

Notes on Some Cretaceous Ammonites from Southern India : Part I *Utaturiceras vicinale* (STOLICZKA) from Southern India

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<https://doi.org/10.5109/1543647>

出版情報 : 九州大學理學部紀要 : Series D, Geology. 17 (3), pp.295-309, 1966-09-15. Faculty of
Science, Kyushu University

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Notes on Some Cretaceous Ammonites from Southern India

By

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Foreword

About a hundred years have passed since BLANFORD and STOLICZKA (1861-66) monographed the Cretaceous cephalopods from southern India. Prior to their work FORBES (1846) described a number of species belonging to the collection of KAYE and CUNLIFFE. He pioneered the Cretaceous paleontology in this area, but the work of BLANFORD and STOLICZKA was more systematic and comprehensive than FORBES'. Toward the end of the last century, when marked improvements were being made in taxonomy and other aspects of palaeontology, KOSSMAT (1895-98) published a revision of the Cretaceous ammonoids primarily on the basis of his study of WARTH's collection. On that occasion he evidently examined some, if not all, of FORBES' and STOLICZKA's specimens. Subsequently SPENGLER (1910) revised nautiloids and belemnoids from the same district, again on the basis of WARTH's collection. Unfortunately WARTH's collection is not available for study.

For some reasons little work has been accomplished on the ammonoids of the Cretaceous of southern India for these fifty years, although many authors frequently referred to the above mentioned previous papers. The senior author (T.M.) once (1942, 1943) attempted to compare the Cretaceous ammonoid faunas of the Japanese province with those of southern India, but as regards the latter he had to depend on the literature. Later (in 1953-54) he had an opportunity to examine FORBES' original specimens at the British Museum (Natural History), but the time was too limited to do a satisfactory study. In December 1964, when the International Geological Congress was held at New Delhi, he visited the Geological Survey of India, Calcutta, to study some ammonoid specimens. Again the time was limited, but owing to the kind help of the staff of the Survey, he was able to study many of STOLICZKA's type specimens. We feel that the redescription, with reillustration, of them is urgently needed in the light of up-to-date knowledge.

In the meanwhile the second author (M.V.A.S.), with his coworkers, has been engaged for these several years in the field work of the Cretaceous of the

Manuscript received May 30, 1966

M. V. A. SASTRY and S. S. SARKAR: Geological Survey of India, Calcutta; Publication authorized by the Director General.

Trichinopoly and Pondicherry districts and the collections of various groups of fossils have been accumulated to a considerable amount. He feels, however, that he requires more time for full publication. The third author (S.S.S.), since his return home from his study of ammonoids in France, has been studying ammonoids from the same areas, although his paleontologic study is frequently interrupted by some other geological ones.

The work of the three authors, thus far, is far from completion and should be proceeded further on. In spite of these circumstances it is desirable to give notes on some of the interesting ammonoid species. It is hoped that the notes may make a step forward to solve international problems as well as to contribute to geology and paleontology of India.

Notes will be published from time to time as the authors' study proceed and the authors may change according to the species concerned.

Part I

Utaturiceras vicinale (STOLICZKA) from Southern India

By

Tatsuro MATSUMOTO and S. S. SARKAR

Abstract

On the basis of restudying syntypes, *Utaturiceras vicinale* (STOLICZKA) is precisely described in this paper, with designation of its lectotype. From the described facts it is concluded that *Utaturiceras* WRIGHT, 1957, is allied to but distinct from *Mantelliceras* HYATT, 1903. Affinity of *Utaturiceras* with *Graysonites*, *Sharpeiceras* and *Acompsoceras* is discussed and a remark is given on *Submantelliceras*.

Introductory Remarks

Genus *Utaturiceras* was established by C. W. WRIGHT (1956, p. 392) as a member of subfamily Metoicoceratinae of the Acanthoceratidae, with *Ammonites vicinalis* STOLICZKA, 1864, as type-species. Based on some British examples he regarded the age of *Utaturiceras* as the upper Upper Cenomanian. Following the scheme of SPATH (1926), WRIGHT (1957, p. L128) presented the zone of *Utaturiceras vicinale* at the top of the Cenomanian in the standard zonal scheme of Western Europe.

CASEY (1960, p. 173) commented that *Ammonites vicinalis* was not a Metoicoceratinae but a basal Cenomanian *Mantelliceras* of the type of *M. saxbii* (SHARPE) and that the uppermost Cenomanian homoemorphic ammonites should be something else.

The two British authors do not seem to have examined the type specimens of *Ammonites vicinalis* STOLICZKA. We describe in this paper what *Ammonites vicinalis* actually is and give remarks on the basis of our observaton.

Description of Species

Family Acanthoceratidae

Genus *Utaturiceras* WRIGHT, 1957

Utaturiceras vicinale (STOLICZKA)

Pl. 32, Fig. 1; Pl. 33, Figs. 1-3; Text-figs. 1-4

Synonymy.—

Ammonites vicinalis STOLICZKA in BLANFORD and STOLICZKA, 1864, *Palaeont. Indica*, [1], 1, p. 84, pl. 44, figs. 1, 4, 5, 7, 8 (*non* figs. 2, 3, 6).

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Acanthoceras vicinale (STOLICZKA), KOSSMAT, 1895, *pro parte* (?), *Beitr. Geol. Pal. Österr, Ungarns u.d. Or.*, **9**, p. 200 [104], pl. 25 [11], fig. 2; 1897, *pro parte* (?), *Ibid.*, **11**, p. 25 [132].

Utaturiceras vicinale (STOLICZKA), WRIGHT, 1956, *Ann. Mag. Nat. Hist.* [12], **9**, p. 392.

Types.—Of the eight illustrated syntypes of STOLICZKA (1864, pl. 44, figs. 1–8), GSI. 183–190, the largest and best preserved one, GSI. 190 (STOLICZKA, 1864, pl. 44, fig. 8) (Pl. 32, Fig. 1 of this paper), is here designated as the lectotype. GSI. 183, 186, 187 and 189 (*Ibid.*, pl. 44, figs. 1, 4, 5, 7) are certainly more or less immature specimens of the same species as the lectotype, but GSI. 185 and 188 (*Ibid.*, pl. 44, figs. 3, 6) are doubtful and GSI. 184 (*Ibid.*, pl. 44, fig. 2) is evidently a different species of probably different genus.

