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HETTANGIAN THROUGH AALENIAN (JURASSIC) GUIDE FOSSILS AND BIOSTRATIGRAPHY, NORTHERN YUKON AND ADJACENT NORTHWEST TERRITORIES

T.P. Poulton

1991

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PREFACE

Although the first Jurassic fossils from the northern Yukon were reported in 1859, it was not until the 1980s that our knowledge of the Jurassic rocks in that part of Canada reached its current level of understanding. Differentiation of these rock units and characterization of facies, thickness trends, and unconformities have depended almost entirely on the recently acquired understanding of the age and facies significance of the fossils. This understanding has been developed through the efforts of many geologists and paleontologists over many years. Previous reports on the Jurassic strata from this area have contained an account of tectonic and paleogeographic implications, and hydrocarbon potential. In this report, the occurrences of marine fossils are documented. These fossils are essential to unravelling the Jurassic stratigraphy, facies, and paleogeography of this area.

Elkanah A. Babcock
Assistant Deputy Minister
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PRÉFACE

Bien que dans le nord du Yukon, les premières découvertes de fossiles du Jurassique aient été signalées en 1859, ce n'est que pendant les années 1980 que nos connaissances des roches jurassiques de cette partie du Canada nous ont amenés au niveau de compréhension actuel. Pour différencier ces unités lithologiques et caractériser les faciès, les directions d'isopaques et les discordances, on a eu recours presque entièrement aux connaissances récemment acquises des datations des fossiles et aux définitions des faciès. Ces connaissances ont été obtenues grâce aux efforts de nombreux géologues et paléontologues au cours des années. Dans les rapports précédents sur les strates jurassiques de cette région se trouvait un compte-rendu des détails tectoniques et paléogéographiques, et du potentiel en hydrocarbures. Le présent rapport traite des occurrences de fossiles marins. L'étude de ces fossiles est indispensable pour déterminer la stratigraphie, les faciès et la paléogéographie jurassique de cette région.

Elkanah A. Babcock
Sous-ministre adjoint
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Abstract

The Bug Creek Group in the northern Richardson Mountains (dominantly shallow marine sandstone) and its more offshore facies equivalent to the west, the Kingak Formation (shale and siltstone), were deposited on a shelf at the northwestern corner of the Jurassic North American continent. The strata are superficially similar to the upper Paleozoic strata below and the Cretaceous strata above, and have internal repetitions of essentially similar lithology. Our knowledge of the Jurassic stratigraphy and paleogeography of the northern Yukon and adjacent Northwest Territories relies strongly, therefore, on understanding the fossils contained in the strata there.

Study of the fossils has permitted dating and paleoenvironmental characterization of the Jurassic formations, mapping of their thickness and facies trends, and recognition of unconformities between them. Every stage of the Jurassic is represented by ammonites or marine bivalves. The Hettangian to Aalenian ammonites permit correlation with international standard zones in many cases, or with local zones in others. The bivalves are useful for less detailed subdivision of the sequences, for correlations where ammonites are not present, and for paleoecological characterization of the strata. One new species of Aalenian bivalve, *Propeamussium* (*Propeamussium*) *patriciae* n. sp. is described. Additional, less common, fossils illustrated include brachiopods and crinoids.

Résumé

Le Groupe de Bug Creek, situé dans le nord des monts Richardson (et principalement composé de grès marin épicontinental) et son faciès extracôtier équivalent à l'ouest, soit la Formation de Kingak (composée de shale et de siltstone), se sont accumulés sur une plate-forme dans le coin nord-ouest du continent nord-américain au Jurassique. Les strates sont superficiellement semblables aux strates sous-jacentes du Paléozoïque supérieur et aux strates sus-jacentes du Crétacé et l'on observe des redoublements de strates de lithologie essentiellement comparable. L'état actuel des connaissances de la stratigraphie et de la paléogéographie du Jurassique dans le nord du Yukon et des Territoires du Nord-Ouest adjacents repose donc fortement sur une bonne compréhension des fossiles que contiennent les strates de ces régions.

L'étude des fossiles a permis la datation et la caractérisation paléoécologique des formations du Jurassique, la cartographie des isopaques et de l'orientation des faciès, et aussi l'identification des discordances entre ces formations. Chaque stade du Jurassique est représenté par des ammonites ou par des bivalves marins. Les ammonites situées entre l'Hettangien et l'Aalénien permettent dans de nombreux cas une corrélation avec des zones standard internationales ou, dans d'autres cas, des zones régionales. Les bivalves sont utiles lorsqu'il s'agit de subdiviser les séquences de façon moins détaillée, d'établir des corrélations de strates sans ammonites, et de procéder à la caractérisation paléoécologique des strates. Une nouvelle espèce de bivalve d'âge aalénien, *Propeamussium* (*Propeamussium*) *partriciae* n. sp., est décrite. En outre, les fossiles moins courants illustrés comprennent des brachiopodes et des crinoïdes.

Summary

The richly fossiliferous, dominantly sandstone Bug Creek Group in the northern Richardson Mountains becomes thicker and has fewer hiatuses westward, changing facies into the shale-siltstone of the Kingak Formation. Both are shallow marine units that were deposited on a broad shelf at the northwestern corner of the Jurassic North American continent. The Lower Jurassic through Aalenian strata of the Bug Creek Group include the Murray Ridge Formation [shale; with local basal Scho Creek Member (sandstone)], the Almstrom Creek Formation (sandstone), and the Manuel Creek Formation [shale; with locally developed upper Anne Creek Member (sandstone)].

Ammonites are sufficiently abundant to facilitate correlation of the formations with international standard zonation schemes. Many of the bivalve species, and a few of the other fossils, such as brachiopods, crinoids and marine algae, appear to have restricted ranges, useful for intrabasinal correlation. Some have ranges similar to those of the same species or genera in northeastern Siberia and Europe, making them useful interbasinal guide fossils. The significant fossils are illustrated in this report and are either assigned to existing Siberian or European species, or are left with open nomenclature, except for one, which is described as a new species in the Aalenian—*Propeamussium* (*Propeamussium*) *patriciae* n. sp.

The Lower Hettangian contains the ammonites *Psiloceras* (*Caloceras*) sp. cf. *P.* (*C.*) *johnstoni* (Sowerby) and *Psiloceras* sp., and the bivalves *Pleuromya galathea* Agassiz, *Prosogyrotrigonia*(?) sp. cf. *P. inouyei* (Yehara), *Cardinia* spp., *Meleagrinella*, *Oxytoma*, and *Parallelodon*(?). These faunas are assigned to the *Psiloceras planorbis* and *P. johnstoni* subzones of the *P. planorbis* Zone and occur in the basal sandstone of the Kingak Formation in the Bonnet Lake area. Other beds that may be Hettangian or Lower Sinemurian contain a diverse shelly fauna including the ammonites *Ectocentrites*(?), and *Badouxia*(?) and the bivalves *Pseudomytiloides*(?), *Pleuromya galathea* Agassiz, *Gryphaea*(?), *Cardinia*(?), *Liotrigonia atirdjakensis* (Koschelkina), *Lima parva* Milova, *Kolymonectes staeschei* (Polubotko), *Oxytoma*, and a variety of other bivalves, gastropods, brachiopods and crinoids. These occur in the basal beds of the Bug Creek Group at Murray Ridge. In addition to the *Psiloceras*-bearing sandstone, the Hettangian, or possible Hettangian, is characterized by *Cardinia* and ferruginous oolite deposits.

Scattered Lower Sinemurian localities, in the lower part of the Bug Creek Group (Murray Ridge Formation) contain *Arnioceras*, *Coroniceras*(?), *Gryphaea*, and other bivalves. Upper Sinemurian faunas are assigned to the *Oxynoticeras oxynotum* and *Echioceras raricostatum* zones. The former, in the Scho Creek Member of the Murray Ridge Formation, contains *Aegasteroceras* (*Arctoasteroceras*) *jeletzkyi* Frebold, *Oxynoticeras oxynotum* (Quenstedt), *Gleviceras*, *Microderoceras*(?), and a variety of bivalves including *Inoceramus* (*Mytiloides*), *Pholadomya idea* d'Orbigny, *Pleuromya galathea* Agassiz, and *Kolymonectes staeschei* (Polubotko). The *E. raricostatum* Zone contains *Echioceras aklavikense* Frebold and articulated crinoids, preserved in the shale and siltstone of the Murray Ridge Formation. Lower beds of the Almstrom Creek Formation are probably also Late Sinemurian in age, and contain *Echioceras*(?), *Pholadomya ambigua* Sowerby(?) and other bivalves. Other faunas, which are probably also Sinemurian are *Eopecten*(?), *Lima parva* Milova, *Oxytoma* (*Palmoxytoma*) *cygnipes* (Young and Bird), and *Gryphaea* in the basal Kingak Formation along Porcupine River, and *Paltechioceras* spp. from the Kingak and Murray Ridge formations.

Upper Pliensbachian beds in the Almstrom Creek Formation contain *Amaltheus bifurcus* Howarth. The following bivalve species in the same formation may also be Pliensbachian: *Liotrigonia atirdjakensis* (Koschelkina), *Pholadomya ambigua* Sowerby, *Harpax* sp. cf. *H. spinosus* (Sowerby), *H. laevigatus* (d'Orbigny), *Meleagrinella* sp. aff. *M. ansparsicosta* (Polubotko), *Oxytoma* (*Oxytoma*) sp. cf. *O. inequivalvis* (Sowerby), and *O.* (*Palmoxytoma*) *cygnipes* (Young and Bird). Upper Pliensbachian beds in the Kingak Formation contain *Amaltheus stokesi* (Sowerby), *A. bifurcus* Howarth, and *Pleuroceras*(?) sp., as well as a variety of bivalves, brachiopods and crinoids.

Dactylioceras, *Hildaites*(?), *Ovaticeras*, *Collina*(?), and harpoceratid ammonites indicate the Lower Toarcian in the Manuel Creek and Kingak formations. Younger Toarcian rocks in the Kingak Formation contain *Pseudolioceras* spp. and other ammonites.

The Lower Aalenian is sparsely represented in the Kingak Formation, by *Leioceras* sp. cf. *L. opalinum* (Reinecke) and possibly also by some *Pseudolioceras* occurrences. Younger Aalenian faunas include the ammonites *Erycitoides howelli* (White), *Pseudolioceras mclintocki* (Haughton), *Planammatoceras*, and the bivalves *Propeamussium* (*Propeamussium*) *patriciae* n. sp., *Astarte aalensis* Oppel, *Inoceramus* (*Mytiloceramus*), *Vaugonia*, *Oxytoma* (*Oxytoma*) *ferrugineum* (Rollier) among others. They occur in the Manuel Creek and Kingak formations.

Sommaire

Dans le nord des monts Richardson, le Groupe de Bug Creek riche en fossiles, principalement composé de grès, s'épaissit et montre moins de hiatus vers l'ouest, et une transition de faciès avec passage au shale et siltstone de la Formation de Kingak. Le Groupe de Bug Creek et la Formation de Kingak sont tous deux des unités sédimentaires de mer peu profonde, qui se sont déposées sur une vaste plate-forme dans le coin nord-ouest du continent nord-américain au Jurassique. Les strates s'échelonnant du Jurassique inférieur à l'Aalénien inclusivement, dans le Groupe de Bug Creek, comprennent la Formation de Murray Ridge [shale; accompagné du Membre de Scho Creek (grès) qui localement est un niveau basal], la Formation d'Almstrom Creek (grès), et la Formation de Manuel Creek [shale; localement accompagné de la partie supérieure du Membre d'Anne Creek (grès)].

Les ammonites sont suffisamment abondantes pour faciliter une corrélation des formations au moyen des schémas internationaux de zones standard. Un grand nombre des espèces de bivalves et quelques-uns des autres fossiles, tels que les brachiopodes, crinoïdes et les algues marines, semblent avoir des intervalles de distribution restreints, qui facilitent une corrélation des strates à l'intérieur du bassin. Quelques-uns ont des intervalles de distribution comparables à ceux des mêmes espèces ou genres du nord-est de la Sibérie et de l'Europe, et pour cette raison, y constituent des fossiles caractéristiques intéressants pour une corrélation des strates intérieures au bassin. Dans ce rapport, sont illustrés les fossiles significatifs; ils sont soit attribués à des espèces sibériennes ou européennes connues, ou bien leur nomenclature reste indéterminée, sauf dans un cas, où le fossile est décrit comme une nouvelle espèce de l'Aalénien—*Propeamussium* (*Propeamussium*) *patriciae* n. sp.

L'Hettangien inférieur contient les ammonites *Psiloceras* (*Caloceras*) sp. cf. *P.* (*C.*) *johnstoni* (Sowerby), et *Psiloceras* sp., et les bivalves *Pleuromya galathea* Agassiz, *Prosogyrotrigonia*(?) sp. cf. *P. inouyei* (Yehara), *Cardinia* spp., *Meleagrinella, Oxytoma,* et *Parallelodon*(?). Ces faunes sont placées dans les sous-zones à *Psiloceras planorbis* et *P. johnstoni* de la zone à *P. planorbis*, et se trouvent dans le grès basal de la Formation de Kingak, dans la région du lac Bonnet. D'autres couches qui pourraient se situer dans l'Hettangien ou dans le Sinémurien inférieur contiennent une faune coquillière diversifiée, contenant en particulier les ammonites *Ectocentrites*(?) et *Badouxia*(?) et les bivalves *Pseudomytiloides*(?), *Pleuromya galathea* Agassiz, *Gryphaea*(?), *Cardinia*(?), *Liotrigonia atirdjakensis* (Koschelkina), *Lima parva* Milova, *Kolymonectes staeschei* (Polubotko), *Oxytoma*, et divers autres bivalves, gastéropodes, brachiopodes et crinoïdes. Ceux-ci se trouvent dans les couches basales du Groupe de Bug Creek, à Murray Ridge. Outre le grès à *Psiloceras*, l'Hettangien, ou des strates qui pourraient appartenir à l'Hettangien, se caractérisent par la présence de *Cardinia* et de dépôts oolitiques ferrugineux.

Des localités éparses du Sinémurien inférieur, dans la partie inférieure du Groupe de Bug Creek (formation de Murray Ridge) contiennent *Arnioceras, Coroniceras*(?), *Gryphaea* et d'autres bivalves. Les faunes du Sinémurien supérieur sont placées dans les zones à *Oxynoticeras oxynotum* et *Echioceras raricostatum*. La première, qui se trouve dans le Membre de Scho Creek appartenant à la Formation de Murray Ridge, contient *Aegasteroceras* (*Arctoasteroceras*) *jeletzkyi* Frebold, *Oxynoticeras oxynotum* (Quenstedt), *Gleviceras, Microderoceras*(?), et divers bivalves, en

particulier *Inoceramus* (*Mytiloides*), *Pholadomya idea* d'Orbigny, *Pleuromya galathea* Agassiz, *Kolymonectes staeschei* (Polubotko). La zone à *E. raricostatum* contient *Echioceras aklavikense* Frebold et des crinoïdes articulés, conservés dans le shale et le siltstone de la Formation de Murray Ridge. Les lits inférieurs de la Formation d'Almstrom Creek datent probablement aussi du Sinémurien supérieur, et contiennent *Echioceras*(?), *Pholadomya ambigua* Sowerby(?) et d'autres bivalves. D'autres faunes, qui datent aussi probablement du Sinémurien, se composent d'*Eopecten*(?), de *Lima parva* Milova, d'*Oxytoma* (*Palmoxytoma*) *cygnipes* (Young et Bird), de *Gryphaea*, dans la formation basale de Kingak qui borde la rivière Porcupine, et *Paltechioceras* spp. provenant des formations de Kingak et de Murray Ridge.

Les lits du Pliensbachien supérieur de la Formation d'Almstrom Creek contiennent *Amaltheus bifurcus* Howarth. Les espèces suivantes de bivalves contenues dans la même formation peuvent aussi être d'âge pliensbachien: *Liotrigonia atirdjakensis* (Koschelkina), *Pholadomya ambigua* Sowerby, *Harpax* sp. cf. *H. spinosus* (Sowerby), *H. laevigatus* (d'Orbigny), *Meleagrinella* sp. aff. *M. ansparsicosta* (Polubotko), *Oxytoma* (*Oxytoma*) sp. cf. *O. inequivalvis* (Sowerby), et *O.* (*Palmoxytoma*) *cygnipes* (Young et Bird). Les couches du Pliensbachien supérieur de la Formation de Kingak contiennent *Amaltheus stokesi* (Sowerby), *A. bifurcus* Howarth, et *Pleuroceras*(?) sp., ainsi que divers bivalves, brachiopodes et crinoïdes.

Les ammonites *Dactylioceras, Hildaites*(?), *Ovaticeras, Collina*(?) et des ammonites de la famille des harpocératidés indiquent le Toarcien inférieur dans les formations de Manuel Creek et de Kingak. Des roches plus récentes d'âge toarcien, appartenant à la Formation de Kingak, contiennent *Pseudolioceras* spp. et d'autres ammonites.

L'Aalénien inférieur est représenté sporadiquement dans la Formation de Kingak par *Leioceras* sp. cf. *L. opalinum* (Reinecke), et peut-être aussi par quelques occurrences de *Pseudolioceras*. Les faunes plus récentes de l'Aalénien comprennent les ammonites *Erycitoides howelli* (White), *Pseudolioceras mclintocki* (Haughton), *Planammatoceras*, et les bivalves *Propeamussium* (*Propeamussium*) *patriciae* n. sp., *Astarte aalensis* Oppel, *Inoceramus* (*Mytiloceramus*), *Vaugonia, Oxytoma* (*Oxytoma*) *ferrugineum* (Rollier) entre autres. Elles apparaissent dans les formations de Manuel Creek et de Kingak.

INTRODUCTION

The primary purpose of this report is to document the occurrence and biostratigraphic importance of fossils characteristic of the Lower Jurassic and Aalenian formations of northern Yukon and adjacent District of Mackenzie.

Many of the species described here have been mentioned before in stratigraphic publications and a few have been previously described and illustrated (Frebold, 1960, 1975; Frebold, Mountjoy, and Tempelman-Kluit, 1967; Frebold and Poulton, 1977). Virtually all of the ammonite and bivalve taxa, and a few other taxa that are either striking, abundant, or appear to have previously unrecognized biostratigraphic utility are illustrated. Some of the fossils, especially the ammonites, but also a few of the bivalve species, are useful in correlating with the international standard zonations mainly based in Europe, as well as with Siberia. Others are more long-ranging worldwide, but within the area characterize a particular formation and therefore are of great use for intrabasinal correlation. To aid the reader in using the fossils biostratigraphically, the illustrations and plates are arranged primarily to emphasize faunal associations and age. Illustration of the fossils and an indication of their biostratigraphic usefulness, rather than sophisticated systematic treatment of the largely poorly preserved material, are the goals of this report.

The formations in the eastern part of the study area in the northern Richardson Mountains were first described comprehensively by Jeletzky (1967), who designated them as members of the newly erected Bug Creek Formation and outlined their essential faunal characteristics. A subsequent publication (Poulton et al., 1982) provided further descriptions, regional relationships, and pointed out the significance to the stratigraphy of a major, previously unrecognized sub-Bajocian unconformity within what Jeletzky (1967) had called the "Intermediate Sandstone Member" of the Bug Creek Formation. The formations from which the presently described fossils come were named by Poulton et al. (1982), and are now all assigned to the Bug Creek Group (Table 1). The strata were discussed further in broad regional context by Poulton (1982, 1984, 1989a, in press b), and by Dixon (1982). Other accounts of the stratigraphy of the northern Richardson Mountains are given in Jeletzky (1975, 1980), Poulton and Callomon (1976), Poulton (1978a, b), and Young et al. (1976).

Stratigraphic and paleoecological summary

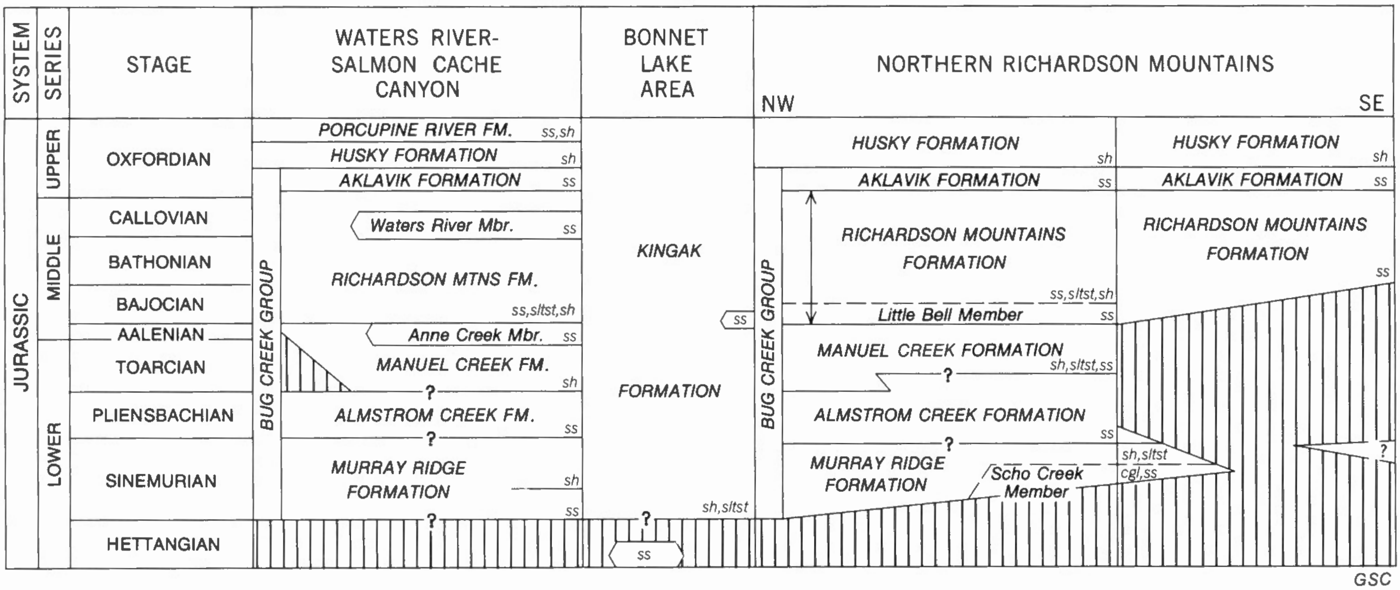
The formations in the northern Richardson Mountains (Fig. 1) are, in ascending stratigraphic order, the Murray Ridge (Sinemurian shale, with a Hettangian(?) to Sinemurian basal conglomerate and sandstone in the east called the Scho Creek Member), the Almstrom Creek (Upper Sinemurian through Lower Toarcian sandstone), and the Manuel Creek (Toarcian and Aalenian shale, with a locally developed Aalenian sandstone upper member – the Anne Creek Member) (Table 1). This succession overlies Permian strata paraconformably, and is overlain by Bajocian strata, paraconformably in the east, apparently gradationally in the west. As a whole, the Jurassic rocks in the east comprise a series of shelf sandstone complexes that are best developed in the central northern Richardson Mountains, and that grade to outer shelf shale and siltstone facies to the north, west, and south. They are epicratonic clastic wedges that become generally thicker, proportionately finer grained, and more complete in terms of the record preserved, in those directions. Dixon (1982) and Poulton (1984, Fig. 23; 1988) have discussed them in terms of sequences related to relative sea level fluctuations. In this report, reference is made to the descriptions and graphic illustrations of stratigraphic sections of the Bug Creek Group presented by Poulton et al. (1982), and no further detailed description of the sections is given here.

The Jurassic shallow marine sandstone and shale of the northern Richardson Mountains pass into a shelf shale succession to the west, the Kingak Formation (Figs. 2, 3). The Kingak is commonly structurally disturbed and poorly exposed. Because of the unsatisfactory nature of the stratigraphy of the lower parts of the Kingak in its western exposures, the Kingak has received little attention, the only description being a brief discussion by Poulton (in press b). For the same reason, no detailed stratigraphic sections of the Kingak Formation are presented in this report, the fossil occurrences being mainly from isolated localities. The stratigraphic and structural position of the localities can only be deduced from the fossils.

