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BULLETIN 120

THORSTEINSSONOCERAS

**A new craspeditid ammonite from the
Valanginian of Ellesmere Island,
Arctic Archipelago**

J. A. Jeletzky

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PREFACE

This report describes some well-preserved and unusual ammonites from the early Cretaceous rocks of Ellesmere Island. These ammonites have a direct application in determining the Jurassic-Cretaceous boundary in Arctic Canada and serve to emphasize again the importance of the systematic study of ammonites as a precise means of Mesozoic chronology and correlation.

J. M. HARRISON,
Director, Geological Survey of Canada

OTTAWA, January 3, 1964

Bulletin 120: *Thorsteinssonoceras*, ein neuer kraspeditider Ammonit aus dem Valanginium von Ellesmere Island im Arktischen Archipel.

Von J. A. Jeletzky

Бюллетень 120: *Thorsteinssonoceras* — новый краспедититовый аммонит из валанжинского яруса о. Элмира, Арктический Архипелаг.
Ю. А. Елецкий

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THORSTEINSSONOCERAS,

A new craspeditid ammonite from the Valanginian of Ellesmere Island, Arctic Archipelago

Abstract

Some well-preserved ammonites from the Valanginian part of the Deer Bay Formation, north of Greely Fiord, Ellesmere Island, are very similar in whorl shape and sculpture to some European species of *Polyptychites* and *Euryptychites*. The suture line indicates that this apparent similarity is a case of homoeomorphy, and the ammonites are assigned to a new genus and species of the family Craspeditidae.

Résumé

Certaines ammonites bien conservées provenant du Valanginien de la formation Deer Bay, au Nord du fjord Greely, dans l'île Ellesmere, ressemblent à certaines espèces européennes de *Polyptychites* et d'*Euryptychites* en ce qui a trait à leur forme et à leur contour. La ligne de suture indique que cette similitude apparente est un cas d'homéomorphie; on a assigné aux ammonites une espèce et un genre nouveaux de la famille des Craspeditidae.

INTRODUCTION

Some well-preserved and rather unusual ammonites were collected in 1961 by R. Thorsteinsson of the Geological Survey of Canada from the Valanginian part of the Deer Bay Formation, north of Greely Fiord, Ellesmere Island. These ammonites are indistinguishable from some well-known European species of *Polyptychites* and *Euryptychites* in their general whorl shape and sculpture. The suture line indicates, however, that they belong to the family Craspeditidae Spath 1924, and shows that the similarity to *Polyptychites*, *Euryptychites*, and also to *Astieriptychites*, is yet another case of homoeomorphy. It is quite evident that the ammonites should be assigned to a new genus and species.

PALAEONTOLOGICAL DESCRIPTIONS

Family CRASPEDITIDAE Spath, 1924

Genus *Thorsteinssonoceras* n. gen.

Type species. *Thorsteinssonoceras ellesmerensis* n. sp. from the Valanginian of Ellesmere Island, Canadian Arctic Archipelago; Spitsbergen and Novaya Zemlia.

Derivation of name. The genus is named for R. Thorsteinsson, Geological Survey of Canada, who collected all the material studied, made excellent collections of many other important Cretaceous and uppermost Jurassic faunas of the Canadian Arctic Archipelago, and provided the writer with the necessary stratigraphical information for this study.

Diagnosis. Medium-sized, fairly involute *Polyptychites*- and *Euryptychites*-like ammonites with a typical craspeditid suture line. In its ribbing habit, presence of bullate umbilical nodes in the intermediate to late growth stages, and low *Polyptychites* (*Euryptychites*)- to high-arched, *Polyptychites* s. str.-like cross-section of the whorl *Thorsteinssonoceras* is indistinguishable from such well-known polyptychitid species as *Polyptychites* (*Euryptychites*) *gravesiformis* Pavlow, 1892 s. lato, *Polyptychites keyserlingi* (Neumayr and Uhlig, 1881-82) s. lato, and *Polyptychites beani* Pavlow, 1892. Its external suture line is, however, essentially like that of early Lower Cretaceous *Subcraspedites* s. str. or *Tollia* s. str. except for its longer, more slender, and more strongly frilled lobes and saddles in the adult

state. The suture line is somewhat ascendant toward the umbilical seam throughout and possesses four to five auxiliary lobes in addition to two lateral lobes and a ventral lobe. The first auxiliary saddle separating the first and second auxiliary lobes is two to four times wider than the other saddles and is subdivided into at least three parts by lobules.

Discussion. In the original diagnosis, Pavlow (1892, p. 476) stressed that the external suture line of *Polyptychites* is not known to possess more than three auxiliary lobes (that is if one uses the Russian system, which recognizes two lateral lobes; see Luppov, *et al.*, 1958, p. 16, text-fig. 76): "Cloisons assez découpées, outre le lobe siphonal et les deux latéraux, on observe le plus souvent deux lobes auxiliaires, rarement trois." At the same time he stressed the feebly suspended character of the auxiliary part of the *Polyptychites* suture line: "Selles subdivisées en deux branches inégales; les sommets de la selle externe et des deux latérales touchent la ligne radiale ou ne montent que faiblement. Les selles auxiliaires s'abaissent un peu vers la suture."

The writer has checked the validity of these conclusions in the modern literature and found them to be correct. All hitherto figured suture lines of *Polyptychites* and *Euryptychites* from northwestern Europe, Central Russia, European Arctic, and Greenland known to the writer (e.g., Koenen, 1902, 1909; Bogoslovsky, 1902; Pavlow, 1892, 1914; Voronets, 1962; Donovan, 1953) conform, indeed, to Pavlow's description. This is, furthermore, true of the type species of *Polyptychites* and *Euryptychites* (Arkell, *et al.*, 1957, pp. L348-9, figs. 456, 3c, and 457, 2c). The only exceptions are the "*Polyptychites keyserlingi*" described and figured by Sokolov and Bodylevsky (1931, p. 76, pl. XI, figs. 1a, b) from the Valanginian of Spitsbergen and "*Euryptychites gravesiformis*" described and figured by Salfeld and Frebold (1924, pp. 6-7, pl. II, figs. 1, 1a) from glacial boulders on Novaya Zemlia. As is shown below, however, these two forms are obviously congeneric and conspecific with *Thorsteinssonoceras ellesmerensis* n. gen. n. sp. Although the sutures of some Eurasian *Polyptychites* species have never yet been figured, there is no reason to doubt the diagnostic value of the suture line for the genus *Polyptychites* s. lato in particular and the family Polyptychitidae Spath, 1924 in general. The fact that the same general type of suture line is characteristic also of their immediate descendants, such as the Simbirskitidae Spath, 1924 (see Wright in Arkell, *et al.*, 1957, fig. 457, 1c, 2c) gives further support to this conclusion. It is, therefore, unlikely that the suture line of *Thorsteinssonoceras* could have evolved out of that diagnostic of the Polyptychitidae, and this genus can hardly be considered as an offshoot of that family.

It is, on the contrary, easy to derive *Thorsteinssonoceras* from *Tollia*, despite the superficial dissimilarity of these two genera. The latest known, early Valanginian representatives of *Tollia*, such as *T. mutabilis* (Stanton) 1895 s. lato and *T. mira* Voronets, 1962 are, indeed, known to develop obtusely rounded more or less parallel-sided cross-sections of the whorl and markedly elevated, sometimes slightly bullate, primary ribs, while retaining the characteristic craspeditid suture

line (Imlay, 1960, pl. 28, figs. 1, 2, 11, 18, 19; Voronets, 1962, pl. XLI, figs. 3a-3b, text-fig. 26). There are, also, other ammonites, such as *Temnoptychites* ex gr. *syzranensis-triptychiformis* Nikitin, and *Virgatoptychites* Voronets, 1958, that combine the characteristic craspeditid suture line with either *Polyptychites* or *Euryptychites* cross-section of the whorl, markedly elevated (*Virgatoptychites*) or bullate (some *Temnoptychites*) primary ribs, and ribbing habit resembling that of some *Polyptychites* species. Some of these, such as *Virgatoptychites* (Voronets, 1958, 1962), have hitherto been placed in the family Polyptychitidae Spath, 1924. They should, however, be considered as other offshoots of the *Tollia*-like representatives of the Craspeditidae Spath, 1924. It is possible that some of them are genetically connected with *Thorsteinssonoceras*.

Some of the extreme morphological variants of *Thorsteinssonoceras ellesmerensis* n. gen. n. sp. described below afford a clear indication of its close affinity with the *Tollia*-like representatives of the Craspeditidae. This species includes, indeed, some forms which are distinctly *Tollia*-like in their considerably higher, high-arched whorl-section, the flanks of which gradually converge toward the moderately obtusely rounded venter from the level of the maximum diameter. These *Polyptychites beani*-like variants of *Thorsteinssonoceras* differ from some late *Tollia*- and *Virgatoptychites*-species only in their well-developed umbilical bullae and in the low point of subdivision of primaries on the flanks.