We were unable to examine KOSSMAT's hypotypes of WARTH's collection, because they are missing.

Measurements (in millimeters).—

Specimen	Remarks	Diameter	Umbilicus (U/D×100)	Height	Breadth (B/H)
GSI. 190	Near ant. end	133.0	27.7 (20.8)	62.5	32.5 (deformed)
"	— $\frac{1}{8}$ vol.; last suture	117.4	24.6 (20.9)	56.7	35.4 (0.62)
"	— $\frac{1}{4}$ vol.; ill. suture	103.0	18.2 (17.6)	51.0	31.5 (0.62)
"	Ca— $\frac{1}{2}$ vol.	87.5	13.4 (15.3)	43.0	27.0 (0.63)
"	Ca—1 vol.	—	—	30.5	19.5 (0.64)
GSI. 189	At ant. end	85.0	15.5 (18.0)	42.5	28.5 (0.67)
"	Ca— $\frac{1}{2}$ vol.	56.5	9.5 (16.0)	27.0	18.0 (0.66)
GSI. 187	At ant. end	31.8	6.5 (20.4)	15.2	11.0 (0.72)
"	— $\frac{1}{4}$ vol.	25.0	5.0 (20.0)	12.5	8.75 (0.70)
GSI. 186		24.0	5.2 (21.6)	12.0	8.0 (0.66)
GSI. 183		11.8	2.3 (19.4)	5.6	3.8 (0.68)

Description.—The lectotype has the last suture at a diameter of 117.4 mm. (on internal mould) and its body-chamber is preserved only for about $\frac{1}{8}$ volution, ending at a diameter of 140 mm. If its body-chamber is assumed to occupy about a half volution, the entire shell must have been considerably large—about 200 mm. in diameter.

The lectotype and the other identified syntypes (i.e. GSI. 183, 186, 187 and 189) of various growth-stages are all compressed, keeping little varied ratio of whorl-height to breadth—10 : about 6–7 (see above *Measurements*). The whorl is fairly involute, about three fifths (in height) of the inner whorl being overlapped by the outer, as seen in the lectotype and the second large syntype (GSI. 189). The umbilicus is fairly narrow, occupying about 20 percent or less of the entire shell diameter. The percent may change with growth and from specimen to specimen, ranging from 15 to 21 percent (see *Measurements*). The umbilical wall is low but steep, nearly perpendicular to the plane of coiling; the umbilical shoulder is subangular. The flanks are rather flattened and nearly parallel in small, young shells, but gently inflated in late growth-stages and in the last whorl of the lectotype the whorl is broadest at the lower two fifths of

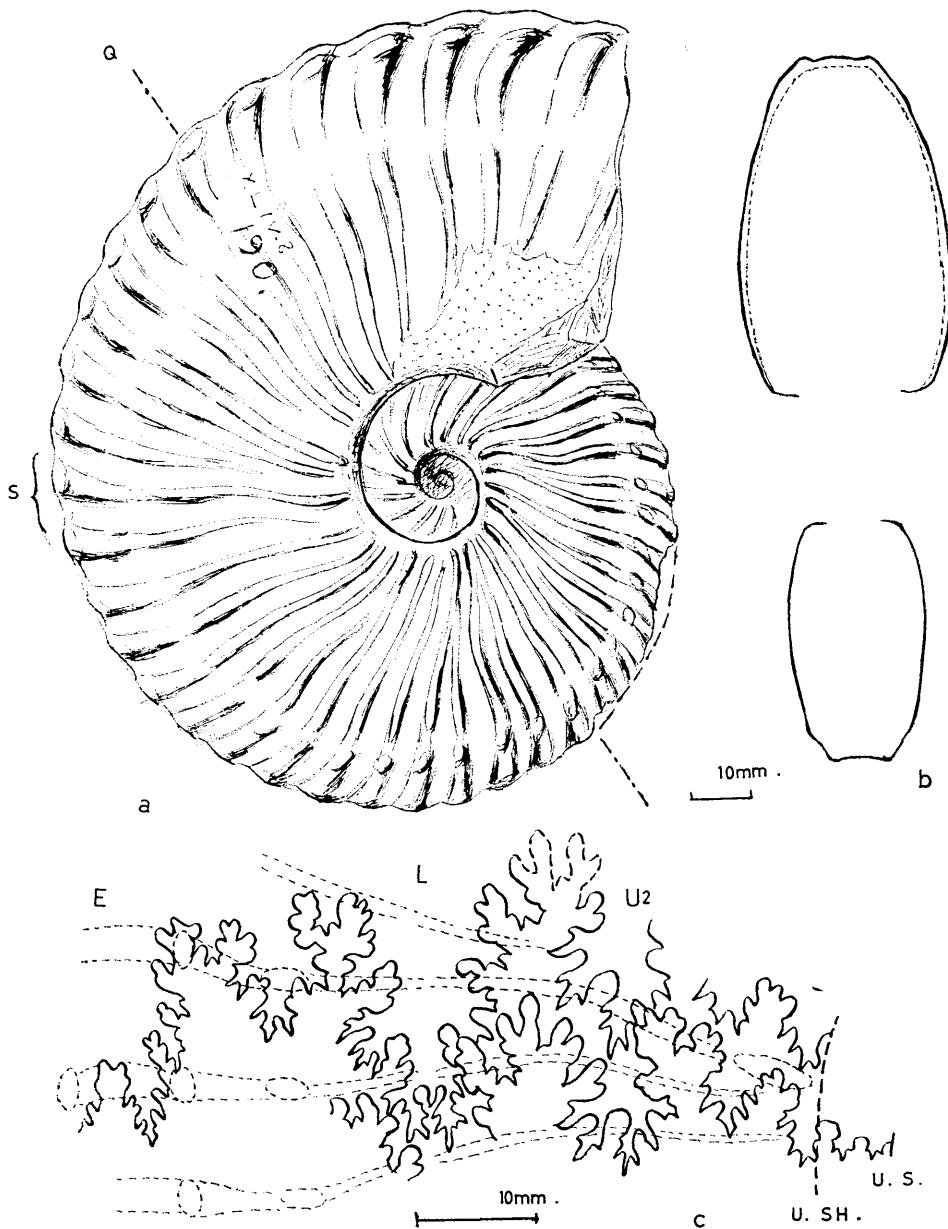


Fig. 1. *Utaturiceras vicinale* (STOLICZKA). Lectotype, GSI.190, from Odium, Utatur [Ootator] Group, southern India. Side view (a); whorl-section at q (b); external suture at s (c). U.S. umbilical seam; U.S.H. umbilical shoulder. (T.M. delin.)

the height and the flanks seem to be somewhat converging. The venter is narrow and flattened, with subangular edges, and the ventrolateral part is sloping (Fig. 1b). (STOLICZKA's pl. 44, fig. 8a, front view of the lectotype, which was

drawn on the deformed last part, does not show the true whorl-section.)