The Kingak Formation contains a basal sandstone of Early Hettangian age at Bonnet Lake, and basal ferruginous strata elsewhere (Frebold and Poulton, 1977; Poulton, in press b). Younger Jurassic sandstones in eastern parts of the Kingak outcrop area represent western tongues of the Bug Creek Group in some cases (Poulton et al., 1982), and localized offshore bar sands in others (Poulton, 1982, 1989b).

TABLE 1

Table of Jurassic formations, northern Yukon and adjacent Northwest Territories



The name Kingak Formation is derived from the equivalent shale formation of northeastern Alaska, named by Leffingwell (1919). The reasons for applying the same name in northern Canada have been discussed by Poulton (1982).

The sandstone formations each contain certain beds that yield an abundant and diverse macrofauna, mainly bivalves. These beds are commonly strongly bioturbated, with an ichnofauna that contains a variety of vertical and horizontal burrows. These characteristics are consistent with their shallow marine depositional settings. The intervening shale formations, in contrast, contain fewer and less varied faunas, each dominated by one or two species of ammonite. One of them, the Murray Ridge Formation, also contains articulated crinoids. These characteristics indicate accumulation below wave base, under anoxic conditions, although sparse benthic bivalve occurrences suggest that these conditions were not invariable. Farther onto the shelf, only a few beds within the Kingak shale are richly fossiliferous, and the faunas are not diverse, consisting mainly of ammonites. Sinemurian fossils are as yet undiscovered in the Kingak Formation. A hiatus on the shelf during this time is consistent with widespread regression succeeded by a transgressive event indicated by the deeper, anoxic conditions of the mainly shaly facies of this age (main part of Murray Ridge Formation) in the northern Richardson Mountains.

STRATIGRAPHY AND FOSSIL OCCURRENCES

This section contains a brief description of the faunas within their stratigraphic framework. They are organized by stage, and by substage and zone where possible. Most, but not all of the ammonites permit such precise dating. For the most part, the Lower Jurassic ammonite zones of Northwest Europe are applicable in northwestern Canada. This is partly because faunal provincialism was poorly developed and partly because of the paleobiogeographic unity of Northwest Europe and Arctic Canada in the Early Jurassic. Provincialism became extreme in the Pliensbachian, where boreal, Tethyan, and more recently, East Pacific faunas are recognized (e.g., Taylor et al., 1984). For this reason, those faunas that permit such precision are assigned to "International Standard Zones", which indicate the applicability of the Northwest European zonation worldwide. The worldwide application of zones is commonly, but not necessarily, based on the presence of identical or closely similar species to those of Europe, and implies approximate chronological contemporaneity. These extrapolations from the European standard zonations are under constant and increasing scrutiny and regional scales are being erected that reflect the differing specific and generic makeup of faunas from one place to another (e.g., Repin, 1977; Hillebrandt and Schmidt-Effing, 1981; Hillebrandt, 1987; Smith et al., 1988). Local standard scales for northern Yukon Lower Jurassic faunas have not yet been erected, because of insufficient diagnostic ammonites in sequences where mutual relationships can be ascertained.

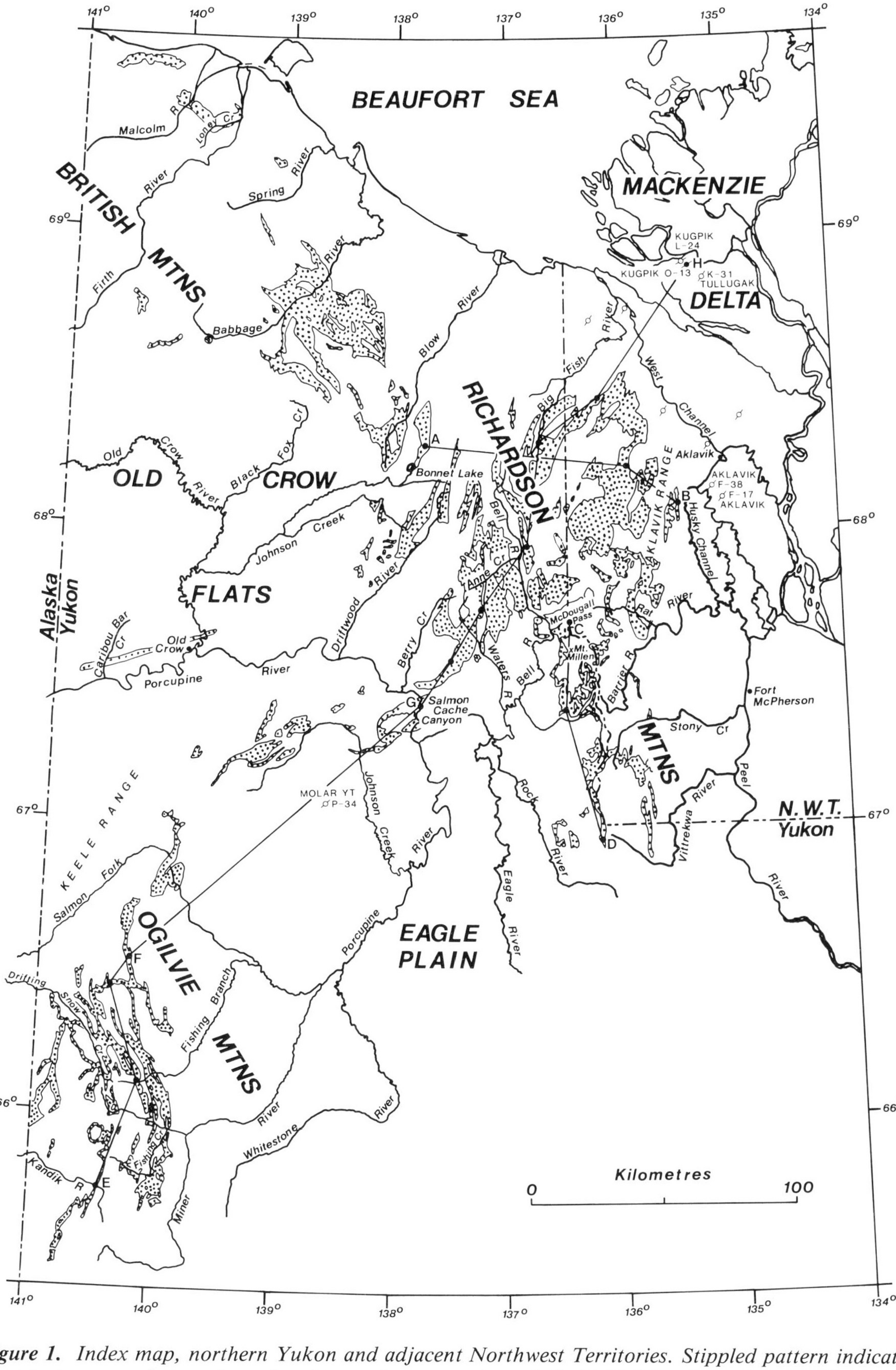


Figure 1. *Index map, northern Yukon and adjacent Northwest Territories. Stippled pattern indicates outcrop area of Jurassic rocks. Lines of cross-sections A–B, C–D (Fig. 2), and E–H (Fig. 3) are shown. (From Poulton, 1982.)*

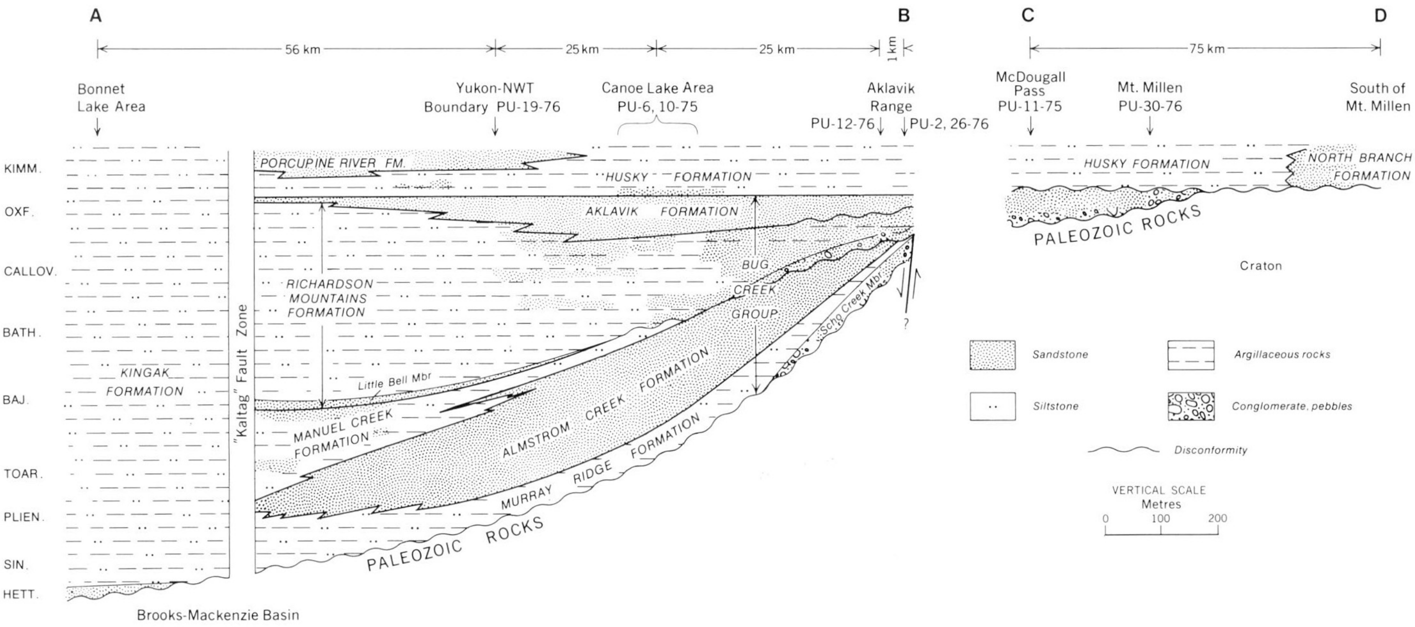


Figure 2. Cross-section from east to west across northern Richardson Mountains (A–B), and from north to south within the northern Richardson Mountains (C–D), illustrating the basinward thickening, facies changes, and more complete section to the west and northwest. Lines of sections shown in Figure 1. Stratigraphic sections are described in Poulton et al. (1982).

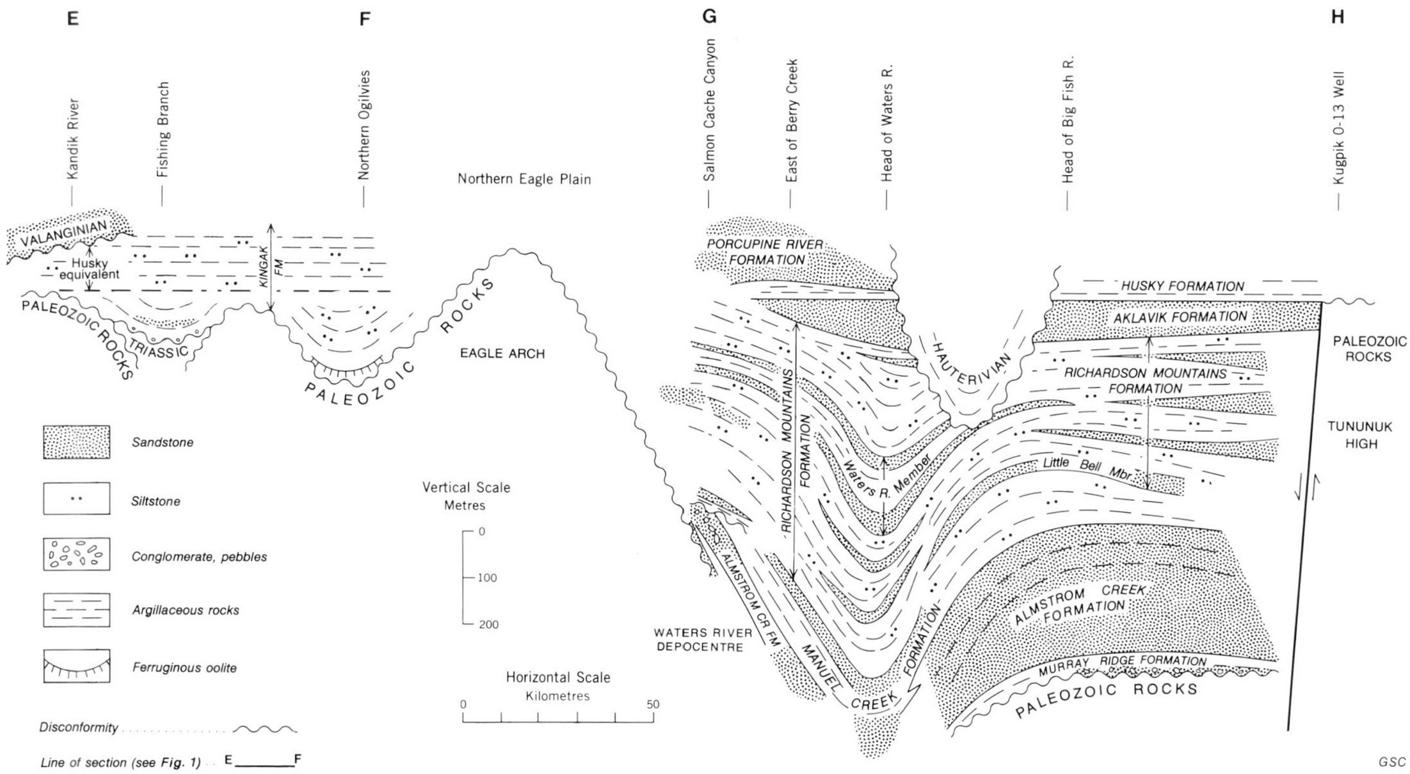


Figure 3. Northeast–southwest cross-section E–H approximately along strike of the Jurassic formations. Line of section shown in Figure 1. The southwestward shaling out and condensation of the Lower and Middle Jurassic beds along the Jurassic shorelines southwestward, away from the depocentre in the northern Richardson Mountains, is well illustrated. (From Poulton, 1987.)

Refined dating of many of the fossil occurrences is not possible because they do not contain diagnostic ammonites. Nevertheless, these occurrences are presented here in their biostratigraphic context because of their value in local correlations, paleoenvironmental implications, and as a contribution to eventual development of more formal local zonations. Many of the ammonites and bivalves are identical or closely similar to those of the northeastern U.S.S.R., and their stratigraphic ranges are similar, as is indicated for individual species in the text below, so that common zonation schemes are to be expected.

Hettangian

Two localities were described by Frebold and Poulton (1977). At one of them, two faunas assigned to the Lower Hettangian standard *Psiloceras planorbis* and *P. johnstoni* subzones of the *P. planorbis* Zone occur in sequence. These two faunas are from the lowest 0.6 m and the upper 0.15 m, respectively, of a 13 m thick sandstone that is the basal unit of the Kingak Formation north of Bonnet Lake (GSC locs. 38800, 39366, 92478, 92482, 92485). Similar faunas and lithotypes indicate the presence of this unit throughout the area of Bonnet Lake and the head of Johnson Creek (GSC locs. 85526, 85527).

The *Psiloceras planorbis* Subzone is represented by poorly preserved, small, evolute, smooth or weakly and distantly ribbed ammonites assigned to *Psiloceras* sp. indet. and *Pleuromya* sp. (Frebold and Poulton, 1977). An additional specimen of *Psiloceras*, one of *Pleuromya galathea* Agassiz, and one of an indeterminate internal mould of a distinctively shaped bivalve are illustrated in this report.

The *Psiloceras johnstoni* Subzone in succession above the *P. planorbis* Subzone north of Bonnet Lake contains *Psiloceras* (*Caloceras*) sp. cf. *P.* (*C.*) *johnstoni*, *Prosogyrotrigonia*(?) sp. cf. *P. inouyei* (Yehara), *Cardinia* sp. cf. *C. hybrida* (J. Sowerby), *C.* sp. aff. *C. concinna* (J. Sowerby), *Pleuromya* (?) sp., *Meleagrinella* sp., *Oxytoma* (*Oxytoma*) sp. and *Parallelodon* (?)sp. (Frebold and Poulton, 1977). Detailed discussion of these faunas is not repeated here. The sandstone that contains these fossils is a shallow marine, basal transgressive unit to the Kingak shale, and many of the fossils, which occur scattered throughout, have been concentrated by reworking in the uppermost beds just below the overlying shale.

Additional probable Hettangian occurrences in the same general area, which do not contain diagnostic fossils, require some discussion of stratigraphic and regional relationships for the documentation of their probable age. Their ages and relative stratigraphic and paleogeographic situations are not yet known with certainty, but it appears that the earliest Jurassic is an interval with lithologically varied and complex relationships, perhaps indicative of relief on the sub-Jurassic surface, and perhaps influenced by a series of short-lived transgressions and regressions.

A sandstone bed outcropping at the head of Johnson Creek probably represents another occurrence of the basal Kingak sandstone north of Bonnet Lake described by Frebold and Poulton (1977). Like that sandstone, it is fine grained and ferruginous, and contains some beds rich in *Cardinia* (e.g., GSC loc. C-81332). Approximately 100 m of section there is rich in sandstone, but only the upper 20 m or so, above a 1.5 m thick lens of chert pebble conglomerate, is thought to be Lower Jurassic. It is somewhat heterogeneous lithologically and contains minor, interbedded shale. In particular, at its base and just above the conglomerate lens, is an interval that is notably ferruginous and contains beds of chamosite oolite with phosphate nodules and fossiliferous lenses (GSC loc. C-81330). The fossils include *Oxytoma*, "*Chlamys*", "*Ostrea*", *Gryphaea*(?), *Lima*(?), *Thracia*(?), other bivalves, rhynchonellid brachiopods, and crinoids. Although many of the fossils are different from those in the Bonnet Lake section, the abundance in some beds of *Cardinia*, like those north of Bonnet Lake (*Cardinia* is so far unknown elsewhere in the basin), and the regional stratigraphic relationships suggest that these lower fossiliferous beds at the head of Johnson Creek are equivalent to those assigned to the *Psiloceras planorbis* Zone at Bonnet Lake. The sandstone at the head of Johnson Creek is overlain by black shale containing rusty, ferruginous concretionary bands 10 to 15 cm thick and minor thin (5-10 cm) beds of gritty siltstone with chert pebbles as large as 1 cm in diameter. Fossils from this shale (GSC loc. C-81329) include *Pentacrinus, Pleurotomaria*, and pectinid bivalves, which, together with the stratigraphic situation and the associated rock types, tie the interval to the basal Bug Creek units in the northern Richardson Mountains to the east.

The basal Jurassic phosphatic and pebbly bed at Murray Ridge (GSC locs. 41454, 94053, C-53361) may be Hettangian or Lower Sinemurian, judging by the occurrence of fragmentary ammonites, possibly *Ectocentrites* and *Badouxia*, which are illustrated in this report. Other fossils from this unit include *Pseudomytiloides*(?), *Pleuromya galathea* Agassiz, *Gryphaea*(?), *Cardinia*(?), *Liotrigonia atirdjakensis* (Koschelkina), *Oxytoma* (*Oxytoma*), *Kolymonectes staeschei* (Polubotko), *Eopecten*(?), *Camptonectes* (*Camptonectes*), *Entolium*(?), *Harpax* sp. cf. *H. spinosus*

(Sowerby), *Lima parva* Milova, *Homomya*, and *Corbicula*(?).

This unit overlies Permian beds paraconformably, and is overlain by shales that contain Upper Sinemurian *Echioceras*. It has been described in detail by Poulton et al. (1982). Paleogeographically, this bed outcrops just westward and just basinward of outcrops of the Scho Creek Member (Upper Sinemurian), and cratonward of the Hettangian basal Kingak beds in the Bonnet Lake area described above and by Frebold and Poulton (1977). The bed also outcrops cratonward of the Hettangian(?) basal Bug Creek beds between Big Fish River and Little Fish Creek described by Poulton et al. (1982, Section PU-1-78). Based on regional relationships, the basal Murray Ridge beds at Murray Ridge could be of either Hettangian or Early Sinemurian age. None of the ammonites has arietitid (Early Sinemurian) affinities, and the ammonites and abundant and varied bivalves are described in this report as Hettangian(?).

The basal Bug Creek beds between Big Fish River and Little Fish Creek are rusty sandstones with phosphate nodules and chert pebble beds at the base. They contain a bivalve fauna dominated by *Gryphaea*, and less common *Kolymonectes* and *Entolium* (GSC locs. C-53354, C-53355); that is, a similar fauna to the basal Murray Ridge fauna at Murray Ridge, although different in lithological detail and faunal dominance. This Hettangian(?) *Gryphaea*-bearing sandstone underlies black shales, typical of the Murray Ridge Formation, which contain Early Sinemurian *Coroniceras*(?) (Poulton et al., 1982).

Elsewhere, to the southwest in the northern Ogilvie Mountains, presumed equivalents at the base of the Kingak include 9 m of hematite oolite at one locality (lat. 66°31′N, long. 140°15′20″W; GSC loc. C-92521 on GSC Map 1522A by D.K. Norris), and 1 m of conglomerate succeeded by shale with ferruginous oolite at another (see Jeletzky, 1971, p. 214).

Thus Hettangian or possibly Hettangian beds are geographically restricted but lithologically varied in the northern Yukon. The regional correlation and approximate dating of the basal Jurassic beds rely largely on considerations of the distribution of *Cardinia*, phosphatic iron oolite beds, and stratigraphic relationships.

Sinemurian

A few scattered occurrences document the presence of the Lower Sinemurian, but there is insufficient faunal material and no stratigraphic sequence to zone it. The ammonites include *Arnioceras* sp. cf. *A. douvillei* (Bayle) (GSC loc. 92595) and *Coroniceras* (?) sp. (GSC loc. C-53357), and bivalves are abundant at the former locality. They include *Gryphaea*, *Meleagrinella*, *Eopecten*(?), *Entolium*(?), *Corbula*(?), and *Corbicula*(?). The Lower Sinemurian fossils are mainly from isolated localities in the lower part of the Murray Ridge Formation. All are illustrated here for the first time.

Two Upper Sinemurian faunas occur in succession in the Murray Ridge Formation. They were assigned to the *Oxynoticeras oxynotum* and *Echioceras raricostatum* zones (Frebold, 1960). The former or lower zone, represented in the Scho Creek Member of the northeastern Richardson Mountains (GSC locs. 25762, 25763, 25765, 26879, 26925, 26973, 26975, 27976, 27978, 27979, 92581, 94026, 94027, 94091, C-4232, C-6612), is characterized above all by *Aegasteroceras* (*Arctoasteroceras*) *jeletzkyi* Frebold, and it also contains *Oxynoticeras oxynotum* (Quenstedt), *Gleviceras*, *Aegasteroceras* spp. indet., *Microderoceras*(?), *Cenoceras* sp. aff. *C. intermedius* Sowerby, and many bivalves, including *Inoceramus* (*Mytiloides*) sp. cf. *M. rassochaensis* Polubotko, *Pholadomya idea* d'Orbigny, *Gresslya*(?), *Pleuromya galathea* Agassiz, *Kolymonectes staeschei* (Polubotko), *Corbula*(?), *Mactra*(?), *Corbicula*(?), *Tellina*(?), and *Nucula*(?), as well as the marine alga *Sagenopteris*. An enigmatic ammonite resembling *Paltechioceras* is probably part of the same fauna (GSC loc. C-106109), although it is possible that it was collected from higher beds, consistent with the younger range of the genus worldwide. One locality (GSC loc. 88066) lying far south of the otherwise known distribution of Lower Jurassic rocks in the report area contains Upper Sinemurian fossils, including *Aegasteroceras*, bivalves and brachiopods (Ager and Westermann, 1963), some of which are illustrated in this report. It has not been possible to find this unusual locality and thus the validity of the locality data for this assemblage is in question (Poulton et al., 1982).

The *Echioceras raricostatum* Zone is represented mainly by many crushed specimens of *Echioceras aklavikense* Frebold and undeterminable *Echioceras*(?) sp. The zone is represented in the main, upper argillaceous parts of the Murray Ridge Formation in the Aklavik Range of the northern Richardson Mountains (GSC locs. 26976, 85926, 92582, C-80309). The ammonites occur in thin siltstone bands in the shale formation. In addition, articulated crinoid columns lie on bedding planes within the shale.