Thorsteinssonoceras is considered to be a short-lived offshoot of *Tollia* or? *Virgatoptychites*, itself probably no more than a subgenus of *Tollia*. It probably became homoeomorphically similar to *Polyptychites* and *Euryptychites* because of the adaptation to a similar, less active mode of life (Arkell, *et al.*, 1957, p. L119). That it could be an offshoot of *Polyptychites* with an acquired *Tollia*-like suture line is considered improbable for the reasons already given. *Thorsteinssonoceras* appears to be, furthermore, somewhat older than most hitherto known representatives of *Polyptychites* and *Euryptychites*.

Affinities and differences. As already pointed out, the genus *Thorsteinssonoceras* differs from *Polyptychites* and *Euryptychites* largely in the craspeditid character of its 'adult' suture line. The presence of at least four to five well-defined auxiliary lobes and the clearly ascendant character of the auxiliary part of the *Thorsteinssonoceras* suture line permit easy differentiation from all members of the family Polyptychitidae Spath, 1924, despite the extreme similarity of its suture line to that of *Polyptychites* (*Euryptychites*) *gravesiformis* Pavlow s. lato (1914, pl. XI, fig. 2d) in its proportions and degree of frilling. The occurrence of at least three, and sometimes of as many as four, lobes on the flank of the shell above its umbilical shoulder (Pl. III, figs. 1C, D; Pl. V, figs. 2A, B) is even more characteristic of *Thorsteinssonoceras*. This feature permits the generic identification of incompletely exposed (or preserved) suture lines that do not permit the observation of the ascendant character and counting of the auxiliary lobes. Another distinctive and diagnostic feature is the extremely wide and further subdivided appearance of the first auxiliary saddle, which usually occurs on the umbilical shoulder of

Thorsteinssonoceras. In the homoeomorphically similar *Polyptychites* and *Euryp-tychites* species (Pl. I, fig. 2B, text-fig. 1f; Pavlow, 1914, pl. XI, fig. 2d; Voronets, 1962, text-fig. 29) it is the second lateral (that is the third from the venter) saddle that is similarly wide and subdivided by lobules. This second lateral saddle of the Polyptychitidae occurs, furthermore, exactly in the position of the first auxiliary (that is fourth from the venter) saddle of *Thorsteinssonoceras* on or close by the umbilical shoulder.

Thorsteinssonoceras differs from all representatives of the genus *Temnoptychites* Pavlow, 1914 in the complete absence of either interruption or weakening of the secondary ribs in the middle of the venter at any of its studied growth stages. This distinction may be critical, as some representatives of *Temnoptychites* are closely similar to *Thorsteinssonoceras* in most or all of their other morphological features. So, for example, *Temnoptychites* cf. *triptychiformis* (Nikitin) et *syzranicus* (Pavlow) of Bogoslovsky (1902, pl. XVII, figs. 1-5) is closely similar to some of the *P. (E.) gravesiformis*-like representatives of *Thorsteinssonoceras ellesmerensis* n. gen. n. sp. in the general shape of the whorls, appearance and spacing of umbilical bullae in the late growth stages, etc. The same is true of the mode of ribbing and the general character of suture line of the early growth stages of this form (Bogoslovsky, 1902, pl. XVII, fig. 2c). The secondaries of the Petchoran form concerned are, however, distinctly weakened or interrupted on the venter of its intermediate growth stages clearly indicating that it belongs to *Temnoptychites* but not to *Thorsteinssonoceras*. The primaries of the early growth stages of the Petchoran form subdivide much higher on the flanks than those of the corresponding growth stages of *T. ellesmerensis*.

The typical representatives of *Virgatoptychites* Voronets, 1958, such as *V. changalassensis* Voronets, 1958 differ sharply from *Thorsteinssonoceras* in the discoidal, *Tollia*-like shape of their shell and the pronouncedly virgatitid ribbing habit of their outer whorls; they completely lack the umbilical bullae, and the fine, sharp primaries subdivide higher on the flanks than the bullate primaries of *Thorsteinssonoceras*. The extreme representatives of *Virgatoptychites*, such as *V. (?) pachsaensis* Voronets, 1958 (pl. I, figs. 1a, b) may, however, become rather similar to the *P. beani*-like variant of *Thorsteinssonoceras ellesmerensis* n. gen. n. sp. in their ribbing habit and whorl section. The complete absence of the bullate primary ribs in *V. (?) pachsaensis* differentiates it from these extreme representatives of *T. ellesmerensis*.

From *Astieriptychites* Bodylevsky 1960, *Thorsteinssonoceras* differs sharply in the *Polyptychites*-like appearance of its umbilical bullae and its craspeditid suture line. As stressed by Bodylevsky (1960, pp. 172-3) and Voronets (1962, pp. 82-3), the suture line of *Astieriptychites* descends toward the umbilical seam and has only two auxiliary lobes; its umbilical bullae are more or less straight and long, resembling those of some *Olcostephanus* or *Simbirskites* (Bodylevsky, 1960, pl. 39, figs. 1a, 2a; pl. 40, figs. 1a, b).

Thorsteinssonoceras ellesmerensis n. sp.

Plate I, figure 1; Plate II, figures 1-3; Plate III, figure 1; Plate IV, figure 1;
Plate V, figures 1, 2; Plate VI, figures 1, 2; text-figs. 1a-e

1924. *Euryptychites gravesiformis*, Salfeld and Frebold, pp. 6, 7, Pl. II, fig. 1, and possibly figs. 2, 3.

1931. *Polyptychites keyserlingi*, Sokolov and Bodylevsky, p. 96, Pl. XI, figs. 1a, b.

?1931. *Polyptychites* aff. *keyserlingi*, Sokolov and Bodylevsky, pp. 97-8, Pl. XIII, figs. 1a, b.

Material. Thirteen more or less fragmentary specimens and identifiable fragments (including the holotype) from GSC loc. 47876. Three fragmentary specimens from GSC loc. 47879.

Holotype. Specimen GSC No. 17226 shown in Plate II, figures 1A-D, text-fig. 1c.

Measurements. The measurements of the best-preserved, figured specimens in mm are as follows: (All specimens are slightly deformed and measurements are approximate only.)

Polyptychites beani-like variant

GSC No. and figure	Diameter	Umbilicus	Height	Thickness
17228 (Pl. II, fig. 3)	89	36 (0.40)	37	42
17231 (Pl. V, fig. 1) (inner whorl)	87	32 (0.37)	36	40
17231 (Pl. V, fig. 1) (end of last whorl)	—	—	54	63
18037 (Pl. V, fig. 2D) (end of whorl)	—	—	30	33 (est.)

Polyptychites keyserlingi-like variant

GSC No. and figure	Diameter	Umbilicus	Height	Thickness
17221 (Pl. VI, fig. 2)	61	25 (0.41)	24	32
18661 (Pl. VI, fig. 1)	55	24 (0.44)	27	36
17226 (Pl. II, fig. 1) (holotype)	89	38 (0.43)	37	54
17229 (Pl. I, fig. 1)	85	36 (0.42)	36	45

Polyptychites gravesiformis-like variant

GSC No. and figure	Diameter	Umbilicus	Height	Thickness
17232 (Pl. IV, fig. 1) (inner whorl)	89	29 (0.33)	33	56 (appr.)
17232 (Pl. IV, fig. 1) (outer whorl)	124 (est.)	63 (0.050)	44	85

Description and Remarks

Whorl shape. As indicated by measurements, and fossil Plates I to VI, the whorl shape of *Thorsteinssonoceras ellesmerensis* n. sp. is highly variable. In the material studied it ranges from that of *Polyptychites (Euryptychites) gravesiformis* Pavlow s. lato (including *P. (E.) pavlovi* Voronets, 1962 non Koenen, 1909) through that closely comparable to *Polyptychites keyserlingi* (Neumayr and Uhlig, 1881-82) s. lato to that closely comparable to *Polyptychites beani* Pavlow, 1892 and *P. rinnei* Koenen, 1909. The representatives of *T. ellesmerensis* resembling *P. keyserlingi* s. lato (inclusive of *P. pavlovi* Koenen, 1902) can only be distinguished from this species by their narrower and deeper umbilicus and by the loss of most or all of their sculpture (except for the bullate lower parts of their primary ribs) on the penultimate whorl and living chamber (compare Pl. I, figs. 2-4).

