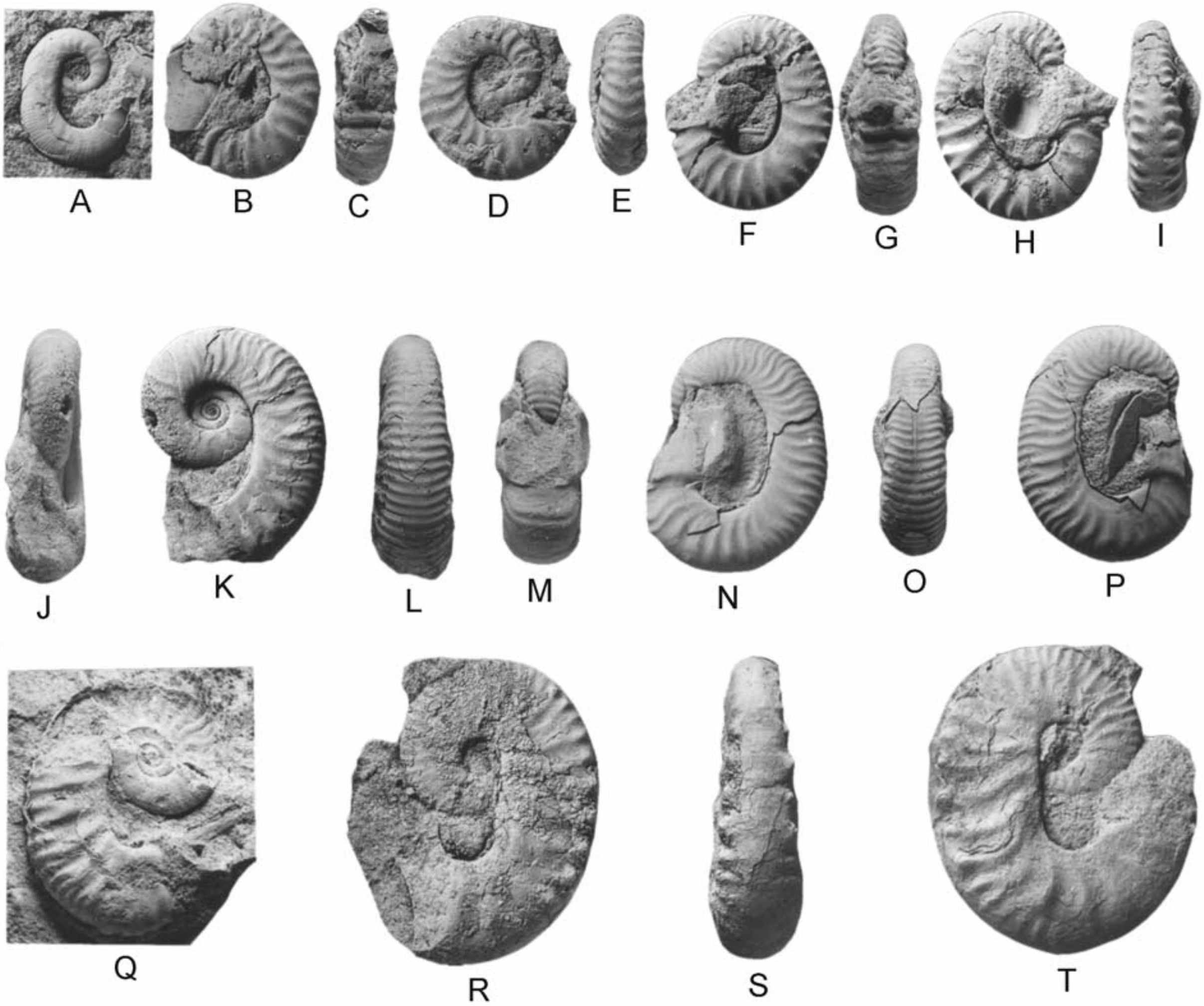
OCCURRENCE: Upper Santonian–Lower Campanian, southern Argentina and Eastern Cape Province, South Africa. ?Upper Trichinopoly Group of South India.

Argentoscaphites corrugatus sp. nov.
(Text-fig. 5 B–I)

DERIVATION OF NAME: *Corrugatus* (Latin): ridged.

TYPES: The holotype is SAM-PCZ 22274 (Text-fig. 5 F–I), the paratype is SAM-PCZ 22275 (Text-fig. 5B–E), from the Santonian to Lower Campanian Mzamba Formation at locality 1 of Kennedy and Klinger (1975, p. 281; see also Klinger and Kennedy 1980a): cliff and foreshore exposures 1km north of the mouth of the Mzamba River, Eastern Cape Province, coordinates 31° 05’ 50” S, 30° 10’ 30” E.

DIAGNOSIS: An *Argentoscaphites* in which the microconch has very coarse branching ribs with strong lateral bullae at the point of branching on the phragmocone.



Text-fig. 5. A – *Yezoites* sp., SAM-PCZ 22245, from the St Lucia Formation at locality 10 of Kennedy and Klinger (1975, p. 282), railroad cutting on the eastern flank of Umkwelane Hill, south of Mtubatuba in northern KwaZulu-Natal, 28° 27' 49'' S 32° 09' 58'' E. The specimen is probably of Coniacian date. B-I – *Argentoscaphites corrugatus* sp. nov. B-E – paratype SAM-PCZ 22275, F-I – the holotype, SAM-PCZ 22274, both from the Santonian to Lower Campanian Mzamba Formation at locality 1 of Kennedy and Klinger (1975 p. 281; see also Klinger and Kennedy 1980a): cliff and foreshore exposures 1 km north of the mouth of the Mzamba River, Eastern Cape Province, coordinates 31° 05' 50'' S, 30° 10' 30'' E. J-T, *Yezoites concinna* sp. nov. J-L – the holotype, SAM-PCZ22269, from west of locality 93 of Kennedy and Klinger (1975, p. 295), hill slopes ESE of Hluhluwe, 28° 03' 19'' S, 32° 20' 00'' E. M-P – paratype OUM KX17220; Q – paratype OUM KX17224, both from locality 13 of Kennedy and Klinger (1975, p. 283): Hill slopes below Riverview Compound, 750 m north of the cane railway bridge across the Mfolozi, south of Mtubatuba, 28° 26' 52'' S, 32° 10' 48''. R-T – paratype OUM KX17226, from locality 14 of Kennedy and Klinger (1975, p. 283), road cuttings below the compound immediately south of the Msunduzi River, 2.1 km NNE of Mfolozi, south of Mtubatuba, 28° 28' 24'' S 32° 10' 43'' E. All specimens are from the Middle Coniacian part of the St Lucia Formation. All figures are ×1.5.