West of the Aklavik Range, as for example at Murray Ridge, two faunas occur in succession. Their ages are somewhat enigmatic because of the poor preservation of the ammonites. The lower fauna occurs in the thin basal bed of the Jurassic, which is characterized above all by a rich assemblage of bivalves, and the gastropod "*Pleurotomaria*". It is treated in this report as possibly Hettangian and is discussed above. Above it, in concretions in the Murray Ridge shale formation (GSC locs. 92602, 94055) are squashed ammonites, first identified as *Vermiceras* by C.R. Stelck (*in* Jeletzky, 1967). They are now assigned to *Echioceras*, and they indicate the age equivalence of this shale with its lithological counterpart in the Aklavik Range to the east. Other fossils in this shale are *Goniomya*, *Gryphaea*(?), and *Meleagrinella*.

The 0.1 to 0.3 m thick, basal Jurassic coquina near Salmon Cache Canyon along Porcupine River (GSC loc. 35919; Poulton, 1978) is thought to be Sinemurian. It contains *Eopecten*(?), *Lima parva* Milova, *Oxytoma* (*Palmoxytoma*) *cygnipes* (Young and Bird), and *Entolium*. Higher beds there form a recessive shale-siltstone unit, 2.3 m thick, and a rust-coloured, fine to medium grained sandstone, characterized by abundant *Gryphaea*, by rhynchonellid brachiopods and by the marine alga *Sagenopteris* (GSC loc. 92559). Specimens of Upper Sinemurian *Paltechioceras* (*Orthechioceras*) sp. cf. *P.* (*O.*) *radiatum* (Trueman and Williams), collected loose along the river (GSC loc. 85359), presumably come from this sandstone.

Lower beds of the Almstrom Creek Formation are Late Sinemurian, at least in places, as is indicated by the presence of one small fragment of *Echioceras*(?) in Aklavik Range (Pl. 2, fig. 16, GSC loc. 92596). Additional faunas from this locality include *Pholadomya ambigua* Sowerby(?), and *Entolium*(?). Lower beds of the formation elsewhere (e.g., GSC locs. 94023, 94120), which are also thought to be Late Sinemurian in age, based on the similarity of their faunas with those of known Sinemurian age elsewhere in the area, contain *Pleuromya galathea* Agassiz, *Meleagrinella*, *Oxytoma* (*Oxytoma*) sp. cf. *O. sinemuriensis* (d'Orbigny), and *Mactra*(?). Other fossils from the Almstrom Creek Formation that may be either Late Sinemurian or Pliensbachian in age are listed below under "Pliensbachian".

Pliensbachian

Only the *Amaltheus stokesi* Subzone of the *Amaltheus margaritatus* Zone of the Late Pliensbachian is documented with certainty, by the presence of *Amaltheus stokesi* and *A. bifurcus*. As in the Canadian Arctic Islands (e.g., Frebold, 1975; Poulton, in press a) the Pliensbachian is poorly represented in terms of the number and variety of faunas and zones present, compared to British Columbia, Europe and even northern Siberia.

The presence of the Almstrom Creek Formation and of the Upper Pliensbachian in Old Crow Flats, south of Porcupine River (GSC loc. 88278), was recorded by Poulton (1982). It is documented by a small fragment of *A. bifurcus* Howarth associated with abundant *Lingula*, which also appears to be characteristic of some beds of the formation in the northern Richardson Mountains. The Almstrom Creek Formation also contains probable Late Sinemurian *Echioceras* (see above), but is otherwise poorly dated. It can probably be considered mainly Pliensbachian because of its stratigraphic position between beds with Upper Sinemurian and Lower Toarcian fossils. The bivalves, which are are locally common in some beds of the formation (e.g., GSC locs. 92580, 94059, 94135, 94181, 94186, C-6147, C-53351) are treated here as either Late Sinemurian or Pliensbachian in age, unless there is clear evidence of their age. Characteristic of certain beds of the formation are *Liotrigonia atirdjakensis* (Koschelkina), *Ostrea* sp., *Pholadomya ambigua* Sowerby, and *Lingula*. Other fossils include *Pleuromya* spp., *Lima, Modiolus, Mactra*(?), *Camptonectes* (*Camptochlamys*), *Aguilerella, Harpax* sp. cf. *H. spinosus* (Sowerby), *H. laevigatus* (d'Orbigny), *Meleagrinella* sp. aff. *M. ansparsicosta* Polubotko, *Oxytoma* (*Oxytoma*) sp. cf. *O. inequivalvis* (Sowerby), *O.* (*Palmoxytoma*) *cygnipes* (Young and Bird), *Eopecten*(?), and *Otapiria*(?) sp. cf. *O. limaeformis* Zakharov.

Upper Pliensbachian beds in the Kingak shale are documented mainly by abundant *Amaltheus stokesi* (Sowerby) and less commonly by *A. bifurcus* Howarth. They occur at Loney Creek in northwesternmost Yukon (GSC locs. 52570, 52687, 52688, 52690, 52692, 52693, 52698, C-53471, C-53472, C-53473, C-53476, C-53478, C-53480, C-53481, C-53490, C-53491, C-53495, C-53496) and north of Bonnet Lake (GSC locs. 39368, 92586). The fossiliferous Upper Pliensbachian shales at Loney Creek make up the interval from about 60 to 100 m above the base of the Kingak. The lower 60 m of the Kingak consist of shales that have not yielded diagnostic fossils but that do contain rare crinoid fragments and nondescript bivalves. The Loney Creek material was described by Frebold et al. (1967) and only a few additional specimens are illustrated in this report. Additional fossils in the Upper Pliensbachian beds at Loney Creek include *Otapiria*(?) sp. cf. *O. limaeformis* Zakharov, *Camptonectes* (*Camptochlamys*) and articulated crinoids of the genus *Seirocrinus*. The Upper Pliensbachian ammonites north of Bonnet Lake occur in about the same interval above the base of the Kingak, above an unfossiliferous shale that overlies the Hettangian basal Kingak sandstone. *Amaltheus stokesi*, *A. bifurcus* and possibly also *A. margaritatus* de Montfort were identified by J.H. Callomon and the writer in the field at this locality, but the main part of the collection is now lost. The specimens were associated with abundant *Gryphaea*, and with *Oxytoma* (*Palmoxytoma*) *cygnipes* (Young and Bird), *Entolium, Harpax laevigatus* (d'Orbigny), *Spiriferina*(?), *Rudirhynchia*, and crinoid fragments (GSC loc. 92586). A single specimen of *Amaltheus* has been found in the Kingak shale along Johnson Creek in a structurally disturbed succession where its stratigraphic relationships are not clear (GSC loc. 92516).

Pleuroceras(?) sp. also occurs north of Bonnet Lake, and suggests the presence there of uppermost Pliensbachian beds, of the *Pleuroceras spinatum* Standard zone although it was collected together with *Amaltheus*.

Coarsening-upward *Gryphaea*-rich shoals on Johnson Creek, in the order of 30 to 60 m thick, may be Late Pliensbachian in age (GSC locs. 92518, 92519, C-81339; Poulton, 1989b). They are found in an isolated exposure that may be faulted against younger Kingak beds. Their base has not been seen and no ammonites have been found in the same exposure. The tentative dating relies on the similarity of the *Gryphaea* specimens with those in the Upper Pliensbachian north of Bonnet Lake, on the probability of *Gryphaea*-rich beds forming areally widespread deposits, and on the presence of a fragmentary *Amaltheus* specimen in the creek bed downstream from the *Gryphaea* shoals.

Toarcian

Lower Toarcian fossils are widespread, but not abundant in the Manuel Creek and Kingak formations. They are generally found in black shale, which contain a restricted ammonite fauna. Bivalves and other benthic organisms are rare. These facies are characteristic of the Lower Toarcian in many parts of western and Arctic Canada and of much of the world, indicating a widespread anoxic (Jenkyns, 1988) transgressive (Poulton, 1988) event. The record of Middle or Upper Toarcian fossils and strata is meager and uncertain. Nevertheless, many collections from these formations, from an interval between clearly Lower Toarcian strata below and Aalenian strata above, contain bivalves, belemnites, and nondescript small specimens of *Pseudolioceras*, which could possibly be of Late Toarcian age. Because similar species occur with diagnostic Aalenian ammonites, however, they are most likely Aalenian. These fossils of questionable age are not treated at length in this report.

Lower Toarcian

The presence of *Dactylioceras* indicates the Lower Toarcian in the lower, and perhaps as high as the middle parts of the Manuel Creek Formation at Murray Ridge (Poulton et al., 1982, p. 26). Farther west and northwest, shale of the Manuel Creek Formation below the Anne Creek Member contains *Dactylioceras* and harpoceratids on the ridges between Big Fish River and Almstrom Creek (GSC loc. 94106, Poulton et al., 1982, Section PU-18-76), and in the area of Mt. McGuire and the head of Waters River (GSC locs. 39342, 94075, C-53375, C-53386; Frebold, 1960; Poulton et al., 1982, Sections PU-11-76, PU-5-78).

Probable Lower Toarcian ammonites, such as *Dactylioceras*, other dactylioceratids, and harpoceratids and *Hildaites*(?) occur sporadically in the Kingak shale, in the vicinity of Bonnet Lake and Johnson Creek (GSC locs. 86821, 86855, 86856, C-4215; Frebold, 1975) and in the Loney Creek and lower Firth River area (GSC locs. 52688, 52689, C-53469, C-53497; Frebold et al., 1967). The latter area has yielded *Collina*(?) and *Ovaticeras*.

Middle or Upper Toarcian

Rare collections contain poorly preserved ammonites that may be Coeloceratidae and *Pseudolioceras*, and which therefore may be Middle Toarcian in age (e.g., GSC loc. C-53492 at Loney Creek). The record of *Peronoceras* sp. cf. *P. polare* (Frebold) from the Mt. McGuire area (GSC loc. 86535) (Frebold, 1975, p. 5, 19; repeated in Poulton et al., 1982, p. 28) cannot be confirmed in the existing collection. What little remains of the collection contains ammonites that do not appear to be Toarcian but may be Middle Jurassic. *Pseudolioceras kedonense* Repin(?) and *Inoceramus* (*Mytiloides*) sp. occur in the Kingak shale in the Bonnet Lake area (GSC loc. 92588) and *P. lectum* (Simpson) has been found along Johnson Creek (GSC loc. 92515).

Aalenian

As in the Arctic Islands of Canada, and northern Siberia, Lower and Upper Aalenian faunas are recognized, and can be assigned to the *Leioceras opalinum* and *Erycitoides howelli* zones, respectively. In the northern Richardson Mountains, the Aalenian is represented in the middle and upper Manuel Creek

Formation (Poulton et al., 1982), and, farther west, part of the Kingak Formation is Aalenian. The Manuel Creek Formation is a coarsening-upward shale to sandstone succession that changes facies westward into the Kingak shale-siltstone facies, and which contains a locally developed upper barrier-bar sandstone member, the Anne Creek Member.

Lower Aalenian

The Lower Aalenian is known with certainty only at one locality in northern Yukon, in the Kingak Formation along Johnson Creek (GSC locs. 92513, C-81334). Here, Aalenian strata contain *Leioceras* sp. cf. *L. opalinum* (Reinecke), which permits correlation with the *Leioceras opalinum* Standard Zone, and *Pseudolioceras* spp. Poorly preserved ammonites that may represent *Leioceras* also occur in other collections from the same area (GSC locs. 92514, 92515).

Pseudolioceras mclintocki (Haughton) or a similar species has also been found in the vicinity of Salmon Cache Canyon on the Porcupine River (GSC loc. 86543), near shales that could represent the Manuel Creek Formation (Poulton, 1978, 1987) as well as in the Kingak Formation in the Bonnet Lake area (GSC locs. 86823, 88654). *Pseudolioceras mclintocki* might suggest an Early Aalenian age, as indicated by the association of *P. mclintocki* and "*L. opalinum*" in the Canadian Arctic Islands (Frebold, 1957a, 1960; Poulton, in press a) and Siberia (Sei et al., 1986).

Upper Aalenian

The Upper Aalenian is characterized primarily by *Erycitoides howelli* (White). The middle and upper parts of the Manuel Creek Formation in the central parts of the northern Richardson Mountains are Upper Aalenian, containing *Erycitoides* and *Pseudolioceras* spp. (GSC locs. 92605, 94040, 94041, 94190, 94192, C-53364; see Poulton et al., 1982, Sections PU-12, 14-75, PU-9-76). *Erycitoides* occurs in the Manuel Creek Formation along the ridges between Big Fish River and Almstrom Creek (GSC loc. 94121; Section PU-19-76 of Poulton et al., 1982). The Upper Aalenian is also represented in the equivalent unit farther southwest, in the vicinity of the head of Waters River and Mt. McGuire in the western parts of the northern Richardsons. Here the sandstones are thicker and more prominent, forming what appears to be a barrier bar sequence called the Anne Creek Member, which is fossiliferous in its lower part in some places (e.g., GSC locs. 87820, Jeletzky, 1972b, p. 38, unit 6; C-53376, C-53387, C-53412; Sections PU-5-78, PU-6-78 of Poulton et al., 1982). The faunas here, as well as many in the Kingak Formation even farther west at the headwaters of Johnson Creek near Bonnet Lake (GSC locs. 88097, 92517, C-81294, C-81295, C-81296, C-81297), along Johnson Creek south and southwest of Bonnet Lake (GSC locs. 39360, C-81340, C-81341, C-81346), and in the Trout Lake and Barn Mountains areas between Blow and Babbage rivers (GSC locs. 41483, 44211, C-53452, C-53453, C-53455, C-53456) are Upper Aalenian; *Erycitoides howelli*, other *Erycitoides* species, *Pseudolioceras whiteavesi* (White), other *Pseudolioceras* species, and *Planammatoceras* occur.

Other Aalenian occurrences and faunas

Characteristic Aalenian taxa, apart from the ammonites mentioned above, include the bivalves *Propeamussium* (*P.*) *patriciae* n. sp., *Astarte aalensis* Oppel, *Inoceramus* (*Mytiloceramus*) sp. cf. *I.* (*M.*) *polyplocus* (Roemer), and *Vaugonia* n. sp.(?). Less diagnostic taxa in the Aalenian include the bivalves *Oxytoma* (*Oxytoma*) *ferrugineum* (Rollier), *Meleagrinella*, *Entolium*, *Eopecten*(?), *Gresslya*, *Pleuromya*, *Homomya*, *Protocardia*, and ostreiid bivalves. These taxa are illustrated from the general vicinity of Mt. McGuire and the head of Waters River (e.g., GSC locs. 39343, 39344), Murray Ridge (GSC locs. 94050, 94051, 94052; Poulton et al., 1982, Section PU-9-76), and from the ridges between Bell River and White Mountains (GSC loc. 86565), as well as from ammonite-bearing localities listed in the previous section.

PALEOBIOGEOGRAPHIC AFFINITIES

The Hettangian faunas reported previously (Frebold and Poulton, 1977) were stated to have affinities with those of Northwest Europe and Japan, and those described as Hettangian(?) in this report perhaps have similarities with the faunas of Mediterranean Europe and Nevada as well. European and Asian affinities are indicated particularly for the Sinemurian ammonites described here. In the Upper Pliensbachian, a clear Boreal fauna can be seen, characterized by Amaltheidae and distinct from that of southern Europe (e.g., Howarth, 1973), the southern parts of the Americas, and southern Asia. It is strongly allied with the Northwest European and northern Siberian boreal faunas, and reflects the first very strong global faunal provincialism in the Jurassic. The same appears true for the Lower Toarcian ammonites, although they are not so clearly distinguished from southern European forms. Whereas Lower Aalenian *Leioceras opalinum* is undifferentiable from its European counterparts, as far as can be seen based on the unsatisfactory material available, *Pseudolioceras mclintocki* is most closely related to Aalenian northern Siberian and Canadian Arctic faunas, and the various species of *Erycitoides* seem to comprise a mainly north Pacific group. The bivalves generally show closest ties with northern Siberia and northwest Europe.

The absence of the cosmopolitan (except Boreal) genus *Tmetoceras* may be a result only of the rarity of Lower Aalenian rocks, and may not have major biogeographic significance, although the genus is absent in the Lower Aalenian of the Canadian Arctic Islands as well.

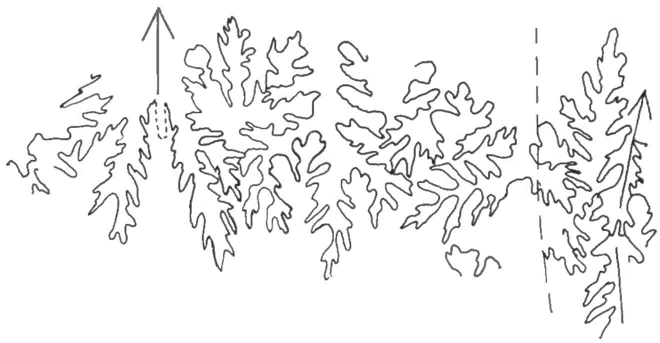


Figure 4. Outer and inner suture pattern, Ectocentrites(?) sp.; figured specimen GSC 92481 from GSC loc. 94053. Whorl height 9 mm. Umbilical seam dashed.

SYSTEMATIC PALEONTOLOGICAL NOTES

Phylum MOLLUSCA

Class CEPHALOPODA

Order AMMONOIDEA Zittel, 1884

Suborder LYTOCERATINA Hyatt, 1889

Superfamily LYTOCERATACEAE Neumayr, 1875

Family ECTOCENTRITIDAE Spath, 1926

Genus *Ectocentrites* Canavari, 1888

Ectocentrites(?) sp.

Plate 1, figures 2-5; Figure 4

Comments. This taxon is represented by a small fragment from the basal Murray Ridge Formation at Murray Ridge (GSC loc. 94053). The smallest whorl preserved has a strongly depressed cross-section. The ribs are simple, straight, and strong, and terminate at weakly developed ventrolateral nodes. The venter is nearly smooth with very weak ribs crossing it with slight forward deflection. The next, largest, whorl preserved has very weak, simple, straight ribs on the flanks. Their ventral terminations are slightly raised to form a subtle ventrolateral shoulder. This small fragment is not generically determinable, but is clearly Hettangian or Sinemurian in affinities and the suture pattern (Fig. 4) suggests assignment to the Lytocerataceae. Except for the weak ventrolateral swellings of the ribs and the stouter cross-section of the Canadian specimen, Lower Hettangian *Psiloceras* (*Paraphylloceras*) *calliphyllum* (Neumayr) and *P.* (*P.*) *strongolum* Lange are very similar (Lange, 1952, Pl. 13, figs. 3a, b; Pl. 14, figs. 6a, b). Additionally, some later Hettangian species of *Saxoceras*, *S. aequale* (Simpson) (*in* Howarth, 1962) and *S. costatum* (Lange) (*in* Arkell et al., 1957) are similar.

The smooth venter and ventrolateral swellings are similar to those of *Ectocentrites* Spath, but this genus generally remains ribbed to later growth stages. The weak ventrolateral swellings on the juvenile shell might suggest a relationship with *Alsatitoides* Guex (1980) but the later growth stages are entirely different. The present specimen is not closely similar to any Sinemurian forms known to the writer, although the basal bed from which it came had been thought previously to be Sinemurian (Poulton et al., 1982), on the basis of regional relationships and the general character of the overall fauna.

Suborder AMMONITINA Hyatt, 1889

Superfamily PSILOCERATACEAE Hyatt, 1867

Family PSILOCERATIDAE Hyatt, 1867

Genus *Psiloceras* Hyatt, 1867

Psiloceras(?) sp.

Plate 1, figure 1

Psiloceras sp. indet. Frebold and Poulton, 1977, p. 91, Pl. 1, figs. 1, 2.

Comments. One fragment is illustrated here in addition to those figured by Frebold and Poulton (1977). It is from the basal Jurassic beds near Bonnet Lake (GSC loc. 92482) and is somewhat more strongly ribbed than others previously described from the same bed.

Family SCHLOTHEIMIIDAE Spath, 1923

Genus *Badouxia* Guex and Taylor, 1976

Badouxia(?) sp.

Plate 1, figures 6, 7

Comments. Together with the undeterminable small specimen described above, these two fragments are the only ammonites that are available from the basal beds of the Jurassic at Murray Ridge (GSC loc. 94053). They are undeterminable, but could easily represent some Hettangian ammonites such as those described from Nevada as *Discamphiceras* or *Kammerkarites* by Guex (1980, Pl. II, fig. 2, Pl. III) or *Waehneroceras*. They are very similar to *Badouxia*, which was originally thought to be Hettangian, but is now (Guex and Taylor, 1976) considered to be a Sinemurian, western North American genus. The present fragments do not appear to have arietitid (i.e., Early Sinemurian) affinities.

Family ARIETITIDAE Hyatt, 1875

Genus *Coroniceras* Hyatt, 1867

Coroniceras(?) sp.

Plate 1, figures 8, 9

"*Arietites*" sp. cf. "*A.*" *bucklandi* (Sowerby). Imlay, 1955, p. 87, Pl. 10, figs. 7, 8.

Arietites sp. cf. *A. bucklandi* (Sowerby). Imlay, 1981, p. 32, Pl. 4, figs. 11, 12.

Comments. The cross-section is more inflated, the ribs stronger and more widely spaced, and the ventrolateral shoulders less well developed than in the *Arnioceras* species described here, and the fragment is too small to meaningfully compare with other arietitid genera or species. *Arnioceras oppeli* Guerin-Franiatte is similar in its stout, subquadrate whorl section and ribbing style and *A. arnouldi* (Dumortier) (*in* Guerin-Franiatte, 1966) is similar except for its finer ribbing. The absence of the critical inner whorls on the Canadian specimens makes assignment to *Arnioceras* unsupportable, however, without other evidence. The single fragment available occurs alone in the northwesternmost Richardson Mountains (GSC loc. C-53357; Poulton et al., 1982, p. 117). The specimen is apparently identical to that illustrated from northern Alaska (Imlay, 1955, 1981).

Genus *Arnioceras* Hyatt, 1867

Arnioceras sp. cf. *A. douvillei* (Bayle)

Plate 1, figures 12-17

Comments. Four specimens are assigned to *Arnioceras* because of their smooth inner whorls, and the typical ribbing and venter of the juvenile growth stages. However, with their well developed tricarinate venter at the largest growth stage preserved, and straight (on the flanks), sharp ribs that terminate rapidly, with a slight forward curvature beyond ventrolateral swellings, they are not typical of most species (e.g., Quenstedt, 1883-1885; Jaworski, 1931), especially the genotype designated in 1954 by ICZN Opinion 307, *A. cuneiforme* Hyatt (see also Arkell et al., 1957). In all characters, but particularly the tricarinate, bisulcate venter, the Canadian species seems to be closest to *Arnioceras douvillei* (Bayle), *A. falcaries* (Quenstedt) and to several specimens assigned to various species of *Arnioceras* by Fucini (1902, Pl. XVII(XX), figs. 12a, b; Pl. XVIII(XXI), figs. 1a, b, c, 6b). *Arnioceras douvillei* was placed in synonymy of *Arnioceras arnouldi* (Dumortier) by Guerin-Franiatte (1966), p. 279, Pl. 151). However, only the holotype of *A. douvillei* figured by Guerin-Franiatte has the venter characteristic of the Canadian species; other specimens, including the lectotype of *A. arnouldi* designated by Guerin-Franiatte, and the original figures of Dumortier (1867, Pls. V, VI) do not. Two figures of ammonites published by Wright (1878-1886, p. 275, Pls. III, IV) and identified as *Coroniceras* (*Primarietites*) by Donovan (1953, p. 25, 26) and figures of *Coroniceras westfalicum* Lange (1952, Pl. XX, figs. 4a, 5a, 6a) show that some Arietitinae have smooth juvenile stages like *Arnioceras*, so that this character is not an infallible generic indicator. It is not clear, however, whether the smooth inner whorls of Wrights's specimens may be an artifact of the artist, however. They also resemble *Ammonites difformis* Emmrich figured by Hauer (1856).