These three variants are herewithin designated as:

- (1) *P. gravesiformis*-like variant
- (2) *P. keyserlingi*-like variant; and
- (3) *P. beani*-like variant.

The extreme, *P. (E.) gravesiformis*-like variant comprises *Euryptychites*- or *Cadoceras sublaeve*-like adult phragmacones (Pl. III, fig. 1; Pl. IV, fig. 1). The extremely low and wide outer (still septate) whorls of this variant are halfmoon shaped and more or less evenly arched throughout their outer side so that the flanks cannot be delimited from the venter. The umbilical shoulder is angular and the umbilical wall meets the outer surface at an angle ranging from 90 to 120 degrees. The umbilical wall is straight to feebly concave and the umbilicus is broadly conical and funnel-like; it is much wider (around 0.50) than in other variants. The whorl is always much wider than high and much lower than that of other variants. This *Euryptychites*-like, late growth stage persists at least through the three outer whorls in addition to the living chamber; it becomes, however, distinctly modified in the earlier whorls (Pl. III, fig. 1B). These whorls (beginning with height of 18 mm and width of 55 mm) become narrower and higher, and gradually acquire a more or less parabolic cross-section with subparallel flanks which are distinctly delimited from the venter proper. The earlier whorls become, on the whole, more and more like the late and intermediate whorls of the *P. keyserlingi*-like variant of *Thorsteinssonoceras ellesmerensis* (see Pl. II, figs. 1B, 2B).

The morphologically extreme *Euryptychites gravesiformis*-like variant of *T. ellesmerensis* is connected by transitions with its typical (or 'mean') *P. keyserlingi*-like variant. The latter is characterized by considerably higher and narrower intermediate to late whorls with subparallel flanks, which are distinctly delimited from the much less markedly arched and often distinctly flattened ventral part of the whorls. As already mentioned, this whorl shape is closely comparable to that of the early whorls of the *P. (E.) gravesiformis* variant of our species. One could say that the ontogenetic development of the *P. keyserlingi*-like variant is 'retarded' as compared with that of its *P. (E.) gravesiformis*-like variant. In the *P. keyserlingi*-like variant the foregoing described 'adult' whorl shape is retained essentially

unchanged throughout development of the whorl, beginning with the earliest growth stages accessible for examination (Pl. VI, figs. 1, 2).

Another extreme variant of *Thorsteinssonoceras ellesmerensis* comprises specimens with a cross-section closely matching that of *Polyptychites beani* Pavlow (1892, pl. XV, fig. 7b), which it also closely resembles in sculpture (Pl. II, fig. 3A; Pl. V, figs. 2B, 2F). Were it not for its craspeditid suture line, this variant would have been identified as *P. beani*. This *P. beani*-like variant is, furthermore, similar in its cross-section to some *Tollia* species, such as *Tollia mira* Voronets, 1962, *Tollia paucicostata* Donovan, 1953, and *Tollia mutabilis* Stanton, 1895. From these *Tollia* species our variant clearly differs, however, in its predominantly virgatitid mode of rib bundling, low point of subdivision of its primaries, and in the already distinctly bullate appearance of the primaries in the early growth stages (Pl. V, fig. 2F). The umbilicus of this variant, although moderately deep and wide, is essentially broadly conical and funnel-like. It differs, therefore, from the narrower but commonly rounded step-like umbilicus of the *P. keyserlingi*-like variant of *T. ellesmerensis* n. gen. n. sp. As in *P. keyserlingi*-like variant, the whorl shape of this *P. beani*-like variant persists essentially unchanged into the earliest growth stages studied (Pl. V, figs. 2D-F).

The *P. beani*-like representatives of *T. ellesmerensis* are connected by all possible intermediate forms with its *P. keyserlingi*-like variant (e.g., Pl. II, fig. 2; Pl. I, fig. 1).

Sculpture. The ontogenetic development of sculpture follows more or less the same pattern in all three morphological variants.

The early whorls have been studied in only a couple of poor fragments extracted from the larger whorls of a *P. (E.) gravesiformis*-like variant. At the terminal height of 12 mm and at an estimated width of about 18 mm these whorls are covered by coarse and elevated but apparently non-bullate or nodose primary ribs which appear to alternately bifurcate and trifurcate closely above the umbilical shoulder. All secondary ribs are more or less markedly deflected forward and cross the venter in a gentle forward loop without becoming either weakened or interrupted. The primaries appear to be restricted to the upper half of the umbilical wall, its lower half being apparently semismooth or smooth.

The earliest fairly well preserved growth stages studied are shown in Plate V, figures 2D-F and Plate VI, figures 1, 2. Beginning with the initial whorl height of about 14 mm (Pl. V, fig. 2D), these early whorls are covered by trifurcating ribs. In this growth stage, which may extend for $\frac{3}{4}$ to 1 whorl to the whorl height of 20 to 25 mm (see GSC No. 17221; Pl. VI, figs. 2A, B), the primary ribs may be either limited to the upper part of the umbilical wall or extend to the umbilical seam. These short, pinched and elevated, and clearly bullate to nodose primary ribs are slanted forward and either comma-like or essentially straight; they bifurcate, for the most part, closely above the umbilical shoulder. Either the anterior or posterior secondary rib bifurcates again within the lower third of the flank. The repeated bifurcation of the posterior secondary produces a virgatitid

trifurcate bundle. Some trifurcate bundles with all secondaries arising directly out of the primary rib were also noted. The posterior secondary rib crosses the flank almost radially, whereas the other two secondaries are somewhat bent forward. Close to the ventral shoulder all three secondaries become deflected forward; they then cross the venter in a gentle forward loop without any weakening or interruption. Rare bidichotomous or quadrifurcate bundles are intercalated with the predominant trifurcate ones in some of the specimens. Some of the secondary ribs are only indistinctly attached to their bundles and some intercalated single ribs were noted in the upper half of the flank between the bundles; these intercalated ribs are also deflected forward at the umbilical shoulder and cross the venter in a gentle forward loop without any weakening or interruption. One or two quadrifurcate, virgatitid rib bundles have been noted in the specimen shown in Plate V, figure 2F.

Some narrow or broad constrictions occur in most specimens; they tend to disorganize the ribbing habit in their proximity.

In specimen GSC No. 17221 (Pl. VI, fig. 2) the primary ribs of the previous growth stage are replaced by the strong, forward inclined or comma-like bullae at a whorl height of about 20 mm. In other specimens studied, with the exception of GSC No. 18037 which retains bullate ribs up to a whorl height of about 29 mm, these bullae appear somewhat earlier. At about the same time the predominantly trifurcate bundles of ribs become replaced by quadri- to quintifurcate bundles. The arrangement of secondary ribs in these bundles varies from the typical virgatitid to typical fasciculate. In the latter, all the ribs arise simultaneously out of the bullate primaries. Some bidichotomous rib bundles are also present. The predominant mode of ribbing varies strongly from specimen to specimen and from one side to another of a specimen. In quintifurcate bundles only two secondary ribs tend to arise out of the bullate primary rib and the posterior secondary rib then bifurcates twice, higher on the flank, according to the virgatitid pattern. The anterior secondary rib tends to bifurcate only once below the mid-flank. Some intercalated single ribs occur between the bundles in the upper half of the flanks and some bundles may include one or more imperfectly attached secondaries, barely traceable into the other ribs.

The posterior ribs of the virgatitid bundles may be either straight or markedly falcoid in the lower two thirds of the flanks. The posterior ribs of any type of bundle tend to be approximately radially directed with all other secondary ribs being deflected forward. In rare instances, however, any of the intermediate ribs may be radially directed while all other ribs of the bundle spread around it in a fan-like fashion (Pl. VI, fig. 2B).

The quadri- or quintifurcate virgatitid ribbing habit tends to be more common and may even predominate in the representatives of *P. beani*-like variant of the species (e.g., Pl. II, fig. 3A). Such specimens may become rather similar to such extreme representatives of *Virgatoptychites* as *V. (?) pachsaensis* Voronets (1958, pl. I, figs. 1a, b) in their ribbing habit and whorl section. The well-developed umbilical bullae in our specimens differentiate them from this *Virgatoptychites*

form. The fasciculate and bidichotomous rib bundles are, on the contrary, more commonly encountered in the *P. keyserlingi*- and *P. (E.) gravesiformis*-like variants of *Thorsteinssonoceras ellesmerensis*.