DESCRIPTION: The holotype (Text-fig. 5F–I) is a complete microconch 18.2 mm long, retaining traces of aragonitic shell on part of the spire, which is 12 mm approximately in diameter. The coiling of the spire is evolute, the flanks feebly convex, subparallel, the ventrolateral shoulders broadly rounded, the venter very feebly convex. Primary ribs are narrow, sharp and prorsirdiate on the inner flank, across which they strengthen progressively, convex at mid-flank, and developing into coarse lateral bullae that give rise to pairs of coarse concave secondary ribs in a distinctive asymmetric Y pattern, the adapical secondary is the stronger and concave; occasional short ribs intercalate. All ribs bear small but distinct ventral clavi that are feebly prorsirsdiate, the clavi offset across the venter, and linked by irregular zigzag ribs that efface at mid-venter. The shaft is relatively narrow, compressed, with feebly convex subparallel flanks, broadly rounded ventrolateral shoulders and a very feebly convex venter. The umbilical wall is low and concave, the umbilical shoulder very narrowly rounded. The distinctive Y- shaped bifurcate ribs extend onto the shaft and adapical part of the curved sector; the primary ribs are prorsirdiate on the inner flank, the lateral bullae at the point of bifurcation weakened. The ventral clavi become transverse, and remain offset across the venter. On the adapertural part of the curved sector the ventral clavi decline, and low ribs pass across the venter, the offsetting of ornament between flanks being lost. The adult aperture is preceded by a strong constriction followed by a strong, simple rib. There is no indication of lappets. The suture (Text-fig. 6B) is simple and little-incised, with a broad, asymmetrically bifid E/A, with a narrow median Λ-shaped element, the lobes on U simple, with a median incision.

Paratype SAM-PCZ22275 (Text-fig. 5B–E) is an internal mould of a microconch which is 15.3 mm long. The individual suffered minor non-lethal damage in life, and while the flank ornament of spire and shaft differ in no significant respects from that of the holotype, the ventral ornament is different (Text-fig. 5E), with the ribs having the form of an asymmetric obtuse chevron, with feeble ventral bullae on one flank only. Symmetry is restored on the shaft, with feeble ventral bullae that are opposite rather than offset connected across the venter by a transverse rib.

DISCUSSION: The new species *corrugatus* is refered to the genus *Argentoscaphites* on the basis of the common shared features of the phragmocone of the microconch South African and macroconch Argentinian material: branching Y-shaped ribbing, and offset ventral clavi. The phragmocones of *mutans* (Text-fig. 4A–F) differ from those of *corrugatus* in being much more compressed and involute, the ribs dense and crowded, and the lateral tubercles weak.

OCCURRENCE: As for types.

Subfamily Otoscaphitinae Wright, 1953
Genus *Yezoites* Yabe, 1910

TYPE SPECIES: *Scaphites perrini* Anderson, 1902, p. 114, pl. 2, figs 71–73, by the subsequent designation of Diener, 1925, p. 213.

Yezoites concinna sp. nov.
(Text-fig. 5J–T)

DERIVATION OF NAME: *Concinnus* (Latin), beautiful.

TYPES: The holotype is SAM-PCZ22269, from west of locality 93 of Kennedy and Klinger (1975, p. 295), hill slopes ESE of Hluhluwe, 28° 03’ 19’’ S, 32° 20’ 00’’ E. Paratypes OUM KX17220, 17222, and 17224 are from locality 13 of Kennedy and Klinger (1975, p. 283): Hill slopes below Riverview Compound, 750 m north of the cane railway bridge across the Mfolozi, south of Mtubatuba, 28° 26’ 52’’ S, 32° 10’ 48’’ E. Paratype OUM KX17226 is from locality 14 of Kennedy and Klinger (1975, p. 283), road cuttings below the compound immediately south of the Msunduzi River, 2.1 km NNE of Mfolozi, south of Mtubatuba, 28° 28’ 24’’ S 32° 10’ 43’’ E. All specimens are from the Middle Coniacian part of the St Lucia Formation.

DIAGNOSIS: Microconch spire and shaft ornamented by delicate ribs that are prorsiradiate on the inner flank, bifurcate at mid-flank, the point of branching a feeble or incipient bulla, from which the ribs sweep back and are concave on the outer flanks and ventrolateral shoulder. Macroconchs develop small ventral bullae on the adapertural part of the spire and most of the body chamber.

DESCRIPTION: The holotype, SAM-PCZ22269 (Text-fig. 5J–L) is a well-preserved, near-complete adult microconch, 23.4 mm long, retaining extensive areas of the original aragonitic shell material. The spire is 15.9 mm in diameter. Coiling is moderately evolute, the umbilicus comprising 24% of the diameter, shallow, with a flattened umbilical wall and broadly rounded umbilical shoulder. The whorls expand slowly, the whorl section as wide as high, with very feebly convex subparallel flanks, broadly rounded ventrolateral shoulders and a feebly convex venter. On the outer whorl, 14 primary ribs per whorl arise at the umbilical seam and pass straight across the umbilical wall, strengthen across the umbilical shoulder and are crowded, narrow, straight and prorsiradiate on the inner flank. They flex back and are convex at mid-flank, where the ribs increase by bifurcation and intercalation, then flex back and pass straight across the outer flanks and near-straight across the venter. The body chamber is compressed, the umbilical wall low, concave, with a very narrowly rounded umbilical shoulder, the whorl section as wide as high, the flanks flattened and subparallel, the ventrolateral shoulders broadly rounded, the venter very feebly convex. The pattern of ribbing present on the coiled portion persists, the primary ribs becoming increasingly prorsiradiate and more widely separated. In places, the point where the ribs bifurcate is strengthened into a weak bulla, most conspicuous on the final curved sector. Paratype OUM KX17220 (Text-fig. 5M–P) is a complete microconch 21.6 mm long. The coiling and ornament are as in the holotype. On the adapertural part of the body chamber, not preserved in the holotype, the ribs weaken and effaces on the venter, which becomes near-smooth. The aperture is constricted, with the constriction most prominent at the base of a pair of large, partially preserved lateral lappets. OUM KX17224 (Text-fig. 5Q) is a fragmentary microconch 23 mm long, with coarser ribbing than the previous specimens, the bullae at the point of branching of the ribs more strongly developed. OUM K17222 (not figured) is a further, incomplete microconch.

OUM KX17226 (Text-fig. 5R–T) is an internal mould of a near-complete macroconch 28.4 mm long. The spire is 16 mm approximately in diameter, and compressed as a result of *post-mortem* crushing. Ornament is of strongly prorsiradiate primary ribs that bifurcate around mid-flank, as in the microconch, but with the branching point strengthened into an incipient bulla. The secondary ribs pass straight across the venter. The shaft of the body chamber is compressed and higher-whorled than that of the microconch, the umbilical wall straight in profile, partially occluding the umbilicus of the spire. Relatively coarse primary ribs are markedly prorsiradiate, bifurcating on the outer flank, flexing back and markedly convex, and linking to small ventral clavi that increase in strength towards the final curved sector of the body chamber. The venter is near smooth at this stage. The tubercles decline and efface on the curved sector. Sutures not seen.