Arnioceras has been illustrated from northern Alaska (Imlay, 1981, p. 33, Pl. 5, figs. 5, 6, 9-24), but the specimens described here are not closely similar to these forms.

Genus *Aegasteroceras* Spath, 1925

Aegasteroceras sp.

Plate 2, figures 7-10

Arctoasteroceras jeletzkyi Frebold (subgen. of *Aegasteroceras*?). Ager and Westermann, 1963, p. 602.

Comments. Two fragments are assigned to this genus, although they are more involute, more compressed and their ribs more closely spaced than is typical for the genus or for *A.* (*Arctoasteroceras*) *jeletzkyi*, which occurs in the same collection. Most specimens of the latter species have a less strongly arched, more rounded venter. The specimens described here do not appear to be closely comparable to any described species.

Subgenus *Arctoasteroceras* Frebold, 1960

Frebold (1960) commented on the similarities of *Arctoasteroceras* with *Aegasteroceras* but differentiated it on the basis of more common asymmetry of the suture line and less strongly developed ribs on the venter of *Arctoasteroceras*. Nevertheless, soon after it was erected, *Arctoasteroceras* was suggested to be a junior synonym of *Aegasteroceras* Spath (Westermann, *in* Ager and Westermann, 1963, p. 602; Donovan and Forsey, 1973; Donovan et al., 1981). For present purposes, it is treated as a distinct subgenus, because of the fading of the ribs on the ventral part of the flanks and their absence over the venter, or the presence of secondaries over the venter, in *Arctoasteroceras*. Judging by recent illustrations (Guerin-Franiatte, 1966, Pls. 189, 192) of the holotypes of the type species of *Aegasteroceras*, *A. simile* Spath and very similar *A. sagitarrium* (Blake), the ribs strengthen ventrally, if anything, and are not significantly curved forward as in *Arctoasteroceras*.

Aegasteroceras (*Arctoasteroceras*) *jeletzkyi* Frebold

Plate 2, figures 3-6

Arctoasteroceras jeletzkyi Frebold, 1960, p. 14, Pl. II, figs. 1-5, Pl. III, figs. 1-3.

Comments. Arctoasteroceras jeletzkyi was illustrated by Frebold (1960); only a few additional specimens, from the Scho Creek Member in Aklavik Range, are figured here to record certain other morphological details, particularly the character of the inner whorls. The species exhibits a rather small range of morphological variability.

Whereas the specimens figured by Frebold (1960) emphasize the very faint keel on the venter, this character is not generally developed on the inner whorls, where faint projected ribs are characteristic of many specimens. These are more numerous than the primaries, which fade part way up the flank, and are separated from them by a narrow, spiral, smooth space.

Aegasteroceras (*Arctoasteroceras*?) sp.

Plate 2, figures 1, 2

One fragment from the Scho Creek Member at Jurassic Butte is compressed and has an acuminate venter, compared to most specimens of the rarely variable *A. jeletzkyi*. Its identification is questionable, but other characters, in particular the manner in which the ribs fade ventrally, and weak projected ribs reappear over the venter, resemble that species.

Family ECHIOCERATIDAE Buckman, 1913

Genus *Echioceras* Bayle, 1878

Echioceras aklavikense Frebold

Plate 2, figures 11, 13-15, 17, 18

Echioceras s.l. sp. indet. Frebold, 1960, p. 17, Pl. 5, figs. 1-3.

Echioceras aklavikense Frebold 1975. p. 9, Pl. 2, figs. 2-8, 9a-c.

Comments. A few specimens are illustrated here from Aklavik Range and Murray Ridge to supplement the original description. Although all specimens are crushed, the cross-section appears to have been rather stout, and there may have been significant ventrolateral shoulders.

The generic assignment of the present specimens within the Echioceratidae as presently understood (Getty, 1973) is problematical. In the closely spaced style of ribbing, they are not closely similar to the type of *Echioceras*, *E. raricostatum* (Zieten), but one species, *E. intermedium* (Trueman and Williams) is similar. Getty (1973) considered *E. intermedium* to possibly be transitional to *Paltechioceras*. *Paltechioceras delicatum* (Buckman) and *P. planum* Trueman and Williams (Getty, 1973) are also similar but are apparently smaller than the Canadian specimens, which lack the bisulcate venter characteristic of *Paltechioceras*.

The closely spaced ribbing and general form are very similar to those of an early species of *Leptechioceras*, *L. charpentieri* (Schafhautl) (Getty, 1973, Pl. 2, fig. 6), but the strength of the ribs on the large growth stages of the Canadian specimens distinguish them from the more typical species of *Leptechioceras*, on which ribbing fades after the juvenile growth stages. A specimen illustrated as *Orthechioceras* sp. by Getty (1973, Pl. 2, fig. 8) is similar to *E. aklavikense*, and the characteristics that Getty (1973) considered to distinguish *Orthechioceras* from *Paltechioceras*; that is, greater breadth of more quadrate whorls, feeble or nonexistent sulci, and more distant ribbing, may characterize the Canadian material, although the invariable crushing renders the whorl cross-section difficult to evaluate. Finally, the type of *Echioceratoides*, *E. regulare* Trueman and Williams, figured by Arkell et al. (1957) in the Treatise and by Getty (1973) is also similar. The decrease in ribbing density at intermediate growth stages, and subsequent increase seen in *E. regulare* (Getty, 1973) and which characterizes *Echioceras* s.s. (Getty, 1973, p. 14) may be represented in *E. aklavikense* by some variability in the ribbing density at different growth stages, although insufficient material is available to document the regularity of this variability. Getty (1973) suggested that the venter illustrated for *E. regulare* is a result of abrasion, and really is bisulcate, like that of *Paltechioceras*.

Given that *Echioceras* s.s. includes nonraricostate species quite unlike *E. raricostatum* (Donovan, 1958; Getty, 1973), the assignment of *E. aklavikense* to *Echioceras* cannot be improved upon at present.

Echioceras aklavikense closely resembles *E. arcticum* Frebold (1975), which in contrast to *E. aklavikense* has slightly developed ventral sulci and a slightly different suture line. *Echioceras arcticum* was assigned to *Plesechioceras* Trueman and Williams, which was shown by Dommergues (1982) to have an older distribution than most other Echioceratidae, occurring in the oldest part of the *Echioceras raricostatum* Zone. Both Canadian species appear to be more inflated than the type species of *Plesechioceras*, *P. delicatum* (Buckman).

Echioceras(?) sp.

Plate 2, figures 12, 16

Comments. In addition to the abundant occurrence of *E. aklavikense* in the middle part of the Murray Ridge Formation in Aklavik Range, the genus is now identified in the lower part of the overlying Almstrom Creek Formation west of Canoe Lake, and in the Murray Ridge Formation at Murray Ridge. The specimens from the latter locality had been identified earlier as *Vermiceras* by C.R. Stelck (*in* Jeletzky, 1967) and as *Arietites* s.l. by Frebold (1960) (Poulton et al., 1982). The problems of homeomorphy between the Arietitinae and the Echioceratidae have been discussed most recently by Getty (1973). None of the Murray Ridge specimens appear to have strongly developed carinate-bisulcate venters characteristic of the Arietitinae.

Genus *Paltechioceras* Buckman, 1924

Paltechioceras(?) sp.

Plate 1, figures 10, 11

Comments. The cross-section is compressed, the ribs finely spaced and gently prorsiradiate, but the fragment is too small to compare meaningfully with any described species. The specimen resembles *P. aplanatum* (Hyatt), figured by Getty (1973, Pl. 4, figs. 1a, b). The specimen is thought to come from the Scho Creek Member, which contains a fauna including *Oxynoticeras oxynotum*, *Gleviceras*, and *Aegasteroceras*, and which underlies the beds with *Echioceras aklavikense*, a nonraricostate species of *Echioceras*. Therefore, this specimen, if it is truly a *Paltechioceras* and truly came from the Scho Creek Member, is out of place with respect to European occurrences of the genus, which occur above, not below *Echioceras* s.s. and other echioceratid genera (Getty, 1973; Dommergues, 1982). The possibility that it might have been collected from higher beds is suggested because it was not reported to occur with other fossils, whereas a normal collection from the Scho Creek Member would yield a large and diverse fauna. There are no older Jurassic beds in the area. The possibility must also be considered that the specimen is an exceptionally young representative of the Arietitidae, some specimens of which it also resembles. No other fossils which might suggest an Early Sinemurian age occur in the area, where the Upper Sinemurian, fossiliferous Scho Creek Member disconformably overlies Permian rocks.

It also resembles those specimens figured as *Ammonites ceras* Giebel and *A. multicostatus* Sowerby by Hauer (1856). The validity of *A. ceras*, at least, is uncertain (see Arkell, 1954, *in* ICZN Opinion 307).

Subgenus *Orthechioceras* Trueman and Williams, 1925

Paltechioceras (*Orthechioceras*) sp. cf.
P. (*O.*) *radiatum* (Trueman and Williams)

Plate 2, figures 19, 20

Comments. One fragment from the Porcupine River near Salmon Cache Canyon (GSC loc. 85359) cannot be distinguished from *O. radiatum* (Getty, 1973, Pl. 5, figs. 1a, b, 2a, b). It is subquadrate in cross-section, with a faintly carinate venter, on both sides of which sulci are barely developed. The ribs are strong, widely spaced, and enlarged slightly at the ventrolateral edge, from where they extend slightly ventrally with a distinct forward projection.

Family OXYNOTICERATIDAE Hyatt, 1875

Genus *Gleviceras* Buckman, 1918

Gleviceras sp.

Plate 3, figures 1-6, 9-12

Gleviceras? sp. indet. Frebold, 1960, p. 17, Pl. IV, figs. 6a-c.

Comments. Additional specimens confirm the presence of *Gleviceras* in the Scho Creek Member. Parts of small, intermediate, and large specimens are illustrated in this report, and they are probably sufficient to provide a confident composite description of the species. The present species does not appear to differ much from the genotype, *G. glevense* Buckman [see also Pia, 1914, Pl. V, fig. 5, Pl. VI, fig. 9 (as *Oxynoticeras subguibalianum*)] unless it has a greater tendency for the ribs to be strengthened along a ventrolateral locus. The primary ribs may be more distantly spaced than in most species, resembling one specimen figured by Wright (1878-1886, Pl. XLV, fig. 4), which Donovan (1953) identified as *Oxynoticeras* (*Gleviceras*) sp. cf. *O.* (*G.*) *guibalianum* (d'Orbigny). The specimens differ from *G. plauchuti* Frebold (1975), from the Canadian Arctic Islands, in their much stronger ribbing. No new name is advisable at present because of the possibility that all the specimens figured do not belong to the same species.

Genus *Oxynoticeras* Hyatt, 1875

Oxynoticeras(?) sp.

Plate 3, figures 7, 8

Comments. One small fragment is figured in this report, in order to further illustrate the presence of *Oxynoticeras* in the Scho Creek Member at Jurassic Butte. Frebold (1960) previously illustrated *O. oxynotum* (Quenstedt) and *O.* sp. from here.

Superfamily EODEROCERATACEAE Spath, 1929

Family EODEROCERATIDAE Spath, 1919

Genus *Microderoceras* Hyatt, 1871

Microderoceras(?) sp.

Plate 2, figure 21

Comments. One fragment from the Scho Creek Member at Jurassic Butte may represent *Microderoceras* or *Eoderoceras*. It resembles *M. birchi* (Sowerby), *Eoderoceras miles* (Simpson), illustrated by Buckman (1911, Pl. XLIV) and by Maubeuge (1963), and specimens illustrated by Quenstedt (1883-1885; Pl. 26, fig. 4) as *Ammonites armatus bimacula*, and by Maubeuge (1963) as *E. armatum* (Sowerby). The fragment appears to be approximately subquadrate, apparently broad in any case and with a gently rounded venter. It has numerous, finely spaced ribs that arise from broad, weakly developed umbilical tubercles. A row of ventrolateral tubercles is more strongly developed.

Family AMALTHEIDAE Hyatt, 1867

Genus *Amaltheus* de Montfort, 1808

Amaltheus is widely reported from Western and Arctic Canada (Frebold, 1964, 1966, 1969, 1970, 1975; Frebold et al., 1967; Smith and Tipper, 1986). The most common species in all parts of its Canadian range is *A. stokesi* (J. Sowerby), as it is in northwest Europe and the northern U.S.S.R.

Amaltheus stokesi (J. Sowerby)

Plate 8, figures 1-8

Ammonites stokesi J. Sowerby, 1818, p. 205, Pl. 191.

Amaltheus stokesi (J. Sowerby). Howarth, 1958, p. 3, Pl. 1, figs. 5-7, 12-14, Pl. 2, figs. 1, 3, 10, Textfigs. 4, 5; Frebold, 1964, p. 9, Pl. 2, figs. 2-6; 1964b, Pl. 6, figs. 6, 7, 13; 1966, Pl. 1, figs. 1-4; 1970, p. 441, Pl. 3, fig. 1; 1975, p. 10, Pl. 4, figs. 3, 4; Frebold et al., 1967, p. 14, Pl. 1, figs. 1-3, 5, 7; Repin, 1974, p. 55, Pl. I, figs. 4-9; Sei and Kalacheva, 1980, p. 71, Pl. 1, figs. 4, 6-8, 11, 13; Imlay, 1981, p. 37, Pl. 10, figs. 27, 28.

Further synonymies are given by Howarth (1958) and by Sei and Kalacheva (1980).

Comments. Several specimens are illustrated from the Kingak Formation at Loney Creek and north of Bonnet Lake to supplement the previous report on northern Yukon specimens (Frebold et al., 1967).

Amaltheus bifurcus Howarth

Plate 8, figures 9, 12-15

Amaltheus bifurcus Howarth, 1958, p. 2, Pl. I, figs. 1-4, 6, 8-11, Pl. X, fig. 3; Frebold et al. 1967, p. 15, Pl. I, figs. 4, 6.

Amaltheus (*Amaltheus*) *bifurcus* Howarth. Repin, 1974, p. 54, Pl. I, figs. 1-3.

Comments. This strongly ribbed, generally small species, with continuous and conspicuously bifurcating ribs, occurs in northern Yukon in the Kingak Formation at Loney Creek and north of Bonnet Lake, apparently together with *A. stokesi.* In addition, one small fragment from Old Crow Flats, south of Porcupine River (Pl. 8, fig. 13), documents the presence there of the Almstrom Creek Formation and of the Late Pliensbachian.

Genus *Pleuroceras* Hyatt, 1867

Pleuroceras(?) sp.

Plate 8, figures 10, 11

Comments. One small fragment from the Kingak Formation north of Bonnet Lake is not determinable with certainty, but it could well be *Pleuroceras*, which would be consistent with its occurrence with other Upper Pliensbachian ammonites of the genus *Amaltheus.* If correctly identified and if the Northwest European zonation is applicable, this specimen indicates the latest Pliensbachian *Pleuroceras spinatum* Zone, so that the collection (GSC loc. 39368) may span several zones.

The specimen has fairly well developed ventrolateral tubercles and a weak keel the details of which cannot be discerned. It is not clear whether sulci were present on either side of the keel because the specimen is distorted, but in any case, the ventral ornament is weakly developed. The ribs are closely spaced, nearly straight, and essentially radial.

Family DACTYLIOCERATIDAE Hyatt, 1867

Genus *Dactylioceras* Hyatt, 1867

Dactylioceras commune (Simpson)

Plate 14, figures 1-11

Ammonites communis Sowerby, 1815, p. 10, Pl. 107, figs. 2, 3.

Dactylioceras commune (Sowerby). Frebold, 1957, p. 2, 3, Pl. I, figs. 1-7; 1960, p. 18, Pl. V, figs. 4-6.

?*Dactylioceras* sp. cf. *D. commune* (Sowerby). Imlay, 1955, p. 88, Pl. 10, figs. 10-12; 1981, p. 38, Pl. 11, figs. 2, 3, 8.

Comments. This species is abundant in the Kingak Formation north of Bonnet Lake (GSC locs. 86821, 86855, C-4215). It had been previously figured by Frebold (1957, 1960) and is widely reported across the Arctic of Canada and Siberia.

Genus *Collina* Bonarelli, 1893

Collina(?) sp. aff. *C.*(?) *simplex* Fucini

Plate 14, figures 12-15

aff. *Dactylioceras simplex* Fucini, 1935, p. 86, Pl. IX(XXXIX), figs. 4, 5.

?*Coeloceras* sp. cf. *C. mucronatum* (d'Orbigny). Imlay, 1955, p. 88, Pl. 12, figs. 12-14.

?"*Dactylioceras*" *simplex* Fucini. Sei and Kalacheva, 1980, p. 77, Pl. III, figs. 13-15.

?*Catacoeloceras*? sp. juv. Imlay, 1981, p. 39, Pl. 12, fig. 6.

Comments. Several specimens were found together with *Ovaticeras* in Lower Toarcian beds on the Lower Firth River (GSC loc. C-53497). They are poorly preserved impressions without sutures, so that their generic assignment is speculative. These specimens differ from *Zugodactylites braunianum* (d'Orbigny) of Europe, *Z.* sp. cf. *Z. braunianus* of the Canadian Arctic Islands (Frebold, 1975, p. 15, Pl. 5, fig. 15), and from the type species of *Omolonoceras* Dagis, *Catacoeloceras* Buckman and all the other genera of Buckman (1926-1927) that Arkell et al. (1957) considered to be junior synonyms of *Catacoeloceras*, primarily in the greater strength of the ventrolateral spines and greater spacing of the ribs. Two photographs of *Omolonoceras manifestum* Dagis (1968, Pl. 1, figs. 4, 8) resemble the Canadian specimens, but they are much larger, and equivalent growth stages of the Siberian and Canadian forms are different. No other described species known to the writer is closer to the Canadian species, however. The cadicone shape and low whorls that diagnose *Omolonoceras* cannot be determined on the Canadian specimens because of their crushing and otherwise poor preservation. *Omolonoceras* Dagis was considered to be a junior synonym of *Zugodactylites* by Donovan et al. (1981).

The Canadian species is clearly Early Toarcian in age, whereas *D. simplex* was described originally from the Upper Pliensbachian of Italy (Fucini, 1935) and the Siberian form is Late Pliensbachian (Sei and Kalacheva, 1980). *Dactylioceras (Eodactylites) simplex* was considered to be earliest Toarcian in age in Chile

(Hillebrandt and Schmidt-Effing, 1981) but it is much more finely ribbed than the northern Yukon species and lacks the prominent tubercles. The northern Alaska species (Imlay, 1955) occurs about 2 m above the highest *Amaltheus* and below the lowest *Dactylioceras* of Toarcian affinities. The potential biostratigraphic significance of this distinctive group is reduced by its rare occurrence, which also makes its taxonomy difficult. The assignment of the northern Yukon species to *Collina* is based on the wide spacing of the primary ribs and the nodes lying high on the flanks. *Collina chilensis* Hillebrandt and Schmidt-Effing (1981) from Chile has much finer primaries and occurs higher in the Toarcian, probably representing a different group than does the northern Yukon species.

Superfamily HILDOCERATACEAE Hyatt, 1867

Family HILDOCERATIDAE Hyatt, 1867

Genus *Ovaticeras* Buckman, 1918

Ovaticeras sp. cf. *O. ovatum* (Young and Bird)

Plate 13, figures 7, 11

cf. *Ammonites ovatus* Young and Bird, 1822

cf. *Ovaticeras ovatum* (Young and Bird). Buckman, 1918, Pl. CXIX.

Comments. Several small and large specimens from the Kingak Formation at Loney Creek represent this Lower Toarcian species (GSC loc. C-53497). The generic and specific assignment is arbitrary, and firmer identification must await a more detailed interregional taxonomic study of the group, which also includes the widespread earliest Toarcian *Tiltoniceras propinquum* (Whiteaves) (e.g., Dagis, 1974).

Genus *Harpoceras* Waagen, 1869

Harpoceras(?) spp.

Plate 13, figure 8; Plate 14, figure 16

Comments. One poorly preserved, moderately involute and finely ribbed specimen that was found with *Dactylioceras*(?), *Paltarpites*(?) and *Pseudolioceras*(?) in the Kingak Formation at Loney Creek (GSC loc. C-53469) may represent Lower Toarcian *Harpoceras, or Tiltoniceras*.

A small fragment from the Kingak Formation north of Bonnet Lake (Pl. 14, fig. 16) is also tentatively assigned to *Harpoceras*(?). It occurs together with *Dactylioceras commune* (Simpson), *Grammoceras*(?) and *Hildaites*(?) and is therefore probably Early Toarcian in age. It has some resemblance to *Protogrammoceras*, however, and the scattered nature of specimens on the surface at this locality (GSC loc. C-4215) does not preclude the possibility of a mixture of latest Pliensbachian and earliest Toarcian forms.

Genus *Hildaites* Buckman, 1921

Hildaites(?) spp.

Plate 13, figures 2-5

Comments. One small whorl fragment of a large ammonite (Pl. 13, figs. 4, 5) from the Kingak Formation north of Bonnet Lake (GSC loc. C-4215) has a subquadrate cross-section and strong, falcoid ribs that are strongly deflected toward a weakly bisulcate venter.

Another from the same locality (Pl. 13, figs. 2, 3) is smaller and clearly has a bisulcate, keeled venter. The umbilical half of the whorl cannot be seen; the ribs on the ventral half are strong.

Genus *Leioceras* Hyatt, 1867

Leioceras sp. cf. *L. opalinum* (Reinecke)

Plate 16, figure 21

cf. *Nautilus opalinus* Reinecke, 1818, p. 55, Pl. 1, figs. 1, 2.

cf. *Lioceras opalinum* S. Buckman, 1887, p. 35, Pl. 13, figs. 1, 8-10.

cf. *Leioceras opalinum* (Reinecke). Frebold, 1957, p. 6, Pl. IV, figs. 1-6, Pl. V, figs. 1, 2; 1960, p. 25, Pl. VI, figs. 1-4, Pl. VII, fig. 1.

Comments. One external mould of the umbilical part of a moderately large specimen, from the Kingak Formation along Johnson Creek (GSC loc. C-81334) is figured. Another specimen is known from the same area (GSC loc. 92513). They cannot be differentiated from *L.* sp. aff. *L. opalinum* from other areas, such as Arctic Canada (e.g., Frebold, 1957, 1960). Other fragments from Johnson Creek may represent *Leioceras* (e.g., GSC locs. 92514, 92515).

Genus *Pseudolioceras* Buckman, 1889

Comments. Tugurites Kalacheva and Sei (1970), with type species *P. whiteavesi* (White) from southern Alaska, was assigned as a subgenus of *Pseudolioceras* (e.g., Sei et al., 1986), and was thought to have significant biostratigraphic value, appearing in younger beds than *Pseudolioceras* (*Pseudolioceras*) in the Bering (North Pacific) faunal province. *Tugurites* is not recognized as a distinct subgenus for the purposes of this report, for reasons discussed under *P. mclintocki* below. Evaluation of the taxonomy at the species level and of the biostratigraphic usefulness of the species of *Pseudolioceras* requires monographic treatment of the genus, which is apparently abundantly preserved in the Toarcian and Aalenian of Europe, the U.S.S.R. and northern Canada.

Pseudolioceras lectum (Simpson)

Plate 13, figures 13-15

Ammonites lectus Simpson, 1843.

Pseudolioceras lectum (Simpson). Buckman, 1911, Pl. XLIII.

?*Pseudolioceras* aff. *compactile* (Simpson). Frebold, 1957, p. 5, Pl. III, figs. 3-5.

Pseudolioceras lectum (Simpson). Dagis, 1974, p. 50, Pl. XVI, figs. 5-8.

?*Pseudolioceras rosenkrantzi* Dagis, 1974, p. 52, Pl. XVIII, figs. 1-7.

?*Pseudolioceras compactile* (Simpson). Okuneva, 1973, Pl. XI, fig. 5.

Comments. Three poorly preserved small specimens from Johnson Creek cannot be differentiated from the northeastern Siberian Toarcian species, *P. rosenkrantzi* (Dagis, 1974) or from specimens described by Frebold (1957) from Prince Patrick Island. The umbilical edge is rounded. In the fading of the ribbing before it is deflected forward near the venter, and in the tiny umbilicus, the Canadian specimens are like *P. compactile* (Simpson) but the umbilical half of each whorl is smooth. *Pseudolioceras compactile*, identified by Okuneva (1973, Pl. XI, fig. 5) from the eastern U.S.S.R., is probably identical. *Pseudolioceras lectum* (Simpson) appears to have priority as a name for this species.