The lectotype is ornamented with numerous, gently flexuous, somewhat prorsiradiate ribs, which consist of alternating primaries and secondaries on the septate whorl; some of the secondaries are branched from the primaries more or less near the umbilical bullae within the inner half of the flank; others are single, appearing at a point not far from the umbilical margin, without umbilical bullae, or at some distance from the umbilical margin (Fig. 1a). The flexuosity of the rib may vary to some extent from a rib to another as the illustration shows. Many of the ribs are gently flexuous, but some others, especially the branched secondaries, are considerably flexuous and very few are nearly straight, although they are all somewhat prorsiradiate. The ribs on the body-whorl are simple, almost equally long and gently flexuous. They are broader and more distant than those on the septate whorl.

On either edge of the narrow and nearly flat or slightly convex venter the ribs are provided with distinct clavi, which may be called ventral, marginal, or outer ventrolateral tubercles by authors. They are weakened and somewhat broadened between the ventral clavi, crossing the venter nearly at right angle to the siphonal line or with a slight forward curve. The distance between the tops of the paired ventral clavi is 11.5 mm. at the last septum and 10 mm. at the stage a half volution earlier than that. The inner ventrolateral tubercles and the umbilical bullae at the end of the primary ribs are moderately distinct up to the shell diameter of 90 mm., but later, in the probably adult stage, they are gradually

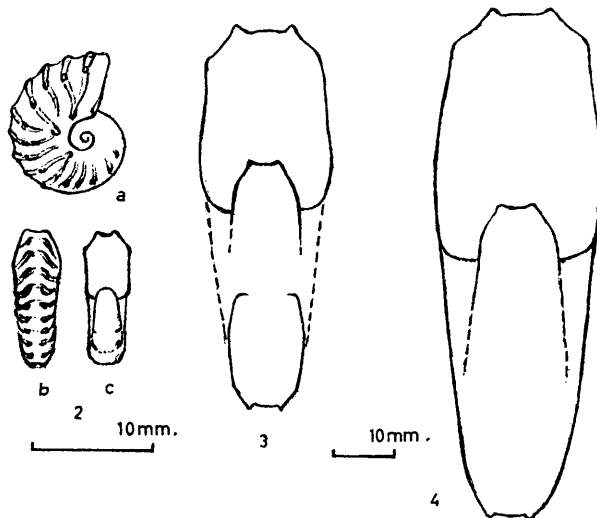


Fig. 2-4. *Utaturiceras vicinale* (STOLICZKA). Three immature syntypes, from Odium, Utatur Group, southern India. 2: side (a), ventral (b) and frontal (c) views of GSI. 183 [=STOLICZKA, 1864, pl. 44, fig. 1, 1a]; 3: Diagrammatic whorl-section of GSI. 187 [=STOLICZKA, 1864, pl. 44, fig. 5]; 4: Outline of GSI. 189 [=STOLICZKA, 1864, pl. 44, fig. 7] in frontal view. (T.M. *delin.*)

weakened and finally on the body whorl the inner ventrolateral tubercles are discernible only as slight swellings and the umbilical bullae are almost obsolete. At the inner ventrolateral tubercles ribs are all bent somewhat forward.

In addition to the above described tubercles there is a row of faint bulges of the ribs in the outer part of the flank, forming weak bullae above the mid-flank. There is a spiral zone of depression between this row and the row of inner ventrolateral tubercles. This character is seen not only on the whole outer whorl of the lectotype but also on the main part of a syntype of moderate size, i.e. GSI. 189, with a diameter of 85 mm.

The latter specimen (Pl. 33, Fig. 3) has ornaments quite similar to those of the septate part of the lectotype. It has on its preserved outer whorl 37 ribs, of which some 15 or 16 primaries have umbilical bullae; there are sometimes two secondaries between the primaries. In the young stage of the same specimen, below the diameter of 50 mm., and in the smaller specimens, as represented by GSI. 187 (Pl. 33, Fig. 2) and 186, there are outer and inner ventrolateral tubercles and umbilical bullae, but no upper lateral bulges nor spiral depression below the inner ventrolateral tubercles. The small, immature specimens have ribs which are essentially similar to that of GSI. 189. In GSI. 187, with a diameter of 32 mm., there are 29 ribs, of which about 10 are primaries. The ribs between the ventral clavi are low and show slight forward curve in this and other small specimens.

The smallest, illustrated specimen of STOLICZKA (1864, pl. 44, fig. 1, 1a), GSI. 183 (Pl. 33, Fig. 1 and Text-fig. 2 of this paper), probably represents an early immature stage of the present species. Its shell form is essentially similar to, being a microform, of those of other larger specimens, but has parallel instead of slightly convergent flanks. It shows three stages in the development of ornaments. The first stage, up to 6 mm. in diameter is smooth. The shell of the second stage, with diameters from 6 to 7.5 mm., has prorsiradiate, alternating short and long ribs, which have only inner ventrolateral tubercles and are bent forward at the ventrolateral shoulder but cross the midventer with weakening and without projection. A very weak, minute umbilical tubercle is discernible at the end of one of the long ribs. In the third stage the umbilical tubercles and outer ventrolateral tubercles are distinctly developed and the ornament is essentially the same as that of the above described larger immature specimens, e.g. GSI. 187.