DISCUSSION: The ornament of the phragmocone and the flank ornament of the body chamber shaft is comparable in microconchs and macroconchs. The dimorphs differ not only in coiling, but also in the development of ventral clavi on the shaft of the macroconch. This is exactly the difference shown between microconch *Yezoites puerculus* (Jimbo, 1894) (p. 37, pl. 5, fig. 4; see revision in Tanabe 1975, p. 109, pls 10–11; 1977, p. 401, pl. 62, figs 1–9; pl. 64, figs 1–5; Alabushev and Wiedmann 1997, p. 13, pl. 3, figs 2–7), and the corresponding macroconch: *Yezoites planus* Yabe, 1910, p. 167, pl. 15, figs 11–18 (see revision in Tanabe 1977 p. 402, pl. 63, figs 1–8, pl. 64, figs 6–9 and Davis *et al*. 1996, p. 506, fig. 9G, H). This is the species closest to *Yezoites corrugatus* sp. nov. The microconchs differ in the coronate whorl section of the phragmocone of *puerculus*/*planus* and the depressed whorl section of the body chamber. The ornament of microconch *puerculus* is highly variable, from near-obsolete to coarse distant ribs with well-developed ventrolateral tubercles, but never quite matches the detailed branching pattern of the present specimens (Tanabe 1977, pl. 62). Macroconch *puerculus* have very weak flank ornament on the shaft of the body chamber, and the adapertural part of the final recurved sector of the body chamber becomes near-smooth (Tanabe 1977, pl. 63).

OCCURRENCE: Middle Coniacian of northern KwaZulu-Natal.

Yezoites australis sp. nov.
(Pl. 4, figs 1–22; Text-figs 6A, 7A–S)

1921. *Scaphites Cunliffei* Forbes sp.; Van Hoepen, p. 28, pl. 5, figs 5–7; text-fig. 16.
? 1921. *Scaphites* sp. Van Hoepen, p. 30.
1921. *Hoploscaphites* sp. juv.; Spath, p. 49.
1922. *Hoploscaphites* sp. (cf. *similaris*, Stoliczka?); Spath, p. 136.
1922. *Hoploscaphites* sp. (cf. *pavana*, Forbes ?); Spath, p. 136.
1922. *Hoploscaphites* sp. ind.; Spath, p. 136.

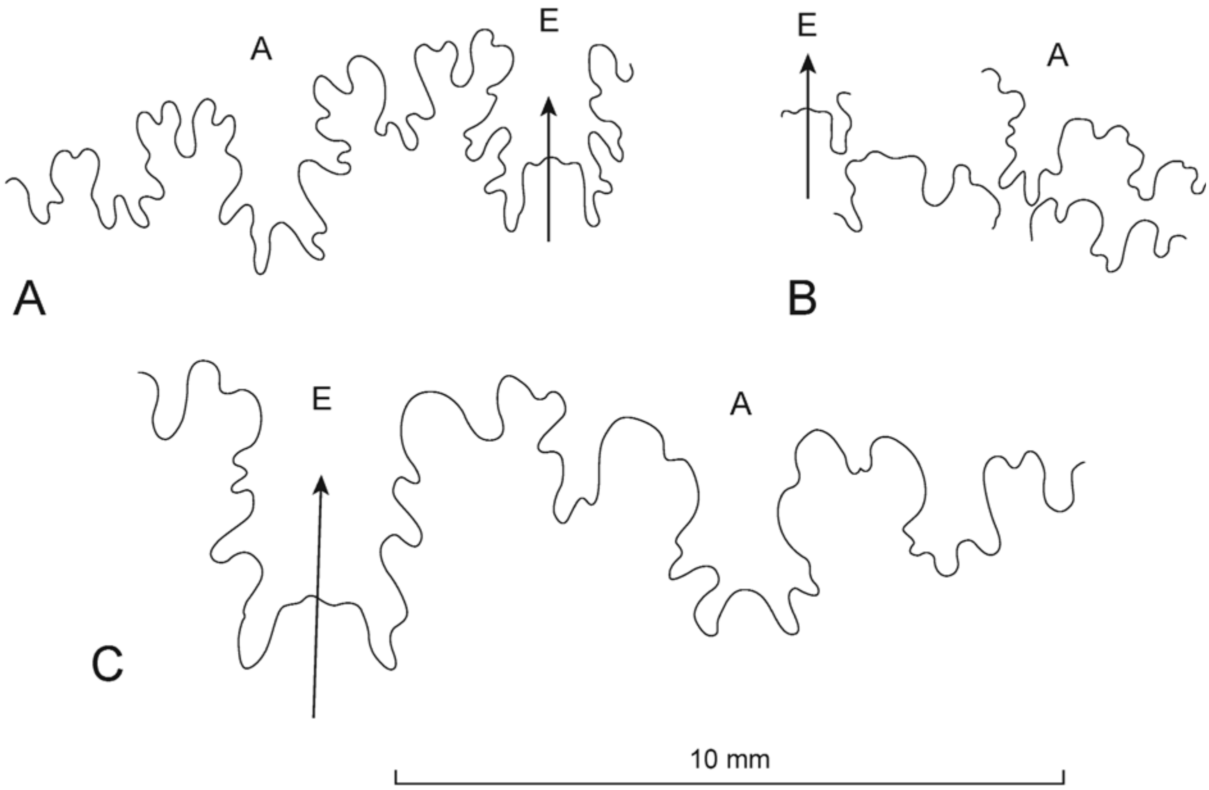
DERIVATION OF NAME: *Australis* (Latin): southern.

TYPES: The holotype is SAM-PCZ22270; it and paratypes OUM KX5033–35, 5038–40,5042a–b, 5044, 5045, 5049 and 5067a–b are from bed B of the Upper Santonian St Lucia at locality 105 of Kennedy and Klinger (1975, p. 296; Klinger and Kennedy 1980b, text-fig. 130), cliff section on the northern end of the southern peninsula in Lake St Lucia, 3.5 km north of the mouth of the Nyalazi River, ESE of Hluhluwe, 28° 03' 27'' S 32° 23' 08''E. Paratypes OUM KX 7811–7814 are from the Upper Santonian part of the Mzamba Formation at locality 1 of Kennedy and Klinger (1975, p. 281; see also Klinger and Kennedy 1980): cliff and foreshore exposures 1 km north of the mouth of the Mzamba River, Eastern Cape Province, 31° 05' 50'' S, 30° 10' 30'' E.