The type of sculpture described commonly persists until the beginning of the penultimate whorl; it may, however, either persist to the beginning of the living chamber (e.g., in specimen GSC No. 17228; Pl. II, fig. 3) or become almost lost on the second whorl before last in some specimens. On the early part of penultimate whorl (or on the second whorl before last in some specimens, e.g., Pl. II, fig. 2), the lower parts of the secondary ribs become indistinct and then are lost completely. This results in the appearance of a progressively wider and better defined smooth band on the whorl flanks (Pl. II, fig. 1A; Pl. I, fig. 1A). At a later stage the ribbing of the ventral parts of the whorl becomes rudimentary and then almost or completely lost. Only one or more constrictions and the bullate primary ribs persist into this essentially smooth adult growth stage of *Thorsteinssonoceras ellesmerensis* (Pl. IV, figs. 1B, C; Pl. III, figs. 1A, C, D; Pl. V, figs. 1A, C) in most specimens studied. Some of the best-preserved specimens are, however, covered by fine and closely spaced striae (Pl. IV, fig. 1C) in part at least. As a rule, the bullate primaries persist to the anterior end of the 'adult' living chamber, although they may become weak or even absent (e.g., Sokolov and Bodylevsky, 1931, p. 76) on some parts of penultimate and ultimate whorls.

The umbilical bullae (or bullate primaries) tend to increase in size and to become more and more widely spaced in forms approaching the *P. (E.) gravesiformis*-like variant of the species but the number per whorl tends to decrease. The penultimate whorl of specimen GSC No. 17228 of the *P. beani*-like variant (Pl. II, fig. 3A) has, for example, eighteen umbilical bullae. The typical representatives of the *P. keyserlingi*- and *P. (E.) gravesiformis*-like variants have between fourteen and sixteen umbilical bullae on their penultimate and ultimate whorls.

The density of ribbing and the bundling ratio vary within wide limits. The intermediate whorl of specimen GSC No. 17221 has, for example, about sixty-eight secondaries and fifteen primaries per whorl (Pl. VI, fig. 2) and a bundling ratio of about 4.5. Another intermediate whorl of the same variant (GSC No. 18661; Pl. VI, fig. 1) has about sixty secondaries and sixteen primaries per whorl resulting in a bundling ratio of only about 3.7. The penultimate whorl of specimen GSC No. 17228 has about seventy-seven secondaries and eighteen primaries per whorl and a bundling ratio of about 4.2 (*see* Pl. II, fig. 1).

Suture line. The earliest observed suture lines (between whorl diameters of 50 to 56 mm; *see* text-fig. 1a, 1b) are often essentially similar to those of the adult representatives of *Craspedites* s. str. and to those of the juvenile representatives of *Tollia* s. lato (inclusive of *Subcraspedites*) so far as the number of auxiliary lobes is concerned. In this growth stage some sutures have only three clearly defined auxiliary lobes (text-fig. 1a, extreme right side). Some other slightly older suture lines have, however, a tiny fourth auxiliary lobe barely visible at the umbilical seam (text-fig. 1a, lower left side). Other sutures representing about the same growth

stage have a well-developed fourth auxiliary lobe (text-fig. 1b; Pl. V, figs. 2A, B) and, sometimes, even a tiny fifth auxiliary lobe.

The general shape, proportions, and degree of frilling of the earliest observed suture lines are always closely comparable to those of *Tollia* s. lato (inclusive of *Subcraspedites*). The lobes are usually broad to moderately slender and moderately incised; they generally maintain their average width and taper markedly only in a few specimens (Pl. II, fig. 2A). Some specimens, mostly belonging to the *P. beani*-like variant, already have slender, long, and more strongly frilled lobes at this growth stage (Pl. V, figs. 2A-C, text-fig. 1b). There seems to be a correlation between the whorl shape and the character of the suture line. The suture line of the *P. beani*-like variant tends, indeed, to be more complex and to have a greater number of auxiliary lobes than that of the other two variants at the earliest observed growth stages. The suture line of the *P. (E.) gravesiformis*-like variant tends to be less complex and to have fewer auxiliary lobes than the other two variants at comparable growth stages (Pl. IV, fig. 1D).

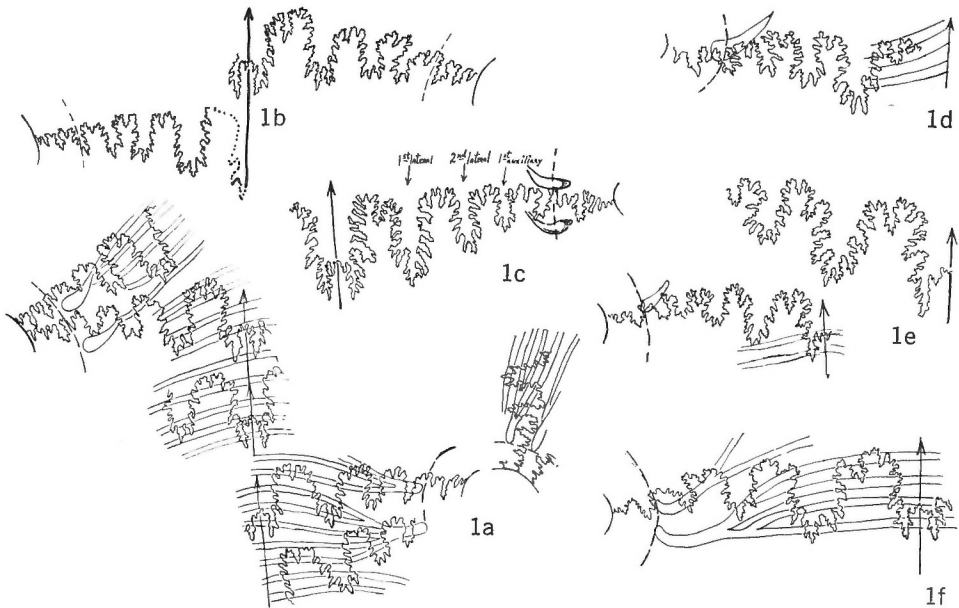
The intervening saddles are, as a rule, wider than the lobes. The first auxiliary saddle is, generally, two to four times as wide as the rest (Pl. II, figs. 1D, 2A; Pl. III, figs. 1C, 1D; Pl. I, fig. 1D; Pl. IV, fig. 1D; text-figs. 1a, 1b, 1c, 1d) and is subdivided into at least three parts by short lobules.

The relative length and width of all lobes vary within considerable limits, but in general the first lateral is only slightly shorter than the ventral lobe. The second lateral tends to be about one quarter shorter than the first lateral, but only slightly narrower. The length of the first auxiliary lobe is usually one half to three quarters that of the second lateral. The width of the first auxiliary fluctuates strongly; it can be almost equal to the width of the second lateral in some specimens (text-fig. 1b) but may also decrease to less than half in other specimens (text-fig. 1a, upper left part). The second auxiliary can be almost as long to slightly longer than the first but tends to be considerably narrower. The third auxiliary is generally only about half as long as the second auxiliary and is about half as wide. The fourth auxiliary is mostly a tiny notch only about one fourth of the length of the third auxiliary or less; in some specimens it reaches one half the length of the third auxiliary and is spike-like (Pl. V, figs. 2A, B; text-fig. 1c).

The first lateral lobe is symmetrically to asymmetrically trifid whereas the second lateral is almost invariably symmetrically to asymmetrically bifid. The first auxiliary lobe is always more or less clearly trifid and the other auxiliaries may be either trifid or simple.

The suture line is feebly or moderately ascendant up to, or almost up to, the umbilical seam. Its auxiliary part either does not show any backward bend in relation to the lateral part, unlike that of *Craspedites* s. str. or *Polyptychites* (Pl. I, fig. 2B; text-fig. 1f), or shows only a slight backward bend in the proximity of umbilical seam (text-fig. 1c).

