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E. KEMPER
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Energy, Mines and Resources Canada
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Abstract

The following new olcostephanid (Ammonitida) taxa are described and figured: Polyptychites (Polyptychites) canadensis n. sp., Amundiptychites n. gen. with its unique genotype A. sverdrupi n. sp., and Ringnesiceras n. gen. The genus Ringnesiceras includes Ringnesiceras n. subgen. with R. (R.) amundense n. sp. (the genotype), R. (R.) pseudopolyptychum n. sp. and R. (R.) tozeri n. sp. and Elleficeras n. subgen. with the unique R. (E.) ellefense n. sp. Amundiptychites aff. A. sverdrupi n. gen. et n. sp. and Buchia crassicollis (Keyserling) s. str. are figured but not described.

The latest early and/or earliest late Valanginian Amundiptychites n. gen. is an aberrant representative of Polyptychitinae Spath 1924 which combines an adult external suture line including three to five auxiliary lobes with fine and closely spaced, somewhat Astieriptychites-like ribbing habit of early and intermediate whorls and deep, funnel-like umbilicus. The adult sculpture combines coarse and widely spaced ribs forming polyptychitinid rib bundles with large and prominent, conical umbilical bullae. Amundiptychites n. gen. appears to be a descendant of Astieriptychites which was endemic to the Sverdrup Basin.

The late Valanginian Ringnesiceras n. gen. is the earliest known representative of Simbirskitinae Spath 1924 characterized by the presence of simbirskitiform bullate primary ribs at some of early and/or intermediate whorls. Unlike other simbirskitinid genera, these ribs become replaced by polyptychitinid umbilical bullae on advanced and terminal whorls. Ringnesiceras n. gen. is interpreted as a connecting link between the latest early Valanginian Polyptychites (Polyptychites) ex gr. canadensis n. sp. and the late early Hauterivian representatives of Simbirskites s. lato. Ringnesiceras n. gen. was apparently endemic to the Sverdrup Basin. However, it occurs in northern Siberia and Central Russia as well.

The following sequence of polyptychitinid and simbirskitinid ammonite faunas was observed in the uppermost lower and upper Valanginian rocks of the central part of Sverdrup Basin (upward sequence):

1. Polyptychites (Polyptychites) tschekanowskii fauna including P. (P.) canadensis n. sp., P. (P.) aff. sphaeroidalis Koenen, Dichotomites (Prodichotomites) hollwedensis Kemper and Amundiptychites sverdrupi n. gen. et n. sp. This fauna is either latest early or earliest late Valanginian in age.

2. Ringnesiceras (Ringnesiceras) pseudopolyptychum fauna including P. (P.) canadensis n. sp. and other undescribed Polyptychites s. str. but lacking Homolsomites. This fauna is of an earliest late Valanginian (i.e. Hollwedensis-Polytomus Zone of northwestern Germany) age and is correlative with the lower part of so-called Polyptychites polyptychus and Dichotomites n. spp. Zone of northern U.S.S.R.

3. Ringnesiceras (Ringnesiceras) amundense fauna with rare R. (R.) pseudopolyptychum. R. (E.) ellefense occurs locally while Homolsomites cf. and aff. H. quatsinoensis and Buchia crassicollis s. str. make their first appearance in this fauna. R. (R.) amundense fauna corresponds to the lower, but presumably not the lowermost, part of Homolsomites quatsinoensis and Buchia crassicollis s. str. Zone of western British Columbia, the middle part of the upper Valanginian Dichotomites-Beds of northwestern Germany and the upper part of the so-called Polyptychites polyptychus and Dichotomites n. spp. Zone of northern U.S.S.R.; and

4. Ringnesiceras (Ringnesiceras) tozeri fauna which contains otherwise only H. cf. and aff. H. quatsinoensis and numerous Buchia ex gr. inflata-sublaevis. This late Valanginian fauna is correlative with the upper, but perhaps not the uppermost, part of Homolsomites quatsinoensis and Buchia crassicollis s. str. Zone of western British Columbia, part or all of the upper Dichotomites-Beds of northwestern Germany, and part or ?all of the North-Siberian Homolsomites bojarkensis Zone.

The uppermost 60 m of the Deer Bay Formation above its beds containing R. (R.) tozeri, etc. contain Buchia ex gr. sublaevis-inflata and are presumed to be of the latest Valanginian age (= "Astieria"-Beds of northwestern Germany).

Résumé

L'auteur décrit, à l'aide d'illustrations, de nouveaux taxa des olcostéphanidés (Ammonitida): Polyptychites (Polyptychites) canadensis esp. nouv., Amundiptychites gen. nouv. avec son unique génotype A. sverdrupi esp. nouv., ainsi que Ringnesiceras gen. nouv. Le genre Ringnesiceras comprend Ringnesiceras nouv. sous-gen. avec R. (R.) amundense esp nouv. (le génotype), R. (R.) pseudopolyptychum esp. nouv. et R. (R.) tozeri esp. nouv., ainsi que Elleficeras nouv. sous-gen. avec l'unique génotype R. (E.) ellefense esp. nouv. Quant à Amundiptychites aff. A. sverdrupi gen. et esp. nouv. et Buchia crassicollis (Keyserling) s. str., l'auteur en donne une illustration sans description.

Amundiptychites gen. nouv., qui date de la toute fin du Valanginien inférieur et ou du tout début du Valanginien supérieur, est un genre aberrant de Polyptychitinae Spath 1924; il allie une ligne de suture externe d'adulte présentant de trois à cinq lobes auxiliaires, des côtes fines et rapprochées qui rappellent un peu celles d'Astieriptychites et sont caractéristiques de tours de spire jeunes et intermédiaires, ainsi qu'un ombilic en forme d'entonnoir. L'adulte présente de grosses côtes largement espacées, groupées en faisceaux à la maniére des polyptychitinidés, de même que des tubercules ombilicaux coniques, grands et proéminents. Amundiptychites gen. nouv. semble un descendant d'Astieriptychites, qui était originaire du bassin de Sverdrup.

Ringnesiceras gen. nouv., du Valanginien supérieur, est le plus jeune représentant connu de Simbirskitinae Spath 1924; il se distingue par la présence, sur certains tours jeunes et ou intermédiaires, de côtes primaires globuleuses qui rappellent celles des simbirskites. Contrairement à d'autres genres de simbirskitinidés, ces côtes sont remplacées par des tubercules ombilicaux de polyptychinidés sur les tours avancés et terminaux. L'auteur interpréte Ringnesiceras gen. nouv. comme un lien entre Polyptychites (Polyptychites) ex. gr. canadensis esp. nouv. de la fin du Valanginien inférieur et les représentants de Simbirskites s. lato. de la fin du Hauterivien inférieur. Ringnesiceras gen. nouv. était apparemment originaire du bassin de Sverdrup. Toutefois, on le rencontre également dans le nord de la Sibérie et en Russie centrale.

La séquence suivante de polyptychitinidés et de simbirskitinidés (ammonites) a été observée dans les roches de la fin du Valanginien inférieur et du Valanginien supérieur qui reposent dans la partie centrale du bassin de Sverdrup (séquence ascendante):

1. Faune de Polyptychites (Polyptychites) tschewanowskii, comprenant P. (P.) canadensis esp. nouv., P. (P.) aff. sphaeroidalis Keonen, Dichotomites (Prodichotomites) hollwedensis Kemper et Amundiptychites sverdrupi gen. et esp. nouv. Cette faune date soit de la toute fin du Valanginien inférieur, soit du tout début de Valanginien supérieur.

2. Faune de Ringnesiceras (Ringnesiceras) pseudopolyptychum, comprenant P. (P.) canadensis esp. nouv. et d'autres Polyptychites s. str. non décrites, mais sans Homolsomites. Cette faune date du début du Valanginien supérieur (c'est-à-dire la zone Hollwedensis-Polytomus du nord-ouest de l'Allemagne) et présente une relation avec la partie inférieure de ce que l'on appelle la zone Polyptychites polyptychus et Dichotomites n. spp. de nord de l'U.R.S.S.

3. Faune de Ringnesiceras (Ringnesiceras) amundense, avec R. (R.) pseudopolyptychum, quoique rarement. R. (E.) ellefense se rencontre par endroits, tandis que Homolsomites cf. et aff. H. quatsincensis ainsi que Buchia crassicollis s. str. font leur premiére apparition dans cette faune. R. (R.) amundense correspond à des étages inférierus, quoique probablement pas les plus bas, de la zone Homolsomites quatsinoensis et Buchia crassicollis s. str. de l'ouest de la Colombie-Britannique, à la partie moyenne des couches de Dichotomites du Valanginien supérieur dans le nord-ouest de l'Allemagne, et à la partie supérieure de la zone du nord de l'U.R.S.S. appelée Polyptychites polyptychus et Dichotomites n. spp.; et

4. Faune de Ringnesiceras (Ringnesiceras) tozeri, qui, autrement, ne contient que H. cf. et aff. H. quatsinoensis ainsi que Buchia ex. gr. inflata-sublaevis en grand nombre. Cette faune du Valanginien supérieur présente une relation avec les étages supérieurs, quoique peut-étre pas les plus hauts, de la zone Homolsomites quatsincensis et Buchia crassicollis s. str. de l'ouest de la Colombie-Britannique, une partie ou la totalité des couches supérieures de Dichotomites du nord-ouest de l'Allemagne, ainsi qu'une partie ou la totalité de la zone Homolsomites bojarkensis de la Sibérie septentrionale.

Les 60 métres supérieurs de la formation Deer Bay, au-dessus des couches contenant entre autres R. (R.) tozeri, renferment Buchia ex. gr. sublaevis-inflata, et on présume qu'ils datent de la toute fin du Valanginien supérieur (Couches "Astieria" de nord-ouest de l'Allemagne).

NEW STRATIGRAPHICALLY AND PHYLOGENETICALLY IMPORTANT OLCOSTEPHANID (AMMONITIDA) TAXA FROM THE UPPERMOST LOWER AND UPPER VALANGINIAN OF SVERDRUP BASIN, N.W.T.

INTRODUCTION

This paper presents results of the writers' study of some new, phylogenetically and biostratigraphically important ammonite taxa from the latest early and late Valanginian of the Sverdrup Basin. Some of these taxa were introduced as nomina nuda in Kemper's (1977) paper dealing with the Valanginian stratigraphy of the Sverdrup Basin. Others were recognized during a detailed study of the olcostephanid ammonite faunas of these beds carried out subsequent to the compilation of Kemper's (1977) paper. This study resulted in a far-reaching revision of the writers' ideas concerning the taxonomy, nomenclature and biostratigraphy (see Fig. 1) of the latest early and late Valanginian olcostephanid faunas of the Sverdrup Basin. Furthermore, it necessitated a revision of some entrenched ideas about taxonomy, phylogenetic relationships and age of some olcostephanid faunas of northern Eurasia. It is impractical to withhold these important results until the publication of the authors' final report now far advanced on the paleontology and stratigraphy of the Valanginian polyptychitinid and simbirskitinid ammonites of the Sverdrup Basin and Northwest Germany. Such results were, therefore, extracted from the manuscript and reorganized into this preliminary report. The report is a contribution to the joint project organized by the Ministerium für Forschung und Technologie der Bundesrepublik Deutschland and the Department of Energy, Mines and Resources of Canada to study the comparative paleontology and biostratigraphy of the Valanginian of Sverdrup Basin and Northwestern Germany. The bulk of the fossils and most of the detailed stratigraphic information used in this paper were obtained by Kemper in the course of his field work in the Sverdrup Basin in 1974 and 1976. However, all biostratigraphic, taxonomic, phylogenetic and paleobiogeographic conclusions contained herein are the result of joint research by Kemper and Jeletzky who are equally responsible for them. Jeletzky has translated into English those sections of the report originally compiled in German by Kemper, organized the completed English text and edited it.

PALEONTOLOGICAL DESCRIPTIONS

Family OLCOSTEPHANIDAE Haug 1910

Subfamily POLYPTYCHITINAE Spath 1924

Subgenus Polyptychites sensu stricto Pavlow 1892

Polyptychites (Polyptychites) canadensis n. sp.

Plate 1, figure 1a, b, Fig. 2

1977 Polyptychites (Polyptychites) canadensis Kemper, p. 5 (nomen nudum)

Origin of name. From the occurrence of the type material in Canada.

Holotype. The specimen GSC 61755 reproduced in Plate 1, figure 1a, b.

Material. Three specimens from three different fossil localities (GSC locs. 85025, 85095 and 93866) on Amund Ringnes Island, N.W.T.

Locus typicus. GSC loc. 93866. Northwestern part of Amund Ringnes Island. Lat. 78°38'20"N, Long. 91°56'W (holotype) and Lat. 78°38'N, Long. 91°50'W (first paratype).

Stratum typicum. Upper Deer Bay Formation, fossiliferous layers 8 and 9 of Kemper (1977, p. 5, Fig. 3; and p. 13-15 of this paper). Uppermost lower Valanginian or basal upper Valanginian (boundary beds).

Diagnosis. A very large (shell diameter of the largest phragmocone known reaches at least 300 mm) Polyptychites sensu stricto species with a narrow (about 23 per cent) umbilicus which becomes pronouncedly step-like in advanced growth stages. The whorl is narrow and high already in the early growth stages and remains so throughout the preserved part of the ontogenesis (no living chambers are known). The ribbing habit is similar to that of P. (P.) orbitatus (Koenen). Ribs closely spaced and the bullae are relatively sparse. The umbilical bullae are comma-like and adorally concave in the early and intermediate growth stages but strongly elevated, rounded and large in advanced growth stages. The typically polyptychitinid external suture line has three auxiliary lobes in all known growth stages.