MATERIAL: OUM KX5036–7, 5043, 5046–7 and 5053–4, from locality 105, as above; SAM-PCZ22271 is probably from this locality and horizon.

DIAGNOSIS: A *Yezoites* with flexuous bifurcating ribs on the phragmocone that become, in the macroconch, coarse, distant and very prorsiradiate on the shaft of the body chamber, and develop ventral clavi.

DESCRIPTION: The holotype, SAM-PCZ22270 (Pl. 4, Figs 18–21), and paratypes OUM OUM KX5033–35, 5038–40,5042b, 5044, 5045, 5049 and 5067a–b , 7811, 7813–4, together with SAM-PCZ22271 are macroconchs. Specimen OUM KX5042a (Pl. 4, Fig. 11) is the only microconch seen. Complete macroconchs range from 25.4 to 28.3 mm in maximum length. The coiled section of the shell varies from compressed (e.g. Text-fig. 7I–J) in the majority of specimens to OUM KX 5041 (Text-fig. 7A–C), where the whorl breadth to height ratio approaches 1. Coiling is very involute, the flanks in compressed individuals feebly convex and subparallel,



Text-fig. 6. External sutures. A – *Yezoites australis* sp. nov, paratype OUM KX5038. B – *Argentoscaphites corrugatus* sp. nov., the holotype, SAM-PCZ22274. C – *Scaphites kieslingswaldensis* Langenhan and Grundey, 1891, SAM-PCZ22257

the ventrolateral shoulders broadly rounded, the venter feebly convex. Ten, to twelve ribs arise at the umbilical seam, strengthen progressively across the umbilical wall and shoulder, where they are feebly convex. The ribs are straight and prorsirdiate on the inner flank, across which they strengthen to mid-flank, where an incipient bulla may develop (Text-fig. 7B). The ribs flex back at this point and are initially convex, and bifurcate before sweeping forwards on the outermost flank and shoulder, becoming feebly concave, while additional ribs intercalate. The ribs pass across the venter in a feeble convexity. The shaft of the body chamber is compressed, with flattened, very feebly convex flanks, broadly rounded ventrolateral shoulders and a feebly convex venter. The venter broadens progressively from the adapical to adapertural end of the shaft (Pl. 4, Figs 1, 6, 9, 14, 20). The umbilical wall is low, flat to feebly concave; in profile it varies from near-straight (Pl. 4, Fig. 13), partially concealing the umbilicus of the spire, to developing a slight but distinct convex course (Pl. 4, Figs 2, 8). Ornament changes markedly from spire to shaft, the dense crowded ornament effaces, and there is a short feebly ornamented to near-smooth section (Pl. 4, Figs 13, 15), beyond which three to four low, broad ribs arise at the umbilical shoulder and are strongly prorsiradiate and concave on the inner flank, where they may bifurcate, strengthen and sweep back on the middle to outer flank, where occasional short ribs intercalate, the ribs linking to coarse oblique ventrolateral tubercles, as few as three in OUM KX5044 (Pl. 4, Figs 12–15) to as many as six, as in the holotype (Pl. 4, Figs 19, 21). The tubercles are linked over the venter by a feeble, progressively broadening rib in some individuals (Pl. 4, Fig. 20); in others the venter is near-smooth on parts of the shaft (Pl. 4, Fig. 1). Tubercles are lost by the adapertural end of the shaft. The recurved sector bears crowded prorsiradiate ribs on the flanks ,weak on the innermost flank, where they arise both singly or in pairs, strengthening progressively and very feebly flexuous on the middle of the flanks, and strong, crowded and feebly concave on the ventrolateral shoulders (Pl. 4, Figs 10, 15). The ribs are feebly convex on the venter, and weakened at mid-venter (Pl. 4, Figs 7, 12, 18). The adult aperture is prorsiradiate, very feebly sinuous, and preceded by a very narrow constriction. The suture (Text-fig. 6A) has a large, quite deeply incised bifid E/A, bifid A and A/P.

OUM KX5042a (Pl. 4, Fig. 11) may be the microconch of the species. The spire is 11 mm approximately in diameter; that of macroconchs is up to 19 mm. The pattern of ornament on the spire, of crowded flexuous ribs that bifurcate around mid-flank, corresponds to that of the compressed, finely ribbed macroconchs (compare Pl. 4, Fig. 11 and Pl. 4, Figs 2, 4, 5). The beginnings of the straight shaft are preserved; it appears to have been narrower than that of the macroconchs.

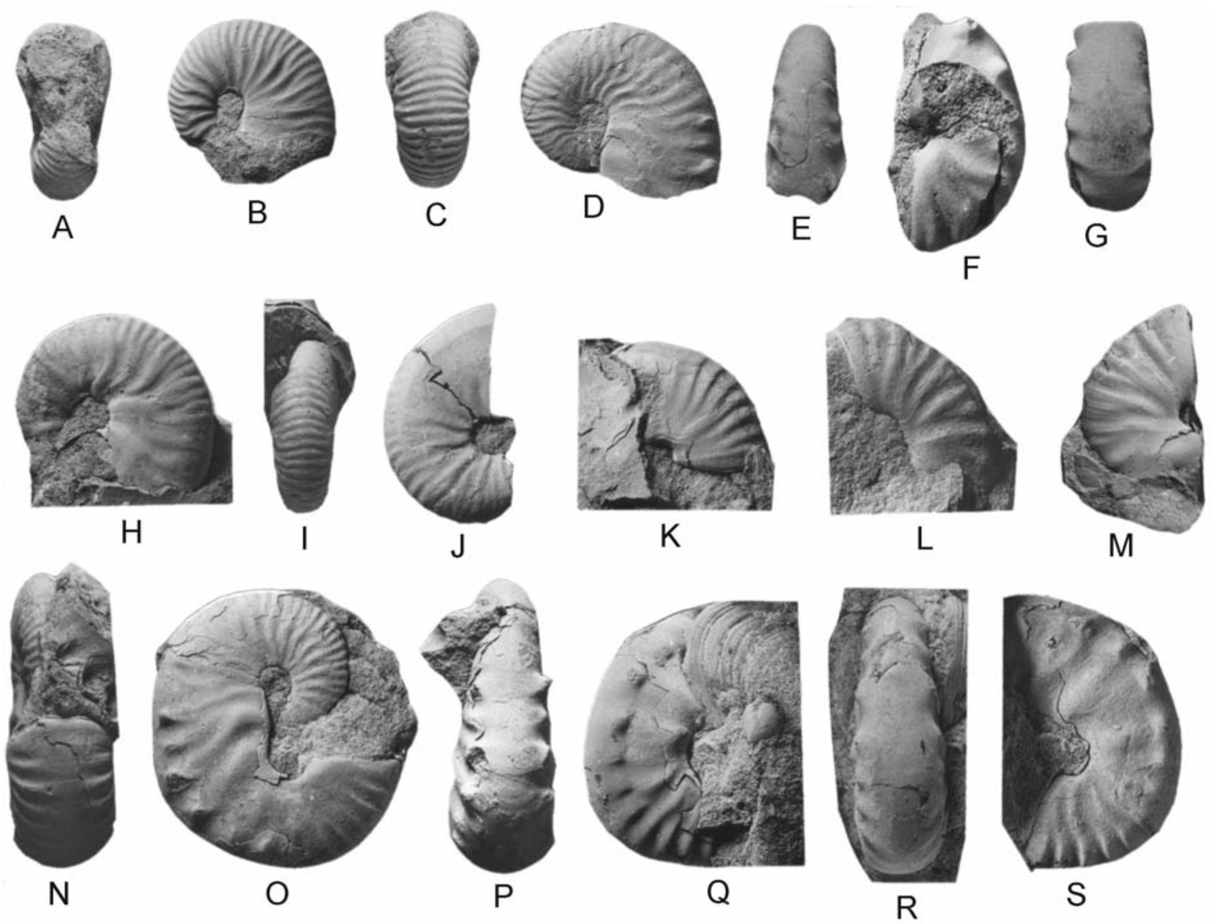
DISCUSSION: The flank ribbing and tuberculation of the body chamber differentiates *Yezoites australis* from all other species referred to the genus. The closest similarity is to *Yezoites planus* var. *gigas* Yabe, 1910 (p. 169, pl. 15 (1), fig. 19). Tanabe (1977, p. 402) regarded this as a strongly ribbed variant of *planus* (the macroconch of *puerculus*). It differs most obviously in having a depressed rather than compressed whorl section. The flexuous ornament of macroconch *australis* phragmocones is quite different from that of macroconch *puerculus* (Tanabe 1977, pl. 63).