The spiral groove on the umbilical wall of GSI. 186, (STOLICZKA's pl. 44, fig. 4, 4a), which STOLICZKA himself noticed, might be a secondary character caused by a parasitic creature.

The suture on the surface of the lectotype (Fig. 1c) is fairly deeply and finely incised. As the adjacent two sutures are in part overlapping, they look very complicated. The first lateral lobe (L) is subsymmetrically divided, with three pairs of major subdivisions, being biparite at the bottom; its median foliole is much lower than and overhang by the adjacent lateral folioles. It is deeper than broad, somewhat deeper than the external lobe (E), and its stem is

moderately narrowed. The second lateral lobe (U2) is much smaller than L and rather asymmetric and somewhat oblique. U2 and four other auxiliary lobes regularly decrease their size. The saddle between E and L is broad and fairly deeply and asymmetrically bipartite; each branch of the saddle is further subdivided and the inner branch is slightly taller than the outer and narrowed by deeply incised lobules. The saddle between L and U2 is higher than that between E and L; it is apparently multipartite. The saddle inside of U2 and the auxiliary saddles are arranged on an descending line.

Remarks.—The proportion of umbilicus to diameter varies to some extent as is that of whorl-breadth to height. The variation is, however, not great as the measurements show. The specimen which was called a more inflated variety by STOLICZKA (1864, pl. 44, fig. 6, 6a), i.e. GSI. 188, has the following dimensions:

	Diameter	Umbilicus (100U/D)	Height	Breadth (B/H)
At ant. end	38.0	6.8 (17.8)	19.5	15.0 (0.77)
— $\frac{1}{4}$ vol.	30.5	5.1 (16.7)	15.2	11.2 (0.73)
— $\frac{1}{2}$ vol.	—	—	12.0	8.8 (0.73)

It is indeed inflated near its anterior end, but in the preceding stages its shell form is not much different from that of the unmistakable examples of the present species. The difference is rather in its coarser, distant, and consequently less numerous ribs. In this respect the specific identity of this specimen with the lectotype is uncertain. Similarly another coarsely ribbed specimen of STOLICZKA (1864, pl. 44, fig. 3, 3a), GSI. 185, is doubtful.

GSI. 184, the original of STOLICZKA's pl. 44, fig. 2, has ornaments distinctly different from those of the other syntypes. In this small specimen, with a diameter of 17 mm., there are 19, somewhat flexuous ribs, which are fairly widely spaced. Longer ribs spring in pairs from rounded umbilical tubercles and short ribs are inserted between two pairs. There are at first outer and inner ventrolateral tubercles but later the outer ones disappear and the inner ones are also weakened. The ribs between the outer ventral tubercles are at first weak and nearly straight, then they are projected but weakened on the mid-venter, and finally, when the outer ventrolateral tubercles are absorbed by the ventral ribs, they are strongly projected, forming chevrons. The venter in the last stage is gently inflated. Thus, this specimen is evidently distinct from the lectotype and other examples of *Utaturiceras vicinale* here revised. It may be an example of *Cottreauites* COLLIGNON, 1929, from India.

Affinities.—So far as the septate whorls are concerned, the present species, as redefined above, closely resembles *Graysonites wooldridgei* YOUNG (1958, p. 175, pl. 28, figs. 1–4; pl. 29, figs. 2, 4, text-figs. 3c, d, f; MATSUMOTO, 1959, p. 66, pl. 18, fig. 1, text-figs. 24–27), from the lower part of Lower Cenomanian of Texas and California, in shell-form, ornaments and sutures. The lectotype of the present species is nearly as large as the holotype of that American species. Up to the diameter of 80 mm. or so they are closely similar. Even the spiral depression below the row of inner ventrolateral tubercles and faint lateral swelling of

ribs are discernible on the septate whorls of this size in the holotype and other specimens of *G. wooldridgei*, as I have already shown (MATSUMOTO, 1959, text-figs. 27, 28). The number of the ribs within a half whorl at this diameter is also nearly the same, about 20, in the two species. The difference of the two species is, however, remarkable in the adult stage. In the adult shell of *Graysonites wooldridgei* the ribs become distant, coarse and straight, the umbilical bullae are enlarged, and the inner ventrolateral tubercles are strengthened to form horns, with superimposed outer ventrolateral (i.e. ventral by some authors) tubercles. In that of the present species the ribs are somewhat broadened but still gently flexuous, the umbilical bullae and inner ventrolateral tubercles are obsolete, while the outer ventrolateral clavi, faint upperlateral bulges of ribs and the above mentioned weak spiral furrow remain. There is no sign of hypernodosity at all. The present species is, thus, considerably allied to but clearly distinguished from *Graysonites wooldridgei*. The two species are at least subgenerically separable.

Acanthoceras discoidale KOSSMAT (1895, p. 201 [105], pl. 25 [11], fig. 1a, b, c), which is not a true *Acanthoceras*, is somewhat similar to the present species, as KÖSSMAT himself pointed out. It has similarly compressed whorl, similar, if not identical, ornament and closely resembling sutures in which auxiliaries are likewise numerous and descending. The holotype* of *A. discoidale*, which is nearly as large as the lectotype of the present species, has likewise equally long, slightly flexuous ribs on the last half whorl but its inner ventrolateral tubercles are not weakened nor extremely strengthened, keeping their moderate distinctness throughout the whole whorl. The upper lateral swellings of the ribs and the faint depressions above them, as seen on the outer whorl of *U. vicinale*, do not seem to be developed in that species. KOSSMAT described this species as being free from umbilical tubercles. This is true for the outer half whorl but in the preceding stage faint bullae are shown by his illustration at the end of some of the long ribs as in the present species. In *A. discoidale* the whorl is less involute and the ribs are somewhat stronger, crossing the venter without notable weakening. To sum up the present species is fairly allied to but well distinguishable from *A. discoidale*. The distinction may be at least subgeneric.

The present species and also *A. discoidale* are clearly separated from typical *Mantelliceras*, i.e. the group of *M. mantelli* (J. SOWERBY) (see SHARPE, 1857, p. 40, pl. 18, fig. 7), in that they have high, rapidly increasing whorls, equally long, gently flexuous ribs on the last whorl, without double umbilical tubercles, and fairly deeply incised sutures which are characterized by numerous, descending auxiliaries.