Remarks. Like other still unpublished late Polyptychites sensu stricto forms of the Deer Bay Formation [e.g. the still unpublished P. (P.) balkwilli n. sp.; see in the section on biostratigraphy], P. (P.) canadensis n. sp. differs from all other representatives of the subgenus in its huge size, and its slender, adventrally narrowed cross-section of the whorl at all known growth stages including the juvenile (Euryptychites-like early or intermediate growth stages are absent) and the shallow, markedly step-like cross-section of the umbilicus. Polyptychites (P.) canadensis n. sp. and its allies are also characterized by the low, wide and pronouncedly comma-like shape of the umbilical bullae in the early and intermediate growth stages, combined with their strongly elevated and rounded appearance and large size in the adult growth stage. Yet another characteristic feature is the presence of three auxiliary lobes combined with the occasional exposure of adventral flank of the fourth auxiliary at the umbilical seam of the adoralmost suture lines known. This external suture line is morphologically transitional to that of Dichotomites and Amundiptychites (see below). Finally, P. (P.) canadensis n. sp. and P. (P.) balkwilli n. sp. are characterized by distinct to marked adoral bends of secondary ribs on the venter. In combination with a slender, somewhat discus-like cross-section of the venter, these ventral bends of the secondaries result in a Dichotomites- and Prodichotomites-like appearance of P. (P.) canadensis n. sp. However, this similarity is of a homeomorph nature only as indicated by the development of large, strongly elevated and rounded adult bullae and the huge size of the adult shell of P. (P.) canadensis n. sp. Because of this combination of morphological features, it was decided to treat P. canadensis and the still undescribed P. balkwilli as representatives of the Polyptychites canadensis species group of the subgenus

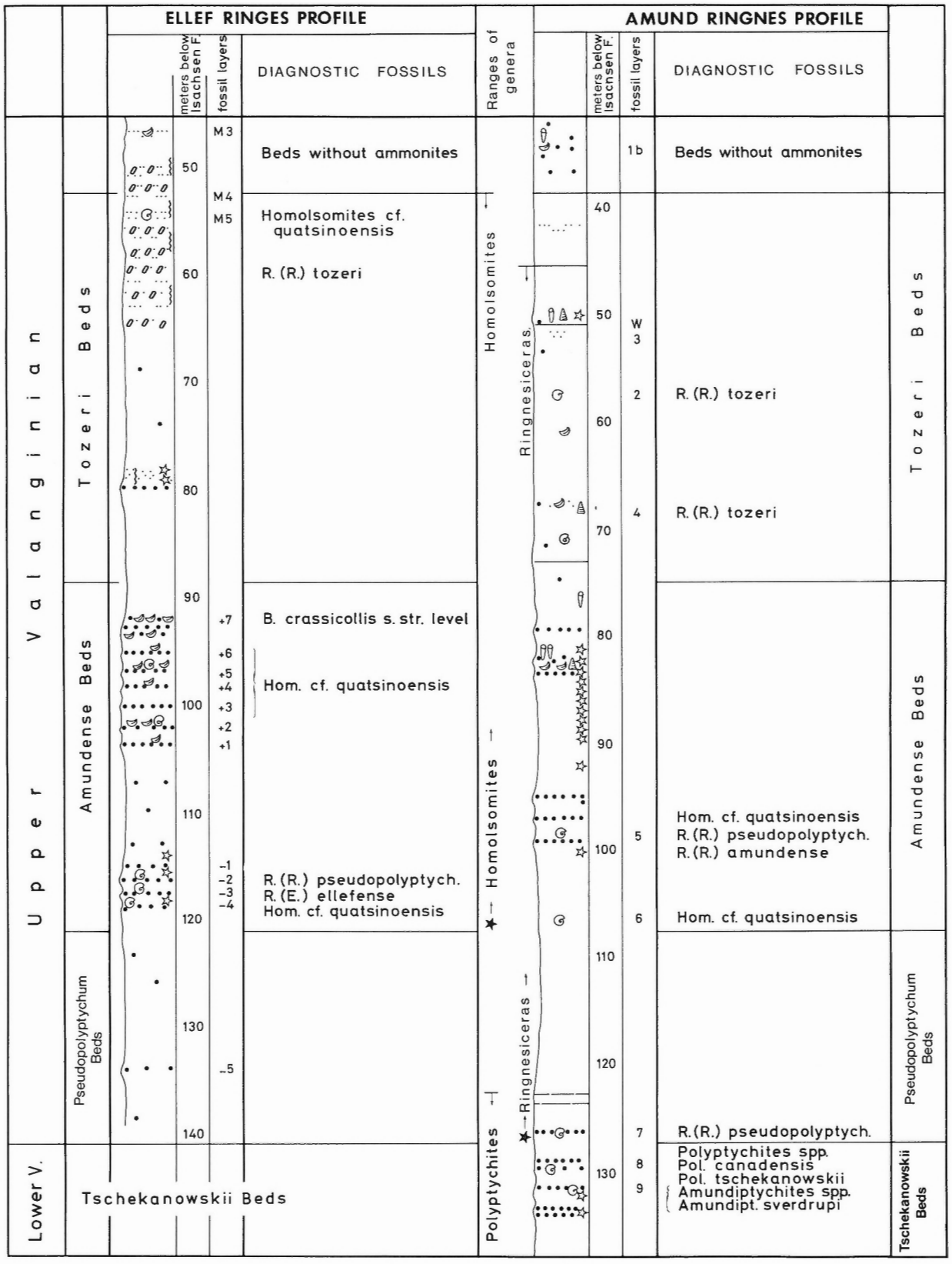


FIGURE 1. *Correlation of principal profiles of the Upper Deer Bay Formation measured on Amund Ringes and Ellef Ringes Islands.*

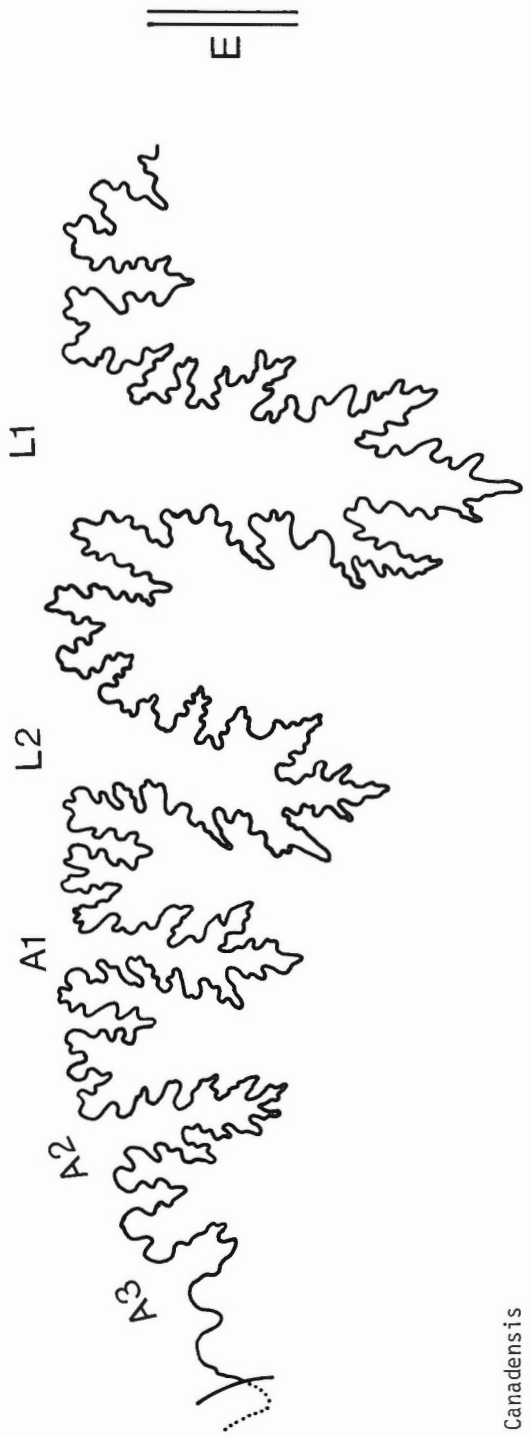


FIGURE 2. External suture line of the holotype of Polyptychites (Polyptychites) canadensis n. sp. reproduced in Plate 1, figure 1a at approximate whorl diameter of 55 mm, x 2.5 (approx.). Abbreviations: E - Ventral lobe; L1 and L2 - Lateral lobes; A1-A3 - Auxiliary lobes (elsewhere A1 to A4). Single line denotes the position of the umbilical seam while the double line denotes that of the mid-venter.

Polyptychites sensu stricto. This species group, which appears to be endemic to the Sverdrup Basin, is believed to be an offshoot of the P. (P.) orbitatus species group (Fig. 8).

Age and stratigraphic range. See in the description of the Polyptychites (Polyptychites) tschekanowskii fauna in the section on biostratigraphy.

Amundiptychites n. gen.

Origin of name. From the occurrence of type material and all other representatives of the genus so far known on Amund Ringnes Island, Sverdrup Archipelago, N.W.T.

Type species. Amundiptychites sverdrupi n. sp.

Diagnosis. Large (adult shell diameter up to 250 m or ?more) Polyptychitinae which have broad and low, semicircular whorl cross-section in early (sometimes earliest only) growth stages but tend to develop considerably higher whorls with a narrowly arched venter in subsequent growth stages. Umbilicus is completely funnel-like. Ribs and umbilical nodes are fine and closely spaced on the early and intermediate whorls. Ribbing habit is mostly polyptychitinid but some at least of the rib bundles of the intermediate growth stages are fasciculate (i.e. Olcostephanus- or Astieriptychites-like) rather than polyptychitinid. Adult sculpture (i.e. that of the adult ultimate and penultimate whorls) consists of coarse, widely spaced ribs arranged in polyptychitinid bundles and large and prominent, conical umbilical bullae. The advanced and adult external suture line has from three to five auxiliary lobes (Fig. 3).

Remarks. The morphological features listed in the diagnosis of Amundiptychites attest to a highly peculiar, truly remarkable character of this new genus. From Polyptychites sensu stricto it differs in the very fine and closely spaced character of the ribs on the early and intermediate whorls. This ribbing habit is combined with an equally fine and closely spaced character and a pronouncedly comma-like shape of the umbilical bullae. Furthermore, the intermediate and adult external suture lines of Amundiptychites have three to five auxiliary lobes and so are advanced rather than typical polyptychitinid in character[1]. Finally, the predominant polyptychitinid rib bundles of the early and intermediate whorls are either interspaced with fasciculate, Olcostephanus- or Astieriptychites-like rib bundles or replaced by the latter on at least some intermediate whorls. Because of these features, the early and intermediate whorls of Amundiptychites resemble the adult whorls of Astieriptychites. However, already the different timing of the appearance of these features indicates the generic independence of Amundiptychites. Furthermore,

[1]The writers' research has revealed that some of the late Valanginian polyptychitinid and simbirskitinid ammonites, including some representatives of Dichotomites Koenen and Amundiptychites n. gen., possess four to five auxiliary lobes instead of the usual two to three auxiliary lobes. This external suture line, similar to that of the Berriasian and early Valanginian Craspeditidae in the number of lobes is herein named the advanced polyptychitinid suture line. The advanced polyptychitinid suture line is distinguished from the homeomorph suture line of the Berriasian and early Valanginian Craspeditidae in its suspensive to subtransverse orientation. It differs from the external suture line of the late Valanginian Craspeditidae (i.e. Homolsomites) in the suspensive to subtransverse orientation combined with a considerably lesser degree of indentation of its much broader and stubbier lobes and lobules.

Amundiptychites differs from Astieriptychites in an entirely different sculpture of its adult penultimate and ultimate whorls. There the above-described Astieriptychites-like sculpture is replaced by one consisting of very large and prominent, oval, rather sparse bullae and coarse, widely spaced secondary ribs forming polyptychitinid bundles.

Another distinctive feature of Amundiptychites is an unusually early weakening of the sculpture on adumbilical parts of the flanks which begins already at the shell diameter of about 70 mm. This phenomenon occurs commonly in other polyptychitinid genera occurring in Sverdrup Basin but a comparably early weakening of the sculpture on the lower flank was observed only in some still undescribed representatives of Astieriptychites. Yet another characteristic feature of Amundiptychites is the more or less prolonged retention (it ends at shell diameters ranging from about 15 to about 70 mm), of a widely umbilicated juvenile growth stage with an approximately subcircular whorl cross-section. The sculpture of this juvenile growth stage is generally speaking similar to that of the intermediate whorl. However, it may be appreciably coarser than the latter in some forms (e.g. A. sverdrupi n. sp.). The infrageneric variation of the juvenile growth stage permits the recognition of two groups of species in the investigated material of Amundiptychites;

1. A. sverdrupi n. sp. described below and characterized by a very great duration (to the shell diameter of about 70 m) of the juvenile growth stage which is more coarsely sculptured than the following intermediate growth stage; and

2. All other studied, still undescribed species (e.g. Amundiptychites thorsteinssoni n. sp.) in which this juvenile growth stage is relatively shortened (it is restricted to the earliest studied growth stages with shell diameter less than 30 mm) and does not seem to be more coarsely sculptured than the intermediate growth stages.

The widely umbilicated growth stage is followed by a stage of relatively slender, wedge-shaped, narrow-ventered whorl cross-section and fine sculpture. This growth stage resembles that of the somewhat later Prodichotomites species on the one hand and that of the contemporary forms of Polyptychites (Polyptychites) canadensis n. sp. species group on the other. These similarities appear to be homeomorph in character as the cross-section and sculpture of the preceding juvenile and following adult whorls of Amundiptychites differ strongly from those of the equivalent whorls of the other two species groups. In the writers' opinion, Amundiptychites is more likely to be a descendant of the somewhat older Astieriptychites which it resembles closely in several ways. The strong resemblance of the juvenile and intermediate growth stages of Amundiptychites to the adult growth stages of Astieriptychites combined with a much larger adult size of the former suggest that it arose via a palingenetical mode of evolution.

Amundiptychites sverdrupi n. sp.

Plate 3, figure 1, Plate 4, figure 1, Fig. 3

1977 Polyptychites (Polyptychites) sverdrupi n. sp. Kemper, p. 5 (nomen nudum)

Origin of name. For Otto Sverdrup, an outstanding explorer of the Canadian Arctic Archipelago.

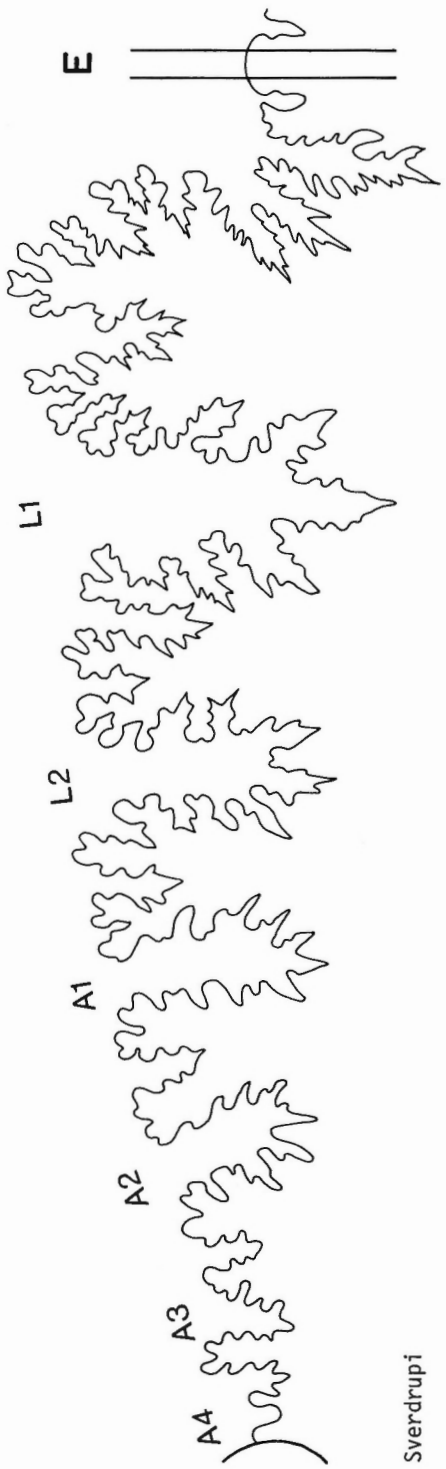


FIGURE 3. *External suture line of the holotype of Amundiptychites sverdrupi n. gen. et n. sp. reproduced in Plate 3, figure 1 at approximate whorl diameter of 80.75 mm, x 1.8. Abbreviations as in Figure 2.*

Holotype. The specimen GSC 61761 reproduced in Plate 3, figure 1, Plate 4, figure 1, Fig. 3.