OCCURRENCE: As for types.

Yezoites sp.
(Text-fig. 5A)

MATERIAL: SAM-PCZ 22245, from the St Lucia Formation at locality 10 of Kennedy and Klinger (1975, p. 282), railroad cutting on the eastern flank of Umkwelane Hill, south of Mtubatuba in northern KwaZulu-Natal, 28° 27' 49'' S 32° 09' 58'' E. The specimen is probably of Coniacian date.

DESCRIPTION: The specimen retains extensive areas of original aragonitic shell. The maximum length is just over 12.5 mm. The spire is 7 mm approximately in diameter. Coiling is very evolute, serpenticone, the whorls expanding slowly, apparently depressed and reniform, the umbilicus wide, with a high flattened wall and rounded umbilical shoulder. There are ten low, blunt ribs on the inner flanks of the internal mould of the adapertural half whorl of the specimen The outermost flanks, ventrolateral



Text-fig. 7. A-S – *Yezoites australis* sp. nov. A-C – OUM KX5041; D, E – OUM KX7813; F, G – OUM KX7814; H, I – OUM KX5049; J – OUM KX5033; K – OUM KX5042b; L – OUM KX5036; M – OUM KX5035; A-K, M – are paratypes, from bed B of the Upper Santonian St Lucia Formation at locality 105, cliff section on the northern end of the southern peninsula in Lake St Lucia, 3.5 km north of the mouth of the Nyalazi River, ESE of Hluhluwe, 28° 03' 27'' S 32° 23' 08''E. N-P, SAM-PCZ22271, probably from locality 105. Q-S – OUM KX7811, a paratype from the Upper Santonian part of the Mzamba Formation at locality 1, cliff and foreshore exposures 1 km north of the mouth of the Mzamba River, Eastern Cape Province, coordinates 31° 05' 50'' S, 30° 10' 30'' E. All figures are ×1.5

shoulders and venter of both mould and shell surface bear delicate crowded ribs, that appear to pass near-straight across the venter. The shaft is narrow, slowly expanding, the umbilical wall concave, the umbilical shoulder very narrowly rounded. The course of the umbilical wall is near-straight in profile, and does not occlude the umbilicus. There are five (?) low, broad, markedly prorsiradiate primary ribs on the inner flank. The ribs flex back and subdivide into two or three secondary ribs, with additional ribs intercalating, so that the outer flanks, ventrolateral shoulders and venter are ornamented by crowded ribs. Shell is preserved on the final hook, and ornament better defined. Low primary ribs are convex on the inner flank, and bi-or trifurcate at mid-flank, where additional ribs intercalate, sweep back, and are initially convex before sweeping forwards, and are concave on the ventrolateral shoulders, passing near-straight across the venter. The adult aperture is partially preserved. Preceded by a broad prorsirsdiate constriction the actual aperture appears to be slightly flared. There are indications of a dorsal projection, and an outer lateral lappet.

DISCUSSION: This tiny specimen is a microconch. The small size, distant blunt primary ribs of the coiled phragmocone and very delicate ornament of the body chamber distinguish it from both *Yezoites concinna* sp. nov. and *Argentoscaphites corrugatus* sp. nov., described above. Lack of tubercles distinguishes it from microconch *Yezoites teshioensis* (Yabe, 1910, p. 171, pl. 15, figs 23–27; see for example Alabushev and Wiedmann 1997, pl. 2, fig. 9). The closest comparisons are thus with *Yezoites puerculus* (Jimbo, 1894) (p. 37, pl. 5, fig. 4; see revision in Tanabe 1975 p. 109, pls 10–11; 1977, p. 401, pl. 62, figs 1–9; pl. 64, figs 1–5; Alabushev and Wiedmann 1997, p. 13, pl. 3, figs 2–7), the macroconch of which is *Yezoites planus* Yabe, 1910, p. 167, pl. 15, figs 11–18 (see revision in Tanabe 1977, p. 402, pl. 63, figs 1–8, pl. 64, figs 6–9, Davis *et al*. 1996, p. 506 fig. 9 G, H, and Alabushev and Wiedmann 1997, pl. 3, figs 2–7), but none quite match the present specimen in terms of phragmocone and body chamber ornament. Accordingly, we leave our specimen in open nomenclature.

OCCURRENCE: As for material.

Acknowledgements

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PLATE 1

Scaphites kieslingswaldensis Langenhan and Grundey, 1891.

1-3 – SAM-PCZ22261; **4** – the holotype of *Scaphites arnaudiformis* Collignon, 1965 p. 17, pl. 420, fig. 1743, in the collections of the Université de Bourgogne, Dijon; **5-7** – SAM-PCZ22265; **8-10** – SAM-PCZ22260; **11, 12** – SAM-PCZ22263; **13-15** – SAM-PCZ 22267; **16-18** – SAM-PCZ22268; **19** – SAM-PCZ22246; **20-22** – SAM-PCZ22262; **23** – SAM-PCZ22249; **24, 29** – SAM-PCZ22258; **25, 26** – SAM-PCZ22257; **27-28** – OUM KX17219.