The suture line of the intermediate whorls gradually becomes more deeply and elaborately incised and acquires considerably longer and narrower lobes on the outer whorls. It acquires, furthermore, four to five (and sometimes even more;



- TEXT-FIGURE 1a.** *Thorsteinssonoceras ellesmerensis* n. gen., n. sp. GSC loc. 47876. GSC No. 17221. A series of suture lines visible on both flanks of the specimen shown in Pl. VI, fig. 2. The 'half-grown' suture lines on the extreme right of the drawing occur on the earliest exposed part of the whorl in Pl. VI, fig. 2A. The two sutures on the lower left of the drawing are the same as those outlined in white on the upper left side of the same figure. The two complete sutures shown on the upper left side of the drawing are, finally those outlined in black near the end of the whorl in Pl. VI, fig. 2B. These sutures are already 'adult' in all essential details of their morphology. Natural size.
- TEXT-FIGURE 1b.** *Thorsteinssonoceras ellesmerensis* n. gen., n. sp. GSC loc. 47876. GSC No. 18037. Reproduction of two 'half-grown', external suture lines visible on both flanks and the venter of the whorl fragment shown in Pl. V, figs. 2A-C. The complete external suture line is that outlined in white in figs. 2A, 2C. The partial suture line lacking the ventral lobe and saddle is that outlined in white in fig. 2B. Natural size.
- TEXT-FIGURE 1c.** *Thorsteinssonoceras ellesmerensis* n. gen., n. sp. Holotype. GSC loc. 47876. GSC No. 17226. Reproduction of a complete, 'adult', external suture line outlined in white in Pl. II, figs. 1C, 1D. Natural size.
- TEXT-FIGURE 1d.** *Thorsteinssonoceras ellesmerensis* n. gen., n. sp. GSC loc. 47876. GSC No. 17228. Reproduction of the last suture line occurring about one inch before the anterior end of the specimen shown in Pl. II, fig. 3A, but not visible there, the specimen being whitened. Natural size.
- TEXT-FIGURE 1e.** *Thorsteinssonoceras ellesmerensis* n. gen., n. sp. GSC loc. 47879. GSC No. 17231. Reproduction of two external suture lines outlined in white on the flanks and venter of the specimen shown in Pl. V, fig. 1. The essentially complete, 'half-grown' suture line is that visible in the lower part of intermediate (sculptured) whorl in figs. 1A, 1B. The incomplete 'adult' suture line (lateral and ventral parts only) is that visible in fig. 1C and in the upper right part (on the outer, smooth whorl fragment) of fig. 1A. Natural size.
- TEXT-FIGURE 1f.** *Polyptychites (Euryptychites) stubbendorfi* (Schmidt) var. *middendorfi* (Pavlow, 1914). GSC loc. 37867. GSC No. 17251. Basal Upper? Valanginian, *Polyptychites stubbendorfi* zone. Canadian Arctic Archipelago, N.W.T., District of Franklin, Ellef Ringnes Island, about 1 7/8 miles east of Isachsen weather station on the north bank of the delta of a nameless creek slightly under half a mile from its mouth and less than 50 feet above sea-level. Deer Bay Formation, from a concretion lying loose on the surface. Collected by R. Thorsteinsson, Geological Survey of Canada, 1958. A complete, 'adult', external suture line of the wholly septate, penultimate(?) whorl of the above mentioned *Euryptychites* species. Introduced for comparison with the suture lines of *Thorsteinssonoceras ellesmerensis*. Natural size.

Pl. II, fig. 1D; text-fig. 1c) relatively long and slender auxiliary lobes. This 'adult' suture line of *Thorsteinssonoceras ellesmerensis* is closely similar to that of *Polyptychites (Euryptychites) gravesiformis* Pavlow s. lato (1914, pl. XI, fig. 2d) in its proportions and degree of frilling. It remains, however, easily distinguishable from that of all representatives of the Polyptychitidae Spath, 1924 in the presence of at least four to five well-defined auxiliary lobes and its clearly ascendant character in both the lateral and auxiliary parts. At least three lobes and sometimes as many as four occur on the flank of the shell above its umbilical shoulder (Pl. III, figs. 1C, D; Pl. V, figs. 2A, B).

Foreign occurrences. Frebald and Stoll (1937, p. 61) recognized that "*Polyptychites keyserlingi*" of Sokolov and Bodylevsky (1931, p. 96, pl. XI, figs. 1a, b) was not conspecific with the true European species but did not give any details. The complete loss of sculpture, except for the umbilical bullae and constrictions, on the last septate whorl and living chamber of the Spitsbergen form differentiate it sharply from the corresponding growth stages of the type specimen of *Polyptychites keyserlingi* (Pl. I, figs. 4A, B), which retains its characteristic ribbing habit at least on the early part of the living chamber. There are other, more important morphological distinctions, however, which make it obvious that the Spitsbergen form has nothing to do with *P. keyserlingi* and is instead congeneric and conspecific with *Thorsteinssonoceras ellesmerensis*. All observable morphological features of the inner whorl of this form (Sokolov and Bodylevsky, 1931, pl. XI, fig. 1a) fall, indeed, clearly within the range of infraspecific variation of our new species. Contrary to its description (Sokolov and Bodylevsky, 1931, p. 96), this growth stage exhibits virgatitid and fasciculate rib bundles in addition to the bidichotomous ones. Also the fan-like arrangement of secondary ribs so characteristic of our species (Pl. VI, fig. 2B) is present in at least one of the figured rib bundles of the Spitsbergen form.

The wholly septate outer whorl of the same specimen (Sokolov and Bodylevsky, 1931, pl. XI, fig. 1b) agrees perfectly well with the heavily bullate, sulcate but otherwise smooth penultimate whorls of the *P. keyserlingi*-like variant of *Thorsteinssonoceras ellesmerensis* in every taxonomically important feature. The complete agreement of the suture line of this specimen with that of the holotype of the Canadian form (Pl. II, fig. 1D; text-fig. 1c) is critical for the recognition of the generic and specific identity of the Spitsbergen and Canadian forms. The suture line of the true *Polyptychites keyserlingi* (Neumayr and Uhlig, 1881-2; see Pl. I, fig. 2B) is, at the same time, quite unlike that of the Spitsbergen form.

"*Polyptychites* aff. *keyserlingi*" of Sokolov and Bodylevsky (1931, pl. XII, figs. 1a, 1b) also agrees well with the bullate but otherwise smooth penultimate whorls of *T. ellesmerensis* in sculpture, number of umbilical bullae, and shape of the whorl. It is, therefore, most probable that this specimen is congeneric and conspecific with *Thorsteinssonoceras ellesmerensis* and does not belong to the family Polyptychitidae Spath, 1924. The absence of the suture line in its photographs does not permit, however, a positive generic identification of this Spits-

bergen specimen, which is only tentatively placed into the synonymy of *Thorsteinsonoceras ellesmerensis*.

The larger, but still completely septate specimen of "*Euryptychites gravesiformis*" of Salfeld and Frebold (1924, pl. II, figs. 1, 1a) from the glacial boulders of Novaya Zemlia is the only other foreign specimen referable to *T. ellesmerensis*. It agrees well with the holotype of the Canadian form in the appearance and number of its umbilical bullae, whorl shape, gradual fading out of ribbing on the flanks and its persistence on the venter at the diameter of about 85 mm. The incompletely exposed suture line on the flanks of this specimen shows, furthermore, two lateral lobes and the first auxiliary lobe instead of only two lateral lobes occurring within the same interval in all representatives of Polyptychitidae. The second auxiliary lobe is visible just below the umbilical shoulder and seems to be separated from the first auxiliary lobe by an unusually wide saddle. The visible parts of this suture thus duplicate the corresponding parts of the suture line of *Thorsteinsonoceras ellesmerensis* and are quite unlike those of *Polyptychites (Euryptychites) gravesiformis* Pavlow s. lato (1914, pl. XI, fig. 2d).

GEOGRAPHICAL RANGE AND AGE

Except for the specimens from the Valanginian rocks of Spitsbergen (in stream bed south of Hecla Haven; Sokolov and Bodylevsky, 1931, p. 96) and from the glacial boulders of Novaya Zemlia (Salfeld and Frebald, 1924, pp. 6-7), *Thorsteinssonoceras ellesmerensis* is known from only two fossil localities north of Greely Fiord on Ellesmere Island. Thorsteinsson (pers. com.) states that it was found in two adjacent sections occurring on the same limb of a syncline of the Deer Bay Formation, 443 to 444 feet above the base of the formation.

No other ammonites have been found associated with *T. ellesmerensis* at either section. At GSC locality 47679 it is accompanied, however, by two typical and large representatives of *Buchia keyserlingi* (Lahusen) var. *sibirica* (Sokolov) 1908. Thorsteinsson has also found a poorly preserved *Temnoptychites* sp. indet. and *Buchia* cf. *keyserlingi* (Lahusen) s. lato in place about 25 feet below the bed containing *Thorsteinssonoceras ellesmerensis* in this section (GSC loc. 52489).

In the Greely Fiord area, at least, *T. ellesmerensis* occurs, thus, closely above the early, but not the earliest, Valanginian *Temnoptychites* zone. The association of *T. ellesmerensis* with *B. keyserlingi* var. *sibirica* and its absence in the younger, presumably basal Upper Valanginian, beds of the Deer Bay Formation on Ellef Ringnes Island (GSC loc. 37867) characterized by *Polyptychites* (*Euryptychites*) *stubbendorfi* (Schmidt) var. *middendorfi* Pavlow, 1914 and *Buchia sublaevis* (Keyserling) 1846 suggest, accordingly, its late Lower or Middle Valanginian age. The beds with *Thorsteinssonoceras ellesmerensis* of the Greely Fiord area are presumably either slightly older than or about contemporary with some part of the *Polyptychites keyserlingi* and *Polyptychites michalskii* zone of Central and Northern Russia (Jeletzky, 1965, corr. chart).