Material. Two specimens from Amund Ringnes Island (GSC 61761, 61765).

Locus typicus. Northwestern part of Amund Ringnes Island; Lat. 78°38'20"N, Long. 97°56'W.

Stratum typicum. Upper Deer Bay Formation, fossiliferous beds 8-9 of Kemper (1977, Fig. 3). Boundary beds of the lower and upper Valanginian.

Diagnosis. Large-sized Amundiptychites which features a prolonged juvenile growth stage (up to shell diameter of about 70 mm) characterized by subcircular whorl cross-section and relatively coarse ribbing. The morphologically typical intermediate and adult growth stages are strongly expressed and well delimited.

Remarks. The individual growth stages of Amundiptychites sverdrupi n. sp. described under the remarks on the genus (p. 4) are so different morphologically that one would doubt their belonging together if the species were represented by fragments alone. The identification of its unfigured fragmentary paratype GSC 61765 became possible only after the almost complete holotype GSC 61761 (Pl. 3, fig. 1, Pl. 4, fig. 1) became available. Amundiptychites sverdrupi n. sp. differs from all other still undescribed Amundiptychites species in a uniquely prolonged juvenile growth stage.

Age and stratigraphic relationships. The species appears to be restricted to the fossiliferous beds 8-9 of Kemper (1977, Fig. 3). For further details see the description of Polyptychites (Polyptychites) tschekanowskii fauna in the stratigraphic section.

Subfamily SIMBIRSKITINAE Spath 1924

Ringnesiceras n. gen.

Type species. Ringnesiceras amundense n. sp.

Derivation of name. From the discovery of the original material of the genus on Ellef and Amund Ringnes Islands of the Sverdrup Archipelago, N.W.T.

Diagnosis. Ammonites in which the Simbirskites-like primary ribs and tubercles are present in the intermediate growth stages only. Polyptychitinid bullae occur instead of these tuberculate primaries in the preceding juvenile and the succeeding advanced growth stages. The external suture line has three to four auxiliary lobes and is either subradially oriented or somewhat ascendant, except in the weakly descendant auxiliary part. Secondary ribs form virgatoptychitid rather than polyptychitid or simbirskitid bundles; they are bent forward on the venter in a Dichotomites sensu lato-like fashion. The shape and proportions of the early whorls resemble those of coronatiform Simbirskites while the intermediate whorls gradually become more and more slender and Prodichotomites-like.

Remarks. The shape of the whorl and the ornamentation of the intermediate whorls of Ringnesiceras resemble those of the simbirskitinid genus Pavlovites described by Aristov (1967) and Ivanov and Aristov (1969) from the Yaroslavl Province in Central Russia. Like Ringnesiceras, this genus combines morphological features of Polyptychites and Simbirskites. However, Ringnesiceras differs sharply from Pavlovites and all other known simbirskitinid genera in the advanced polyptychitinid character of its external suture line which has three to four auxiliary lobes. The suture line of Pavlovites, Gorodzovia, Subspeetoniceras and Simbirskites sensu lato (i.e. of all its subgenera) has, in contrast, only two auxuliary lobes and is distinctly to markedly suspensive in the auxiliary part.

Another morphological distinction of Ringnesiceras is the non-simbirskitinid, predominantly virgatoptychid bundling habit of secondary ribs which may also have a somewhat polyptychitinid-like arrangement (see descriptions of individual species for further details). Yet another distinctive morphological feature of Ringnesiceras is a relatively to very broad (almost euryptychitid in R. amundense (see Bogoslowsky, 1902, Pl. XIV, figs. 4a, 6b) and [R. (R.) tozeri n. sp.; see Pl. 2, fig. 4c and Jeletzky, 1973, Pl. 2, Fig. 1c], almost semicircular cross-section of the early whorls. This feature is particularly important in ruling out a direct genetic connection of Ringnesiceras with the superficially similar Prodichotomites in which the early whorls have a characteristically slender cross-section. These two genera differ also in the sculpture as Prodichotomites does not develop simbirskitiform primary ribs in any growth stage.

Ringnesiceras occurs in considerably older beds than any other simbirskitinid genus known. It is associated with Homolsomites cf. and aff. H. quatsinoensis (Whiteaves), Buchia ex aff. inflata-sublaevis (including B. bulloides Lahusen and B. n. sp. aff. inflata Jeletzky) and locally with B. crassicollis (Keyserling) sensu stricto. This fauna is diagnostic of the lower upper Valanginian zone of Buchia ex gr. inflata-sublaevis throughout Arctic and Western North America (see Jeletzky, 1973, Fig. 3 and the stratigraphic section of this paper for further details). All other presently known simbirskitinid genera, in contrast, are restricted to the lower to upper Hauterivian rocks (e.g. Wright in Arkell et al., 1957, p. L350; Rawson, 1971, p. 69-80, Fig. 9; Bähr, 1964, p. 166, Appendix 6).

Aristov (1967) and Ivanov and Aristov (1969) attempted to interpret Pavlovites and other simbirskitinid genera from the Lower Cretaceous rocks of Yaroslavl (e.g. Gorodzovia and Subspeetoniceras) as early Hauterivian ancestors of Simbirskites sensu lato. However, their conclusions were subsequently discredited by a detailed stratigraphic and palaeontological study of this erratic block by Gol'bert et al. (1977). These workers concluded that the unit containing Pavlovites, Gorodzovia and Subspeetoniceras is separated from the underlying allegedly lower Hauterivian (in the writers' opinion upper Valanginian) unit containing "Homolsomites" ivanovi Aristov (actually a Neocraspedites-like representative of Prodichotomites; see Aristov, 1974, p. 152, Pl. XIV, figs. 1-2, Pl. XV, figs. 1-3) and Buchia ex gr. crassicollis-sublaevis by a regional hiatus. They have, furthermore, discovered that the Yaroslavl fauna of simbirskitinids described by Aristov (1967) and Ivanov and Aristov (1969) occurs about 8 m stratigraphically above the hiatus and that the basal bed of the unit containing it carries young shells of other simbirskitinids. These simbirskitinids were identified as Speetoniceras by Gol'bert et al. (1977, p. 80). These data indicate that the Yaroslavl fauna of simbirskitinids is of late rather than early Hauterivian age. There is accordingly no reason to interpret the early late Valanginian Ringnesiceras n. gen. as an immediate ancestor of Pavloviceras, especially as their external suture lines are quite dissimilar. Pavlovites is, therefore, more likely a short-lived, late evolutionary offshoot of the main simbirskitinid lineage which became superficially similar to the considerably earlier Ringnesiceras n. gen.

The Ringnesiceras species of Sverdrup Basin are characterized by a great number (± 23) of slender and sharp-topped primary ribs which have lost the bullate habitus of their polyptychitinid predecessors at least in their middle growth stages. This modification was effected by the stretching of these ribs in the adventral direction which was naturally accompanied by a displacement of the starting point of the bundle of secondary ribs toward the middle of the flank. These processes, furthermore, were accompanied by an elevation of the adventral parts of the primary ribs. The combination of these three processes produced simbirskitiform primary ribs of Ringnesiceras. The acute, truly tubercular shape of the above-mentioned adventral elevations, which is characteristic of the primary ribs of true Simbirskites, tends to be imperfectly developed in Ringnesiceras and to be present only in its advanced representatives. In combination with the older age of Ringnesiceras n. gen., this indicates that its primary ribs represent an initial stage of the development of the simbirskitiform primary ribs. This inferred early phase of the simbirskitinid phylogeny is also characterized by the replacement of simbirskitiform primaries by normally bullate primaries in the late growth stages of Ringnesiceras. This development is completely unknown in the Simbirskites. The early growth stages of Ringnesiceras also have regular polyptychitiform bullae instead of simbirskitiform primaries. The evolutionary development of the typical Simbirskites-like primaries out of the polyptychitiform bullae follows, therefore, a proterogenetic (or prophetic; Pavlow, 1901, p. 62-63) mode.

Polyptychites (Polyptychites) ex gr. canadensis n. sp. appears to be a likely ancestral stock of Ringnesiceras which evolved into the most primitive and oldest representative of this genus - R. pseudopolyptychum n. sp. - within the Sverdrup Basin (Fig. 8). The oldest known Simbirskites (Milanowskia) ex gr. concinnus-staffi Wedekind from the lower-upper Hauterivian boundary beds are the most likely descendants of advanced Ringnesiceras, such as R. tozeri n. sp. This is suggested by the similarity of the ribbing habit of juvenile whorls of R. tozeri n. sp. (see Pl. 2, figs. 3a, 4a, 4b) to that of the similar-sized whorl of these Simbirskites (Milanowskia) forms (e.g. Rawson, 1971, Pl. 3, figs. 1a, 4). Furthermore, their distance in time favors this idea.

The marked distinctions of the external suture line of these Simbirskites (Milanowskia) from that of Ringnesiceras sensu stricto are interpreted as a result of its gradual reduction in the course of evolution of the still unknown early Hauterivian representatives of Simbirskitinae. This idea is supported by the observed evolutionary trend of the external suture line in the presently known Ringnesiceras sensu stricto species. The advanced polyptychitinid external suture line of the oldest of these - R. (R.) pseudopolyptychum n. sp. - has four auxiliary lobes. The presumably late juvenile to half-grown external suture line of the next younger representative - R. (R.) amundense n. sp. - has two to three auxiliary lobes. Finally, the advanced external suture line of the youngest known representative - R. (R.) tozeri n. sp. - has only three auxiliary lobes. The last two suture lines are no longer advanced polyptychitinid in character and are distinctly more simbirskitinid than the first.

The inferred Ringnesiceras-Simbirskites sensu stricto lineage appears to be an important stage of evolution of the Early Cretaceous Perisphinctacea which connects its subfamilies Polyptychitinae and Simbirskitinae. The existence of such connecting links between these two subfamilies in the Arctic region was already suggested by Pavlow (1902, p. 42; 1914, p. 68) who states in the latter paper (Jeletzky's translation from Russian): "It must be taken into the consideration that I have already made a suggestion about a possible association of the first Simbirskites with the representatives of genus Polyptychites in the Petchora Basin (Pavlow, 1902, p. 42). These beds may prove to be equivalents of the middle Neocomian of western Europe (Pavlow, 1902, p. 42)".

As already mentioned, suitable ancestors of Ringnesiceras [i.e. some Polyptychites (Polyptychites) ex gr. canadensis n. sp.] occur in the uppermost lower Valanginian beds of the Deer Bay Formation. Furthermore, it appears logical to interpret the oldest, morphologically most primitive representatives of the genus (i.e. R. pseudopolyptychum) as direct ancestors of its younger, morphologically more advanced representatives (i.e. R. amundense n. sp. and R. tozeri n. sp.). These data indicate that Ringnesiceras is an endemic lineage which arose and evolved in the Sverdrup Basin throughout the early late Valanginian and part or ?all of the late late Valanginian (Fig. 8).

The early Hauterivian and ?latest Valanginian evolutionary history of Ringnesiceras and its inferred transmutation into coronate simbirskitinids must have taken place elsewhere in the Arctic following the apparently complete draining of Sverdrup Basin and its transformation into a deltaic-alluvial lowland and a source area (i.e. in the marginal parts) in the latest Valanginian or ?earliest Hauterivian.

The Petchora Province ammonites described and figured by Bogoslowsky (1902, Pl. XIV, figs. 3-5) as Olcostephanus neritzensis could be connecting links between Ringnesiceras and Simbirskites sensu lato. Their stratigraphic position in the profile is, however, unknown which precludes any definitive decision concerning their phylogenetic position within this lineage.

In addition to its above-discussed principal lineage (e.g. R. pseudopolyptychum→ R. amundense→ R. tozeri), Ringnesiceras apparently developed some phylogenetic offshoots. The most important of these is Elleficeras n. subgen. which is described below. This subgenus differs from the subgenus Ringnesiceras sensu stricto in a considerably more slender and higher proportion of the whorls at intermediate and advanced growth stages. The sturdy, subcircular whorl cross-section is restricted to the very early growth stages and the adult external suture line has no less than four auxiliary lobes. This subgenus Elleficeras appears to be derived from R. (R.) pseudopolyptychum n. sp. which alone is known to have four auxiliary lobes.

Although Ringnesiceras was apparently an endemic of the Sverdrup Basin, it does not seem to be restricted to it. As pointed out in the description of individual Canadian species of the subgenera, Ringnesiceras sensu stricto and Elleficeras, Ringnesiceras (Ringnesiceras) amundense n. sp. appear to be present in the Valanginian rocks of Petchora Province in the European part of the Soviet Union where it was identified as Olcostephanus (sensu lato) spp. by Bogoslowsky (1902). Furthermore, it is probable that R. (R.) pseudopolyptychum n. sp. is represented by some specimens from the basal upper Valanginian of northern Soviet Union which were identified as Polyptychites cf. or aff. P. polyptychus by Soviet workers recently. Finally, it is probable that Ringnesiceras (Elleficeras) ellefense n. sp. is represented by "Olcostephanus" cf. bidichotomus Bogoslowsky 1902 in the Petchora Basin and is closely allied to Ringnesiceras (Elleficeras) petschorense (Bogoslowsky, 1902) of that middle Russian basin. These data suggest that the Canadian Ringnesiceras species are widespread guide fossils of the late Valanginian in the Arctic regions of the Boreal Realm.

Ringnesiceras (Ringnesiceras) n. subgen.

Type species. As for the genus Ringnesiceras.

Diagnosis. Ringnesiceras forms in which the juvenile growth stage characterized by sturdy and relatively to very broad, almost semicircular cross-section of the whorl is unusually prolonged (up to whorl height of 20 mm or somewhat more). The advanced growth stages are characterized by whorl cross-sections which are not much higher than wide. These advanced cross-sections are always considerably sturdier and lower than the equivalent cross-sections of the subgenus Elleficeras.

Remarks. See in the descriptions of the genus Ringnesiceras and subgenus Elleficeras.

Ringnesiceras (Ringnesiceras) amundense n. sp.

Plate 1, figure 2a, b, Fig. 4

1902 Olcostephanus cf. polyptychus Bogoslowsky, p. 45, 46, 132, 133, Plate 13, figures 2a- 2c, 5a-5b, 6a-6b.

1902 Olcostephanus cf. keyserlingi Bogoslowsky, p. 46, 47, 133, Plate 13, figures 4a, 4b.

Origin of name. From the occurrence of the type specimen on Amund Ringnes Island.

Material. Two well-preserved specimens GSC 61756 and 61766 from GSC loc. 93755 (Ke76/11/5) on Amund Ringnes Island. Four specimens from Petchora Basin, European part of USSR (see in the synonymy).