The originals of Figs 1–3, 8–10, 20–22, are from between localities 92 and 93 (see below). The original of Fig. 4 is from the Lower Coniacian Zone of *Kossmaticeras theobaldi* and *Barroisiceras onilahyense* of Collignon at his locality 335, Beantaly (Belo sur Tsiribihina), Madagascar. The originals of Figs 5–7 and 16–18 are from locality 93, hill slopes ESE of Hluhluwe, 28° 03’ 19’’ S, 32° 20’ 00’’ E. The original of Figs 19 and 23 are from locality 71, degraded river cliffs on the north bank of the Munywana Creek, 27° 51´ 48’’ S 32° 21’ 08’’ E.

The original of Figs 24–26 are from locality 92, temporary exposures ESE of Hluhluwe, 28° 03’ 07’’ S 32° 20’ 10’’ E . The original of Figs 27–29 are from locality 13, hill slopes below Riverview Compound, 750m north of the cane railway bridge across the Mfolozi, south of Mtubatuba, 28° 26’ 52’’ S, 32° 10’ 48’’.

All figures are ×1.5

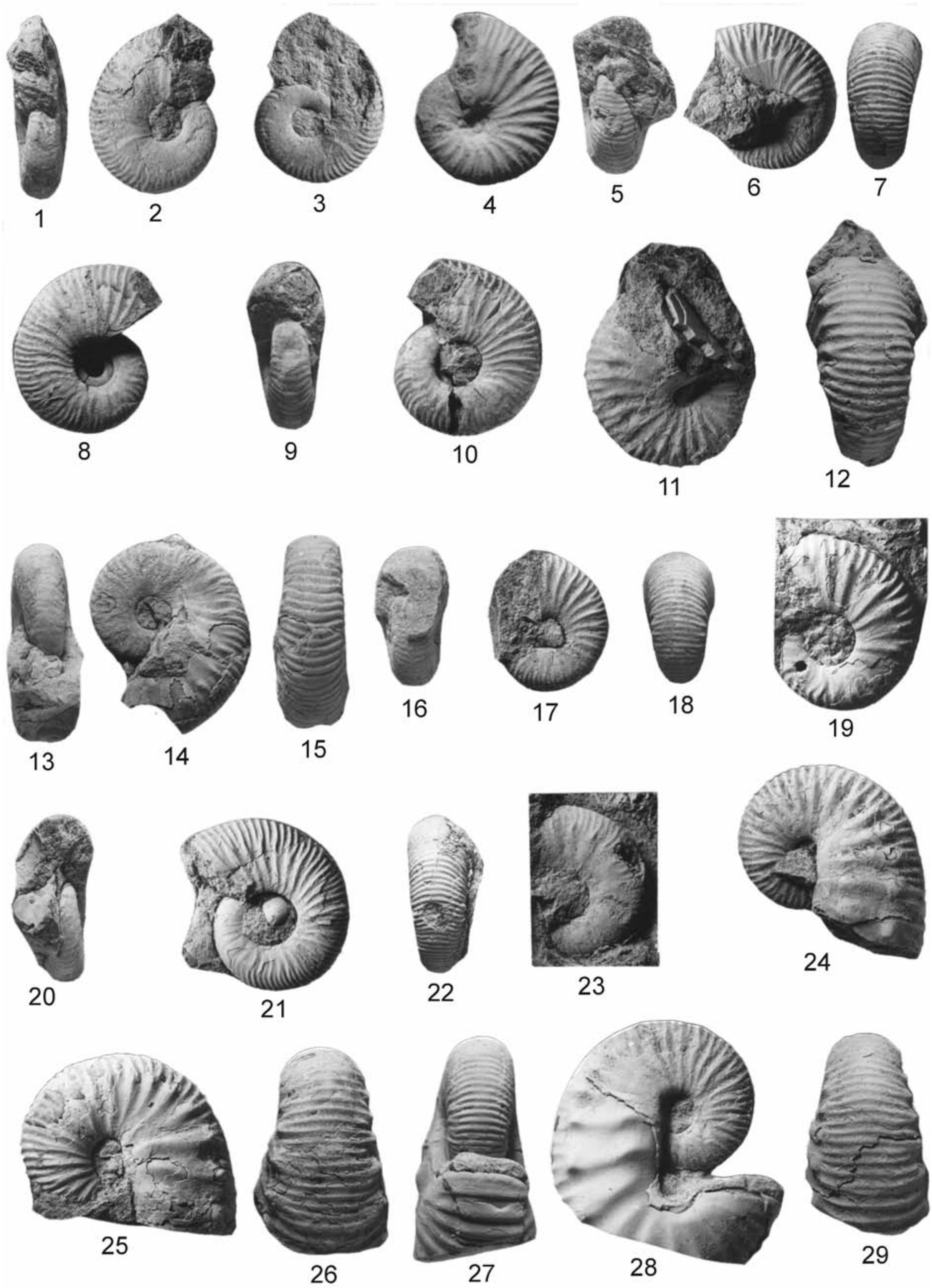
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PLATE 2

1-9, 14-17 – *Scaphites kieslingswaldensis* Langenhan and Grundey, 1891. 1, 2 – OUM KX17219; 3–5 – SAM-PCZ22251; 6 – SAM-PCZ22266; 7-9 – SAM-PCZ22256; 14–17 – SAM-PCZ22256. **10-13** – *Scaphites manasoaensis* Collignon, 1965. 10 – the holotype, the original of Collignon, 1965, p.16, pl. 420, fig. 1740, in the Collections of the Université de Bourgogne, Dijon. 11–13 – SAM-PCZ22252.

The original of Figs 1 and 2 is from locality 13, hill slopes below Riverview Compound, 750 m north of the cane railway bridge across the Mfolozi, south of Mtubatuba, 28° 26’ 52’’ S, 32° 10’ 48’’ The original of Figs 3–5, and possibly, Figs 11–13 are from locality 71, degraded river cliffs on the north bank of the Munywana Creek, 27° 51´ 48’’ S 32° 21’ 08’’. The originals of Figs 6, 14–17 are from locality 93, hill slopes ESE of Hluhluwe, 28° 03’ 19’’ S, 32° 20’ 00’’ E. The original of Fig. 10 is from the Lower Coniacian Zone of *Kossmaticeras theobaldianum* and *Barroisiceras onilahyense* of Collignon at his locality 462, Manasoa (Betioky), Madgascar.