The compressed subgroup of *Mantelliceras*, as represented by *M. hyatti* SPATH (1925; see SHARPE, 1857, p. 40, pl. 18, fig. 4), is somewhat similar to the immature shell of the present species in the shell-form and mode of ribbing. Its

* The holotype, by monotypy, of this species is missing, so we have to depend on KOSSMAT's description and illustration.

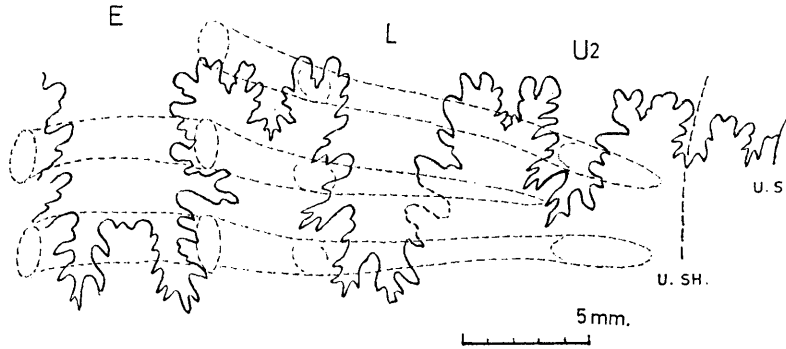


Fig. 5. *Mantelliceras hyatti* SPATH. Kyushu Univ. No. 9307, from loc. T.M. 53E, St. Catherine Point, Isle of Wight, Chloritic Marl (Lower Cenomanian), England (T.M. Coll.). External suture at whorl-height=28 mm., i.e. at shell-diameter=62 mm. (T.M. delin.)

suture is, however, of the same pattern as that of *M. mantelli* (see Fig. 5 in this paper and also COLLIGNON, 1937, pl. 9, fig. 9). The larger shell of *Mantelliceras couloni* (D'ORBIGNY) (1850, p. 147; see COLLIGNON, 1937, p. 56, pl. 11, fig. 1), another compressed *Mantelliceras*, has an evolute outer whorl on which the ribs are strong, rigidly rectiradial, alternating long and short and provided with prominent ventral tubercles, with a furrow between them. The present species and also *A. discoidale* KOSSMAT, thus, cannot be grouped with this kind of compressed *Mantelliceras*.

The small immature shells of the present species are not only similar to the holotype and hypotypes of *Ammonites aumalensis* COQUAND (1862, p. 172, pl. 1, figs. 27–28; PERVINQUIÈRE, 1907, p. 296, pl. 16, figs. 6–11; 1910, p. 42, pl. 4, figs. 11–19), the type-species of *Submantelliceras* SPATH, 1923, from the basal Cenomanian of Algeria and Tunisia, but also to the immature shells of *Graysonites*, as represented by the inner whorl of the holotype of *G. lozoi* YOUNG (1958, p. 172, pl. 27, figs. 1, 2, 6, 7, 9, 10), from the lower Lower Cenomanian of Texas, in the shell-form, ornamentation and suture. The lectotype of *Ammonites saxbii* SHARPE (1857, p. 45, pl. 20, fig. 3; subsequently designated by WRIGHT and WRIGHT, 1951, p. 38), from the Lower Cenomanian of England, is also similar to them, as STOLICZKA himself pointed out. This species has been referred to *Mantelliceras* by British palaeontologists (SPATH, 1937; WRIGHT and WRIGHT, 1951; CASEY, 1960), but without seeing the sutures and an adult shell we cannot determine with confidence whether it is really a *Mantelliceras* or not. All these small specimens resemble to a considerable extent the immature shells of certain *Stoliczkaia*, a probable ancestor of the subfamily Mantelliceratinae.

The present species reaches nearly the same size as that of *Sharpeiceras*, as do species of *Graysonites*. If we consider the lateral row of weak buldges of the ribs on its outer whorl, we can say that it has four rows of tubercles on one side. This is the same number as that of *Sharpeiceras*. In all the species of *Sharpeiceras*, however, the ribs are stronger, more rigid and rectiradial and the tubercles

are more prominent and nearly equidistant in lateral view.

Utaturiceras vicinale is considerably similar to *Acompsoceras essendiense* (SCHLÜTER) (1871, p. 3, pl. 1, figs. 5-7; pl. 2, figs. 2, 4), from the Lower Cenomanian of Germany, in shell-form, ventrolateral clavi and sutures. Even a faint spiral depression below the row of faint lower ventrolateral nodes, as seen in the former in the stage with diameter 50 to 140 mm., is also discernible in the shell of

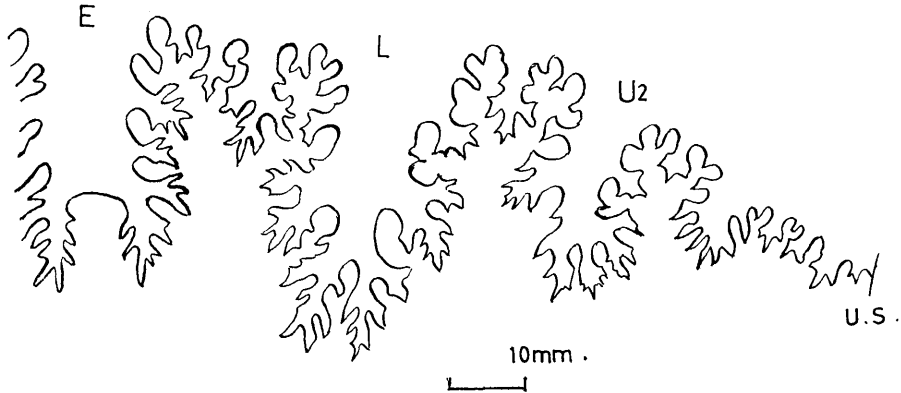


Fig. 6. *Acompsoceras sarthense* (GUÉRANGÈRE, 1867) [= *Ammonites inconstans* SCHLÜTER, 1871]. Original specimen of SCHLÜTER, 1871, pl. 3, figs. 4-5, Palaeontological Museum, University of Bonn, No. 30b. External suture at whorl-height=90 mm. This fine suture was not illustrated by SCHLÜTER. Note its similarity to the suture of *Utaturiceras vicinale*, except for more phylloid outline of folioles in *Acompsoceras*. (T.M. delin.*)