Holotype. The specimen GSC 61756 reproduced on Plate 1, figure 2a, b.

Locus typicus. Amund Ringnes Island, northwestern part; Lat. 78°38'20"N, Long. 97°56'W.

Stratum typicum. GSC loc. 93755. Upper Deer Bay Formation, fossiliferous layer 5 of Kemper (1977, Fig. 3). Lower, but not the basal, upper Valanginian.

Diagnosis. A Ringnesiceras (Ringnesiceras), the juvenile to halfgrown shells of which are characterized by the sturdiest and widest whorl cross-section known in the subgenus Ringnesiceras. This cross-section does not become discus-like in the most advanced (presumably halfgrown) growth stages known. The umbilicus wider than that of the corresponding growth stages of any other species known. The most advanced, presumably halfgrown external suture lines known have two to three auxiliary lobes.

Remarks. The exceptionally wide umbilicus (about 33 per cent of the shell diameter) of all so far known juvenile to presumably halfgrown representatives of R. (R.) amundense n. sp. (the adapicalmost part of the living chamber present in the unfigured paratype GSC 61766 is presumed to be the remnant of an intermediate chamber) and the exceptionally low and wide whorl proportions of R. (R.) amundense preclude its confusion with the corresponding growth stages of any other representatives of the subgenus Ringnesiceras sensu stricto. Furthermore, these growth stages differ from the corresponding growth stages of R. (R.) pseudopolyptychum n. sp., in the external suture lines characterized by the presence of two to three auxiliary lobes. These most advanced, presumably halfgrown suture lines known have three auxiliary lobes when they fall within concave segments of the umbilical seam between the primary ribs of the preceding whorl. However, they have only two auxiliary lobes when they fall within the convex segments of the umbilical seam which coincide with the primary ribs of the preceding whorl (Fig. 4). Ringnesiceras (R.) amundense differs even more from the corresponding growth stages of the subgenus

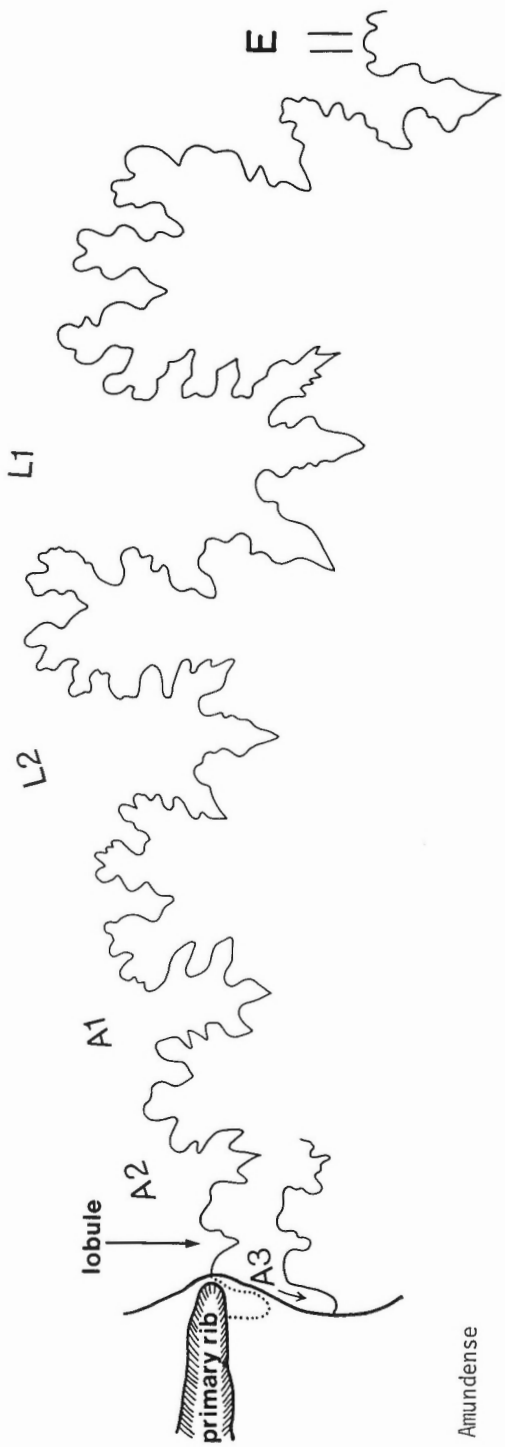


FIGURE 4. *External suture line of the holotype of Ringnesiceras (Ringnesiceras) amundense n. gen. et n. sp. reproduced in Plate 1, figure 2a at approximate whorl diameter of 23.4 mm, x 5.5. Abbreviations as in Figure 2.*

Elleficeras which have incomparably more slender, much higher than wide whorls and more deeply indented external suture lines with at least four auxiliary lobes. The dimensions and morphology of the adult shell are unknown.

As already mentioned, R. (R.) amundense appears to be a direct descendant of the earliest late Valanginian R. (R.) pseudopolyptychum n. sp. and an immediate ancestor of the late late Valanginian R. (R.) tozeri n. sp. The occurrence of both Canadian representatives of R. (R.) amundense in bed 5 of upper Deer Bay Formation intervening between the beds containing the other two species strongly supports this idea. These stratigraphic relationships of the three forms concerned contributed to the decision of the writers to treat R. (R.) amundense as an independent evolutionary stage (i.e. paleontological species) of the Ringnesiceras sensu stricto lineage rather than an extreme variant or a small dimorph of R. (R.) tozeri n. sp.

The Central Russian specimens of Bogoslowsky (1902) listed in the synonymy of R. (R.) amundense n. sp. are well-preserved, typical representatives of the species. The specimen reproduced in Bogoslowsky's Plate 13, figure 2 is its more slender and less densely ribbed variant closely approaching the more slender Canadian specimen GSC 61766. No information is available about the exact age and zonal assignment of these specimens.

Ringnesiceras (Ringnesiceras) pseudopolyptychum n. sp.

Plate 2, figure 2a-c, Fig. 5, 5a

1977 Dichotomites (?Prodichotomites) tozeri n. sp. (pars) Kemper, p. 5.

Origin of name. The specific name pseudopolyptychum is introduced to point out the superficial similarity, as opposed to true specific identity, of our form with Polyptychites polyptychus (Keyserling).

Holotype. Specimen GSC 61758 from GSC loc. 93871 reproduced in Plate 2, figure 2a-c.

Material. Four specimens from Ellef Ringnes Island including two from the GSC loc. 93870 and two from GSC loc. 93871. Furthermore, one specimen from GSC loc. 93755 and one from GSC loc. 93753 on Amund Ringnes Island.

Locus typicus. Ellef Ringnes Island, Sverdrup Archipelago, N.W.T., GSC loc. 93871 situated about 12.8 km southwest of the Isachsen Weather Station; Lat. 78°43'N, Long. 103°00'W.

Stratum typicum. GSC loc. 93755. Upper Deer Bay Formation. Fossiliferous bed 7 (Ke76/3/4) of Kemper (1977, Fig. 3). Lowermost upper Valanginian.

Diagnosis. Medium-sized species of Ringnesiceras (Ringnesiceras) combining a narrow umbilicus comprising about 27 per cent of the shell diameter with a feeble development or bare suggestion of tubercles on the simbirskitoid primary ribs of the intermediate growth stages. The secondary ribs of intermediate whorls are arranged in polyptychitid bundles which arise either out of numerous fine and high umbilical bullae or out of the above-mentioned simbirskitoid ribs. Cross-sections of juvenile whorls are broad while those of intermediate whorls are slender and higher than wide. These cross-sections have a flat-sided, discus-like shape.

Remarks. Ringnesiceras (Ringnesiceras) pseudopolyptychum n. sp. is but a homeomorph of sculpturally similar Polyptychites (Polyptychites) polyptychus (Keyserling) because of the presence of four auxiliary lobes instead of only two characteristic of the latter species (Pavlow, 1892, p. 477-78, Pl. XV, fig. 2a-c) and the presence of at least some simbirskitoid primary ribs with incipient to feeble simbirskitoid tubercles in the intermediate growth stages. Furthermore, it differs from the true Polyptychites (Polyptychites) polyptychus in the gradual transformation of low and broad, semicircular-shaped early whorls into considerably higher than wide, flat-flanked and discus-shaped intermediate whorls. All above-mentioned distinctions are of generic rather than specific value as pointed out in the description of Ringnesiceras n. gen. From other representatives of the subgenus Ringnesiceras sensu stricto, R. (R.) pseudopolyptychum n. sp. differs in:

1. Prevalence of polyptychitid bundling habit and comma-like polyptychitid bullae on the intermediate whorls combined with a relatively more limited and feeble development of simbirskitoid primary ribs and tubercles; and

2. Slender, considerably higher than wide, and flat-flanked cross-section of intermediate whorls.

The advanced, but presumably not adult, external suture line of R. (R.) pseudopolyptychum n. sp. differs from that of other Ringnesiceras (Ringnesiceras) species known in the prevalent presence of four auxiliary lobes. However, the taxonomic reliability of this feature is somewhat uncertain. Judging by the rather scant material available, the adumbilicalmost part of this suture line, which includes the third and fourth auxiliaries, tends to be rather imperfectly differentiated and variably shaped. As indicated in Figure 5, the auxiliary lobes of this part of the suture line are simple tack-like structures similar and subequal to the intervening lobule. Therefore, they can only be distinguished from the latter because of their positioning. An additional lobule may be present between the fourth auxiliary and the umbilical seam in those suture lines which are situated within the concave segments of the umbilical seam confined between the primary ribs of the preceding whorl (Fig. 5a).

The Polyptychites (Polyptychites)-like character of sculpture of R. (R.) pseudopolyptychum n. sp. combined with its being the oldest known representative of the genus and subgenus show that it represents the rootform of Ringnesiceras morphologically and phylogenetically transitional to the advanced representatives of Polyptychites (Polyptychites) sensu stricto. Among the latest early Valanginian Polyptychites (Polyptychites) forms of the Sverdrup Basin, R. (R.) pseudopolyptychum n. sp. resembles most closely P. (P.) canadensis n. sp. described elsewhere in this paper. This Polyptychites sensu stricto species occurs in the next older fossiliferous layer 8 of the Upper Deer Bay Formation (Fig. 1). It is concluded accordingly that R. (R.) pseudopolyptychum n. sp. developed out of P. (P.) ex gr. canadensis in the Sverdrup Basin at about the time when the subgenus Polyptychites sensu stricto already transmutated into Dichotomites (Prodichotomites) in the Valanginian Basin of Lower Saxony.

Stratigraphic relationships and age. See in the description of Ringnesiceras (Ringnesiceras) pseudopolyptychum fauna in the stratigraphic section.

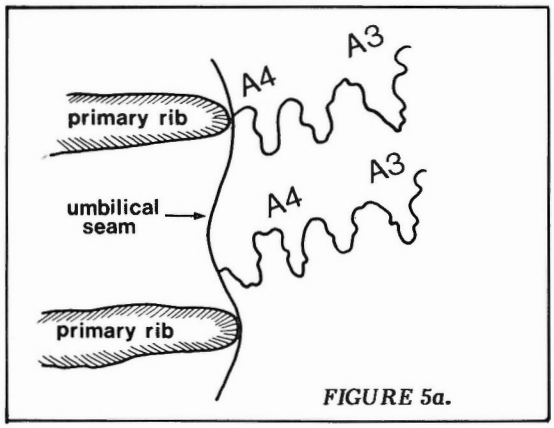
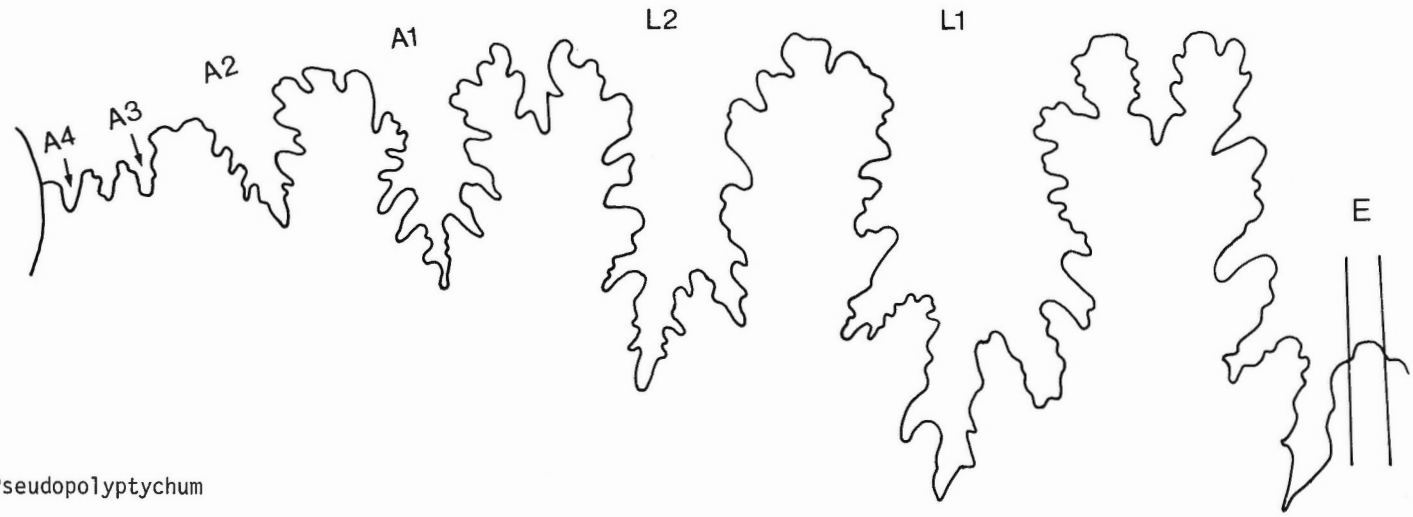


FIGURE 5a.



Pseudopolyptychum

FIGURE 5, 5a. *External suture lines of the holotype of Ringnesiceras (Ringnesiceras) pseudopolyptychum n. gen. et n. sp. reproduced in Plate 2, figure 2a. Figure 5 drawn at approximate whorl diameter of 17 mm, x 3 (approx.). Figure 5a drawn at approximate whorl diameter of 13 mm, x 8 (approx.). Abbreviations as in Figure 2.*

Ringnesiceras (Ringnesiceras) tozeri n. sp.

Plate 2, figures 3a, b, 4a-c, Fig. 6

1965 Homolsomites bojarkensis Shulgina, Plate IV, figure 1 (non Pl. I-III).

1973 Polyptychites (Dichotomites) aff. bidichotomus Jeletzky, p. 72, 73, Plate 1, figure 1a, 1b, Plate 2, figure 1a-1c, Plate 3, figure 1.

1975 Dichotomites (Prodichotomites) sp. Kemper, p. 248, 249.

1977 Dichotomites (Prodichotomites) tozeri n. sp. Kemper, p. 5 (partim).

Origin of name. For E.T. Tozer of the Geological Survey of Canada in recognition of his outstanding research on the Mesozoic geology of Sverdrup Basin.