Pseudolioceras sp. aff. *P. rosenkrantzi* Dagis

Plate 13, figure 12

aff. *Pseudolioceras rosenkrantzi* Dagis, 1974, p. 52, Pl. XVIII, figs. 1-7.

Comments. One small fragment of a relatively large specimen, from the Kingak Formation at Loney Creek (GSC loc. C-53492) resembles *P. rosenkrantzi*, but it is not sufficiently well preserved to identify with certainty.

Pseudolioceras kedonense(?) Repin

Plate 13, figure 1

?*Pseudolioceras kedonense* Repin, *in* Polubotko and Repin, 1966, p. 52, Pl. III, figs.1-3; Textfig. 10.

?*Pseudolioceras kedonense* Repin. Dagis, 1974, p. 47, Pl. XIV, figs.1-3, Pl. XV, figs. 1-9.

?*Pseudolioceras lectum* (Simpson). Okuneva, 1973, Pl. XI, figs. 3, 4.

Comments. One small fragment from the Kingak Formation north of Bonnet Lake (GSC loc. 92588) is indistinguishable from *P. kedonense* of Siberia. However, it is fragmentary and not positively determinable, and has similarities with *Phlyseogrammoceras* and *Harpoceratoides* as well. Specimens identified as *P. lectum* (Simpson) by Okuneva (1973, Pl. XI, figs. 3, 4) from the eastern U.S.S.R. appear to be identical.

Pseudolioceras mclintocki (Haughton)

Plate 16, figures 1-13, 15, 16

Ammonites m'clintocki Haughton. M'Clintock, 1858, p. 244, Pl. 9, figs. 2-4.

Harpoceras m'clintocki Haughton. Neumayr, 1885, p. 85, Pl. 1, figs. 5-8.

Ludwigia m'clintocki Frebold, 1957a, p. 7, Pl. 5, figs. 3-4.

Pseudolioceras m'clintocki (Haughton). Frebold, 1960, p. 20, Pl. VIII, figs. 1-9, Pl. IX, figs. 2-4.

Pseudolioceras maclintocki (Haughton). Sei and Kalacheva, 1980, p. 83, Pl. V, figs. 9-15.

Pseudolioceras (*Tugurites*) *maclintocki* (Haughton). Sei et al., 1986, Fig. 3(E-H).

Comments. *Pseudolioceras mclintocki* was originally based on small, indifferently preserved whorl fragments from Prince Patrick Island, on which the umbilical portion of the shell was not preserved (Haughton, *in* M'Clintock, 1858). Their precise stratigraphic provenance and faunal association are unknown. The type material was reillustrated by Neumayr (1885), but it was not until new material was found by E.T. Tozer at or near the original locality, in beds containing ammonites identified as *Leioceras opalinum* Reinecke and assigned to the Lower Aalenian, that a satisfactory description became available (Frebold, 1957a). A sharp umbilical edge of moderate and large growth stages was shown by Frebold (1957a) to be present in this species.

This species, widespread in Arctic Canada, is well represented in the northern Yukon area, in the Upper Aalenian *Erycitoides howelli* Zone associated with *E. howelli*. Other specimens, without associated ammonite taxa, could just as well represent the Lower Aalenian *Leioceras opalinum* Zone. Three small specimens illustrated in this report (Pl. 16, figs. 2, 5-8) show the relatively open umbilicus and rounded umbilical edge of juvenile forms. None of the specimens appear to have the raised umbilical rim that characterizes *P.* sp. aff. *P. whiteavesi* (White) as redefined as a subspecies of *P. mclintocki* by Westermann (1964), or the subgenus *Tugurites* Kalacheva and Sei (1970), in which the two species were placed, as redefined by Sei et al. (1986). Furthermore, the association of *P. mclintocki* with Upper Aalenian *E. howelli* in some collections, and the Toarcian occurrences in the Arctic Islands (unpubl.) of some specimens with raised umbilical rims undifferentiable from *P. whiteavesi* described below, deny the restricted age ranges for the two species, and for the two subgenera proposed by Sei et al. (1986). In contrast to their proposal that these taxa have major biostratigraphic utility, the two subspecies and subgenera both appear to have overlapping ranges in Canada. Furthermore, the illustrations (compare Figs. 3B and C with 3I and M) of Sei et al. (1986) do not support their assertion that Toarcian *Pseudolioceras* lack a raised umbilical rim, and the continuity of ribs on the umbilical portion of the flanks in some Toarcian species (compare Fig. 3A with 3I and M) deny another of their diagnostic characters. For present purposes, the subgenus *Tugurites* is not considered to have great stratigraphic importance, and the arguments for its validity raised by Sei et al. (1986) do not appear to be totally applicable in Canada. Donovan et al. (1981) had already considered it to be a junior synonym of *Pseudolioceras*.

Pseudolioceras sp. aff. *P. whiteavesi* (White)

Plate 16, figure 14

aff. *Ammonites* (*Amaltheus*) *whiteavesi* White, 1889, p. 69, Pl. 13, figs. 1-5.

aff. *Pseudolioceras whiteavesi* (White). Imlay, 1955, p. 89, Pl. 12, figs. 15, 16.

aff. *Pseudolioceras mclintocki whiteavesi* (White). Westermann, 1964, p. 421, 490, Pl. 68, fig. 2, Pl. 69, figs. 1-6, Pl. 70, figs. 1-4, Pl. 71, figs. 1, 2.

aff. *Tugurites whiteavesi* (White). Kalacheva and Sei, 1970, p. 450, Pl. 1, figs. 1-3; 1976, p. 81, Pl. I, figs. 14, 15; 1980, p. 84, Pl. VI, fig. 7, Pl. VII, figs. 1, 2, 11, 12.

aff. *Pseudolioceras* (*Tugurites*) *whiteavesi* (White). Sei et al., 1986, Fig. 3(I-M).

Comments. One fragment, from the Kingak Formation southeast of Trout Lake, exhibits strong, falcate ribs and a sharp, fine, raised umbilical edge that is crenulated by the intersection with the ribs. It is associated with probable *Erycitoides*, as is the species throughout the North Pacific (Sei et al., 1986). It is of Late Aalenian age.

Family HAMMATOCERATIDAE Buckman, 1887

Genus *Erycitoides* Westermann 1964

Westermann (1964) erected the genus, designated the lectotype of its type species, *E. howelli* (White), and gave an extensive discussion of the genus and species. He erected two subgenera *Erycitoides* s.s. and *Kialagvikes*, suggesting them to be macro- and microconchs, respectively, of *Erycitoides*. The two are closely associated in the southern Alaska and northern Yukon collections as well as in British Columbia (e.g., Poulton and Tipper, 1991). The specimens illustrated in this report, from northern Yukon, confirm the morphological variability of *Erycitoides*. There appear to be a greater proportion of coarsely ribbed species, some with prominent umbilical bullae, in the northern Yukon collections than in the material from southern Alaska, but similar forms occur also in British Columbia.

The history of the taxon *Erycitoides* since it was erected, and the characteristics differentiating it from *Podagrosiceras* Maubeuge and Lambert, which Donovan et al. (1981) considered to be a senior synonym, were summarized by Poulton and Tipper (1991).

Erycitoides howelli (White)

Plate 14, figures 26, 27; Plate 15, figures 1, 2, 3, 5-7, 15-19, 21-24, 28; Plate 16, figures 17, 18

Ammonites (*Lillia*) *Howelli* White, 1889, p. 68, Pl. 12, figs. 1, 2; Pl. 14, figs. 1-3.

Hammatoceras Howelli (White). Pompeckj, 1900, p. 275.

Erycites howelli (White). Imlay, 1955, p. 90, Pl. 13, figs. 12, 13.

?*Erycites* cf. *E. howelli* (White). Frebold, 1961, p. 7, Pl. 5, fig. 2.

Erycitoides (*Erycitoides*) *howelli* (White). Westermann, 1964, p. 360, Pls. 44-58, Textfigs. 6-15; Sei and Kalacheva, 1968, p. 39, Pl. 7, figs. 1-3, Pl. 8, figs. 4-6; 1980, p. 87, Pl. VI, fig. 1; Poulton and Tipper, 1991.

Comments. The specimens illustrated in this report are entirely typical of the species as documented from southern Alaska, eastern Siberia, and British Columbia, and they further illustrate the morphological variability of the species. In the northern Yukon, they come from the Kingak Formation in the Johnson Creek and Trout Lake–Barn Mountains areas. *Erycitoides howelli* ranges through much if not all of the Upper Aalenian and is characteristic in northern North America and northeastern Asia of the *E. howelli* Assemblage Zone.

Erycitoides kialagvikensis (White)

Plate 15, figures 8, 10, 14

Ammonites (*Lillia*) *Kialagvikensis* White, 1889, p. 69 (499), Pl. 13, fig. 7.

Erycitoides (*Kialagvikes*) *kialagvikensis* (White). Westermann, 1964, p. 392, Pl. 62, figs. 1-6, Pl. 63, figs. 1-7, Textfigs. 19-21.

Comments. The species is represented by three specimens from the Kingak Formation along Johnson Creek and from the Barn Mountains–Trout Lake area. It is associated with *E. howelli.*

Erycitoides spinatus Westermann(?)

Plate 16, figure 19

Erycitoides (*Kialagvikes*) *spinatus* Westermann, 1964, p. 397, Pl. 64, figs. 1-6; Sei and Kalacheva, 1980, p. 87, Pl. VI, figs. 2, 5.

Comments. The persistence of ventrolateral tubercles to a diameter of 1.5 cm indicates the possible assignment of one small specimen from the Kingak Formation southeast of Trout Lake to this species.

Erycitoides sp.

Plate 15, figure 9

Comments. One small and specifically undeterminable fragment from the Manuel Creek Formation between Fish River and Almstrom Creek also represents *Erycitoides.*

Erycitoides(?) spp.

Plate 15, figures 11, 12, 13, 20, 25-27

Comments. Two small ammonite fragments questionably referred to *Erycitoides* are the only ammonites that occur in the upper beds of the Manuel Creek Formation in its eastern outcrop area, and are therefore significant for dating that unit. They were found at Murray Ridge (GSC locs. 94190, 94192). The two fragments differ considerably from one another but both are coarsely ribbed, the ribs subdividing into two secondaries on one specimen (Pl. 15, fig. 12), and into multiple secondaries on the other (Pl. 15, fig. 13). The strong umbilical bullae on the latter specimen (Pl. 15, fig. 13) allies it with another specimen from another locality (Pl. 15, fig. 25) that has coarser, bifurcating ribs.

Another specimen from the Kingak Formation in the Trout Lake area (Pl. 15, fig. 20) has coarsely spaced bifurcating ribs and intercalated ribs, but lacks the prominent bullae and thus resembles the specimen shown in Plate 15, figure 12. Similar coarse ribs characterize the whorl fragment shown in Plate 15, figures 26, 27 from the same area, but its cross-section is more subquadrate than other specimens. This last specimen appears to lack a keel and the ribs are somewhat alternating, but the significance of these features on such a small fragment in a collection dominated by more typical *Erycitoides* is uncertain.

One specimen from the Kingak Formation of the Barn Mountains area (Pl. 15, fig. 11) is represented by the umbilical portions only. Up to a diameter of about 0.25 cm, the shell is nearly smooth. From 0.25 to 1 cm in diameter, there are well defined ribs, consisting of relatively coarsely spaced, forward leaning primaries, each differentiated into two secondaries with some intercalated secondaries and typical of juvenile *Erycitoides*. Beyond 1 cm in diameter, the inner whorls are partially occluded by the subsequent one so that only their dorsalmost parts, with the prorsiradiate dorsal parts of the primary ribs, can be seen.

Genus *Planammatoceras* Buckman, 1922

Planammatoceras spp.

Plate 15, figure 4; Plate 17, figures 1-7

Comments. Several fragments illustrated in this report, from the Kingak Formation of the Barn Mountains area and along Johnson Creek, probably represent *Planammatoceras* Buckman (1922). They are associated with *Erycitoides howelli* (White) and indicate a Late Aalenian age. Two of the specimens (Pl. 17, figs. 3–5) have umbilical tubercles that are stronger than on most other Hammatoceratinae. Similar species have been described from Japan by Sato (1954); the latter resemble the northern Yukon specimens in the contrasting coarse umbilical nodes and unusually fine secondaries at large growth stages. Especially similar is *Grammoceras chibai* Yokoyama (Sato, 1954, p. 94, Pl. VIII, fig. 6). However, that species, like most other Hammatoceratinae, becomes smooth or only weakly ribbed at growth stages that are still strongly ribbed in the Canadian specimens. Those previously described species that are still coarsely ribbed at large growth stages, such as *Hammatoceras planinsigne* Vacek [1886, p. (33) 89, Pl. XIII] do not share the combination of fine secondaries and very coarse umbilical tubercles, and the high ratio of secondaries per tubercle (about 5:1) of the Canadian species. One specimen from the Barn Mountains area (Pl. 15, fig. 4) may represent the subgenus *Pseudaptetoceras* and indicate that latest Aalenian beds are present there, but it is not sufficient to identify with certainty.

Superfamily PHYLLOCERATACEAE Zittel, 1884

Family PHYLLOCERATIDAE Zittel, 1884

Genus *Calliphylloceras* Spath, 1927

Calliphylloceras(?) sp.

Plate 13, figures 9, 10

Comments. A small fragment of a large, undeterminable ammonite from Lower Toarcian beds of the Kingak Formation at Loney Creek (GSC loc. C-53492) perhaps represents *Calliphylloceras*.

Ammonite, gen. et sp. indet.

Plate 13, figure 6

Comments. One small fragment with widely spaced, gentle folds and very fine falcoid ribs, from Lower Toarcian beds of the Kingak Formation north of Bonnet Lake (GSC loc. C-4215), is undeterminable. It could represent any of several groups, such as *Phylloceras heterophyllum*, *Pleydellia*, *Phlyseogrammoceras*, *Protogrammoceras*, *Harpoceras*, or *Harpoceratoides*.

Order NAUTILIDA Agassiz, 1847

Family NAUTILIDAE de Blainville, 1825

Genus *Cenoceras* Hyatt, 1884

Cenoceras sp. aff. *C. intermedius* (Sowerby)

Plate 1, figures 20, 21

aff. *Cenoceras intermedius* (Sowerby, 1816), *in* Kummel et al., 1964, p. K449, Fig. 331.

Comments. This specimen resembles *C. intermedius* (Sowerby) (see von Hauer, 1856, Pl. XXV) and *C. annulare* (Phillips) (see Howarth, 1962), although the latter species is smaller and begins to uncoil at a smaller growth stage than does the northern Canadian specimen. It comes from the Upper Sinemurian Scho Creek Member in the northern Richardson Mountains (GSC loc. 25762).

Class BIVALVIA

Most of the supra-generic taxonomy follows Cox et al. (1969). However, some revisions, principally those of Waller (1978) have been accommodated. The Treatise (Cox et al., 1969) emphasizes the dentition in the classification of major taxa, and there has been much discussion of alternative taxonomies based on other structures, including soft parts of living bivalves and life habits. The philosophy and validity of much of the bivalve major taxa classification was discussed by Purchon (1978, 1987). Many of the species described here, particularly the smaller and less numerous ones, are difficult to assign with certainty to larger taxa, or even to a particular genus in some cases, because the all-important hinge structure cannot be seen clearly.

Subclass PALAEOTAXODONTA Korobkov, 1954

Order NUCULOIDA Dall, 1889

Superfamily NUCULACEA Gray, 1824

Family NUCULIDAE Gray, 1824

Genus *Nucula* Lamarck, 1799

Nucula(?) sp.

Plate 7, figures 25, 26

Comments. Small *Nucula*(?) shells are abundantly preserved in pockets at several localities in the Hettangian(?) basal Murray Ridge Formation at Murray Ridge. Their dentition cannot be observed.

Subclass AUTOBRANCHIA Grobben, 1894

Superorder ISOFILIBRANCHIA Iredale, 1939

Order MYTILOIDA Ferussac, 1822

Superfamily MYTILACEA Rafinesque, 1815

Family MYTILIDAE Rafinesque, 1815

Genus *Modiolus* Lamarck, 1799

Modiolus sp.

Plate 9, figure 5

Comments. One small specimen of this ubiquitous genus is available, from Late Sinemurian or Pliensbachian beds of the Almstrom Creek Formation at Canoe Lake.

Superorder PTERIOMORPHIA Beurlen, 1944

Order PTERIOIDA Newell, 1965

Suborder PTERIINA Newell, 1965

Superfamily PECTINACEAE, Rafinesque, 1915

Family OXYTOMIDAE Ichikawa, 1958

Genus *Meleagrinella* Whitfield, 1885

Meleagrinella spp.

Plate 6, figures 8-11; Plate 9, figures 9, 15, 16;
Plate 11, figures 12, 13; Plate 17, figure 11

Comments. Small *Meleagrinella*, generally less than 1.5 cm across, are common in Jurassic deposits of all ages throughout Western and Arctic Canada. Their left valves are not strongly convex as a rule, and generally, discordance of the valve margins cannot be seen. Thus their assignment to *Meleagrinella*, as diagnosed by Cox (1969) is uncertain. Nevertheless, until the taxonomy of these groups is clarified definitively, the name *Meleagrinella* is applied in this report, as it is elsewhere by other workers, to these small, feebly sculptured and weakly convex bivalves. Zakharov (1962) showed that the somewhat similar pectinaceans *Otapiria limaeformis* Zakharov and "*Monotis*" *pseudooriginalis* Zakharov of the Lower Lias of northeastern U.S.S.R. are extremely variable in outline, and some of the specimens identified in this report as *Meleagrinella* are similar to some of those he illustrated. None of the Canadian specimens varies as far from subcircular in outline as do the majority of specimens of those Siberian species, however. For the most part, the hinge characteristics cannot be observed.

Meleagrinella(?) has been described and illustrated from the Lower Hettangian beds of the Bonnet Lake area (Frebold and Poulton, 1977), and additional specimens of *Meleagrinella* from Hettangian(?) through Aalenian beds are illustrated in this report. No morphological characteristics have been identified that would permit meaningful biostratigraphic subdivision of the genus. It is much more abundant in Sinemurian beds than in those of other ages, and the juvenile, umbonal portions of the Sinemurian and Pliensbachian(?) specimens are smooth in contrast to those of the Aalenian; none are known from the Toarcian so far. Sinemurian specimens (from GSC locs. 26866, 59295, 92602, 94120) are illustrated in Plate 6, and probable Pliensbachian specimens in Plate 9, figures 15, 16. One Aalenian specimen from between Big Fish River and Almstrom Creek is illustrated also (GSC loc. 94121; Pl. 17, fig. 11).

Meleagrinella(?) sp. aff. *M.*(?) *ansparsicosta* Polubotko

Plate 11, figures 4, 5, 11

aff. *Meleagrinella ansparsicosta* Polubotko, *in* Efimova et al., 1968, p. 41, Pl. 21, figs. 3-7.

Comments. A few shells from Upper Sinemurian or Pliensbachian beds of the Almstrom Creek Formation at Canoe Lake are very weakly, radially ribbed externally. Their internal ornament cannot be seen clearly but it appears that there are no significant radial riblets even at the margins. Their generic assignment is unclear, and they differ from *M. echinata* in the same way as the specimens described above, as well as in being larger. The only one of them that exhibits the umbonal area is symmetrical and has subequally developed auricles, also not characteristic of *Meleagrinella*. The specimens are similar in their ribbing style to some from the Pliensbachian of Siberia described as *M. ansparsicosta*, but the ribs of the Canadian specimens are weaker, and the symmetry also may distinguish them. Nevertheless, these characteristics are not clearly seen in the specimens illustrated here, and no other species seems to be closer to them.

Genus *Oxytoma* Meek, 1864

Oxytoma (*Oxytoma*) spp.

Plate 6, figures 17-20; Plate 11, figures 1-3;
Plate 9, figure 12; Plate 17, figures 8-10

Comments. Oxytoma is a common component of Jurassic faunas throughout Western and Arctic Canada. Specimens from the Lower Hettangian of northern Yukon were illustrated by Frebold and Poulton (1977), and further specimens from the Sinemurian through Aalenian are figured in this report. There is some variation among them. Two specimens, probably of Pliensbachian age, are more coarsely and more regularly ribbed than the others. The best preserved Sinemurian(?) specimen, referred to *O.* sp. cf. *O. sinemuriensis* (d'Orbigny), (Pl. 6, fig. 19) is significantly longer than high, the Late Sinemurian or Pliensbachian specimens, *O.* sp. cf. *O. inequivalvis* (J. Sowerby) (Pl. 11, figs. 1-3) only moderately so, and an Aalenian specimen referred to *O.* (*O.*) *ferrugineum* (Rollier) (Pl. 17, figs. 8, 9) is approximately equidimensional. This variation corresponds to greater angles between the posterior wing and the posterodorsal edge of the main part of the shell, and may have biostratigraphic value.

The three Upper Sinemurian or Pliensbachian specimens from the northern Yukon area have a more gently rounded posteroventral margin than does *O. inequivalvis* in Europe, but are very similar in the coarse spacing of the ribs and the general shell outline. They come from the Almstrom Creek Formation at Canoe Lake and in the Cache Creek area. The ribbing of the best preserved specimen (Pl. 11, fig. 2) is slightly irregular compared with the others.

The best preserved Aalenian specimen exhibits very fine concentric ornament, unlike the others, imparting a fine reticulate character to the shell. *Oxytoma* (*Oxytoma*) *ferrugineum*, which occurs in Aalenian beds of the Manuel Creek Formation at Murray Ridge, was originally described from Europe and is known from northeastern Siberia (Efimova et al., 1968).

Subgenus *Palmoxytoma* Cox, 1961

The subgenus *Palmoxytoma* was erected to recognize the major morphological differences between *O. cygnipes* (Young and Bird) and other *Oxytoma* species, namely the broad spacing of its primary ribs and the highly regular ribbing style. Its range is at least Norian to Pliensbachian worldwide and several species are now recognized. The differentiation and potentially important biostratigraphic significance of these species need further study.

Oxytoma (*Palmoxytoma*) *cygnipes* (Young and Bird)

Plate 6, figures 14-16; Plate 11, figures 14-16

Pecten cygnipes Young and Bird, 1822, Pl. IX, fig. 6.

Avicula cygnipes. Phillips, 1835, Pl. 14, fig. 2; Efimova et al., 1968, p. 46, Pl. 22, figs. 11, 12; Milova, 1976, p. 53, Pl. IV, fig. 6, Pl. V, figs. 2-5.

Oxytoma cygnipes. Frebold, 1957, p. 67, Pl. 156, figs. 1-5.

?*Avicula anserina* Moberg 1888, Pl. III, fig. 18.

Comments. A few probable Sinemurian and probable Pliensbachian specimens represent this distinctive species, which occurs in the Pliensbachian of Europe and northeastern U.S.S.R. (Efimova et al., 1968; Milova, 1976) and the Sinemurian of Western Canada (Frebold, 1957b) and Japan. The external ornament is clearly seen only on the Late Sinemurian or Pliensbachian specimens

(Pl. 11, figs. 14-16). Those illustrated come from the Sinemurian(?) basal Jurassic bed along Porcupine River (GSC loc. 35919), from the Almstrom Creek Formation at Canoe Lake (Pl. 11, figs. 15, 16) and from the Kingak Formation north of Bonnet Lake (Pl. 11, fig. 14).

Family AVICULOPECTINIDAE Meek and Hayden, 1864

Genus *Otapiria* Marwick, 1935

Otapiria(?) sp. cf. *O. limaeformis* Zakharov

Plate 9, figures 6, 13, 14

? cf. *Otapiria limaeformis* Zakharov, 1962.

Comments. Otapiria has never before been reported from Canada, and indeed is very rare, in spite of its being widely reported in northern U.S.S.R.. It is recorded elsewhere in North America from only a few localities in northern and east-central Alaska (Imlay, 1967), and has been found in the Canadian Arctic Islands and British Columbia (Poulton, work in progress).