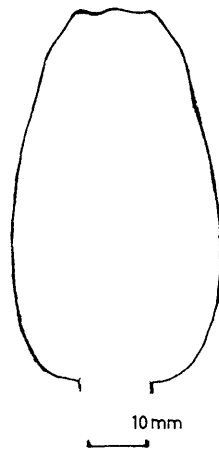


Fig. 7. *Acompsoceras essendiense* (SCHLÜTER). Whorl section of a syn-type, whose suture was illustrated by SCHLÜTER (1871, pl. 2, fig. 2). Note its similarity to that of *Utaturiceras vicinale*, except for a faint median keel on its venter. (T.M. delin.*)

* I thank Professor K. J. MÜLLER of the University of Bonn, who rendered every facility for my study of SCHLÜTER's type specimens in Bonn. (T. MATSUMOTO)

the corresponding size of the latter. The ribs persist but the umbilical bullae are obsolete on the adult whorl of the former, while the umbilical bullae are well developed but the ribs are much weakened on that of the latter, as in other species of *Acompsoceras* HYATT, 1903.

A significant but hitherto overlooked fact is that in the pattern of suture *U. vicinale* is more closely allied to the type- and other species of *Acompsoceras*, *Graysonites* and also *Sharpeiceras* than to those of *Mantelliceras*. The suture of these ammonites seems to be fundamentally related to that of certain species of *Stoliczkaia*, for instance, *S. rhamnnotus* (SEELEY), as figured by SPATH (1931, p. 333, text-fig. 109c; pl. 31, figs. 4, 7, 9, 12a, b), in rather slender and deeply incised elements, with numerous, gradually descending auxiliaries, and also in more or less phylloid aspects of the folioles. The small, probably immature, specimens of *Submantelliceras aumalense* (COQUAND) rather have this type of suture and by this character *Submantelliceras* can be distinguished from *Mantelliceras* even in immature stages. SORNAY (1955, p. 24) has rightly pointed out that the suture of *Submantelliceras* is closely allied to that of *Cottreauwites* COLLIGNON, 1929.

It is furthermore noted that *Utaturiceras vicinale* is somewhat similar to some species of *Forbesiceras*, KOSSMAT, 1897, in the compressed shell, paired ventral clavi, and especially so in the pattern of suture. The distinction is that in the latter the whorl is more involute and more compressed, the venter is narrower and has a median row of faint clavi, the ribs are finer and more numerous, and the suture has a well developed adventitious lobe in the external saddle. The similarity is, however, significant. We would entirely agree with CASEY (1965, p. 461) in ascribing *Forbesiceras* and related genera to Acanthocerataceae. While *Forbesiceras* is originated in *Neophlyticeras* of Lyelliceratiidae, *Utaturiceras* and related genera (or subgenera) are derived from *Stoliczkaia* of the same family. They are in parallel relationship.

Occurrence.—The syntypes of STOLICZKA are recorded to have come from Odium, Utatur [Ootatoor] Group. We have not yet confirmed the precise stratigraphic position of this species in India. COLLIGNON (1964, p. 148) has reported the same species from the Lower Cenomanian of Madagascar.

Concluding Remarks

From the above described observations the following remarks can be led as a conclusion.

(1) As far as the available material is concerned, *Utaturiceras* WRIGHT, 1956, is allied to but distinguishable from *Graysonites* YOUNG, 1958, *Mantelliceras* HYATT, 1903, *Acompsoceras* HYATT, 1903, and *Sharpeiceras* HYATT, 1903. It is a member of the subfamily Mantelliceratinae and not that of the subfamily Metoicoceratinae, as SPATH (1937) doubted and as CASEY (1960) has already pointed out.

(2) The generic diagnosis of *Utaturiceras* may be given as follows: Shell is

fairly involute, fairly narrowly umbilicate, with rather rapidly increasing, high whorls. Flanks are nearly flat and parallel in the early growth-stage and gently inflated and slightly convergent in the late; venter is narrow, rather flat and bordered by angular edges; lower ventrolateral shoulders sloping. The ribs on the septate whorl are more or less flexuous and of unequal length, sometimes branching, each provided with inner ventrolateral tubercle and outer ventral clavus; the longer primary has umbilical bulla. Those on the adult body-whorl are gently flexuous, somewhat broadened, devoid of umbilical bullae and inner ventrolateral tubercles, and provided with only outer ventral clavi. On the venter between the clavi the ribs are weakened and cross it straightly or with slight projection. In the adult stage an upper lateral row of weak bullae are developed on the ribs and there is a shallow radial furrow between it and the row of inner ventrolateral tubercles. The suture is fairly deeply and finely incised, and has a deeply bipartite external saddle, a deep and narrow, lateral lobe, which is bipartite at the bottom, and numerous descending auxiliaries.

(3) Genus *Submantelliceras* SPATH, 1923, is still ambiguous, because the adult shell of its type-species is not precisely known. The holotype of '*Acanthoceras discoidale* KOSSMAT might represent the adult stage of *Submantelliceras*.

(4) If *Submantelliceras* had such an adult shell, *Submantelliceras*, *Utaturiceras* and *Graysonites* could be treated as subgenera of *Submantelliceras* (*s.l.*), because their diagnoses are manifested mainly in the adult shell. They are closely allied one to another in the small, immature stage. They may be diverging derivatives from a common ancestor, *Stoliczkaia*. They are similar to but well distinguishable from the compressed subgroup of *Mantelliceras* (i.e. subgroup of *M. hyatti*), as well as from the typical group of *Mantelliceras* (i.e. that of *M. mantelli*) by a particular pattern of suture and other characters.

(5) From the morphological view points *Utaturiceras* is likely to be of Lower Cenomanian age as are *Submantelliceras* and *Graysonites*. The precise stratigraphic position of *Utaturiceras*, here emended, should be determined by further study.

(6) *Submantelliceras*, *Cottreautes*, *Utaturiceras*, *Graysonites* and *Acompsoceras* form a subgroup of Acanthoceratidae which is in parallel with Forbesiceratidae. The former is derived from *Stoliczkaia* and the latter from *Neophlycticeras* of Lyelliceratidae.