Holotype. The specimen GSC 33332 reproduced in Jeletzky's (1973, Pl. 1, fig. 1a, 1b, Pl. 2, fig. 1a-1c, Pl. 3, fig. 1) paper.

Material. One specimen from Ellef Ringnes Island (holotype). Two juvenile specimens from Amund Ringnes Island collected at Lat. 78°38'20"N, Long. 97°56'W. One specimen from the Khatanga Depression, northern Siberia (Shulgina, 1965, Pl. IV, fig. 1, only this specimen).

Locus typicus. Ellef Ringnes Island of the Sverdrup Archipelago, N.W.T. Exact locality unknown.

Stratum typicum. Upper Deer Bay Formation, beds situated ca. 60 m stratigraphically below the contact with the Isachsen Formation.

Diagnosis. A large-sized (the largest phragmocone is estimated to have maximum shell diameter of at least 200 mm) Ringnesiceras sensu stricto species which differs from other representatives of the genus in more pronounced forward bends of secondary ribs in the venter of intermediate whorls. Furthermore, R. (R.) tozeri n. sp. differs from the comparably large R. (R.) pseudopolyptychum n. sp. in the appreciably more narrow and deeper umbilicus and the presence of only three auxiliary lobes in the advanced

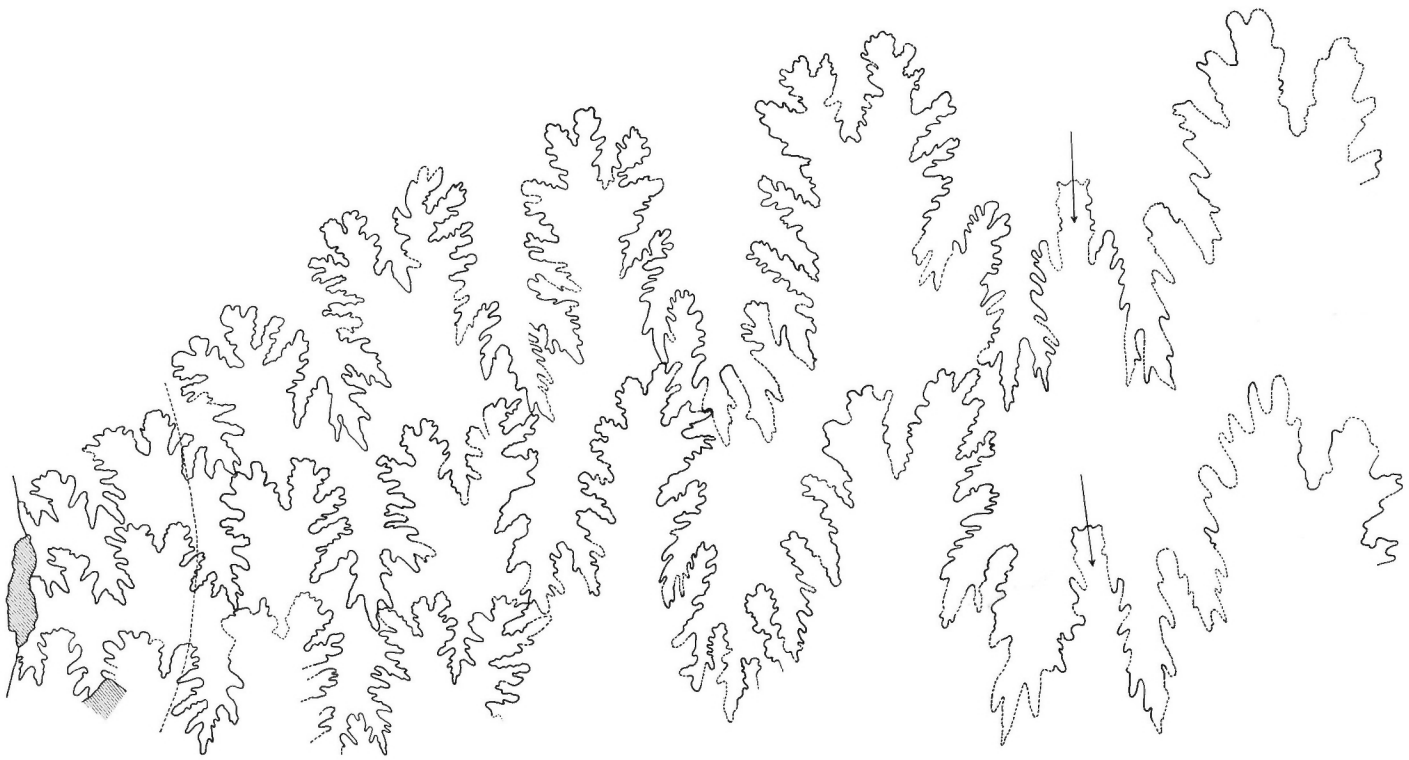


FIGURE 6. *Three adjacent external suture lines of the holotype of Ringnesiceras (Ringnesiceras) tozeri n. gen. et n. sp. figured by Jeletzky (1973, Pl. 2, fig. 1a) at approximate whorl diameter of 79.7 mm, x 1.4. Abbreviations as in Figure 2.*

external suture line. From equivalent growth stages of R. (R.) amundense n. sp. R. (R.) tozeri n. sp. differs in the more slender, adventrally narrowing whorl cross-section and appreciably more narrowly rounded venter (compare Jeletzky, 1973, Pl. 2, fig. 1b, 1c with Pl. 1, fig. 2b of this paper).

Remarks. R. (R.) tozeri n. sp. is the youngest known representative of Ringnesiceras and at the same time the youngest representative of the family Olcostephanidae known in the Valanginian rocks of Sverdrup Basin. None of the other two presently known Ringnesiceras sensu stricto species was found in the Tozeri-Beds. The material now available is scarce and fragmentary but the younger age of the specimens available in combination with the distinctive morphology of R. (R.) tozeri n. sp. leaves no doubt about its being an independent species.

The holotype which was figured by Jeletzky (1973) under the name of Polyptychites (Dichotomites) aff. bidichotomus is not reproduced in this paper. This specimen exposes only parts of two intermediate, fully septate whorls. The previous intermediate and juvenile whorls are only observable in cross-section. The only exception is the earliest preserved whorl, of which only the impression of the venter is preseved (Jeletzky, 1973, Pl. 2, fig. 1c). However, most of juvenile growth stages concealed in the holotype are well exposed in two small specimens found on Amund Ringnes Island and figured herein (Pl. 2, figs. 3a, b, 4a-c). These specimens are assigned to R. (R.) tozeri n. sp. as the shape and proportions of their cross-sections are closely similar to those of the corresponding whorls of the holotype. Furthermore, they were found at about the same level as the holotype. These two juvenile specimens exhibit only the beginning of the simbirskitinid sculptural growth stage near their oral ends (Pl. 2, figs. 3a, 4b) where the simbirskitiform primaries and tubercles are either feebly developed or only suggested. The extent of this simbirskitinid growth stage and the morphology of its principal part remain unknown as neither the simbirskitiform primaries nor the simbirskitiform tubercles persist onto the innermost intermediate whorl fully exposed in the holotype (Jeletzky, 1973, Pl. 3, fig. 1). This whorl is already ornamented by typical polyptychitinid bullae and rib bundles similar to those exposed on the equivalent growth stages of R. (R.) pseudopolyptychum n. sp.

The ammonite figured in Plate IV, figure 1 of Shulgina's (1965) paper and misinterpreted as Homolsomites bojarkensis is a typical representative of R. (R.) tozeri n. sp. This is indicated by the presence of well-developed umbilical bullae in combination with a narrow and deep but not involute umbilicus and the polyptychitinid external suture line. The last is similar to that of R. (R.) tozeri n. sp. in the general appearance of lobes and saddles, distinctly suspensive character of the auxiliary part and presence of only three auxiliary lobes. The biostratigraphic implications of this finding are discussed in the stratigraphic section (p. 16).

Stratigraphic relationships and age. On Amund Ringnes Island R. (R.) tozeri n. sp. was so far found only in beds 2 and 4 of Kemper (1977, Fig. 3; this paper, Fig. 1). The holotype found on Ellef Ringnes Island is derived from an approximately equivalent interval, judging by its recorded stratigraphic position about 60 m below the contact with the Isachsen Formation. For further details see the description of Ringnesiceras (Ringnesiceras) tozeri fauna in the stratigraphic section.

Ringnesiceras (Elleficeras) n. subgen.

Type species. Ringnesiceras (Elleficeras) ellefense n. sp.

Origin of name. From the occurrence of the type species on Ellef Ringnes Island of Sverdrup Archipelago, N.W.T.

Diagnosis. A subgenus of Ringnesiceras characterized by slender and high, discus-like shaped whorls, except for the early juvenile growth stages, and a narrow umbilicus. The generally speaking Dichotomites- or Homolsomites-like ribbing habit includes fine simbirskitiform primary ribs and tubercles in late juvenile and early intermediate growth stages. The external suture line has four auxiliary lobes.

Remarks. Like the subgenus Ringnesiceras sensu stricto, the subgenus Elleficeras nov. is characterized by a simbirskitiform development of primary ribs in the late juvenile and early intermediate growth stages. No polyptychitid umbilical bullae occur in these growth stages. Instead we observe adumbilically extended primary ribs with their tubercle-like greatest elevations not near the umbilical shoulders but appreciably farther adventrally. These primary ribs extend directly into one of the secondary ribs. Other secondaries split off from them whenever they are not intercalated between the rib bundles. The point of subdivision of primary ribs is situated on the lower flank at an appreciable distance from the umbilical shoulder.

In spite of the fact that not all of these primary ribs have a simbirskitiform tubercle near their subdivision into secondary ribs, they differ fundamentally from those of the genera Polyptychites, Dichotomites and Astieriptychites. These genera possess umbilical bullae in all late juvenile to adult growth stages, including those equivalent to the growth stages where simbirskitiform ribs and tubercles occur in Elleficeras. These bullae, which tend to be more or less comma shaped, are superimposed on the ventral shoulder and the secondary ribs arise directly out of them.

A diametrically opposed development occurs in the superficially similar Homolsomites ex gr. quatsinoensis (see Jeletzky, 1965, Pl. XX, figs. 2-7, 13-15) in which neither bullae nor simbirskitiform primary ribs are present. The fine and low primary ribs of these Homolsomites bifurcate or subdivide irregularly rather high on the flank. In the advanced growth stages these ribs commonly subdivide above the middle of the flank. In combination with the greater number of auxiliary lobes and the markedly ascendant orientation of the external suture line, these sculptural differences assert that Homolsomites is a craspeditid homeomorph of Elleficeras subgenus novum.

The suture line of Elleficeras differs less from that of the superficially similar Dichotomites, as for example D. (Prodichotomites) perovalis (Koenen), than it does from that of Homolsomites. Elleficeras has only four auxiliary lobes and its external suture line is suspensive rather than ascendant and so rather like that of Dichotomites. In spite of the fact that the diagnostic features of Elleficeras only become evident by thorough study, it obviously is a close ally of Ringnesiceras n. gen. which is only superficially similar to some Prodichotomites and Homolsomites. As already mentioned in the description of Ringnesiceras n. gen., Elleficeras appears to be an offshoot of its principal lineage designated herein as subgenus Ringnesiceras sensu stricto (Fig. 8). Elleficeras is accordingly considered to be but a subgenus of Ringnesiceras n. gen.

The subgenus Elleficeras is so far only known from the upper Deer Bay Formation of Sverdrup Basin. However, it may occur in Valanginian rocks of the Petchora Basin in Central Russia. It is possible, namely, that "Olcostephanus" petschorensis Bogoslowsky and "O." cf. bidichotomus Bogoslowsky, which are two of the most commonly cited late Valanginian forms of that region, are Elleficeras rather than Dichotomites or Homolsomites. These two species are consistently placed into Dichotomites in the Russian (e.g. Saks et al., 1965; Saks and Shulgina, 1974; Shulgina, 1978) and West European (e.g. Frebold, 1929) literature since the erection of that generic name by Koenen (1909). However, Jeletzky (1973, p. 73) concluded that "O." petschorensis is a Homolsomites ex gr. H. quatsinoensis (Whiteaves) because of the presence of at least four auxiliary lobes in its advanced external suture line. So far as the shape and proportions of intermediate and early whorls of the ammonites assigned to "Olcostephanus" petschorensis and "O." cf. petschorensis by Bogoslowsky (1902, Pl. XII, figs. 1-4) are concerned, they could well belong to Elleficeras ex aff. E. ellefense n. sp. However, none of these specimens exhibits simbirskitiform primary ribs, and bullae diagnostic of this genus. Furthermore, the fine primary ribs of smaller specimens (e.g. Bogoslowsky, 1902, Pl. XII, figs. 2a, 3a, 4a) tend to bifurcate or to subdivide irregularly higher upflank than those of Elleficeras ellefense n. sp. In view of these apparent morphological distinctions of "O." petschorensis and "O." cf. petschorensis from the Canadian Elleficeras and because of unavailability of any comparative material of these forms, the writers feel unable to determine them generically.

"Olcostephanus" cf. bidichotomus of Bogoslowsky (1902, Pl. 13, fig. 1a-1c) is a much more Elleficeras ellefense-like form in regard to the above critical morphological features (see the description of E. ellefense n. sp. for further details). It is accordingly assigned tentatively to this Canadian species.

The probably presence of the subgenus Elleficeras in the upper Valanginian of European Russia (Petchora Basin) suggests that this presumably endemic Canadian subgenus has an extensive geographical range and so is an important interregional index fossil of the equivalents of Ringnesiceras (Ringnesiceras) pseudopolyptychum-Beds.

Ringnesiceras (Elleficeras) ellefense n. sp.

Plate 1, figure 3, Plate 2, figure 1a, b, Fig. 7

?1902 Olcostephanus cf. bidichotomus Bogoslowsky, p. 43-45, 131-132, Plate XIII, figures 1a-1c.

Holotype. Specimen GSC 61757 reproduced in Plate 1, figure 3, Plate 2, figure 1a, b.

Material. Two specimens (GSC 61767, 61768) from the upper Deer Bay Formation on Ellef Ringnes Island. One specimen (see synonymy) from the Valanginian of the Petchora Basin.

Locus typicus. Ellef Ringnes Island, 13 m southeast of Isachsen Weather Station; Lat. 78°43'N, Long. 103°00'W.

Stratum typicum. Basal Amundense-Beds. Upper Valanginian.

Diagnosis. Elleficeras species which differs from the only other known, informally described species (Elleficeras n. sp. indet.) in relatively coarser ribbing habit.