A few specimens, illustrated in this report from Upper Sinemurian or Pliensbachian beds of the Almstrom Creek Formation (Pl. 11, figs. 12, 13) are extremely finely ribbed, and some show the weakly prosocline outline of some of the more subcircular variants of the assemblages of *O. limaeformis* Zakharov (1962) of the Lower Lias of northeastern U.S.S.R. Smooth or weakly concentrically ribbed shells from Upper Pliensbachian beds of the Kingak Formation at Loney Creek (Pl. 9, figs. 6, 13, 14) are probably right valves of the same species. None of the specimens are positively identifiable, however, and could possibly represent variants of *Meleagrinella*.

Family PECTINIDAE Rafinesque, 1815

Genus *Entolium* Meek, 1865

Entolium spp.

Plate 6, figures 29, 30; Plate 17, figures 12-18

Comments. Specimens of the long-ranging, ubiquitous, generalized genus *Entolium* from Sinemurian through Aalenian beds are illustrated in this report. No biostratigraphically significant differences have been recognized between specimens of different ages so far.

Entolium(?) sp.

Plate 6, figures 31, 33-35

Comments. Two moderately sized specimens from the Hettangian(?) basal Jurassic bed at Murray Ridge and other fragments from Sinemurian beds are weakly and somewhat irregularly concentrically ribbed, and may represent *Entolium*. However, they have more asymmetrical ears, characteristic of that genus (see Pl. 6, figs. 34, 36).

Genus *Kolymonectes* Milova and Polubotko, 1976

The erection of *Kolymonectes* differentiated a morphologically distinctive and apparently biostratigraphically important bivalve that had previously been included in the genus *Aequipecten* Fischer for want of a better taxon. *Chlamys* (*Aequipecten*) was considered to be a Lower Cretaceous to Recent, and only questionably Upper Jurassic, group (Cox et al., 1969), although it continues to be reported in older rocks [e.g., Pliensbachian of Siberia (Milova, 1976)]. *Kolymonectes* is reported from Norian through Jurassic rocks in Siberia (Milova, 1976).

Kolymonectes staeschei (Polubotko)

Plate 6, figures 21-28

Aequipecten (?) *staeschei* Polubotko, *in* Efimova et al., 1968, p. 80, Pl. 7, figs. 1-9.

Kolymonectes staeschei (Polubotko). Milova, 1976, p. 68.

Comments. The shells are characterized by short, irregular riblets around the margin of the shell internally; by weak, irregular, closely spaced radial ribs externally; and by a slight asymmetry at the umbo, the anterior ear or wing being slightly larger than the posterior one, but without a significant byssal notch. In some specimens (e.g., Pl. 6, fig. 21) the ribs are separated by flat interspaces, and in some others in the same collection (e.g., Pl. 6, fig. 23) the ribs are not separated from one another, and are broad and grooved. The specimens illustrated in this report cannot be differentiated from *K. staeschei* (Polubotko), unless the external radial ornament is slightly stronger in that Sinemurian Siberian species. *Kolymonectes staeschei* seems to be a useful Sinemurian and Hettangian(?) guide, occurring only in the Murray Ridge Formation.

Entoliid bivalves, indet.

Plate 5, figure 22; Plate 17, figure 22

Comments. One small fragment with a fine, reticulate ornament resulting from the intersection of very fine ribs and fine growth lines is figured, from the Hettangian(?) basal Jurassic bed at Murray Ridge (GSC loc. 94053). Another, from the Aalenian (Pl. 17, fig. 22) resembles *Entolium* except for the strongly asymmetrical auricles.

Genus *Eopecten* Douvillé, 1897

Eopecten(?) sp.

Plate 6, figures 12, 13, 32, 38;
Plate 11, figures 6, 8-10;
Plate 17, figures 19-21

Comments. Eopecten was first named for a Middle Jurassic species from Germany. Several subsequently named genera, including the widely known *Velata* Quenstedt, have been treated as junior synonyms (Cox et al., 1969). Specimens from the Sinemurian basal Jurassic bed along Porcupine River (GSC loc. 35919; Pl. 6, figs. 12, 13), from the basal Murray Formation at Murray Ridge (Pl. 6, fig. 38), and from Lower Sinemurian beds at Fish Creek (Pl. 6, fig. 32), are questionably assigned to this genus because of their distinctive wavy, intercalating radial ribs, although the auricles are only preserved on the specimen from Murray Ridge. Their ribbing is stronger than in the type species of *Eopecten, E. tuberculosis* (Goldfuss). *Eopecten* is also tentatively identified in Upper Sinemurian or Pliensbachian beds of the Almstrom Creek Formation at Canoe Lake and in the Cache Creek area (Pl. 11, figs. 6, 8-10), and several specimens from the Aalenian (Pl. 17, figs. 19-21), each different in the details of their outline or ribbing character, are questionably assigned to *Eopecten*.

Genus *Camptonectes* Agassiz *in* Meek, 1864

Camptonectes (*Camptonectes*) sp.

Plate 6, figure 37

Comments. One small fragment, smooth on the internal mould, and with a well developed auricle, from the basal Murray Ridge Formation at Murray Ridge, is figured.

Subgenus *Camptochlamys* Arkell, 1980

Camptonectes (*Camptochlamys*) sp.

Plate 11, figures 17-22

Comments. Several specimens from Upper Sinemurian or Pliensbachian beds of the Almstrom Creek (Pl. 11, figs. 18-21) and Kingak formations (Pl. 11, fig. 17) are referred to this subgenus. Of those for which the outline can be seen, there seems to be considerable variation in the relative height versus width. The reticulate sculpture is somewhat finer than in the type species, *C.* (*C.*) *intertextus* (Roemer) from the Upper Jurassic of England.

Family PROPEAMUSSIIDAE Abbott, 1954

Genus *Propeamussium* de Gregorio, 1884

Propeamussium (*Propeamussium*) *patriciae* n. sp.

Plate 18, figures 1-25

Holotype. GSC holotype 92819 from GSC locality C-81341, Kingak Formation, Johnson Creek. Upper Aalenian *Erycitoides howelli* Zone (Pl. 18, figs. 22, 25).

Etymology. In honor of my wife.

Description and discussion. The most recent comprehensive study of the genus is by Johnson (1984) who considered all the European Jurassic specimens of *Propeamussium* (*Propeamussium*) to be resolvable into only three species—*P. pumilum* (Lamarck) (which he considered to include the most commonly reported Aalenian species *P. personatum*), *P. laeviradiatum*, and *P. nonarium*. The specimens described here from the northern Yukon area are closely similar only to the first, *P. pumilum*, but differ in the regularity and strength (on the juvenile shell) and wide spacing of the external ribbing. The well defined byssal notch that characterizes the only other subgenus of *Propeamussium*, *Parvamussium*, is missing on the Canadian specimens. The new species is characterized by its straight hingeline, small and nearly symmetrical auricles, absence of a byssal notch, 10 or so internal radial riblets reaching from three quarters to nine tenths (variable from one specimen to another) of the way to the ventral margin, and the regular, low-relief external radial ribbing. One specimen figured as *Variamussium* sp. by Efimova et al. (1968, Pl. 66) is similar to *P. patriciae* but has more irregular external ribs. Although the species appears to be restricted to the Aalenian in the northern Yukon area and perhaps also in British Columbia, it occurs more commonly in the Toarcian of the Canadian Arctic Islands. The closest species in Europe, *P. pumilum*, has a Toarcian through Lower Bajocian range according to Johnson (1984).

Superfamily PLICATULACEA Watson, 1930

Family PLICATULIDAE Watson, 1930

Genus *Harpax* Parkinson, 1811

Comments. The dentition of the Canadian species is like that of the European representatives of *H. laevigatus* (d'Orbigny) and *H. parkinsoni* (Bronn) illustrated by Dumortier (1869), Troedsson (1951), and others, and Siberian forms illustrated by Koschelkina (1962), Efimova et al. (1968), and Milova (1976). It it is not like that of *Plicatula*, in which genus *Harpax* has been placed as a junior synonym by several authors (e.g., Troedsson, 1951; Cox et al., 1969, p. N377), nor like any other Pectinacean. In contrast to *Plicatula*, there is no significant ligament pit. Instead, in the left valve, two well defined, more or less symmetrically disposed teeth extend radially from the apex of the shell, which essentially corresponds to its umbo or beak. There is no cardinal area. On one specimen from Canada, the anterior surface of the anterior tooth is covered with very fine striae oriented essentially perpendicular to the overall plane of the shell. The illustrations of Dumortier indicate that European representatives may have more completely, and more regularly striate teeth. These various characters make the *Harpax* dentition superficially similar to that of the unrelated Trigoniidae. There is considerable variability in the orientation of the teeth in *Harpax*, but they are generally more symmetrically placed. There is apparently some variation in their curvature. In addition, there is considerable variation in the strength of the hinge plate on which the teeth reside. All in all, the dentition indicates the need to retain *Harpax* as an independent genus from *Plicatula*, although it can probably best be maintained in the family Plicatulidae, no other being more suitable.

Harpax sp. cf. *H. spinosus* (Sowerby)

Plate 7, figures 2-7, 27, 28; Plate 9, figures 7, 12

Harpax spinosus. Koschelkina 1962, Pl. IV, figs. 3, 3a.

Harpax spinosus. Efimova et al., 1968, Pl. 28, figs. 4a, b, 5.

Comments. Several specimens from the Hettangian(?) or Sinemurian basal Jurassic unit at Murray Ridge (Pl. 7, figs. 2-7, 27, 28) and from Upper Sinemurian or Pliensbachian (Pl. 9, figs. 7, 12) beds of northwestern Canada are closely similar to *H. spinosus*. The Canadian specimens cannot apparently be differentiated from the several species from the Pliensbachian of the northeastern U.S.S.R. (Koschelkina, 1962; Efimova et al., 1968; Sibiriakova, 1973).

Harpax laevigatus (d'Orbigny)

Plate 7, figure 1; Plate 9, figure 8

Harpax laevigatus d'Orbigny. Koschelkina, 1962, p. 43, Pl. IV, figs. 4, 4a.

Comments. One specimen is illustrated from Upper Pliensbachian beds of the Kingak Formation north of Bonnet Lake (Pl. 7, fig. 1), and another poorly preserved specimen is illustrated from Upper Sinemurian or Pliensbachian beds of the Almstrom Creek Formation of the Cache Creek area (Pl. 9, fig. 8). They are larger and more strongly concentrically coarsely rugose than those assigned to *H.* sp. cf. *H. spinosus*. It is not clear whether this is due to abrasion or not, and it is not clear whether these two odd specimens belong to the same species as the others. They are apparently the same as specimens described from Europe (Dumortier, 1869, Pl. XL, figs. 9, 10) and from Siberia (Koschelkina, 1962), all Pliensbachian in age.

Superfamily PTERIACEA Gray, 1847

Family INOCERAMIDAE Giebel, 1852

Comments. Although the Inoceramidae have been the subject of many descriptive works and taxonomic studies, the generic, subgeneric and specific taxonomy of the Jurassic taxa is still particularly confused at present, not the least because of the proliferation of names introduced over the last 30 years or so by workers in the U.S.S.R.. A conservative approach is adopted here.

Genus *Pseudomytiloides* Koschelkina, 1963

Pseudomytiloides (?) sp.

Plate 4, figure 2

Comments. A single specimen of this type occurs in the area, in the Hettangian(?) basal Jurassic bed at Murray

Ridge (GSC loc. 94053). It is questionably referred to this genus. *Mytiloides marchaensis* Petrova, from the Middle Lias of Siberia was designated genotype by subsequent designation (Cox, 1969), but the standard figure Cox reproduced in the Treatise is of the English Toarcian species *P. dubius* (J. de C. Sowerby). The specimen illustrated in this report has regularly spaced lamellae, as do the two species named above, but does not closely resemble them otherwise, although it is not sufficiently complete to compare meaningfully. Because the hinge structure, and wings (if any were present) cannot be seen, the specimen may possibly represent a species of *Isognomon*.

Genus *Inoceramus* Sowerby, 1814

Subgenus *Mytiloides* Brongniart, 1822

Inoceramus (*Mytiloides*) sp. cf. *M. rassochaensis* (Polubotko)

Plate 4, figure 1

cf. *Pseudomytiloides rassochaensis* Polubotko, *in* Efimova et al., 1968, p. 61, Pl. 6, figs. 1-7.

Comments. *Inoceramus* is extremely rare in pre-Toarcian rocks of North America. One Upper Sinemurian specimen from Bug Creek Canyon, figured in this report, closely resembles those from the Sinemurian of Siberia, although it is not well enough preserved to compare the irregularity of the ribbing that is seen in the Siberian species. Another specimen was identified by Ager and Westermann (1963) from the northern Richardson Mountains as *Inoceramus*(?) but it cannot be confidently determined. The possibility that the specimen figured in this report represents *Isognomon* cannot be completely dismissed, because the hinge structure and wings, if any were present, cannot be seen.

Inoceramus (*Mytiloides*) sp.

Plate 14, figure 23

Comments. One specimen from the Toarcian north of Bonnet Lake (GSC loc. 92588) is similar to two species named from the Toarcian of Europe—*M. gryphoides* (Schlotheim) and *M. amygdaloides* (Goldfuss). These species have also been identified in the Middle Lias and Toarcian to Lower Aalenian, respectively, of Siberia (Berg et al., 1947; Efimova et al., 1968). Another similar species, referred to *Inoceramus ambiguus* Eichwald by Sibiriakova (1973), from the eastern U.S.S.R., is based on unidentifiable original material, and the specimens illustrated from the U.S.S.R. seem to be more irregularly ribbed than the northern Yukon specimen. Okuneva (1973) named the genus *Galinia* for similar specimens from the Toarcian of the eastern U.S.S.R., but its taxonomic status and its validity with respect to earlier named genera and subgenera of *Inoceramus* remain unconfirmed at present.

Subgenus *Mytiloceramus* Rollier, 1914

Mytiloceramus is based on the Aalenian species *Inoceramus polyplocus* Roemer, and in age and morphology seems to accommodate well the northern Yukon, as well as the Siberian Aalenian, species, although both are also similar to younger Middle Jurassic species generally assigned to *Retroceramus* Koschelkina.

Inoceramus (*Mytiloceramus*) sp. cf. *I.* (*M.*) *polyplocus* Roemer

Plate 14, figures 24, 25, 28, 29

cf. *Inoceramus polyplocus* Roemer, 1857, p. 624; 1870, p. 198, Pl. 16, fig. 6.

Retroceramus lungershauseni Koschelkina, 1962, Pl. XIII, fig. 2.

Retroceramus lungershauseni. Efimova et al., 1968, Pl. 64, figs. 1, 2, Pl. 65, figs. 1, 2.

Retroceramus elegans Koschelkina, 1962, Pl. XIV, fig. 1.

Retroceramus elegans. Efimova et al., 1968, Pl. 63, figs. 2, 3.

Mytiloceramus polyplocus (Roemer). Sei, 1976, p. 102-104, Pl. I, fig. 9.

Mytiloceramus ex gr. *polyplocus* (Roemer). Sei, 1976, p. 104, Pl. I, figs. 10-12.

?*Mytiloceramus obliquus* (Morris and Lycett). Sei, 1976, Pl. I, figs. 6-8.

Mytiloceramus anilis (G. Pcelinceva). Sei, 1976, p. 105, Pl. II, figs. 1-6.

Mytiloceramus tugurensis Sei, 1976, p. 106, Pl. II, figs. 7-9, Pl. III, figs. 1, 2.

Mytiloceramus ex gr. *elegans* Koschelkina. Sei, 1976, p. 107, Pl. III, figs. 3-6.

Comments. The Aalenian specimens illustrated in this report conform well with those from the Aalenian of the northeastern U.S.S.R. (Koschelkina, 1962; Efimova et al., 1968; Sei, 1976). They are weakly and irregularly ribbed compared with most younger Middle Jurassic species, and more strongly ribbed and larger than the Lower Jurassic species. *Inoceramus ambiguus* Eichwald, identified in the Toarcian-Aalenian of the eastern U.S.S.R. (Okuneva, 1973) is based on unidentifiable original material, and the specimens illustrated here are more irregularly ribbed than those from the U.S.S.R. Out of the wealth of species names available, the northern Yukon specimens are here compared with the earliest named Aalenian species, from Europe.

Family BAKEVELLIIDAE King, 1850

Genus *Aguilerella* sp.

Aguilerella sp.

Plate 9, figures 1-4, 10, 11

Comments. Two specimens (Pl. 9, figs. 10, 11) from the Upper Sinemurian and Pliensbachian Almstrom Creek Formation near Canoe Lake are typical of this genus in the characteristic outline and negligible inflation, although they are poorly preserved and the external ornament cannot be seen. Others from the same formation, from the same area and from the Cache Creek area (Pl. 9, figs. 1–4) are referred to the genus even though their entire outline cannot be seen. On one (Pl. 9, fig. 4), weak, regularly spaced, concentric lamellae form a conspicuous external ornament. The genus occurs throughout the Jurassic of Europe and has been reported from the Pliensbachian of northeastern Siberia (Efimova et al., 1968), where *A. kedonensis* Polubotko was named. The Canadian specimens may well represent the same species. However, *A. kedonense* was also based on poor material and specific identity of the Canadian and Siberian specimens cannot be demonstrated.

Order MYOIDA Stoliczka, 1870

Suborder MYINA Stoliczka, 1870

Superfamily MYACEA Lamarck, 1809

Family CORBULIDAE Lamarck, 1818

Genus *Corbula* Bruguière, 1797

Corbula(?) sp.

Plate 7, figures 8-10

Comments. Two specimens from Lower Sinemurian beds at Fish Creek and one from the Upper Sinemurian Scho Creek Member at Bug Creek Canyon probably represent *Corbula*.

Subclass HETERODONTA Neumayr, 1884

Order VENEROIDA H. Adams and A. Adams, 1856

Superfamily MACTRACEA Lamarck, 1809

Family MACTRIDAE Lamarck, 1809

Genus *Mactra* Linné, 1767

Mactra(?) sp.

Plate 7, figures 11-14; Plate 8, figure 21

Comments. Four specimens from Upper Sinemurian beds at Bug Creek Canyon (Pl. 7, figs. 12, 13) and others from Upper Sinemurian or Pliensbachian beds of the Almstrom Creek Formation at Cache Creek (Pl. 8, fig. 21) and at Bug Creek Canyon (Pl. 7, figs. 11, 14) may represent *Mactra*.

Superfamily LIMACEA Rafinesque, 1815

Family LIMIDAE Rafinesque, 1815

Genus *Lima* Bruguière, 1797

Subgenus *Lima* Bruguière 1797

Lima (*Lima*) *parva* Milova

Plate 6, figures 1-7

Lima (*Lima*) *transversa* Polubotko, *in* Kiparisova et al., 1966, Pl. XXV, fig. 5 (only).

Lima (*Lima*) *parva* Milova, 1976, p. 72, Pl. XII, figs. 3, 4.

Comments. Small *Lima* of Sinemurian or perhaps also Hettangian age, characterized by ribs with rounded cross-sections and flat interspaces, are undifferentiable from the Sinemurian specimens from Siberia. Those illustrated in this report are from the basal Jurassic beds at Murray Ridge (GSC locs. 94053, C-53361), along Porcupine River (GSC loc. 35919), and at Bug Creek Canyon (GSC loc. 92581). The species therefore appears to have biostratigraphic significance over a broad area. This is further emphasized by the presence of a similar species, *L. hettangiensis* Terquem (see Dechaseaux, 1936, p. 6, Pl. I, fig. 1) in the Hettangian and Sinemurian of Europe. *Lima* (*Lima*) *parva* is smaller than the otherwise similar species *L.* (*L.*) *transversa* Polubotko, in which it had been included initially.

Lima (*Lima*) sp.

Plate 11, figure 7

Comments. One small shell from Upper Sinemurian or Pliensbachian beds of the Almstrom Creek Formation at Canoe Lake is similar in size and the regularity of the ribbing to *L. transversa*, but the ribs do not have the same rounded cross-sections and are not so conspicuously separated from one another by flat interspaces.

Order TRIGONIOIDA Dall, 1889

Superfamily TRIGONIACEA Lamarck, 1819

Family TRIGONIIDAE Lamarck, 1819

Genus *Vaugonia* Crickmay, 1930

Vaugonia n. sp.(?)

Plate 14, figures 17, 18

Comments. Three left valves are known from the Aalenian upper part of the Manuel Creek Formation at Murray Ridge. They are not sufficiently abundant or well preserved to name as a new species, but appear to differ from any other in their age and in the steeply oblique orientation and fine, regular spacing of the ribs on the anterior part of the shell. These specimens represent a rare northern occurrence of what is basically a southern genus, although similar shells, all generally similar to *Vaugonia literata* (Young and Bird), have been previously reported from Arctic Canada (Poulton, 1979), Greenland (Rosenkrantz, 1934, 1942) and Siberia (e.g., Efimova et al., 1968).

Genus *Liotrigonia* Cox, 1952

Liotrigonia atirdjakensis (Koschelkina)

Plate 5, figures 18-21; Plate 8, figures 16-19

?*Trigonia modesta* Moberg, 1888, Pl. II, figs. 1a, b, 2.

Myophoria atirdjakensis Koschelkina, 1962, p. 20, Pl. II, fig. 3 (fig. 4 in plate explanation).

?*Myophoria lingonensis*. Efimova et al., 1968, Pl. 19, figs. 5a, b, c.

Comments. Liotrigonia lingonensis (Dumortier), or other species compared with it have been reported from Pliensbachian beds of Europe (Lycett, 1872-1879), of East Greenland (Rosenkrantz, 1934, 1942), and eastern U.S.S.R. (Savel'ev, 1962; Koschelkina, 1962; Efimova et al., 1968). The Canadian specimens described in this report, which are much smaller than *L. lingonensis*, exhibit the curved regular striae characteristic of the Trigoniidae on at least the facing sides of the teeth. Their marginal carina is sharper, as is the posteroventral margin. The new specimens come from Hettangian(?) (GSC loc. 94053), Sinemurian (GSC loc. 91454) and Upper Sinemurian or Pliensbachian (GSC locs. 92580, C-53351) beds of northwestern Canada. They are apparently undifferentiable from one another, and from the Siberian species reported from the Upper Pliensbachian. If *Trigonia modesta* Moberg (1888) is the same as the Canadian and Siberian species, as seems likely judging by its morphology, it is the senior synonym. However, its age was poorly documented, and the synonymy is therefore uncertain.

Superfamily PHOLADOMYACEAE Gray, 1847

Family PHOLADOMYIDAE Gray, 1847

Genus *Pholadomya* G.B. Sowerby, 1823

Comments. The Sinemurian and Pliensbachian(?) beds of northwestern Canada commonly contain *Pholadomya*. The same two species have been recognized also in the Lias of Europe, and in the Pliensbachian of northeastern U.S.S.R..

Pholadomya idea d'Orbigny

Plate 4, figures 4-12, 14, 15

Comments. The most common species of *Pholadomya* is characteristic for the Upper Sinemurian Scho Creek

Member of the Murray Ridge Formation. It is medium sized, normally 5 to 6 cm long, with moderately spaced radial ribs but an unribbed or weakly ribbed anteroventral end.

Pholadomya ambigua Sowerby

Plate 4, figure 13; Plate 12, figures 1-4

Comments. This species is characteristic of the Upper Sinemurian and Pliensbachian(?) beds of the Almstrom Creek Formation. It is larger than *P. idea*, reaching 9 cm, and is more coarsely ribbed.

Genus *Goniomya* Agassiz, 1841

Goniomya sp.

Plate 4, figure 3

Comments. One specimen of this genus, which is unusually uncommon in the Lower Jurassic in the area, is illustrated from the Upper Sinemurian at Murray Ridge.

Genus *Homomya* Agassiz, 1843

Homomya sp.

Plate 7, figure 15; Plate 18, figure 31

Comments. Homomya is represented by one specimen from the Hettangian(?) basal Jurassic bed at Murray Ridge (Pl. 7, fig. 15), and by one from the Aalenian at Murray Ridge (Pl. 18, fig. 31).