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Plates I to VI

All figures natural size except where otherwise stated

PLATE I

- Figures 1A-D. *Thorsteinssonoceras ellesmerensis* n. gen. n. sp.
GSC loc. 47876. GSC No. 17229. Canadian Arctic Archipelago, District of Franklin, N.W.T., Ellesmere Island, southeast limb of syncline 2½ miles east of the mouth of a major unnamed river entering a prominent bay, which joins Greely Fiord 4 miles east of Hare Fiord. Deer Bay Formation, fresh, locally derived talus at 444-foot level above base of formation. Collected by R. Thorsteinsson, Geological Survey of Canada, 1961.
Part of completely septate penultimate whorl of a medium-sized mostly shell covered specimen transitional between the *P. beani*-like and *P. keyserlingi*-like variants of the species. A fragment of the living chamber is preserved near the left side of fig. 1A. The specimen shows the gradual decline of the ornament on the penultimate whorl.
1A. Lateral view; 1B. ventral view; 1C. cross-sections of the penultimate and all older whorls including the innermost one; 1D. lateral part of external suture line. Only lateral and first two auxiliary lobes are visible.
- Figures 2A, B. *Polyptychites keyserlingi* (Neumayr and Uhlig, 1881-82) var. *pavlowi* Koenen, 1902. Intermediate-sized cotype subsequently separated by Koenen (1902) from its 'adult' specimen shown in fig. 4 as *P. pavlowi*. Osterwald, Northwest Germany. Mid-Valanginian, *Polyptychites keyserlingi* zone. (From Neumayr and Uhlig, 1881-82, Pl. 27, figs. 2, 2a.)
Intermediate, wholly septate whorl.
2A. Lateral view; 2B. external suture line.
- Figure 3. *Polyptychites keyserlingi* (Neumayr and Uhlig, 1881-82) s. lato. Reproduction of the smallest cotype of the species. From Neumayr and Uhlig (1881-82, Pl. 27, fig. 3). Locality as for figs. 2A, B. Lateral view.
- Figures 4A, B. *Polyptychites keyserlingi* (Neumayr and Uhlig, 1881-82) f. typ. End part of whorl (living chamber) of largest cotype shown by Neumayr and Uhlig (1881-82, Pl. 27, figs. 1, 1a). Süntel, Hanover, Mid-Valanginian, *Polyptychites keyserlingi* zone.
4A. Lateral view of end part of living chamber; 4B. cross-section of end of the living chamber and venter of the earliest visible part of ultimate whorl.

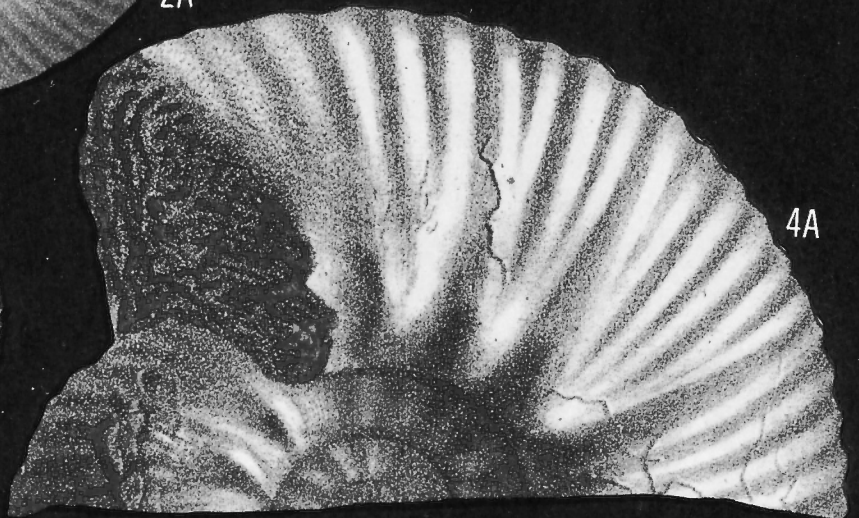
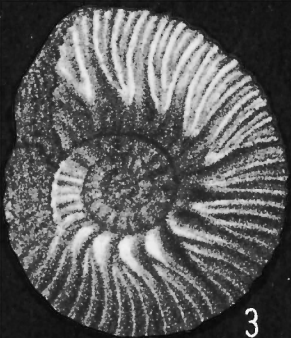
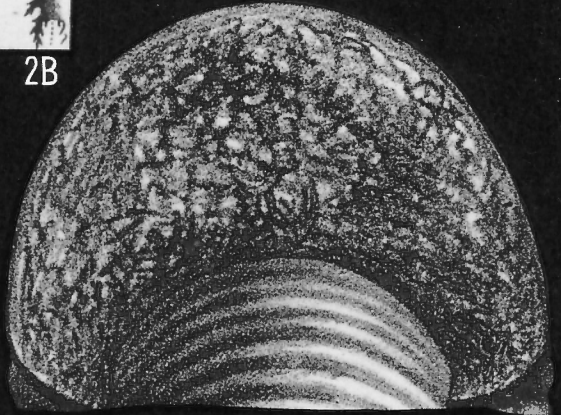
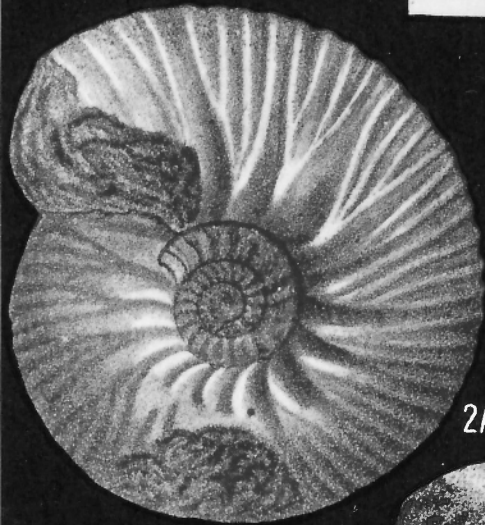


PLATE II

Thorsteinssonoceras ellesmerensis n. gen. n. sp.

- Figures 1A-D. Holotype. GSC loc. 47876. GSC No. 17226. Same locality as for the specimen shown in Pl. I, fig. 1. Intermediate whorl (septate to the end) of a medium-sized, typical specimen, which closely matches specimen of "*Polyptychites keyserlingi*" of Sokolov and Bodylevsky (1931, Pl. XI, figs. 1a, b) in all respects except for smaller size. An internal cast with considerable patches of shell layer preserved. 1A. Lateral view; 1B. cross-section of the end of the whorl and the venter of its earlier part. Two constrictions are visible. The whorl is much lower and wider than that of the European *P. keyserlingi* shown in Pl. I, fig. 4B; 1C. ventral view of the middle part of the whorl with the suture line outlined in white; 1D. lateral view of the external suture line.
- Figures 2A-C. GSC loc. 47876. GSC No. 17227. The same locality as for the specimen shown in Pl. I, fig. 1. Part of the somewhat laterally compressed inner whorl of the variant with unusually broad, short, and tapering lateral and auxiliary lobes. Undistorted, the whorl section of this fragment was probably intermediate between those shown in figs. 1B and 3C of this plate. An internal cast. 2A. Lateral view; 2B. cross-section of the whorl showing outlines of four earlier whorls; 2C. ventral view.
- Figures 3A-C. GSC loc. 47876. GSC No. 17228. Locality as for the specimen shown in Pl. I, fig. 1. Penultimate whorl of a medium-sized representative of the extreme *P. beani*-like variant of the species. The last inch or so of the whorl corresponds to the very beginning of the living chamber. Except for its suture line, this specimen is indistinguishable from *Polyptychites beani* Pavlow, 1892. The sculpture only begins to fade out closely before the beginning of the living chamber. Ribbing habit of this specimen is characterized by predominance of virgatitid bundles on the penultimate whorl. 3A. Lateral view; 3B. ventral view of the middle part of the whorl; 3C. cross-section of anterior end (beginning of the living chamber) and early part of the whorl. Whorl cross-section is much higher and narrower than that of most other representatives of *T. ellesmerensis* seen; its maximum width is, furthermore, situated at the umbilical margin. This results in the distinctly *Tollia*- and *Virgatoptychites*-like appearance of the specimen.