Remarks. The holotype is a phragmocone without any trace of the body chamber. It reveals the morphology of two whorls, the adoral of which appears to be the penultimate whorl. The lesser part of the preceding third whorl is observable within the second whorl. This only partly visible

third whorl is still wider than high while the other two are slender and higher than wide. The relative slenderness of the whorl increases in the course of the ontogeny. The whorl's cross-section is rounded-triangular with distinctly convex flanks (Pl. 1, fig. 3). The greatest width of the whorl occurs near the broadly rounded umbilical shoulder. Therefrom it decreases all the way upflank to the narrowly arched venter. The narrow umbilicus is shallow and its low walls are distinctly convex. However, the umbilicus is step-like rather than funnel-like as the last whorl covers only about 77 per cent of the preceding whorl. Most of the external suture line is directed subradially. The suture has four auxiliary lobes in addition to two lateral lobes and its auxiliary part is somewhat descendant.

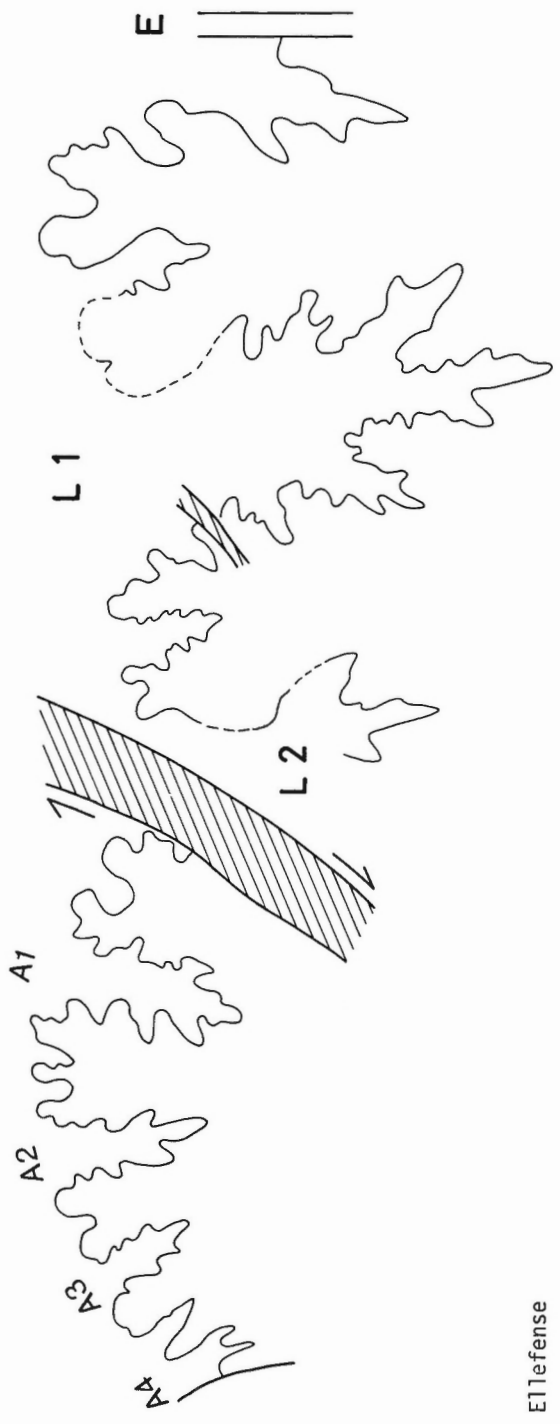


FIGURE 7. *External suture line of the holotype of Ringnesiceras (Elleficeras) ellefense n. gen. et n. sp. reproduced in Plate 2, figure 1b at approximate whorl diameter of 30 mm, x 4 (approx.). Abbreviations as in Figure 2.*

The second last preserved whorl is ornamented by at least twenty-two primary ribs which begin on the outer third of the umbilical wall. These ribs are low on the umbilical shoulder and become higher further upflank. The greatest height is attained near the place where the secondaries split off (Pl. 2, fig. 1a, 1b). However, the ribs do not become markedly tuberculate even at that place, so that their overall appearance can only be defined as feebly simbirskitiform. The aptness of this definition is further stressed by the fact that the primary ribs are relatively short and extend only a small distance toward the middle of the flank. In spite of these qualifications, the presence of simbirskitiform primary ribs instead of bullae is obvious. These primaries are approximately radially oriented to the end of the second last preserved whorl.

The primary ribs are still simbiriskitiform on the adapical part of the last preserved, presumably penultimate whorl. However, they acquire a slight comma-like bend at the umbilical shoulder in this segment. Farther adorally the primary ribs become more and more bullae-like to the oral end of the whorl. This attests that R. (E.) ellefense n. sp. exhibits the same recurrence of umbilical bullae in the adult growth stage as the previously described species of the subgenus Ringnesiceras.

The secondary and tertiary ribs are relatively coarse for the subgenus; they bend forward markedly on the venter. On the preserved penultimate whorl the rib bundles consist of two secondary ribs of which either both or the posterior only bifurcate again. The tertiary ribs subdivide at various levels within the adventral half of the flank. Bifurcating intercalated ribs occur between the rib bundles on the first half of the adoralmost preserved whorl. Then the bundling of ribs becomes disorganized on the adoralmost quarter of that whorl. This indicates an advanced age of the holotype which apparently includes most of the penultimate whorl (i.e. to the point closely before the beginning of the body chamber).

The unfigured second Canadian representative of R. (E.) ellefense n. sp. is a deformed fragment which is larger but more narrrowly umbilicate than the holotype. This already bullate fragment exhibits rib bundles with three secondary ribs which bifurcate again in the middle part of the flank. This fragment is assumed to be a morphologically extreme variant of R. (E.) ellefense until its status is clarified through the discovery of additional better preserved material.

The writers place the only figured representative of "Olcostephanus" cf. bidichotomus Bogoslowsky, 1902 tentatively into the synonymy of R. (E.) ellefense n. sp. because of its far-reaching similarity to the Canadian holotype in most taxonomically significant features. This specimen of "Olcostephanus" cf. bidichotomus of Bogoslowsky (1902, Pl. 13, figs. 1a-1c) was placed in Dichotomites by Jeletzky (1973, p. 73) because of its polyptychitinid suture line which is suspensive in the auxiliary part and apparently has no more than three auxiliary lobes. However, the distinctly elevated primary ribs of this form are elongated and straight to almost straight (Bogoslowsky, 1902, Pl. XIII, fig. 1a). Furthermore, the adapicalmost of these ribs appear to exhibit tubercle-like elevations at the points of their

subdivision. Finally, the whorl shape and sculpture are similar to those of the Canadian holotype of R. (E.) ellefense n. sp. Unfortunately, the relevant figure of Bogoslowsky (1902, Pl. XIII, fig. 1a) is a line drawing, the accuracy of which can only be tested by inspection of the actual specimen.

Stratigraphic relationships and age. The Canadian representatives of Ringnesiceras (Elleficeras) ellefense n. sp. were found in those beds of the Ellef Ringnes Island Profile (i.e. Ke76/3/2 and 3) which appear to be correlative with the basal part of the Amundense-Beds. This correlation is based on their association with the earliest known representatives of Homolsomites cf. and aff. H. quatsinoensis (for further details see the stratigraphical section).

BIOSTRATIGRAPHY

The latest early and late Valanginian faunas discussed below were obtained from only two closely studied complete profiles of the upper Deer Bay Formation (Kemper, 1975, 1977) and a few isolated fossil localities which cannot be related stratigraphically to the individual beds and units of these profiles. Therefore, it is impossible to claim at this time that the distinctive ammonite faunas recognized in these profiles form the basis of widespread regional or interregional fossil zones. The beds containing these faunas, therefore, are designated informally as fossiliferous beds (i.e. Polyptychites (Polyptychites) tschekanowskii Beds). However, some of the diagnostic ammonites of these informal units appear to be present in contemporary beds of distant boreal regions. It is expected accordingly that most or all of the "beds" recognized herein will be recognized as regional or interregional fossil zones in the future.

Sequence of ammonite faunas in the studied uppermost lower and upper Valanginian profiles of Sverdrup Basin

The depocentre of Sverdrup Basin was situated in the area of Amund Ringnes Island. The upper Valanginian sequence of the upper Deer Bay Formation described by Kemper (1975, 1977) is well exposed in the northwestern part of this island. The fossiliferous profile measured there is illustrated by the Figure 1. Ellef Ringnes Island was situated closer to the western margin of the basin. The upper Valanginian profile measured there in the area situated about 13 km southwest of the Isachsen Weather Station yielded important ammonite faunas. This profile is also illustrated in Figure 1.

Polyptychites (Polyptychites) tschekanowskii fauna

The most abundant ammonite fauna of Amund Ringnes Island was found in beds 8-9 of this profile (Fig. 1). The presence of huge Polyptychites (Polyptychites) tschekanowskii Pavlow in the bed 8 indicates either the latest early or earliest late Valanginian age of this fauna as this Arctic species is very closely related to P. (P.) sphaeroidalis of northwestern Germany. The latter species characterizes the topmost part of the lower Valanginian but ranges up into the basal upper Valanginian Hollwedensis Zone (Kemper, 1976). This conclusion is confirmed by the discovery of one specimen each of Polyptychites (Polyptychites) aff. sphaeroidalis and Dichotomites (Prodichotomites) hollwedensis Kemper, 1978 on Amund Ringnes Island. The exact stratigraphic position of these two specimens in the profile is not known. However, they are believed to be derived either from bed 8 or from bed 9 because of the geographic position of their localities. These two beds represent accordingly the boundary beds of the lower/upper Valanginian. They are designated herewith the Polyptychites (Polyptychites) tschekanowskii beds.

The Tschekanowskii Beds contain an association of true Polyptychites which are characterized by exceptionally large dimensions [e.g. the still undescribed P. (P.) balkwilli n. sp.]. The most distinctive species is Polyptychites (Polyptychites) canadensis n. sp. described and figured in this report (Pl. 1, fig. 1a-b). Other ammonites of this fauna, such as Amundiptychites sverdrupi n. sp. (Pl. 3, fig. 1, Pl. 4, fig. 1) and other still undescribed allied forms (e.g. Pl. 3, fig. 2a-c), also reach a large size. These ammonites are presumably descendants of Astieriptychites (Fig. 8).

Ringnesiceras (Ringnesiceras) pseudopolyptychum fauna

Some of the exceptionally large sized ammonites occur also in bed 7 overlying the Polyptychites (Polyptychites) tschekanowskii Beds on Amund Ringnes Island. These include P. (P.) canadensis n. sp. and the still undescribed P. (P.) balkwilli n. sp. However, bed 7 is characterized by the presence of other medium to large ammonites with high and, in the advanced growth stages, slender whorls combined with narrow umbilicii. One of these ammonites is described herein as Ringnesiceras (Ringnesiceras) pseudopolyptychum n. sp. (Pl. 2, fig. 2a-c). This species is a representative of one of several groups of olcostephanid ammonites which possess polyptychitinid rib bundles for which Polyptychites (Polyptychites) polyptychus was named [see description of P. (P.) pseudopolyptychum for further details].

No representatives of Homolsomites were found in this bed. The unfossiliferous basal part of the Ellef Ringnes profile underlying its Beds-4 to-1 (Fig. 1) appear to be equivalent to bed 7 of the Amund Ringnes profile. The ammonite fauna of bed 7 is designated herein as the Ringnesiceras (Ringnesiceras) pseudopolyptychum fauna (Fig. 1). The information about the age of this regional ammonite fauna and its bed in the Sverdrup Basin is provided by its direct superposition on beds 8-9 containing Polyptychites (Polyptychites) tschekanowskii and designated earlier as Tschekanowskii Beds. These stratigraphic relationships indicate the approximate correspondence of the Ringnesiceras (Ringnesiceras) pseudopolyptychum Beds to the Hollwedensis-Polytomus Zone of the Lower Saxonian Basin and, therefore, to the lower part of the Dichotomites Beds (Fig. 9).

In the USSR, the lowermost upper Valanginian Polyptychus Zone is mostly recognized on the Russian Platform (Saks et al., 1965). However, it must be even more valid for the Petchora Basin where the types of Polyptychites (Polyptychites) polyptychus (Keyserling, 1846) were found. The Polyptychus Zone is not recognized in the Arctic Basins of the USSR in spite of the fact that "P. polyptychus" (in part designated as "P. ex gr. polyptychus") is being expressly cited (Klimova, 1960; Saks and Shulgina, 1974; Schulgina, 1978) therefrom. The ammonites associated with these P. (P.) polyptychus-like forms are designated as Dichotomites, Prodichotomites, "Neocraspedites" and Bochianites (Shulgina, 1978). Some of these associated ammonite species are presumably conspecific with the species of the lower Dichotomites Beds of northwestern Germany. Therefore, the above-mentioned P. (P.) polyptychus-like ammonites of the Arctic regions of USSR occur in beds of definitely early late Valanginian age roughly corresponding to the Pseudopolyptychum-Beds of the Sverdrup Basin.

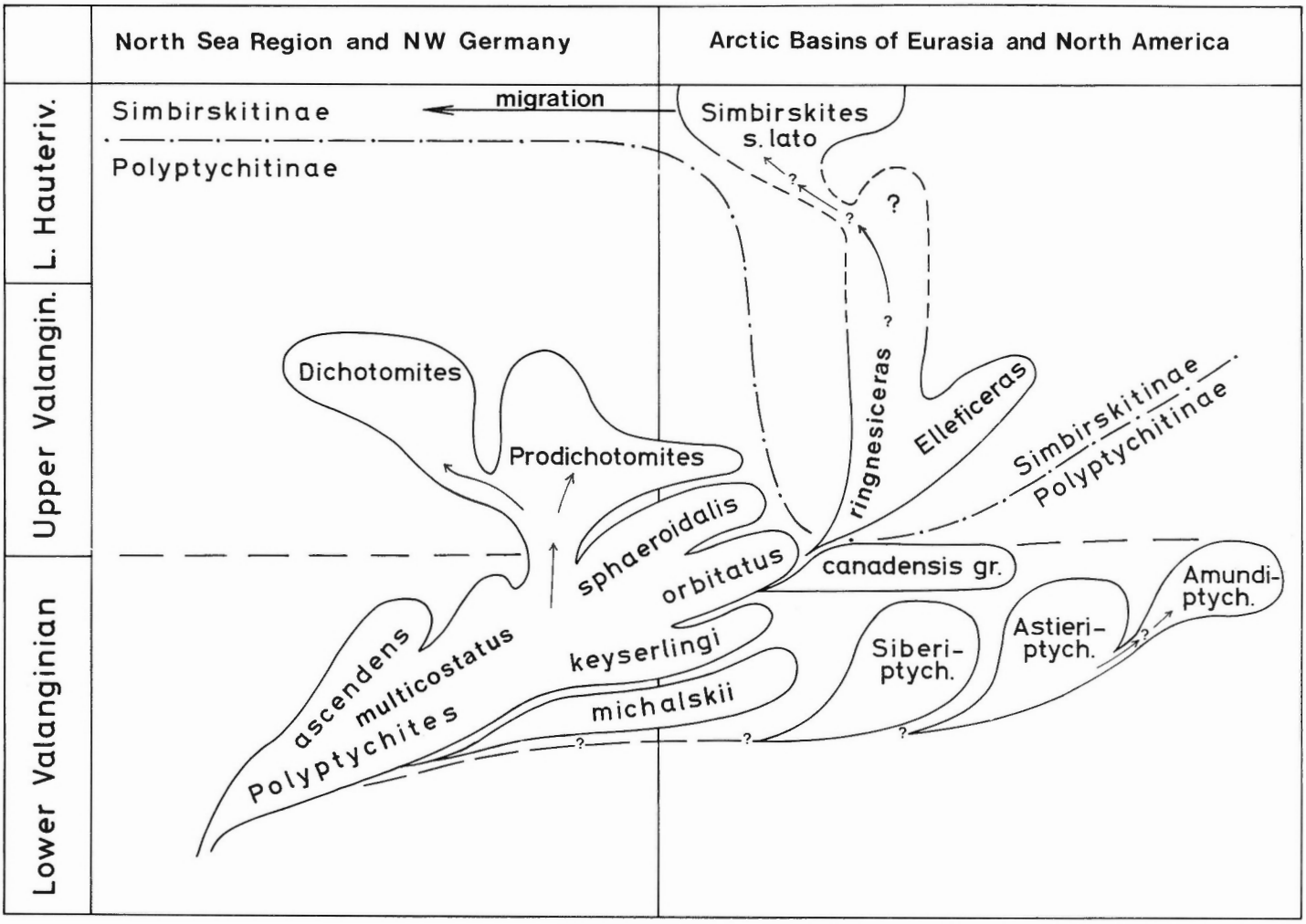


FIGURE 8. *Assumed phylogenetic relationships and migrations of the latest early and late Valanginian olcostephanid genera of Sverdrup Basin.*