References Cited

- CASEY, Raymond (1960): Cenomanian ammonite zone. *Geol. Mag.*, **97**, (2), 173-174.
——— (1965): A monograph of the Ammonoidea of the Lower Greensand. Part 6. *Palaeontogr. Soc.* 1964, 399-546, pls. 67-90.
- COLLIGNON, Maurice (1928-29): Les céphalopodes du Cénomanien pyriteux du Diégo-Suarez. *Ann. Paléont.*, **17** (1928), 137-160, pls. 15[1]-19[5]; *Ibid.*, **18** (1929), 1-56, pls. 1[6]-2[7].
- (1931): La faune de Cénomanien a fossiles pyriteux du nord de Madagascar. *Ann. Paléont.*, **20**, 43-104, pls. 5[1]-9[5].

- (1937): Ammonites Cénomaniennes du sud-ouest de Madagascar. *Ann. Géol. Serv. Mines*, (8), 29–72, pls. 1–11.
- (1964): *Atlas de fossiles caractéristiques de Madagascar (Ammonites)*, (11) Cenomanien, 152p., pls. 318–355, Serv. Géol., Tananarive.
- COQUAND, H. (1862): Géologie et paléontologie de la région sud de la province de Constantine. *Mém. Soc. d'Emul. Provence*, **2**, 341p., 36pls.
- FORBES, Edward (1846): Report on the Cretaceous fossil invertebrate from southern India, collected by Mr. KAYE and Mr. CUNLIFFE. *Trans. Geol. Soc. London*, [2], **7** (for 1845), 97–174, pls. 7–19.
- HYATT, Alpheus [Ed. by T. W. STANTON] (1903): Pseudoceratites of the Cretaceous. *Monogr. U. S. Geol. Surv.*, **44**, 351p. incl. 47pls.
- KOSSMAT, Frantz (1895; 97; 98): Untersuchungen über die südindische Kreideformation. I, II, III. *Beitr. Paläont. Geol. Österr.-Ungarns u.d. Orients*, **9**, 97–203 [1–107], pls. 15–25 [1–11] (1895); **11**, 1–46, [108–153], pls. 1–8 [12–19] (1897); **11**, 89–152 [154–217], pls. 14–19 [20–25] (1898).
- MATSUMOTO, Tatsuro [Matumoto, Taturō] (1942): Correlation of the Cretaceous deposits of southern India and Japan. *Jour. Geol. Soc. Japan*, **49**, (584), 149–164 (in Japanese).
- (1943): Fundamentals in the Cretaceous stratigraphy of Japan. Parts II & III. *Mem. Fac. Sci., Kyushu Imp. Univ.*, [D], **2**, (1), 97–237.
- (1959): Upper Cretaceous ammonites of California. Part II. *Mem. Fac. Sci., Kyushu Univ.*, [D], Spec. Vol., **1**, 1–172, pls. 1–41.
- (1960): *Graysonites* (Cretaceous ammonites) from Kyushu. With notes on stratigraphy by M. AMANO, T. MATSUMOTO, H. OKADA and H. OGURI. *Mem. Fac. Sci., Kyushu Univ.*, [D], **10**, (1), 41–58, pls. 6–8.
- ORBIGNY, Alcide d' (1850): *Prodrome de Paléontologie stratigraphique universelle*, **2**, Paris.
- PERVINQUIÈRE, L. (1907): Études de paléontologie tunisienne. 1. Céphalopodes des terrains secondaires. *Carté Géol. Tunisie*, 428p., 27pls.
- (1910): Sur quelques ammonites du crétacé algérien. *Mém. Soc. Géol. France, Paléont.*, **17**, Mém. no. 42, 86p., 7pls.
- SCHLÜTER, Clement (1871–76): Die Cephalopoden der oberen deutschen Kreide. *Palaeontographica*, **21**, 1–24, pls. 1–8 (1871); 25–120, pls. 9–35 (1872); **24**, 121–264, pls. 36–55 (1876).
- SHARPE, Daniel (1873–57): Description of the fossil remains of mollusca found in the Chalk of England. *Palaeontogr. Soc.*, 68p., 27pls. (1–26, pls. 1–10, 1853; 27–36, pls. 11–16, 1855; 37–68, pls. 17–27, 1857).
- SORNAY, Jacques (1955): Ammonites nouvelles du Crétacé de la région des Monts du Mellègue (Constantine). *Serv. Carte Géol. l'Algérie, Mém. Paléont.*, (18), 40p., 2pls.
- SPATH, L. F. (1923): On the ammonite horizons of the Gault and contiguous deposits. *Summ. Progr. Geol. Surv.*, (1922), 139–149.
- (1925): On Upper Albian ammonites from Portuguese East Africa. With an appendix on Upper Cretaceous ammonites from Maputoland. *Ann. Transvaal Mus.*, **11**, (3), 179–200, pls. 28–37.
- (1926): On the zones of the Cenomanian and the uppermost Albian. *Proc. Geol. Assoc.*, **37**, 420–432.
- (1931): A monograph of the Ammonoidea of the Gault. Part 8. *Palaeontogr. Soc.*, 1929, 313–378, pls. 31–36.
- (1937): The nomenclature of some Lower Chalk ammonites. *Geol. Mag.*, **74**, 277–281.
- SPENGLER, Erich (1910): Untersuchungen über die südindische Kreideformation. Die Nautiliden und Belemniten des Trichinopolydistrikts. *Beitr. Paläont. Geol. Österr.-Ungarns u.d. Orients*, **23**, 125–157 [1–33], pls. 11–14 [26–29].