Family CERATOMYIDAE Arkell, 1934

Genus *Gresslya* Agassiz, 1843

Gresslya(?) sp.

Plate 4, figures 16-23, 25-27;
Plate 18, figures 26, 27

Comments. Gresslya(?) sp. is abundantly represented in the Upper Sinemurian Scho Creek Member (Pl. 4, figs. 16-23, 25-27). Several specimens are illustrated from Bug Creek Canyon (GSC loc. 92581). The one illustrated from Aalenian beds at Murray Ridge (Pl. 18, figs. 26, 27) is almost certainly *Gresslya*.

Family PLEUROMYIDAE Dall, 1900

Genus *Pleuromya* Agassiz, 1842

Pleuromya galathea Agassiz

Plate 1, figure 19; Plate 4, figures 24, 28, 29;
Plate 5, figures 1-3; Plate 8, figure 20

Comments. This weakly sculptured, strongly asymmetrical species has been illustrated from Hettangian beds near Bonnet Lake (Frebold and Poulton, 1977). One more specimen from there (Pl. 1, fig. 19) and others from the Hettangian(?) basal Jurassic bed at Murray Ridge (Pl. 5, fig. 1) and from Upper Sinemurian beds at Bug Creek Canyon and Cache Creek area (Pl. 4, figs. 24-29; Pl. 5, figs. 2, 3) are illustrated in this report.

One small specimen, possibly belonging to this species, from Upper Sinemurian or Pliensbachian beds of the Almstrom Creek Formation at Canoe Lake is also illustrated (Pl. 8, fig. 20).

Pleuromya spp.

Plate 8, figures 22, 23; Plate 18, figures 28-30

Comments. Two specimens of a coarsely and irregularly ribbed species are illustrated from the Almstrom Creek Formation (Pl. 8, figs. 22, 23). They are Late Sinemurian or Pliensbachian in age. Two other, mutually different species, from the Aalenian at Murray Ridge (Pl. 18, figs. 28–30) are also illustrated.

Superfamily OSTREACEA Rafinesque, 1815

Family GRYPHAEIDAE Vyalov, 1936

Genus *Gryphaea* Lamarck, 1801

Gryphaea spp.

Plate 5, figures 4-13, 16;
Plate 11, figures 23-25

Comments. Specimens are illustrated from Lower Sinemurian beds at Fish Creek (GSC loc. 59295; Pl. 5, figs. 4, 13, 16). The left valves are not strongly arcuate, and the posterior sulcus and flange are not strongly developed.

Upper Pliensbachian beds of the Kingak Formation north of Bonnet Lake contain *Gryphaea* (Pl. 11, fig. 23).

Beds low in the Kingak Formation along Johnson Creek contain biostromes of *Gryphaea* coquina or near-coquinas (Pl. 5, figs. 5-12; Pl. 11, figs. 24, 25; Poulton, 1989b). These are not securely dated but may be Late Pliensbachian for reasons described above in the section entitled "Pliensbachian". Specimens from the *Gryphaea* shoals are large (Pl. 5, figs. 5, 6) and extremely variable in morphology, presumably due to crowding (compare Pl. 5, figs. 5, 7-9).

Gryphaea(?) sp.

Plate 5, figures 14, 15

Comments. A right valve from the Hettangian(?) basal bed at Murray Ridge (GSC loc. 94053; Pl. 5, fig. 15) and another from higher Sinemurian beds at Murray Ridge (Pl. 5, fig. 14), almost certainly represent *Gryphaea*.

Family OSTREIDAE Rafinesque, 1815

Genus *Ostrea* Linne, 1758

Ostrea spp.

Plate 10, figures 1-11; Plate 14, figure 19

Comments. Some probable Pliensbachian beds in the Almstrom Creek Formation are rich in *Ostrea* shells. Those illustrated come from GSC localities 92580, 94059, and 94135. They are large, essentially flat, and weakly and finely ribbed. Together with *Lingula*, these oysters suggest some stressful, perhaps brackish(?) nearshore influence on the shallow marine sandstones in which they occur (Poulton et al., 1982).

Another small fragment that probably represents an ostreiid bivalve is figured from the Aalenian upper part of the Manuel Creek Formation at Murray Ridge (Pl. 14, fig. 19).

Superfamily CORBICULACEA Gray, 1847

Family CORBICULIDAE Gray, 1847

Genus *Corbicula* Mergele von Muhlfeld, 1811

Corbicula(?) sp.

Plate 7, figures 17-21

Comments. Corbicula may be represented by four specimens figured here, from the Hettangian(?) basal Jurassic bed at Murray Ridge (Pl. 7, figs. 19-21), from Lower Sinemurian beds at Fish Creek (Pl. 7, fig. 18), and from the Upper Sinemurian Scho Creek Member at Bug Creek Canyon (Pl. 7, fig. 17).

Superfamily CRASSATELLACEA Ferussac, 1822

Family CARDINIIDAE Zittel, 1881

Genus *Cardinia* Agassiz, 1841

Cardinia spp.

Plate 5, figure 17

Comments. Two species, *C.* sp. cf. *C. hybrida* (J. Sowerby) and *C.* sp. aff. *C. concinna* (J. Sowerby) were described and illustrated by Frebold and Poulton (1977), from Lower Hettangian beds in the Bonnet Lake area (GSC locs. 92478, 39366). The former occurs abundantly in the basal Jurassic Hettangian sandstone of that area, and exhibits considerable morphological variation, and the specimens from any particular locality cover the morphological range of several, at least, European species. The genus only occurs in abundance in these Hettangian sandstones and therefore is an important index for the Hettangian in the Bonnet Lake–Johnson Creek area. An additional fragmentary specimen is illustrated here, from the Hettangian(?) basal Jurassic bed at Murray Ridge (GSC loc. 94053).

Family ASTARTIDAE d'Orbigny, 1844

Genus *Astarte* Sowerby, 1816

Astarte aalensis Oppel

Plate 14, figures 20-22; Plate 16, figure 20

Astarte aalensis. Benecke, 1905, p. 221, Pl. XVI, figs. 9-11.

Astarte aalensis. Petrova, *in* Berg et al., 1947, p. 112, Pl. X, figs. 14a, b.

Comments. This small species is characteristic of the Aalenian in Germany and the U.S.S.R., and occurs in the Aalenian beds of the Manuel Creek Formation in nests where the small individuals are extremely numerous. It is probably synonymous with what some authors in the U.S.S.R. (e.g., Sibiriakova, 1973) have called *Astarte* sp. cf. *A. voltzi* Roemer.

Superfamily CARDIACEA Lamarck, 1809

Family CARDIIDAE Lamarck, 1819

Genus *Protocardia* von Beyrich, 1845

Protocardia sp.

Plate 18, figure 32

Comments. One average-sized specimen from the Aalenian at Murray Ridge is illustrated. The genus is unusually rare in the report area.

Superfamily TELLINACEA de Blainville, 1814

Family TELLINIDAE de Blainville, 1814

Genus *Tellina* Linné, 1758

Tellina(?) sp.

Plate 7, figures 22, 23

Comments. Tellina is questionably identified in the Upper Sinemurian Scho Creek Member at Bug Creek Canyon (GSC loc. 94091).

Superfamily PANDORACEA Rafinesque, 1815

Family THRACIIDAE Stoliczka, 1870

Genus *Thracia* Sowerby, 1823

Thracia(?) sp.

Plate 7, figures 16, 24

Comments. Small bivalves from the Hettangian(?) or Sinemurian basal Jurassic bed at Murray Ridge may represent *Thracia*.

Bivalvia, gen. et sp. indet.

Plate 1, figure 18; Plate 8, figures 24, 25

Comments. Two internal moulds, one from Upper Sinemurian or Pliensbachian beds of the Almstrom Creek Formation at Cache Creek (Pl. 8, figs. 24, 25) and one from the Lower Hettangian beds near Bonnet Lake (Pl. 1, fig. 18) are figured. They are distinctively shaped, highly asymmetrical, about as high as wide, but cannot be identified because of the absence of external ornament and hinge structure.

Class GASTROPODA

Genus *Pleurotomaria* Sowerby, 1821

Pleurotomaria sp.

Plate 5, figure 18

Comments. Pleurotomaria occurs in northern Canada in the basal unit of the Scho Creek Member in the northern Yukon and adjacent Northwest Territories, and equivalent or homotaxial basal Jurassic unit of Melville Island in the western Canadian Arctic (unpubl.). This restricted distribution, which makes it a useful guide fossil for local purposes, presumably reflects its living environment in the extremely shallow, nearshore, perhaps highly turbulent environments associated with the basal Jurassic transgression.

Phylum ECHINODERMATA

Order ISOCRINIDA Sieverts-Doreck, 1952

Family PENTACRINITIDAE Gray, 1842

Genus *Seirocrinus* Gislen, 1924

Seirocrinus sp. aff. *S. subangularis* (Miller)

Plate 12, figures 9-11

aff. *Seirocrinus subangularis* (Miller). Fischer et al., 1986, p. 124, Pl. 25, figs. 10, 11.

Comments. Crinoids are prominent at two localities in the area. Those figured occur in two, 2.5 cm thick crinoidal coquina bands in a small, fault-bounded shale section on the south side of Loney Creek, northwestern Yukon (Pl. 12, figs. 9, 11). Slabs with articulated specimens indicate the absence of bottom currents or scavengers during deposition. The two coquina bands are 6.7 m apart. The overlying shales contain *Amaltheus*, of Late Pliensbachian age, at several levels, the lowest 7.6 m above the highest coquina band. The crinoids are similar to those identified from northeastern Alaska by F. Springer (*in* Leffingwell, 1919; Detterman et al., 1975), and to the European Middle Lias species *Seirocrinus subangularis* (Miller). The articulated character and stratigraphic position below *Amaltheus* of both the Alaskan and Loney Creek crinoids, and their geographic proximity, suggest that the two occurrences may represent the same beds. Elsewhere in the Kingak Formation, isolated crinoid fragments occur in Upper Pliensbachian beds north of Bonnet Lake (Pl. 12, fig. 10).

Articulated crinoids also occur in thin laminae in the Murray Ridge Formation siltstone on the spur extending eastward toward Mackenzie Delta from Jurassic Butte. They occur with, or very close to, *Echioceras aklavikense* Frebold, of Sinemurian age. The specimens are not well enough preserved to compare closely with those from Loney Creek, but their mode of occurrence is similar, and it is possible that they are of the same age and represent the same Sinemurian event, although the latter are treated here as being possibly Pliensbachian. No diagnostic Sinemurian fossils are known from northern Yukon west of the northern Richardson Mountains, and none are reported from northeastern Alaska.

Isolated crinoid columnals appear uncommonly in bivalve shell hash beds in the Almstrom Creek Formation at several localities. The age of the formation appears to range from Late Sinemurian through Early Toarcian, and the age of each crinoid columnal occurrence is not better dated.

Similar crinoids have been figured from Lower Jurassic beds of the northeastern U.S.S.R. (Koschelkina, 1962; Efimova et al., 1968).

Phylum BRACHIOPODA

Spiriferina(?) sp.

Plate 12, figures 6, 7, 8

Comments. A distinctive, large brachiopod is common in Upper Pliensbachian beds of the Kingak shale north of Bonnet Lake (GSC loc. 92586), for which beds it appears to be a useful guide fossil. Another, smaller brachiopod, tentatively referred to *Rudirhynchia*, is associated with it, as are *Gryphaea* and *Amaltheus*.

Lingula sp.

Plate 12, figure 5

Comments. Lingula is common in Upper Pliensbachian and possibly other beds of the Almstrom Creek Formation (Poulton et al., 1982). The specimen figured comes from Old Crow Flats south of Porcupine River (GSC loc. 88278).

PLANTAE

Sagenopteris sp.

Plate 1, figures 22-24

Comments. This marine alga is characteristic in the probably Upper Sinemurian sandstone near Salmon Cache Canyon, along Porcupine River (GSC loc. 92559). It also occurs in the Upper Sinemurian Scho Creek Member at Bug Creek Canyon (GSC loc. 92581). Other Lower Jurassic Arctic specimens of *Sagenopteris* were illustrated by Efimova et al. (1967).

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APPENDIX

List of GSC fossil localities and identifications

Data on the fossil localities, formation, age, collectors, relevant publications and fossil assemblages (all identified by the author unless otherwise stated) are given here. Where possible, the relation to other fossil localities is given, or reference is made to the appropriate measured section in other publications, where the same locality numbers are used. Unless otherwise stated, the fossils were collected in situ from a narrow stratigraphic interval.

5287. J.J. O'Neill, 1915. About 32 km southwest of Herschel Island; Loney Creek, Herschel Island map area, northern Yukon (NTS 117 D). Kingak Formation. See also GSC locality 52690. Upper Pliensbachian. See Frebold et al., 1967, p. 8.

Amaltheus stokesi (Sowerby)

25762. J.A. Jeletzky, 1955. A wall-like hogsback 30 m west of the east-west trending ridge just south of the longest east-west trending ridge that crosses the alluvial plain about 3 km south of Bug Lake and Bug Creek. Jurassic Butte area, Aklavik map area, Northwest Territories (NTS 107 B). Scho Creek Member, Murray Ridge Formation. Upper Sinemurian. See Frebold, 1960, p. 4.

Aegasteroceras (*Arctoasteroceras*) *jeletzkyi* Frebold
Oxynoticeras oxynotum (Quenstedt)
Gleviceras sp.
Cenoceras sp. aff. *C. intermedius* Sowerby
Entolium(?) sp.
Pleuromya sp.
Bivalves, indet.
Gastropods, indet.

25763. J.A. Jeletzky, 1955. Wall-like escarpment on north slope of the east-west trending ridge, about 728 m elevation, 2.1 km south-southwest of Bug Lake; second ridge north of the longest that extends across the alluvial plain 3 km south of Bug Lake. Aklavik Range, Aklavik map area, Northwest Territories (NTS 107 B). Bug Creek Group. Upper Sinemurian. See Frebold, 1960.

Aegasteroceras (*Arctoasteroceras*) *jeletzkyi* Frebold
Pleuromya sp.
Bivalves, indet.
Gastropods, indet.

25765. J.A. Jeletzky, 1955. Elevation 342 m, on east side of hogsback 30 m west of top of east-west trending ridge just south of the longest ridge that crosses the alluvial plain about 3 km south of Bug Lake and Bug Creek. Aklavik Range near Jurassic Butte, Aklavik map area, Northwest Territories (NTS 107 B). Scho Creek Member, Bug Creek Group. Upper Sinemurian. See Frebold 1960, page 4.

Aegasteroceras (*Arctoasteroceras*) *jeletzkyi* Frebold
Oxynoticeras oxynotum (Quenstedt)
Gleviceras(?) sp.
Nautiloids, indet.
Oxytoma sp.
"*Cardinia*"(?) sp.
Bivalves, indet.
"*Pleurotomaria*" sp.
Gastropods, indet.

26879. J.A. Jeletzky, 1955. About 350 m downstream from a 30 m high cliff, Bug Creek Canyon, Aklavik Range, Aklavik map area, Northwest Territories (NTS 107 B). Sinemurian.

Inoceramus (*Mytiloides*) sp. cf. *I.* (*M.*) *rassochaensis* Polubotko
Pleuromya sp.
Bivalves, indet.
Gastropods, indet.
Seirocrinus sp.
Nautiloid, indet.
Belemnoteuthis sp.

26925. J.A. Jeletzky, 1955. A rocky ridge extending across the alluvial plain toward "Amphitheater Ridge", about 3 km south of Bug Lake and Bug Creek; Jurassic Butte area, Aklavik Range, Aklavik map area, Northwest Territories (NTS 107 B). Scho Creek Member, Murray Ridge Formation. Upper Sinemurian.

Pleuromya sp.
Pholadomya idea d'Orbigny
Bivalves, indet.
Gastropods, indet.

26973. J.A. Jeletzky, 1955. A rocky ridge extending across the alluvial plain toward the south end of "Amphitheater Ridge", about 3 km south of Bug Lake and Bug Creek; near Jurassic Butte, Aklavik Range, Aklavik map area, Northwest Territories (NTS 107 B). Scho Creek Member, Murray Ridge Formation. Upper Sinemurian. See Frebold, 1960.

Aegasteroceras (*Arctoasteroceras*) *jeletzkyi* Frebold
Oxynoticeras oxynotum (Quenstedt)
Gleviceras(?) sp.

Nautilus sp.
Bivalves, indet.
Gastropods, indet.
Nautiloid, indet.

26975. J.A. Jeletzky, 1955. About 350 m downstream from the 30 m high cliff, on the rim of terrace; Bug Creek Canyon, Aklavik Range, Aklavik map area, Northwest Territories (NTS 107 B). Scho Creek Member, Murray Ridge Formation. Upper Sinemurian. See Frebold, 1960.

Aegasteroceras (*Arctoasteroceras*) *jeletzkyi* Frebold
Bivalves, indet.
Gastropods, indet.

26976. J.A. Jeletzky, 1955. Outcrops on side of canyon about 30 m downstream from 30 m high cliff at west end of canyon, about 1 to 2 m above water level; Bug Creek Canyon, Aklavik Range, Aklavik map area, Northwest Territories (NTS 107 B). Murray Ridge Formation. Upper Sinemurian. See Frebold, 1960, p. 6.

Echioceras aklavikense Frebold

26978. J.A. Jeletzky, 1955. Elevation 408 m, on upper part of a ridge extending across the alluvial plain toward the south end of "Amphitheater Ridge", at south side of a pronounced sandstone crossridge; Aklavik Range, near Jurassic Butte, Aklavik map area, Northwest Territories (NTS 107 B). Murray Ridge Formation. Upper Sinemurian. See Frebold (1960, page 6).

Aegasteroceras (*Arctoasteroceras*) *jeletzkyi* Frebold
Oxynoticeras oxynotum (Quenstedt)
Gleviceras sp.
Pleuromya sp.
Bivalves, indet.
Belemnoteuthis(?) sp.
Nautiloids, indet.
Gastropods, indet.

26979. J.A. Jeletzky, 1955. About 3 km south of Bug Lake and Bug Creek; Jurassic Butte, Aklavik map area, Northwest Territories (NTS 107 B). Murray Ridge Formation. Upper Sinemurian.

Echioceras(?) sp.
Entolium sp.
Kolymonectes staeschei (Polubotko)

35919. J.A. Jeletzky, 1958. Northeast shore of river, 34 km downstream from the mouth of Bell River and 0.8 km downstream from where the river turns sharply from the north-northeast to the northwest; Porcupine River, Bell River map area, northern Yukon (NTS 116 P). Bug Creek Group. Sinemurian(?).

Gryphaea sp.
Lima (*Lima*) *parva* Milova
Oxytoma (*Palmoxytoma*) *cygnipes* (Young and Bird)
Eopecten(?) sp.
Spiriferinid(?) brachiopod
Rhynchonellid brachiopods

38800. J.A. Jeletzky, 1959. About 14.5 km slightly east of north from the north end of Bonnet Lake, in the lower end of a deep, north trending ravine; headwaters of Blow River, Bonnet Lake area; lat. 68°19′N, long. 137°46′W. Blow River map area, northern Yukon (NTS 117 A). Kingak Formation. Hettangian. See Frebold and Poulton, 1977.

Psiloceras (*Caloceras*) sp. cf. *P.* (*C.*) *johnstoni* (Sowerby)
Cardinia sp.
Oxytoma sp.
Bivalves, indet.

39342. Texaco Exploration, 1959. About 35 km northwest of Summit Lake, Mt. McGuire area; lat. 67°50′00″N, long. 137°12′0″W. Bell River map area, northern Yukon (NTS 116 P). Bug Creek Group. Toarcian. See Frebold (1960); Poulton et al. (1982, p. 96).

Dactylioceras sp.
Harpoceratid ammonite

39343. Texaco Exploration, 1959. 35 km northwest of Summit Lake, Mt. McGuire area; lat. 67°50′N, long. 137°12′00″W. Bell River map area, northern Yukon (NTS 116 P). Bug Creek Group. Black phosphatic siltstone about 460 m above limestone. Frebold (1960) wrongly recorded this locality as Pliensbachian, and from north of Bonnet Lake. Aalenian(?). See Frebold, 1960; Poulton et al. (1982, p. 96).

Pseudolioceras sp.
Eopecten(?) sp.
Corbicula(?) sp.
Bivalves, indet.

39344. Texaco Exploration, 1959. About 35 km northwest of Summit Lake, Mt. McGuire area; lat. 67°50′N, long. 137°12′W. Bell River map area, northern Yukon (NTS 116 P). Bug Creek Group. About 460 m above limestone coquina. Aalenian(?).

Pseudolioceras(?) sp.
Inoceramus sp.
Oxytoma(?) sp.
Corbicula(?) sp.

39360. Texaco Exploration 1959. About 19 km southwest of Bonnet Lake; lat. 68°05′00″N, long. 138°08′00″W. Blow River map area, northern Yukon (NTS 117 A). Kingak Formation. Aalenian(?).

Erycitoides(?) sp.

39366. Texaco Exploration, 1959. Stream about 16 km north of Bonnet Lake, Bonnet Lake area; lat. 68°18′N, long. 137°42′W. Blow River map area, northern Yukon (NTS 117 A). Basal sandstone member, Kingak Formation, Top of 20 m thick, rusty light grey sandstone. Same as GSC locality 38800. Lower Hettangian. See Frebold and Poulton, 1977.

Psiloceras sp. cf. *P. johnstoni* (Sowerby)
Cardinia sp.
Prosogyrotrigonia sp. cf. *P. inouyei* (Yehara)
Bivalves, indet.

39368. Texaco Exploration, 1959. On a small stream approximately 16 km north of Bonnet Lake; Blow River map area, northern Yukon (NTS 117 A). Kingak Formation, Upper Pliensbachian.

Amaltheus stokesi (Sowerby)
Amaltheus bifurcus Howarth
Pleuroceras(?) sp.
Plicatula(?) sp.
Harpax laevigatus (d'Orbigny)
Gryphaea sp.
Corbula(?) sp.
Belemnoteuthis sp.
"*Seirocrinus*" sp.

41452. A.E.H. Pedder, 1959. Murray Ridge; lat. 67°58′N, long. 136°25′W. Bell River map area, Northwest Territories (NTS 116 P). Bug Creek Group. Although this collection appears to be from talus, some specimens are illustrated because of their documentary significance. Hettangian(?) and Aalenian (mixed).

Homomya(?) sp.
Chlamys(?) sp.
Oxytoma(?) sp.
Entolium sp.
Corbicula(?) sp.
Corbula(?) sp.
Pleurotomaria sp.
Seirocrinus(?) sp.

41454. A.E.H. Pedder, 1959. Murray Ridge; lat. 67°58′N, long. 136°25′W. Bell River map area, Northwest Territories (NTS 116 P). Basal member, Hettangian(?).

Harpax sp.
Oxytoma(?) sp.
Gryphaea(?) sp.
Lima(?) sp.
"*Corbicula*" sp.
Thracia(?) sp.
Liotrigonia atirdjakensis (Koschelkina)
Kolymonectes staeschei (Polubotko)
Eopecten(?) sp.
Entolium(?) sp.
Bivalves, indet.
Pleurotomaria sp.
Rhynchonellid brachiopods
Seirocrinus sp.

41483. A.E.H. Pedder (Triad Oil Co.), 1959. Barn Mountains area; lat. 68°36′N, long. 138°19′W. Blow River map area, northern Yukon (NTS 117 A). Kingak Formation. Aalenian.

Pseudolioceras mclintocki (Haughton)
Erycitoides howelli (White)
Erycitoides kialagvikensis (White)
Erycitoides(?) sp.
Planammatoceras sp.
Planammatoceras (*Pseudaptetoceras*?) sp.
Inoceramus (*Mytiloceramus*) sp. cf. *I.* (*M.*) *polyplocus* Roemer

44211. Triad Oil Company, 1959. Near Barn Mountains; lat. 68°36′N, long. 138°18′W. Blow River map area, northern Yukon (NTS 117 A). Kingak Formation. Aalenian.

Pseudolioceras(?) sp.
Erycites sp. aff. *E. howelli* (White)

52617. E.W. Mountjoy, 1962. Upper Fish Creek (Murray Ridge), Bell River map area, northern Yukon. Manuel Creek Formation. Aalenian(?).