The writers are uncertain whether or not these references to P. (P.) polyptychus, which are so common in the Russian literature, pertain to the true P. (P.) polyptychus (Keyserling, 1846) or rather to the Ringnesiceras (Ringnesiceras) pseudopolyptychum n. sp. The uncertainty of the Russian workers, commonly expressed in the use of prefixes "aff." or "cf.", suggests that at least these citations may refer to R. (R.) pseudopolyptychum n. sp. This suspicion is strengthened by the circumstance that the Russian workers consistently cite P. (P.) polyptychus and closely allied Polyptychites forms from the above-mentioned lower upper Valanginian beds overlying those containing all other Polyptychites sensu stricto forms. This always was, and still is, incomprehensible to West European and North American specialists as ammonites resembling P. (P.) polyptychus are consistently absent in the corresponding beds of their countries (i.e. until the discovery of such ammonites in the Sverdrup Basin) while being present in the underlying lower Valanginian beds.

The discovery of ammonites with a Polyptychites (Polyptychites) polyptychus-like ribbing habit in the lowermost upper Valangian beds of Sverdrup Basin suggests that some at least of the P. (P.) polyptychus-like ammonites of northern Soviet Union belong to Ringnesiceras (Ringnesiceras) ex gr. pseudopolyptychum instead of being representatives of true P. (P.) polyptychus (Keyserling, 1846).

Ringnesiceras (Ringnesiceras) amundense fauna

The next younger ammonite fauna of Amund Ringnes Island occurs in bed 5 of Kemper (1977, Fig. 3; this paper, Fig. 1). This fauna was not found in Kemper's profile measured on Ellef Ringnes Island. However, it may be represented by the Beds-4 to-1 and +1 to +7 inclusive of this profile (Fig. 1).

The most characteristic ammonite of bed 5 is Ringnesiceras (Ringnesiceras) amundense n. sp. described herein (Pl. 1, fig. 2a, b). This species, which is easily distinguishable from the preceding and following Ringnesiceras (Ringnesiceras) species, appears to be restricted to this bed. However, one specimen of the older R. (R.) pseudopolyptychum n. sp. was found in bed 5 and others were found in the apparently correlative beds-4 to-1. Ringnesiceras (Ringnesiceras) amundense is designated as the name fossil of this fauna.

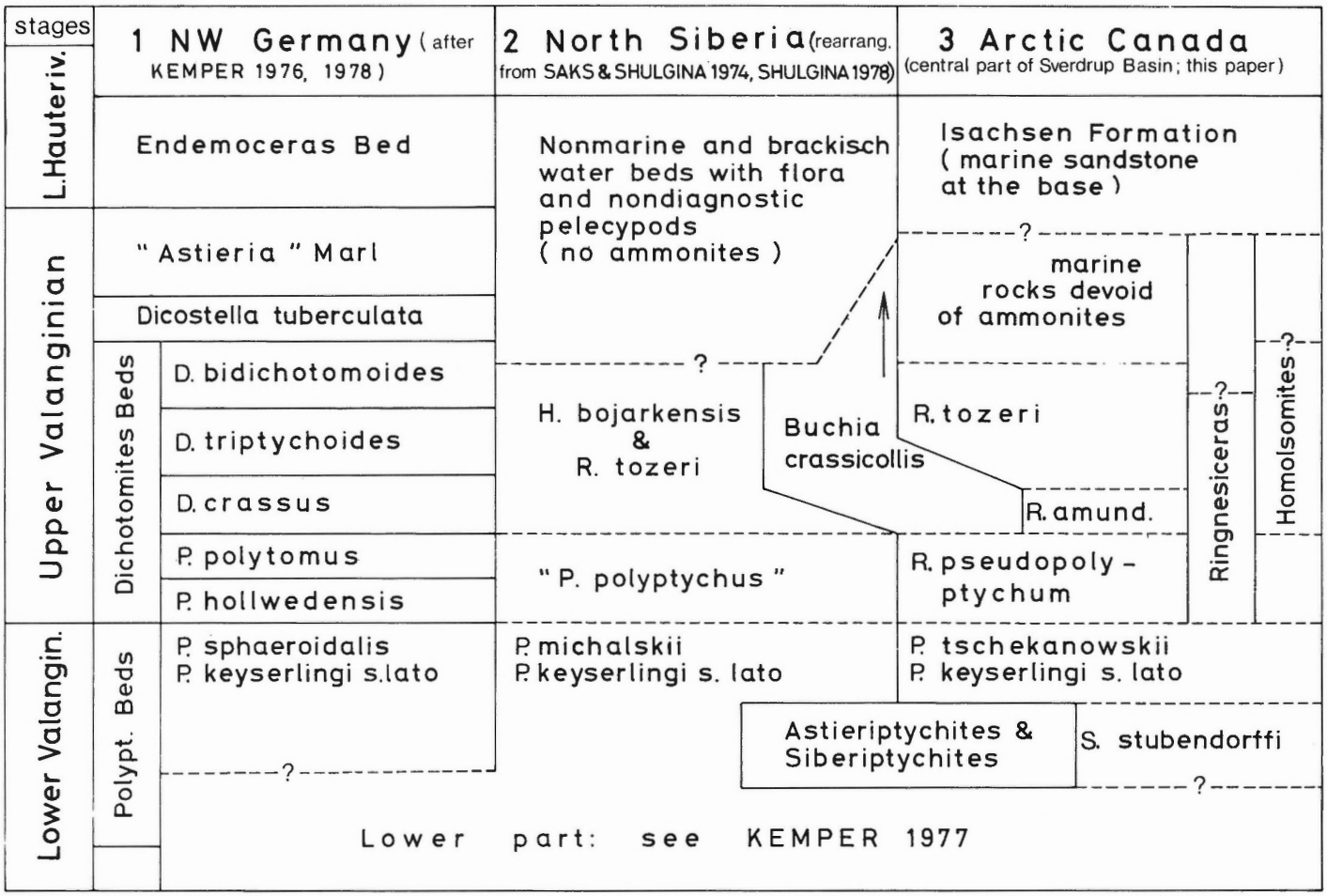


FIGURE 9. *Succession and correlation of the latest early and late Valanginian olcostephanid faunas of the Sverdrup Basin.*

The Amundense fauna is characterized also by the first appearance of typical representatives of Buchia crassicollis (Keyserling) which are figured in Plate 4, figures 2, 3 of this paper. This Buchia form is restricted to bed 5 on Amund Ringnes Island where it is rare. However, it ranges well above the assumed equivalents of this bed on Ellef Ringnes Island (i.e. Beds-4 to-1; see Fig. 1) where it is much more common. These assumed equivalents of bed 5 also contain Ringnesiceras (Elleficeras) ellefense n. sp. described herein (Pl. 2, fig. 1a, b) and other still undescribed representatives of this subgenus. Homolsomites cf. and aff. H. quatsinoensis (Whiteaves) figured by Jeletzky (1964, Pl. XI, fig. 7, Pl. XII, fig. 4, Pl. XIII, fig. 6a-6c) occur rarely in beds 5 and 6 of Amund Ringnes profile but is rather more common in presumably equivalent beds on Ellef Ringnes Island (Fig. 1). This first appearance of Homolsomites seems to represent an important biochronological datum level in the Sverdrup Basin. It appears to coincide approximately with the boundary between the Pseudopolyptychum- and Amundense-Beds as defined earlier in this section and helps to differentiate their ammonite faunas. The presence of Homolsomites permits the correlation of the Amundense-Beds with the lower, but presumably not the lowermost, part of Homolsomites quatsinoensis and Buchia crassicollis Zone of western British Columbia and Pacific States of U.S.A. (see Jeletzky, 1965; 1973, p. 72, Fig. 3 for further details). In terms of the broad Buchia and ammonite zones proposed for the Valanginian rocks of Sverdrup Basin and the Arctic mainland of Canada by Jeletzky (1973), the Amundense-Beds appear to correspond to the lower but not the basal part of the Homolsomites aff. quatsinoensis Subzone of the Buchia ex gr. inflata-sublaevis Zone. Because of an entirely Arctic character of the olcostephanid ammonites of the Amundense fauna, it cannot be correlated directly with any of the Dichotomites zones recently proposed by Kemper (1978) for the Dichotomites Beds of Northwest Germany. However, it is possible to correlate the Amundense fauna with the upper part of the so-called Polyptychites polyptychus and Dichotomites n. sp. zones of the European Russia and Northern Siberia (see Jeletzky, 1973, Fig. 3, graphs, 6, 5). This is suggested, in particular, by the presence of Ringnesiceras (Ringnesiceras) pseudopolyptychum n. sp. and Ringnesiceras (Elleficeras) ellefense n. sp. in this fauna. As already mentioned, the writers believe that at least some of the ammonites identified as P. (P.) polyptychus by Russian workers actually belong to the Canadian R. (R.) pseudopolyptychum. Furthermore, R. (E.) ellefense n. sp. may be a close ally of R. (E.) petschorense (Bogoslowsky, 1902) which occurs in the Polyptychites polyptychus and Dichotomites spp. zones (see p. 11 for further details).

Ringnesiceras (Ringnesiceras) tozeri fauna

The youngest late Valanginian ammonite fauna of the Sverdrup Basin was found in beds 4 and 2 of the Amund Ringnes Island profile (Kemper, 1977, Fig. 3; this paper, Fig. 1) where it is separated from the Amundense-Beds by about 30 m of ammoniteless shale. This Ringnesiceras (Ringnesiceras) tozeri fauna is also known in the Ellef Ringnes Island profile where it occurs about 60 m stratigraphically below the top of the Deer Bay Formation (Jeletzky, 1973, p. 50, expl. of Pl. 1, fig. 1). The most diagnostic fossil of this fauna is Ringnesiceras (Ringnesiceras) tozeri n. sp. described by Jeletzky (1973, Pl. 1, fig. 1a, 1b, Pl. 2, fig. 1a-1c, Pl. 3, fig. 1) under the name of Polyptychites (Dichotomites) aff. bidichotomus (Leymerie). Two small specimens are figured herein (Pl. 2, figs. 3, 4). Ringnesiceras (R.) tozeri n. sp. is designated as the name fossil of this fauna which otherwise contains only Homolsomites cf. and aff. H. quatsinoensis (Whiteaves) and numerous Buchia ex gr. inflata-sublaevis. The latter include B. crassicollis solida (Lahusen), B. n. sp. aff. inflata (Toula) and B. bulloides (Lahusen). The youngest known ammonites of the Tozeri fauna were found about 60 m below the top of the Deer Bay Formation in both profiles (Jeletzky, 1973, p. 50; Kemper, 1977, Fig. 3).

Because of the presence of Homolsomites cf. and aff. H. quatsinoensis (Whiteaves) and Buchia crassicollis solida (Lahusen), the Tozeri fauna can be correlated with the upper, but perhaps not the uppermost, part of the Homolsomites quatsinoensis and Buchia crassicollis fauna of western British Columbia and the Pacific States of the U.S.A. (see Jeletzky, 1965; 1973, p. 72, 73, fig. 3 for further details). According to Jeletzky (1973, p. 72, Fig. 3), the Homolsomites quatsinoensis and Buchia crassicollis Zone of the Pacific Slope of North America does not include the uppermost Valanginian beds and this idea is accepted as valid by the writers.

In terms of the broad Buchia and ammonite zones proposed by Jeletzky (1973) for the Valanginian rocks of the Sverdrup Basin and the Arctic mainland of Canada, the Tozeri-Beds correspond to the upper part of the Homolsomites aff. quatsinoensis Subzone of the Buchia ex gr. inflata-sublaevis Zone.

Like the underlying Ringnesiceras (Ringnesiceras) amundense-Beds, the Tozeri-Beds contain an ammonite fauna which does not have any species in common with the upper Valanginian beds of Northwest Europe. Where the Valanginian basins of northwestern Europe are concerned, it is only possible to suggest that the Tozeri-Beds must correspond to part or all of the upper Dichotomites-Beds as defined recently by Kemper (1976, 1978). It is unlikely that the Tozeri-Beds include equivalents of the next younger "Astieria"-Beds which are of youngest late Valanginian age according to Kemper (1976, 1978) but this correlation cannot be ruled out at present because of the uncertain position of the Valanginian/Hauterivian boundary in the Sverdrup Basin (Jeletzky, 1973; Kemper, 1977, p. 4, 5, Fig. 3).

The absence of Ringnesiceras (Ringnesiceras) pseudopolyptychum n. sp. and representatives of the subgenus Elleficeras nov. in the Tozeri-Beds suggest their being younger than any part of the Polyptychus and Dichotomites spp. zones of European Russia and Northern Siberia. The Tozeri-Beds are, therefore, correlated tentatively with part or ?all of the next younger Homolsomites bojarkensis Zone of these regions. This correlation is supported by the close affinity of Homolsomites aff. quatsinoensis (Whiteaves) to H. bojarkensis Shulgina, which was already stressed by Jeletzky (1973, p. 73). Furthermore, the Homolsomites bojarkensis fauna includes at least one specimen of Ringnesiceras (Ringnesiceras) tozeri n. sp. reproduced by Shulgina (1965, Pl. IV, fig. 1). As already pointed out in the description of R. (R.) tozeri n. sp., this specimen has the ribbing habit, umbilicus and external suture line of this Ringnesiceras species and so has nothing to do with the holotype and other representatives of Homolsomites bojarkensis Shulgina (1965) reproduced in her Plate I, figures 1a, 1b; Plate II, figure 1, Plate III, figures 1a-1y.