- STOLICZKA, Ferdinand, in BLANFORD, M. F. and STOLICZKA, Ferdinand (1861-66): The fossil Cephalopoda of the Cretaceous rocks of southern India. *Mem. Geol. Surv. India, Palaeont. Indica*, [1], 1-40, pls. 1-25 (1861); [3], 1, 41-216, pls. 26-94, with 66a (1863-66) [41-56, pls. 26-31 (1863); 57-106, pls. 32-54 (1864); 107-154, pls. 55-80 (1865); 155-216, pls. 76-94 (1866)].
- WRIGHT, C. W. (1956): Notes on the Cretaceous ammonites. III. *Utaturiceras* gen. nov. and the *Metoicoceratinae*. *Ann. Mag. Nat. Hist.*, [12], 9, 391-393.
- in MOORE, R. C. [Editor] (1957): *Treatise on Invertebrate Paleontology*, (L), Mollusca, 4, Cephalopoda: Ammonoidea, Univ. Kansas Press.
- and WRIGHT, E. V. (1951): A survey of the fossil Cephalopoda of the Chalk of Great Britain. Primarily a nomenclatorial revision of Daniel SHARPE's "Description of the fossil remains of Mollusca found in the Chalk of England. Part I, Cephalopoda" (1853-1857). *Palaeontogr. Soc.*, 1950, 1-40.
- YOUNG, Keith (1958): *Graysonites*, a Cretaceous ammonite in Texas. *Jour. Paleont.*, 32, (1), 171-182, pls. 27-29.

Tatsuro MATSUMOTO, and S.S. SARKAR

Notes on Some Cretaceous Ammonites
from Southern India. Part I

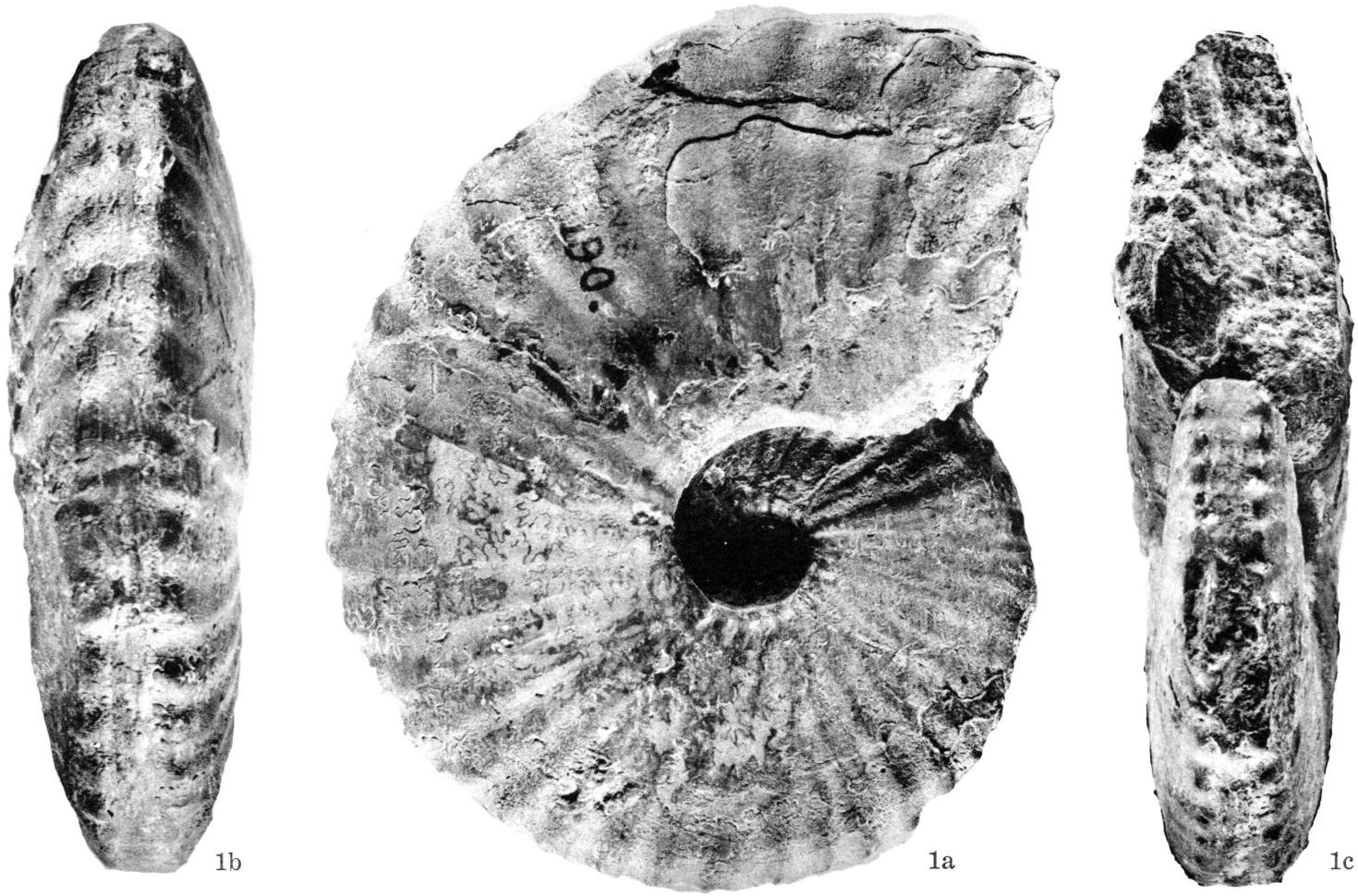
Plates 32~33

Plate 32

Explanation of Plate 32

Fig. 1. *Utaturiceras vicinale* (STOLICZKA)
Lectotype, GSI. 190, from Odium, Utatur [Ootatoor] Group, southern India.
Lateral (a), ventral (b) and frontal (c) views, $\times 1$.

(Geological Survey of India photos.)



T. MATSUMOTO & S. S. SARKAR: *Utaturiceras vicinale*

Plate 33

Explanation of Plate 33

Figs. 1-3. *Utaturiceras vicinale* (STOLICZKA)

Syntypes of various growth-stages, from Odium, Utatur [Ootatoor] Group, southern India.

1. GSI. 183, original specimen of STOLICZKA, 1864, pl. 44, fig. 1. Lateral (a), ventral (b) and frontal (c) views, $\times ca. 4$.
2. GSI. 187, original specimen of STOLICZKA, 1864, pl. 44, fig. 5. Lateral (a) and ventral (b) views, $\times 2$.
3. GSI. 189, original specimen of STOLICZKA, 1864, pl. 44, fig. 7. Lateral (a) and frontal (b) views, $\times 1$.

(Geological Survey of India photos.)