All figures are ×1.5

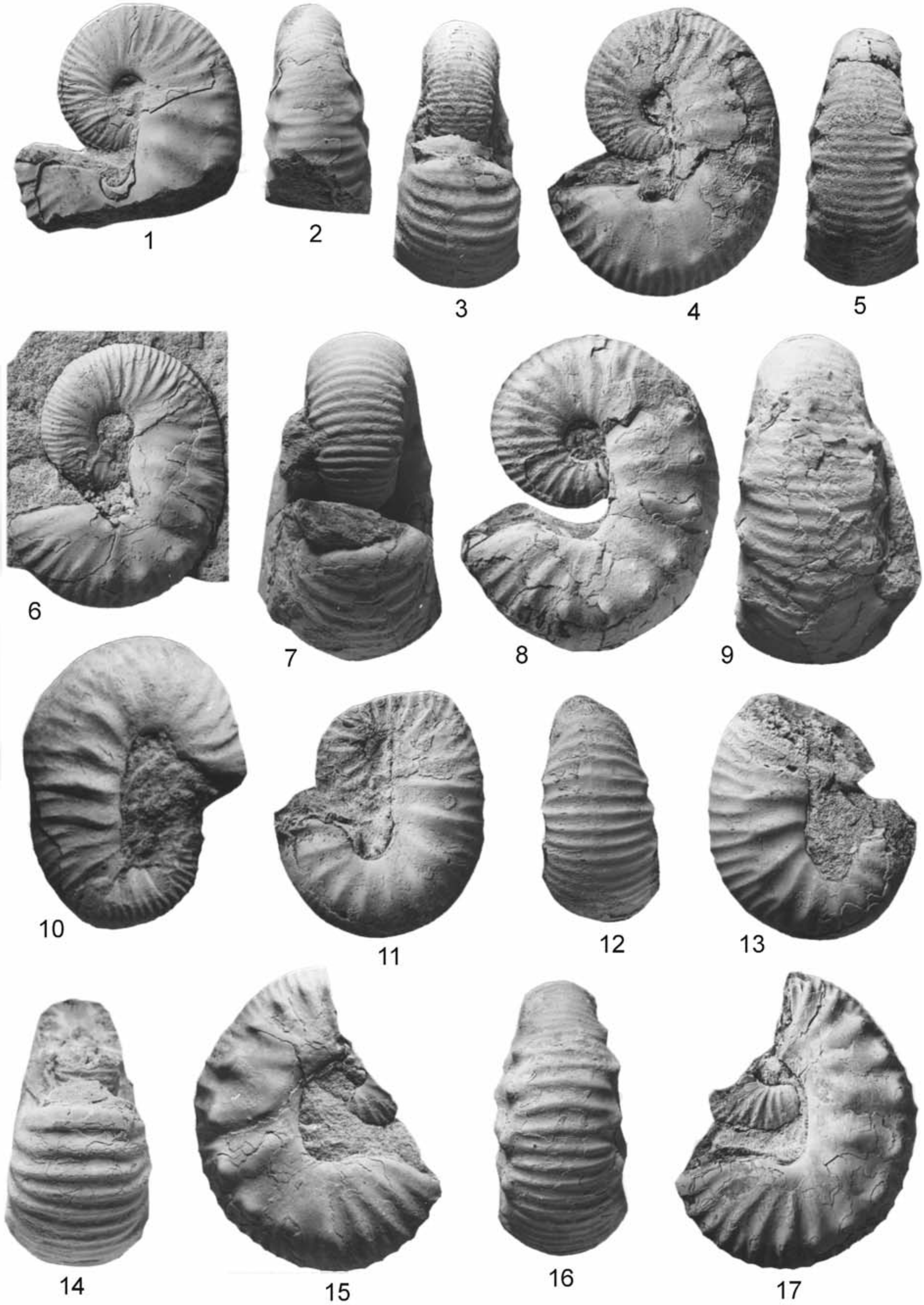
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PLATE 3

Scaphites kieslingswaldensis Langenhan and Grundey, 1891.

1-3 – SAM-PCZ22248; **4** – SAM-PCZ22250; **5, 6** – OUM KX17228; **7-9** – SAM-PCZ22255; **10** – the original of *Scaphites meslei* var. *masiaposensis* Collignon, 1965 p. 1738, pl. 420, fig. 1739; **11, 12** – OUM KX17227; **13, 16, 17** – SAM-PCZ22247; **14, 15** – SAM-PCZ22250.

The originals of Figs 1–4, 7–9, 13–17, are from locality 71, degraded river cliffs on the north bank of the Munywana Creek, 27° 51´ 48'' S 32° 21' 08''. The originals of 5, 6, 11, 12 are from, locality 72, degraded river cliff and alluvial flats on the north side of the Mzinene River 200-300m east of the causeway across the river, 27° 51' 52'' S, 32° 21' 34'' E. The original of Fig. 10 is from the Zone of *Peroniceras dravidicum*, that is to say the Middle Coniacian, of Collignon's locality 263, Masiaposa (Belo sur Tsiribihina, Madagascar.