The Homolsomites bojarkensis Zone is assumed to be of an early Hauterivian age by all Soviet workers (e.g. Saks and Shulgina, 1974; Gol'bert et al., 1977; Shulgina, 1978). The improbability of this correlation was already stressed by Jeletzky (1973, p. 73). The new fossil evidence presented above confirms his conclusion and permits a definitive correlation of the North Siberian and the Central Russian Homolsomites bojarkensis Zone with part or all of the late, but apparently not the latest (Jeletzky, 1973, p. 73, Fig. 3), Valanginian Ringnesiceras (Ringnesiceras) tozeri-Beds of the Sverdrup Basin.

Valanginian/Hauterivian boundary beds

The age and correlation of the uppermost 60 m of the Deer Bay Formation, which did not yield any ammonites, have already been discussed by Jeletzky (1973, p. 72, 73, Fig. 3) and Kemper (1977, p. 5, 6, Fig. 3). The writers are unable to add anything essential to the information provided in these papers.

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PLATE 1

Fig. 1a,b. Polyptychites (Polyptychites) canadensis n. sp. Holotype. GSC 61755. Upper Deer Bay Formation, Tschekanowskii- to Pseudopolyptychum-Beds, GSC loc. 93866 (=Ke76/11/7-9). Transitional beds between lower and upper Valanginian, northwestern Amund Ringnes Island, Lat. 38°38'20"N, Long. 97°56'W. x1.

Fig. 2a,b. Ringnesiceras (Ringnesiceras) amundense n. gen., n. subgen. et n. sp. Holotype. GSC 61756. Upper Deer Bay Formation. Amundense-Beds, GSC loc. 93755 (=Ke76/11/5). Basal upper Valanginian, northwestern Amund Ringnes Island, Lat. 78°38'20"N, Long. 97°56'W. x1.

Fig. 3. Ringnesiceras (Elleficeras) ellefense n. sp. Ventral view of the specimen shown on Plate 2, figure 1, x1.

Plate 1

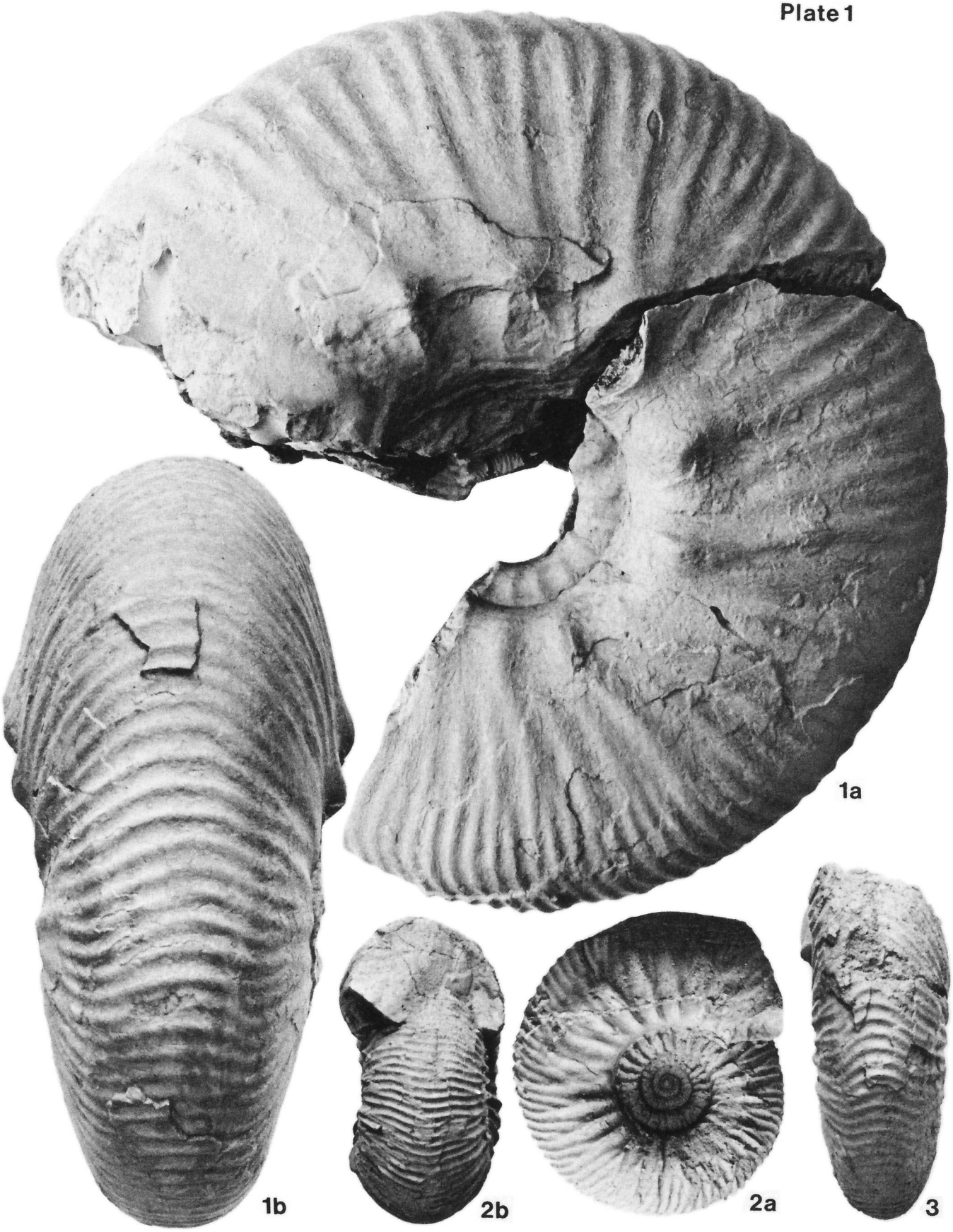

PLATE 2

Fig. 1a,b. Ringnesiceras (Elleficeras) ellefense n. gen., n. subgen. et n. sp. Holotype. GSC 61757. Upper Deer Bay Formation, basal Amundense-Beds, GSC loc. 93870 (=Ke76/3/2). Upper Valanginian, Ellef Ringnes Island, 13 km southeast of Isachsen Weather Station; Lat. 78°43'N, Long. 103°00'W. Two lateral views, x1 (ventral view see Pl. 1, figure 3).

Fig. 2a-2c. Ringnesiceras (Ringnesiceras) pseudopolyptychum n. gen., n. subgen. et n. sp. Holotype. GSC 61758. Upper Deer Bay Formation. Pseudopolyptychum-Beds, GSC loc. 93871 (=Ke76/3/4). Upper Valanginian. Ellef Ringnes Island, 13 km southeast of Isachsen Weather Station; Lat. 78°43'N, Long. 103°00'W. 2a. Lateral view; 2b. Lateral view of the other flank; 2c. Ventral view. All photos x1.

Fig. 3a-3b. Ringnesiceras (Ringnesiceras) tozeri n. gen., n. subgen. et n. sp. Plesiotype. GSC 61759. A juvenile specimen. Upper Deer Bay Formation. Tozeri-Beds, GSC loc. 91297 (=Ke74/11/2). Upper Valanginian, Northwestern Amund Ringnes Island; Lat. 78°38'20"W, Long. 97°56'W. 3a. Lateral view; 3b. Ventral view. Both photos, x1.

Fig. 4a-4c. Ringnesiceras (Ringnesiceras) tozeri n. gen., n. subgen. et n. sp. Plesiotype GSC 61760. A juvenile specimen. The same horizon, fossil locality and age as for the specimen reproduced in Figure 3. 4a. Lateral view; 4b. Lateral view; 4c. Ventral view. All photos x1.

Plate 2

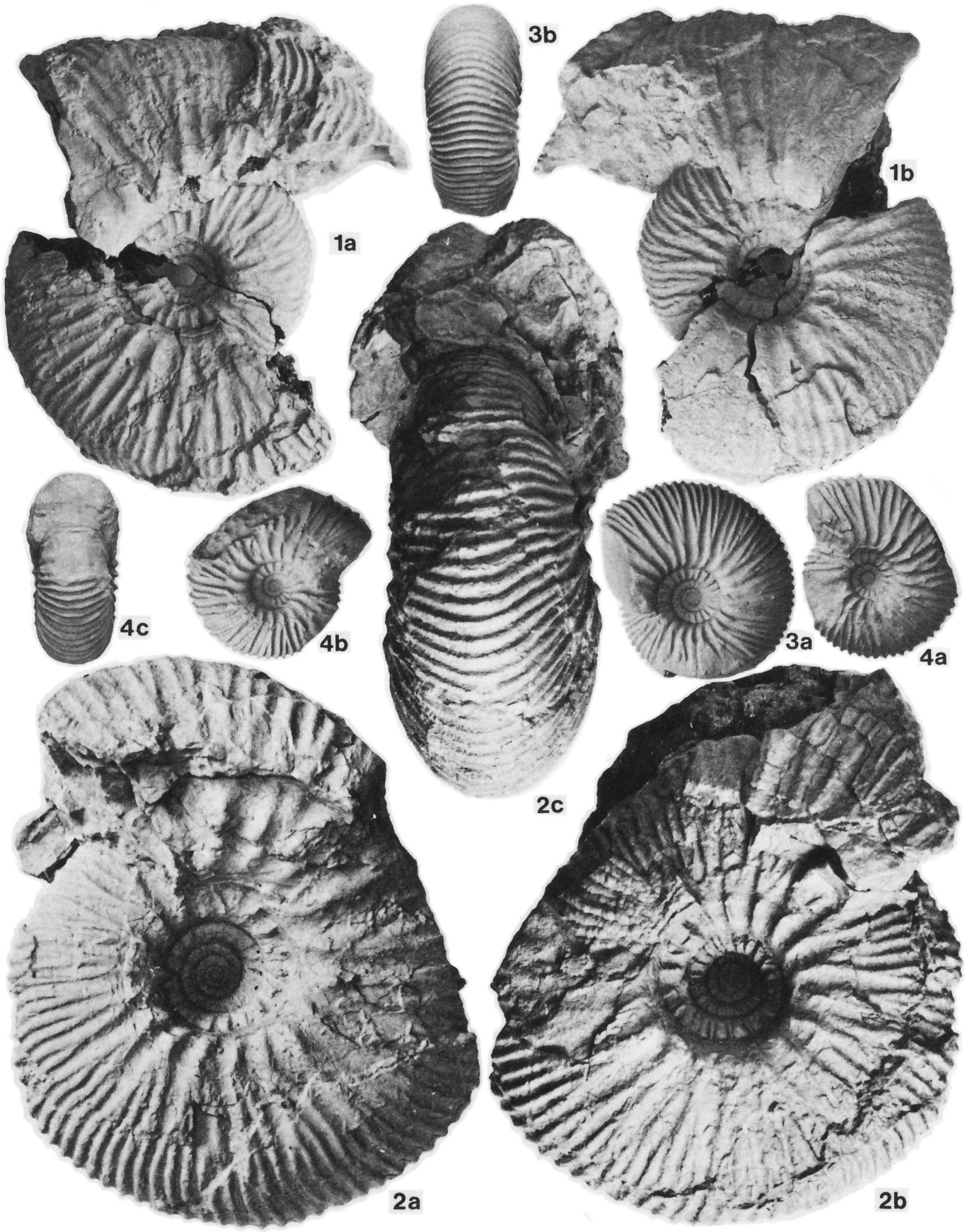

PLATE 3

Fig. 1. Amundiptychites sverdrupi n. gen. et n. sp. Holotype. GSC 61761. Upper Deer Bay Formation. Tschekanowskii- to Pseudopolyptychum-Beds (transitional beds between lower and upper Valanginian), GSC loc. 93753 (=Ke76/11/7-9). Northwestern Amund Ringnes Island; Lat. 78°38'20"N, Long. 97°56'W. Lateral view, x0.9.

Fig. 2a-2c. Amundiptychites aff. A. sverdrupi n. gen. et n. sp. GSC 61762. Upper Deer Bay Formation. Exact horizon unknown but the specimen is presumably derived from the Tschekanowskii- to Pseudopolyptychum-Beds (transitional beds between lower and upper Valanginian), GSC loc. 85059. Northern Amund Ringnes Island, Airphoto A16748-40-(1), exact locality not known. Collected by the Mobil Oil Co. of Canada Ltd. Intermediate whorl of an Amundiptychites form which differs from equivalent growth stages of the typical representatives of A. sverdrupi in much more pronounced sculpture, marked adoral bends of secondary ribs on the venter and greater slenderness of the whorl. The early growth stage of A. aff. A. sverdrupi, which is characterized by a broad, semicircular cross-section of the whorl (Figure 2c), ends earlier than in the typical representatives of A. sverdrupi. The taxonomic significance of these distinctions is uncertain. 2a. Lateral view; 2b. Ventral view; 2c. Cross-sections of five intermediate and early whorls. Note the contrast between the broad, semicircular cross-sections of the innermost three whorls and the higher than wide, wedge-like cross-sections of the outer two whorls.

Plate 3

PLATE 4

Fig. 1a,b. Amundiptychites sverdrupi n. gen. et n. sp. Holotype. GSC 61761. Upper Deer Bay Formation. Tschekanowskii- to Pseudopolyptychum-Beds (transitional beds between lower and upper Valanginian), GSC loc. 93753 (=Ke76/11/7-9). Northwestern Amund Ringnes Island. Lat. 78°38'20"N, Long. 97°56'W. 1a. Ventral view, x0.9 (see Pl. 3, figure 1 for the lateral view). Cross-sections of four advanced whorls and the ventral view of the fifth inner whorl; 1b. Lateral view of the fifth inner whorl, x0.9.

Fig. 2a-2e. Buchia crassicollis (Keyserling, 1946) sensu stricto. Hypotype. GSC 61763. Upper Deer Bay Formation. From beds presumably equivalent to the Amundense-Beds of Amund Ringnes Island (lower upper Valanginian), GSC loc. 93876 (=Ke76/3/+7). Ellef Ringnes Island, 13 km southeast of Isachsen Weather Station. Lat. 78°43'N, Long. 103°00'W. A broad, oblique form, somewhat transitional to B. crassicollis var. inflata (Lahusen, 1888). 2a. View of left valve from above; 2b. View of right valve from above; 2c. Left lateral view of both valves; 2d. Right lateral view of both halves; 2e. Hinge margins and beaks of both valves viewed from above. All photos, x1.

Fig. 3a-3e. Buchia crassicollis (Keyserling, 1846) sensu stricto. Hypotype. GSC 61764. Same formation, beds and fossil locality as for the specimen reproduced in Figure 2. A narrow, straight form. 3a. View of left valve from above; 3b. View of right valve from above; 3c. Left lateral view of both valves; 3d. Right lateral view of both valves; 3e. Hinge margins and beaks of both valves viewed from above. All photos, x1.

Plate 4