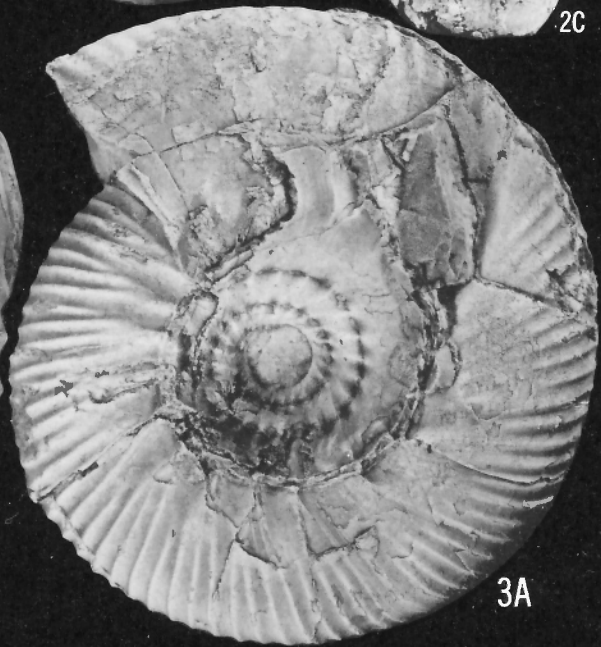


PLATE III

- Figures 1A-D. *Thorsteinssonoceras ellesmerensis* n. gen. n. sp.
GSC loc. 47876. GSC No. 17225. Locality as for the specimen shown in Pl. I, fig. 1.
- Fragment of an intermediate whorl (fully septate) of a large representative of the extreme *Polyptychites* (*Euryptychites*) *gravesiformis*-like variant of the species. Internal cast.
- 1A. Ventral view with the suture line outlined in white. A well-developed constriction occurs in the middle part of the whorl fragment. 1B. Oblique view of the cross-section of the whorl, which also shows cross-sections of four inner whorls. An impression of the venter of the fifth (one of the earliest) whorl is also visible. 1C. Lateral view with the suture line outlined in white. Another, strongly weathered suture line is visible near the lower margin of the photograph. 1D. Lateral view of the other side with the inner part of the external suture outlined in white. The extra wide first auxiliary saddle is clearly visible at the umbilical shoulder between the first and second auxiliary lobes.

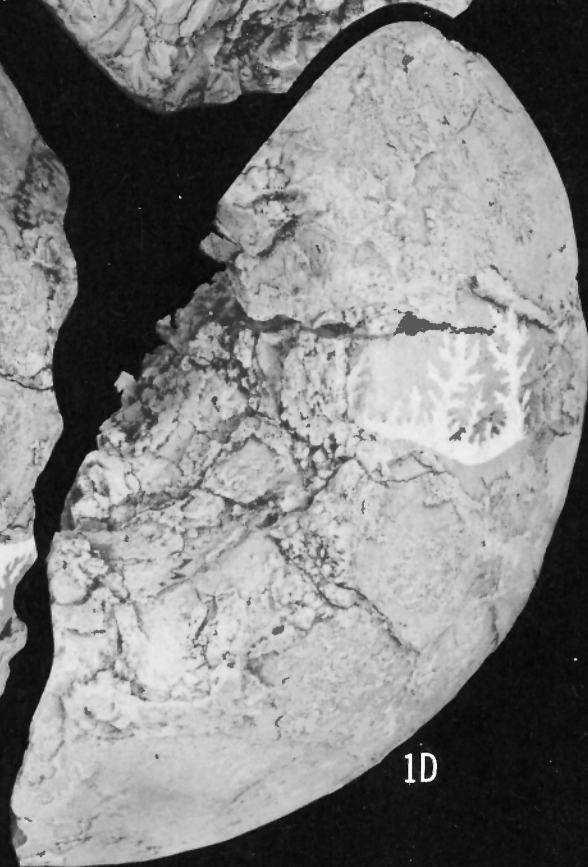


PLATE IV

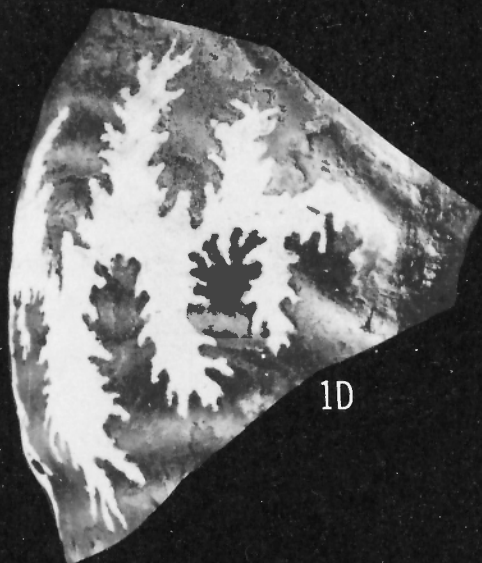
Figures 1A-E.

Thorsteinssonoceras ellesmerensis n. gen. n. sp.

GSC loc. 47879. GSC No. 17232. Late Lower or Middle Valanginian. Canadian Arctic Archipelago, District of Franklin, N.W.T., Ellesmere Island, southeast limb of syncline $2\frac{1}{2}$ miles east of the mouth of a major unnamed river entering a prominent bay, which joins Greely Fiord 4 miles east of Hare Fiord. Deer Bay Formation. Collected from the measured section adjoining GSC loc. 47876 at 443-to-444-foot level above the base of the formation. Collected by R. Thorsteinsson, Geological Survey of Canada, 1961.

Fragmentary intermediate whorl (probably penultimate whorl) of a large and typical representative of the *Polyptychites* (*Euryptychites*) *gravesiformis*-like variant of the species and a well-preserved inner whorl of the same showing its typical ribbing habit. Septate to the end. The fragment of intermediate whorl is already smooth, except for sharp and large umbilical nodes, one constriction and fine striae covering the shell surface. Internal cast with considerable patches of well-preserved shell-layer on the fragmentary intermediate whorl.

1A. Cross-sections of both whorls and the venter of the early half of the inner, distinctly ribbed whorl. Sharp umbilical nodes and one constriction (on the inner whorl) are clearly visible. Two suture lines outlined in white. 1B. Ventral view of the essentially smooth intermediate (penultimate?) whorl. Sharp umbilical nodes and one constriction are clearly visible. 1C. Lateral view of both preserved whorls. The lateral parts of two external suture lines are outlined in white. The upper suture shows the first auxiliary saddle and second lateral lobe; it is the same as that shown in fig. 1D. 1D. Lateral view of the external suture line of the inner whorl (the same as shown in fig. 1C) X 2. The outlines of second and third auxiliary lobes are inked in. The fourth auxiliary lobe (not outlined) is dimly visible at the umbilical seam. This 'half-grown' suture line differs from the 'adult' suture line of the specimen shown in Pl. III, fig. 1, in being considerably less frilled. 1E. Ventral part of the external suture line (the same as that outlined in white in fig. 1A) X 3.



1D



1B



1A



1C



1E

PLATE V

Thorsteinssonoceras ellesmerensis n. gen. n. sp.

Figures 1A-C. GSC loc. 47879. GSC No. 17231. Locality as for specimen shown in Pl. IV, fig. 1.