All figures are ×1.5

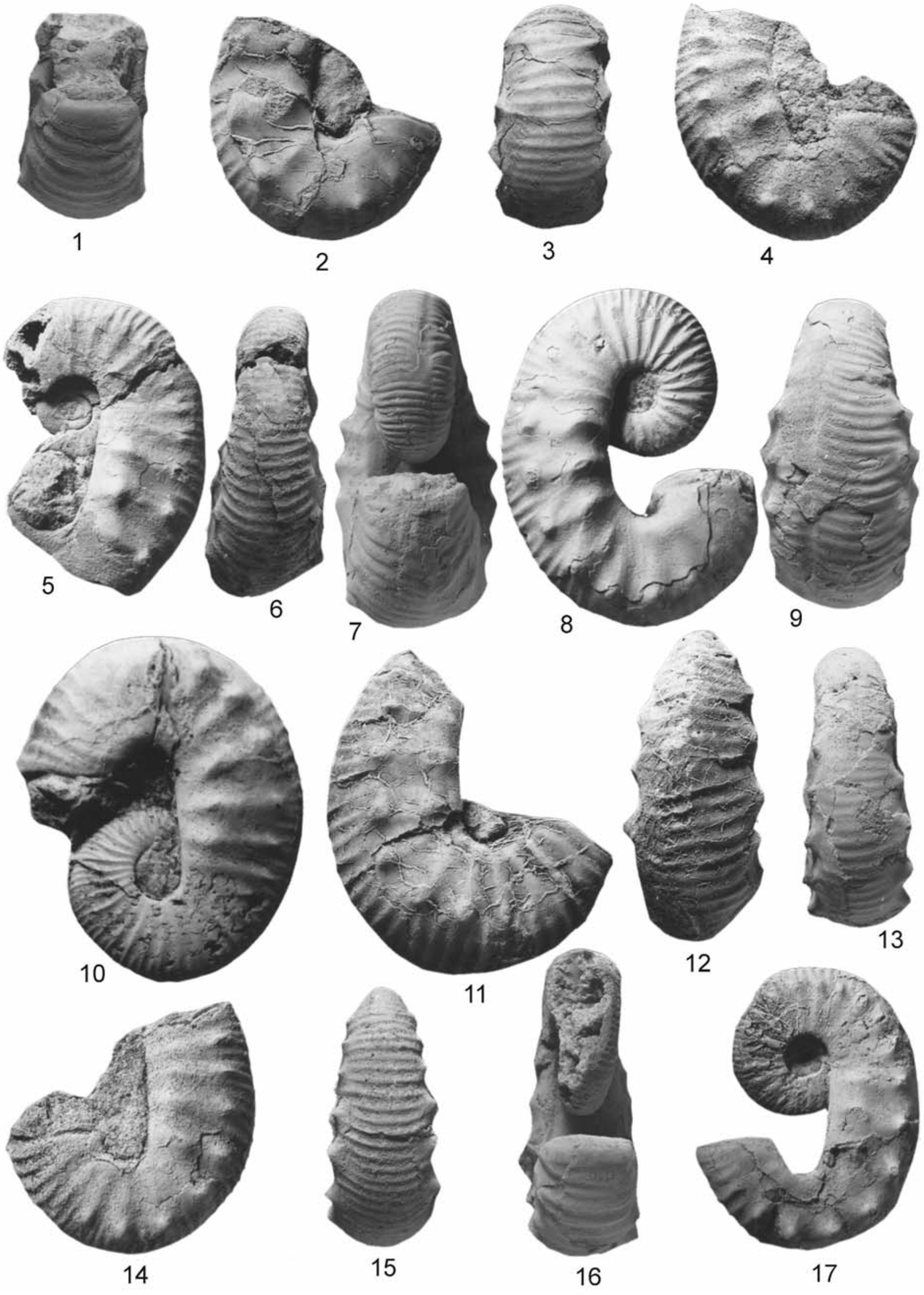
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PLATE 4

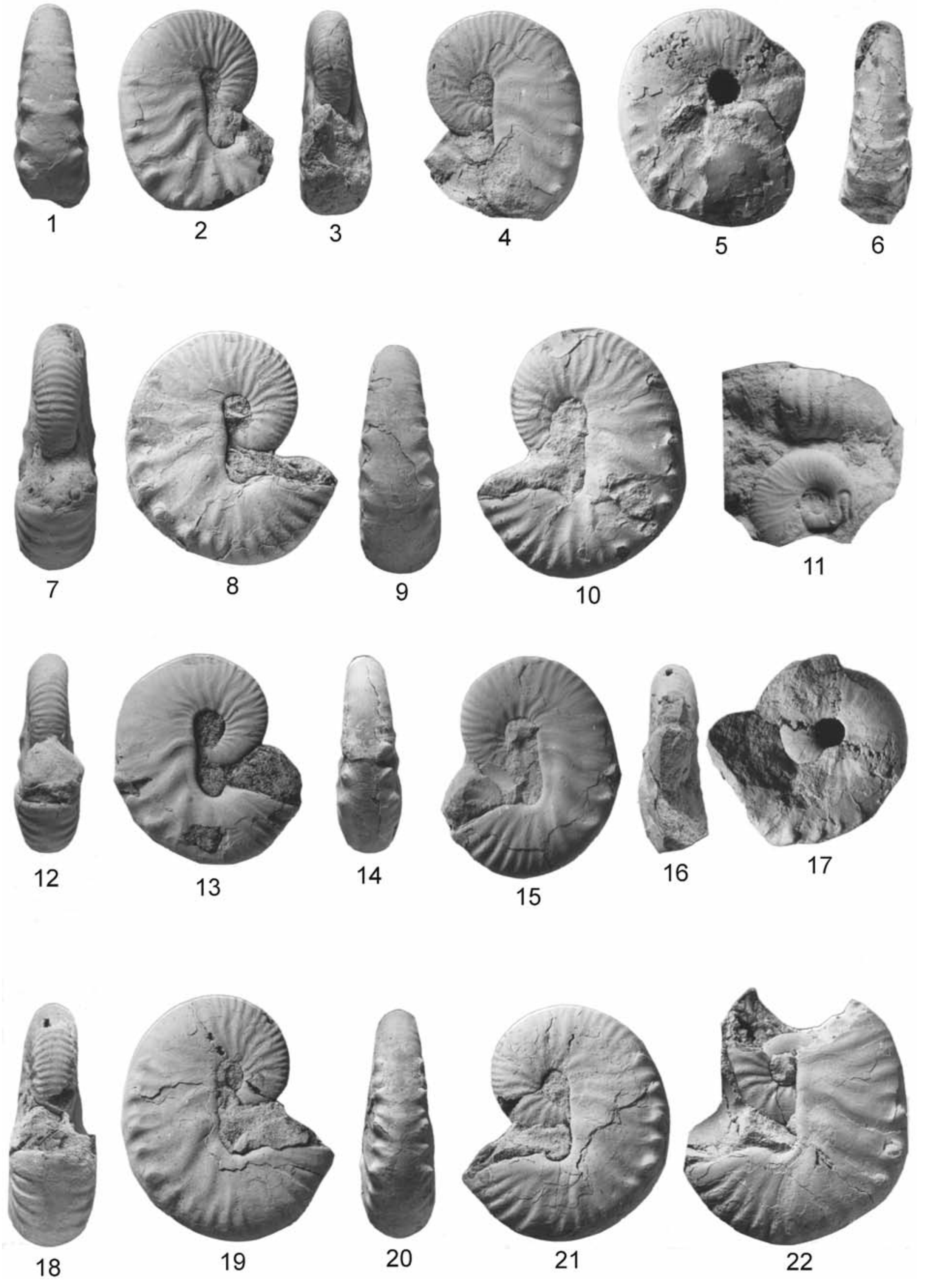
Yezoites australis sp. nov.

1-4 – OUM KX5040; **5, 6, 16, 17** – OUM KX5038; **7-10** – OUM KX5045; **11** – OUM KX5042a; **12-15** – OUM KX5044; **18-21** – SAM-PCZ22270; **22** – OUM KX5039.

18–21 is the holotype; the remaining specimens are paratypes. 1–10, 12–22 are macroconchs; 11 is a microconch.

Al specimens are from from bed B of the Upper Santonian St Lucia at locality 105, cliff section on the northern end of the southern peninsula in Lake St Lucia, 3.5 km north of the mouth of the Nyalazi River, ESE of Hluhluwe, 28° 03' 27'' S 32° 23' 08''E.

All figures are ×1.5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