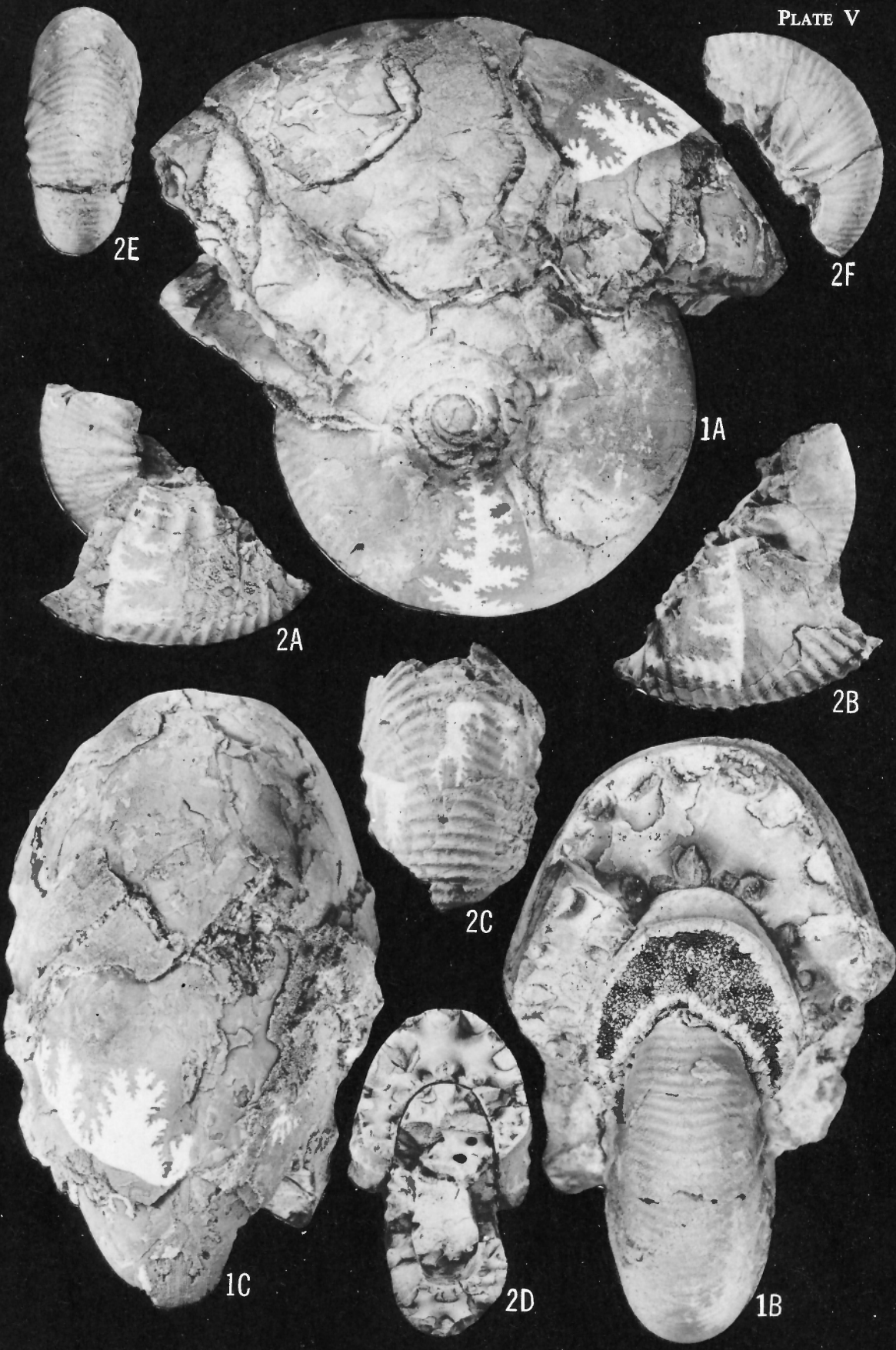
Fragment of penultimate(?) whorl septate to the end. No constrictions occur on this fragment, which encloses a complete inner whorl. The latter is already semismooth, except in the earliest visible part. An internal cast with considerable patches of shell layer on the penultimate (?) whorl. A large but unusually feebly and finely sculptured representative of *Polyptychites beani*-like variant of the species.

1A. Lateral view. Complete lateral and auxiliary parts of two suture lines are outlined in white on the inner whorl. First and second lateral lobes of much stronger frilled 'adult' suture line are outlined in white on the penultimate(?) whorl. 1B. Cross-sections of both preserved whorls and the venter of the early part of the inner whorl. 1C. Ventral view of the fragmentary penultimate(?) whorl with the 'adult' suture line outlined in white.

Figures 2A-F. GSC loc. 47876. GSC No. 18037. Locality as for specimen shown in Pl. I, fig. 1.

Fragments of two inner whorls of the *Polyptychites beani*-like variant of the species. Probably the inner whorls of a specimen transitional between the *P. beani*- and *P. keyserlingi*-like variants of the species but closer to the former variant in the high-arched cross-section. Larger fragment is mostly covered by the shell layer while the smaller fragment is largely an internal cast.

2A-B. Lateral views of both fragments in their normal position. Complete lateral and auxiliary parts of two external suture lines are outlined in white on the larger fragment. These sutures are unusually slender, strongly frilled and show well-developed fourth auxiliary lobes. 2C. Ventral view of the larger fragment showing the ventral part of a suture line outlined in white. 2D. Cross-section of both fragments. Oblique cross-section of the next younger whorl is visible in the lower part of the photograph. 2E. Ventral view of the smaller (inner) fragment showing the already markedly bullate primary ribs. 2F. Lateral view of the smaller (inner) fragment showing its predominantly trifurcate ribbing habit.



2E

2F

1A

2A

2B

2C

1C

2D

1B

PLATE VI

Thorsteinssonoceras ellesmerensis n. gen. n. sp.

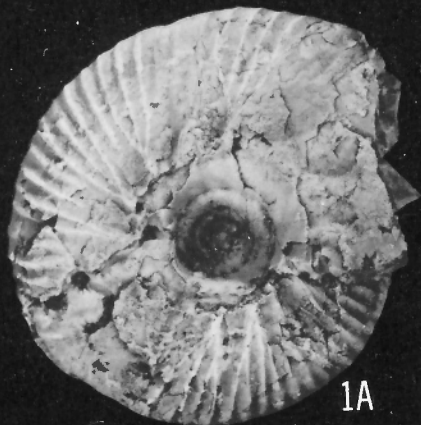
Figures 1A-D. GSC loc. 47876. GSC No. 18661. Locality as for the specimen shown in Pl. I, fig. 1. An almost completely shell-covered inner whorl of the *Polyptychites keyserlingi*-like variant of the species. This inner whorl combines the unusually deep, essentially funnel-like umbilicus and the heavy build of the above variant with the relatively high-arched cross-section characterizing the inner whorls of the *Polyptychites beani*-like variant of the species (comp. are Pl. V, figs. 2A-D).

1A. Lateral view; 1B. other lateral view with suture line outlined in white; 1C, ventral view of the middle part of the whorl. The markedly bullate appearance of primary ribs is clearly visible; 1D. oblique view of the cross-section of whorl end and the ventral view of its early part.

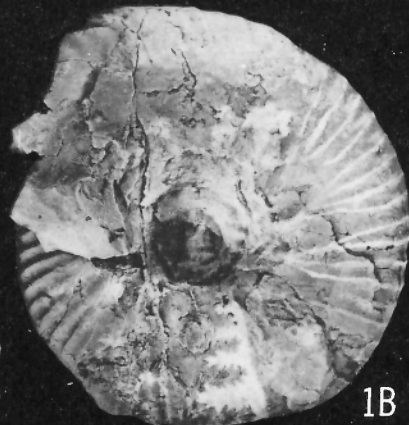
Figures 2A-E. GSC loc. 47876. GSC No. 17221. The same locality, etc. as for the specimen shown in Pl. I, fig. 1.

A partly shell-covered inner whorl of the typical representative of the *P. keyserlingi*-like variant of the species. This specimen has a markedly step-like umbilicus which is wider and more shallow than that of the specimen shown in fig. 1. At the same time its cross-section is closer to that of the corresponding stages of representatives of the *P. keyserlingi*-like variant shown in Pl. I, fig. 1C and Pl. II, fig. 2B than to the high-arched but more sloping cross-section of the *P. beani*-like forms shown in Pl. V, fig. 2D.

2A. Lateral view. Two sutures are outlined in white; 2B. lateral view of the other side. Rib bundles and two suture lines are outlined in black; 2C. cross-section of the imperfectly preserved end of the whorl and the venter of its earliest part exposed; 2D. ventral view of the end part of the whorl. Two suture lines are outlined in white; 2E. ventral view of the middle part of the whorl with the suture lines somewhat dimly outlined in white. The strongly bullate appearance of the primary ribs is clearly visible.



1A



1B



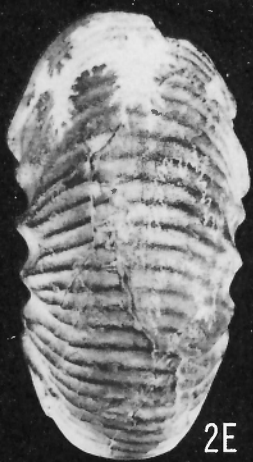
1D



1C



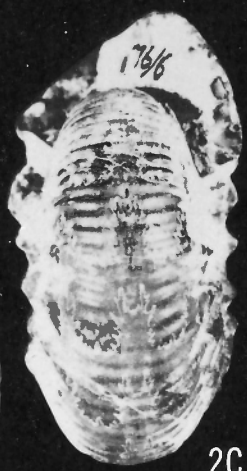
2D



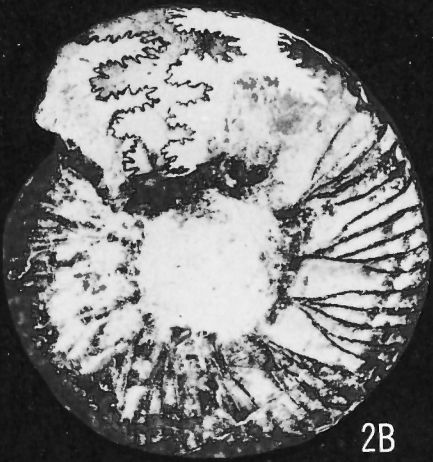
2E



2A



2C



2B