Propeamussium (*Propeamussium*) sp.
Entolium sp.
Eopecten(?) sp.
Chlamys(?) sp.
Bivalves, indet.
Belemnites, indet.

52670. E.W. Mountjoy, 1962. Murray Ridge, at head of Fish Creek; lat. 67°58′N, long. 136°25′W. Bell River map area, Northwest Territories (NTS 116 P6). Manuel Creek Formation, Unit 25 of section 158 MJ (116 P6) of Mountjoy and Procter (1969). Toarcian or Lower Aalenian.

Propeamussium (*Propeamussium*) sp.
Eopecten(?) sp.
Brachybelus sp.

52687. E.W. Mountjoy, 1962. About 3 km upstream from mouth of creek, Loney Creek, Herschel Island map area, northern Yukon (NTS 117 D). Kingak Formation. Same as GSC locality 52690. Upper Pliensbachian, *Margaritatus* Zone. See Frebold et al. (1967, p. 8).

Amaltheus bifurcus Howarth

52688. E.W. Mountjoy, 1962. Loney Creek, 32 km southwest of Herschel Island, Herschel Island map area, northern Yukon (NTS 117 D). Kingak Formation. Specimens probably collected loose at same locality as GSC locality 52692. Upper Pliensbachian and Lower Toarcian (mixed). Frebold et al. (1967, p. 8).

Amaltheus stokesi (Sowerby)
Harpoceras sp.
Dactylioceras sp.

52689. E.W. Mountjoy, 1962. Loney Creek, Herschel Island map area, northern Yukon (NTS 117 D). Kingak Formation. Frebold et al. (1967, pl. 1) noted a small *Amaltheus stokesi* from this locality. It cannot be confirmed in the existing collections. Toarcian. Frebold et al. (1967, p. 8).

Harpoceras sp.
Dactylioceras sp.

52690. E.W. Mountjoy, 1962. Loney Creek, about 32 km southwest of Herschel Island; Herschel Island map area, northern Yukon (NTS 117 D). Kingak Formation. Same as GSC locality 52687. Upper Pliensbachian, *Margaritatus* Zone. See Frebold et al. (1967, p. 8).

Amaltheus sp.

52692. E.W. Mountjoy, 1962. Loney Creek, about 32 km southwest of Herschel Island; Herschel Island map area, northern Yukon (NTS 117 D). Kingak Formation. Same as GSC locality 52688. Upper Pliensbachian, *Margaritatus* Zone. See Frebold et al. (1967, p. 8).

Amaltheus bifurcus Howarth

52693. E.W. Mountjoy, 1962. Loney Creek; Herschel Island map area, northern Yukon (NTS 117 D). Kingak Formation. Upper Pliensbachian.

Amaltheus sp.
Amaltheus bifurcus Howarth

52698. E.W. Mountjoy, 1962. About 8 km upstream from the mouth of Loney Creek; Herschel Island map area, northern Yukon (NTS 117 D). Kingak Formation. Upper Pliensbachian. See Frebold et al. (1967).

Otapiria(?) sp. cf. *O. limaeformis* Zakharov

59295. Triad Oil Company, 1959. Near junction of Fish Creek and the creek to its east; Fish Creek, Aklavik map area, Northwest Territories (NTS 107 B). Bug Creek Group, at base of Jurassic. Although this locality is poorly documented, it is highly significant for providing the first record of Lower Sinemurian *Arnioceras* in the area. Lower Sinemurian.

Arnioceras sp. cf. *A. douvillei* (Bayle)
Gryphaea sp.
Camptonectes(?) sp.
Lima(?) sp.
Pleuromya sp.
"*Ostrea*" sp.
Kolymonectes sp.
Meleagrinella sp.
Thracia(?) sp.
Isocardia(?) sp.
Eopecten(?) sp.
Entolium(?) sp.
Corbula(?) sp.
Corbicula(?) sp.
Gastropods, indet.
Terebratulid brachiopods
Rhynchonellid brachiopods

85359. W.W. Nassichuck, 1970. Between Bell and Driftwood rivers, 18 km downstream from mouth of Bell River; Porcupine River, Bell River map area, northern Yukon (NTS 116 P). Bug Creek Group. Loose talus about 15 m upstream from bed 3 of Section 102 of J.A. Jeletzky. Loose talus. Sinemurian and Bajocian/Bathonian (mixed). See Frebold (1975, p. 3).

Paltechioceras (*Orthechioceras*) sp. cf. *P.* (*O.*) *radiatum* Trueman
Cranocephalites(?) sp.
Inoceramus(?) sp.
Ostrea sp.
Belemnites, indet.

85526. J.A. Jeletzky, 1970. At 36 m high undercut bank in the southeast side of a sharp point by the south shore of the confluence of Johnson Creek, which drains Bonnet Lake; 8 km west of the lake. Bonnet Lake area, lat. 68°09′45″N, long. 137°58′W. Blow River map area, northern Yukon (NTS 117 A). Basal sandstone member, Kingak Formation; in situ and fresh float of basal 0.6 to 1.0 m of Unit 12 of section. Hettangian. See Frebold (1975, p. 1); Frebold and Poulton (1977).

Psiloceras sp.
Gryphaea(?) sp.
Pleuromya(?) sp.

85527. J.A. Jeletzky, 1970. Bonnet Lake area; lat. 68°10′N, long. 138°05′W. Blow River map area, northern Yukon (NTS 117 A). Basal sandstone member, Kingak Formation; in situ and fresh float. Same locality as GSC locality 85526; about 12 m stratigraphically higher. Hettangian. See Frebold (1975); Frebold and Poulton (1977).

Psiloceras(?) sp.

85926. Shell Oil Company, 1970. Bug Creek; lat. 68°04′N, long. 135°25′W. Aklavik map area, Northwest Territories (NTS 107 B). Murray Ridge Formation, About 68 m above base of section. Upper Sinemurian, *Raricostatum* Zone.

Echioceras aklavikense Frebold

86565. Shell Oil Company (1961). Murray Ridge; lat. 67°53′N, long. 136°40′W. Bell River map area, northern Yukon (NTS 116 P). Aalenian(?).

Astarte sp.
Chlamys(?) sp.
Oxytoma sp.
Entolium sp.
Bivalves, indet.
Belemnites, indet.

86821. J.A. Jeletzky, 1970. On crest of low "slate" ridge on west side of creek flowing north; east side of Blow Dome and 905 m (2969 ft.) summit; Bonnet Lake area; lat. 68°17′N, long. 137°47′35″W. Blow River map area, northern Yukon (NTS 117 A). Kingak Formation, mostly float. Lower Toarcian, *Falcifer* Zone. See Frebold (1974, p. 4).

Harpoceras sp. aff. *H. exaratum* (Young and Bird)
Dactylioceras commune (Simpson)

86823. J.A. Jeletzky, 1970. Crest of low "slate" ridge on west side of creek flowing north; 33 m on bearing 30° along ridge crest, and stratigraphically above GSC locality 86821; Bonnet Lake area; lat. 68°17′N, long. 137°47′35″W. Blow River map area, northern Yukon (NTS 117 A). Kingak Formation, in situ. Aalenian.

Pseudolioceras sp. cf. *P. mclintocki* (Haughton)

86854. J.A. Jeletzky, 1970. East side of creek, on east side of a 905 m (2969 ft.) high, rounded mountain on east side of Blow Dome section exposed north of Bonnet Lake; Blow river map area, northern Yukon (NTS 117 A). Kingak Formation. Aalenian.

Erycitoides(?) sp.

86855. J.A. Jeletzky, 1970. About 50 m (164 ft.) upstream from GSC locality 86854; probably younger than GSC locality 86821. Bonnet Lake area, Blow River map area, northern Yukon (NTS 117 A). Kingak Formation. Middle Toarcian.

Dactylioceras sp.
Pseudolioceras(?) sp.
Phylloceras(?) sp.

86856. J.A. Jeletzky, 1970. Same area as GSC locality 86855, but about 5 m farther south; collection from concretions loose on surface. Bonnet Lake area, Blow River map area, northern Yukon (NTS 117 A). Kingak Formation. Middle Toarcian.

Dactylioceras sp.

87820. J.A. Jeletzky, 1971. A sandstone ridge in westernmost range of Richardson Mountains, between Berry Creek and Waters River near head of Berry Creek; lat. 67°31′25″N, long. 137°27′35″W. Bell River map area, northern Yukon (NTS 116 P). Anne Creek Member, Manuel Creek Formation. Aalenian(?). See Jeletzky (1972, p. 38).

Pseudolioceras sp. cf. *P. mclintocki* (Haughton)
Propeamussium (*Propeamussium*) sp.
Pseudodicoelites sp.
Brachybelus sp.

88066. Shell Canada Limited, 1958. The validity of this locality information is questionable because of its location far south of the known distribution of the Lower Jurassic. It is included because of the significance of its faunas. Northern Richardson Mountains; lat. 67°37′N, long. 136°10′W. Bell River map area, Northwest Territories (NTS 116 P). Upper Sinemurian. See Ager and Westermann (1963), Frebold (1975), Poulton et al. (1982).

Aegasteroceras (*Arctoasteroceras*) *jeletzkyi* Frebold
Aegasteroceras sp.
Ammonite, indet.
Pholadomya sp.
Nuculana sp.
Nuculids(?)
Inoceramus-like bivalve
Lima sp.
Pleurotomaria sp.
Onychites sp.

88097. Shell Oil Company, 1961. Tributary of Johnson Creek, visible at edge of air photo A22879-127; lat. 68°03′N, long. 137°54′W. Blow River map area, northern Yukon (NTS 117 A). Kingak Formation. Aalenian.

Pseudolioceras sp. cf. *P. mclintocki* (Haughton)

88278. Shell Oil Company, 1971. Porcupine River area; lat. 67°24′N, long. 138°28′W. Old Crow map area, northern Yukon (NTS 116 N/O). Almstrom Creek Formation. Upper Pliensbachian.

Amaltheus bifurcus Howarth
Bivalves, indet.
Lingula sp.

88654. Shell Oil Company, 1971. lat. 68°09'30N, long. 138°02′30″W. Blow River map area, northern Yukon (NTS 117 A). Kingak Formation. Aalenian.

Pseudolioceras(?) sp. aff. *P. mclintocki* (Haughton)
Leioceras sp. cf. *L. opalinum* (Reinecke)
Inoceramus (*Retroceramus*) sp.
Propeamussium (*Propeamussium*) sp.
Entolium sp.
Oxytoma (*Oxytoma*) sp.
Corbula sp.
"*Ostrea*" sp.

92478. T.P. Poulton, 1975. Upper 0.3 m of the 13 m thick basal Jurassic sandstone. Small creek north of Bonnet Lake; lat. 68°19′N, long. 137°46.5′W. Blow River map area, northern Yukon (NTS 117 A). Basal sandstone member, Kingak Formation, Lower Hettangian. See Frebold and Poulton (1977).

Psiloceras sp. cf. *P. johnstoni* (Sowerby)
Pleuromya sp.
Cardinia sp. cf. *C. hybrida* (J. Sowerby)
Oxytoma sp.
Meleagrinella(?) sp.
Prosogyrotrigonia(?) sp. cf. *P. inouyei* (Yehara)
Parallelodon(?) sp.

92482. T.P. Poulton, 1975. In small creek north of Bonnet Lake; lat. 68°19′N, long. 137°46.5′W. Blow River map area, northern Yukon (NTS 117 A). Basal sandstone, Kingak Formation, basal 10 cm. Lower Hettangian. See Frebold and Poulton (1977).

Psiloceras sp.
Pleuromya galathea Agassiz

92485. T.P. Poulton, 1975. In small creek north of Bonnet Lake; lat. 68°19′N, long. 137°46.5′W. Blow River map area, northern Yukon (NTS 117 A). Basal sandstone, Kingak Formation, loose boulders in creek, derived from lowest 10 cm. Lower Hettangian. See Frebold and Poulton (1977).

Psiloceras sp.
Bivalves, indet.

92513. T.P. Poulton, 1975. Johnson Creek; lat. 68°03′N, long. 138°04′30″W. Blow River map area, northern Yukon (NTS 117 A). Kingak Formation. Same as GSC localities 92514 and 92515, but from upper 6 m of section. Lower Aalenian.

Leioceras sp. cf. *L. opalinum* (Reinecke)

92514. T.P. Poulton, 1975. Same as GSC locality 92513 but from lower 12 m of outcrop; Johnson Creek; lat. 68°03′N, long. 138°04′30″W. Blow River map area, northern Yukon (NTS 117 A). Kingak Formation. Lower Aalenian.

Pseudolioceras sp. aff. *P. mclintocki* (Haughton)
Leioceras sp. aff. *L. opalinum* (Reinecke)

92515. T.P. Poulton, 1975. Johnson Creek; lat. 68°03′N, long. 138°4.5′W. Blow River map area, northern Yukon (NTS 117 A). Kingak Formation, collected loose at base of bluffs. Toarcian and Lower Aalenian(?), mixed(?).

Pseudolioceras lectum (Simpson)
Leioceras(?) sp.

92516. T.P. Poulton, 1975. Nearly same location as GSC localities 92513 to 92515, but in shale outcrop 0.4 km to the east, Johnson Creek; lat. 68°03′N, long. 138°04′W. Blow River map area, northern Yukon (NTS 117 A). Kingak Formation, concretions in shale. Upper Pliensbachian.

Amaltheus sp.

92517. T.P. Poulton, 1975. Johnson Creek; lat. 68°03′N, long. 138°4.5′W. Blow River map area, northern Yukon (NTS 117 A). Kingak Formation, collected loose in creek bed. Aalenian.

Planammatoceras sp.
Inoceramus(?) sp.

92518. T.P. Poulton, 1975. Johnson Creek; lat. 68°03′N, long. 138°03.5′W. Blow River map area, northern Yukon (NTS 117 A). Kingak Formation, *Gryphaea* beds. Lower Jurassic (Pliensbachian(?)). See Poulton (1989b).

Gryphaea sp.
Oxytoma sp.
Chlamys(?) sp.
Pleuromya(?) sp.
Rhynchonellid brachiopods
Terebratulid brachiopods
Crinoids, indet.

92519. T.P. Poulton, 1975. Johnson Creek; lat. 68°03′N, long. 138°02′45″W. Blow River map area, northern Yukon (NTS 117 A). Kingak Formation, *Gryphaea* beds. Lower Jurassic [Pliensbachian(?)]. See Poulton (1989b).

Gryphaea sp.

92559. T.P. Poulton, 1975. Sandstone rib projecting into Porcupine River at low water level, on north side of river just downstream from major northeast bend. Porcupine River; lat. 67°25′30″N, long. 137°46.5′W. Bell River map area, northern Yukon (NTS 116 P). Bug Creek Group, upper 1.5 m of sandstone rib, "*Gryphaea*" bed of Poulton (1978). Probably Sinemurian.

Gryphaea sp.
Alectryonia(?) sp.
Lima(?) sp.
"*Ostrea*"(?) sp.
Oxytoma sp.
Rhynchonellid brachiopods
Sagenopteris sp.

92580. T.P. Poulton, 1975. Outcrop on top of hill west of Canoe Lake, overlooking tributary of Little Fish Creek to west, and overlooking small lake to north. Canoe Lake; lat. 68°14′N, long. 135°56′W. Aklavik map area, Northwest Territories (NTS 107 B). Almstrom Creek Formation. Upper Sinemurian or Pliensbachian.

Gryphaea(?) sp.
Isocardia(?) sp.
Oxytoma sp.
Liotrigonia(?) sp.
Pholadomya sp.
Ostrea sp.
Aguilerella sp.
Oxytoma (*Oxytoma*) sp. cf. *O.* (*O.*) *inequivalvis* (Sowerby)
Oxytoma (*Palmoxytoma*) *cygnipes* (Young and Bird)
Camptonectes (*Camptochlamys*) sp.
Liotrigonia atirdjakensis (Koschelkina)
Pholadomya ambigua Sowerby
Eopecten(?) sp.
Lima sp.
Meleagrinella sp. aff. *M. ansparsicosta* Polubotko
Belemnites, indet.
Rhynchonellid brachiopods

92581. T.P. Poulton, 1975. Bug Creek Canyon, Aklavik map area, Northwest Territories (NTS 107 B). Scho Creek Member, Murray Ridge Formation, collected in situ and loose, from about 3 m above base of Jurassic. Type section of Bug Creek Formation. Upper Sinemurian, *Oxynotum* Zone.

Aegasteroceras (*Arctoasteroceras*) *jeletzkyi* Frebold
Oxynoticeras(?) sp.
Gleviceras sp.
Cardinia(?) sp.
Meleagrinella sp.
Pleuromya galathea Agassiz
Pholadomya idea d'Orbigny
Mactra(?) sp.
Gresslya(?) sp.
Lima (*Lima*) *parva* Milova
Orbiculoidea sp.
Rhynchonellid brachiopods
Nautiloid, indet.
Belemnoteuthis sp.
Sagenopteris sp.

92582. T.P. Poulton, 1975. Bug Creek Canyon, Aklavik map area, Northwest Territories (NTS 107 B). Murray Ridge Formation, about 16 m above base of Jurassic. Upper Sinemurian, *Raricostatum* Zone.

Echioceras aklavikense Frebold
Echioceras sp. cf. *E. arcticum* Frebold
Pleuromya sp.

92586. T.P. Poulton, 1975. Creek north of Bonnet Lake; lat. 68°19′N, long. 137°46.5′W. Blow River map area, northern Yukon (NTS 117 A). Kingak Formation, from concretions and interbeds, loose on a slope of black fissile shale. Upper Pliensbachian.

Amaltheus stokesi (Sowerby)
Amaltheus bifurcus Howarth
Lima(?) sp.
Oxytoma sp.
Gryphaea(?) sp.
Isocardia(?) sp.
Thracia(?) sp.
Meleagrinella(?) sp.
Entolium sp.
Camptonectes (*Camptochlamys*) sp.
Oxytoma (*Oxytoma*) *cygnipes* (Young and Bird)
Bivalves, indet.
Seirocrinus sp. aff. *S. subangularis* (Miller)
Spiriferina(?) sp.
Rudirhynchia sp.

92588. T.P. Poulton, 1975. North of Bonnet Lake; lat. 68°19′N, long. 137°47′W. Blow River map area, northern Yukon (NTS 117 A). Kingak Formation. Toarcian.

Partschiceras(?) sp.
Pseudolioceras kedonense Repin (?)
Inoceramus (*Mytiloides*) sp.

92596. T.P. Poulton, 1975. West of Canoe Lake; lat. 68°14′N, long. 135°56′W. Bell River map area, northern Yukon (NTS 116 P). Almstrom Creek Formation. Near GSC locality 92580. Upper Sinemurian(?). See Poulton et al. (1982, Sec. PU-6,10-75).

Echioceras(?) sp.
Oxytoma sp.
Pholadomya ambigua Sowerby
Entolium(?) sp.

92602. T.P. Poulton, 1975. Murray Ridge; lat. 67°58′30″N, long. 136°22′30″W. Bell River map area, northern Yukon (NTS 116 P). Murray Ridge Formation; concretions loose 0.6 to 38 m above base of Jurassic. Upper Sinemurian, *Raricostatum* Zone. See Poulton et al. (1982, Sec. PU-12, 14-75).

Echioceras sp.
Gryphaea(?) sp.
Meleagrinella sp.
Entolium sp.
Meleagrinella sp.
Goniomya sp.
Camptonectes sp.
Pleuromya(?) sp.

92605. T.P. Poulton, 1975. Murray Ridge; lat. 67°58′30″N, long. 136°22′30″W. Bell River map area, northern Yukon (NTS 116 P). Manuel Creek Formation. Phosphatic concretions, collected loose. Aalenian. See Poulton et al. (1982, Sec. PU-12,14-75).

Pseudolioceras mclintocki (Haughton) (?)
Erycitoides(?) sp.
Propeamussium (*Propeamussium*) *patriciae* n. sp.
Inoceramus (*Mytiloceramus*) sp. cf. *I.* (*M.*) *polyplocus* Roemer
Entolium sp.
Protocardia sp.
Oxytoma sp.
"*Isocardia*" sp.
Pleuromya sp.
Belemnites, indet.

94023. T.P. Poulton, 1976. Bug Creek Canyon; lat. 68°04′N, long. 135°28.5′W. Aklavik map area, Northwest Territories (NTS 107 B). Lower part, Almstrom Creek Formation. Red weathering sandstone bed in recessive interval above lowest sandstone, and below green and red banded glauconitic beds. Upper Sinemurian(?).

Oxytoma sp.
Gryphaea sp.
"*Ostrea*" sp.
Entolium sp.
Meleagrinella sp.
Kolymonectes sp.
Chlamys(?) sp.
Mactra(?) sp.

94026. T.P. Poulton, 1976. At end of flat-topped spur projecting east-southeast, 1.5 km from Jurassic Butte; lat. 68°01′30″N, long. 135°25′30″W. Aklavik map area, Northwest Territories (NTS 107 B). Murray Ridge Formation. A 0.6 m thick recessive bed 2.5 to 3 m above base of Jurassic. This overturned section was previously described by Jeletzky (1967, Sec. 24, p. 102-104, Pl. 6, fig. 1). Upper Sinemurian.

Aegasteroceras (*Arctoasteroceras*) sp.
Meleagrinella(?) sp.
Pholadomya sp.
Gastropods, indet.

94027. T.P. Poulton, 1976. At end of flat-topped spur projecting east-southeast 1.5 km from Jurassic Butte; lat. 68°01′35″N, long. 135°25′30″W. Aklavik map area, Northwest Territories (NTS 107 B). Murray Ridge Formation. Fossils loose on Murray Ridge shale, probably from Scho Creek Member. This overturned section was previously described by Jeletzky (1967, Sec. 24, p. 102-104, Pl. 6, fig. 1). Upper Sinemurian. See Poulton et al. (1982, Sec. PU-2, 26-76).

Aegasteroceras (*Arctoasteroceras*) sp. aff. *A.* (*A.*) *jeletzkyi* Frebold
Echioceras(?) sp.
Pholadomya idea d'Orbigny

94036. T.P. Poulton, 1976. Blow River map area (NTS 117 A); lat. 68°24.5′N, long. 136°12.5′W, northern Yukon. Aalenian(?).

Erycitoides(?) sp.
Chlamys(?) sp.
Entolium(?) sp.
Pleuromya sp.
Eopecten(?) sp.
Belemnites, indet.

94040. T.P. Poulton, 1976. Murray Ridge; lat. 67°58.6′N, long. 136°22.5′W. Bell River map area, Northwest Territories (NTS 116 P). Manuel Creek Formation. Aalenian.

Erycitoides sp.
Pseudolioceras mclintocki (Haughton)
Propeamussium (*Propeamussium*) *patriciae* n. sp.
Chlamys(?) sp.
Modiolus(?) sp.
Corbicula(?) sp.
Astarte sp.

Lima sp.
Entolium sp.
Oxytoma sp.
Inoceramus sp.
Eopecten(?) sp.
Belemnites, indet.

94041. T.P. Poulton, 1976. Murray Ridge; lat. 67°58.6′N, long. 136°22.5′W. Bell River map area, Northwest Territories (NTS 116 P). Manuel Creek Formation. Aalenian.

Pseudolioceras mclintocki (Haughton)
Oxytoma sp.
Kolymonectes(?) sp.
Entolium sp.
Pleuromya sp.
Astarte sp.
Inoceramus sp.
Protocardia sp.
Oxytoma (*Oxytoma*) *ferrugineum* (Rollier)
Propeamussium (*Propeamussium*) *patriciae* n. sp.
Entoliid bivalve, indet.
Homomya sp.
Belemnites, indet.

94047. T.P. Poulton, 1976. North face of east-west trending ridge southeast of White Mountains; lat. 67°58.6′N, long. 136°22.5′W. Bell River map area, northern Yukon (NTS 116 P). Murray Ridge Formation. Upper Sinemurian.

Echioceras(?) sp.
Gryphaea sp.
Meleagrinella sp.
Entolium sp.
Oxytoma (*Oxytoma*) sp.

94050. T.P. Poulton, 1976. Murray Ridge; lat. 68°01.5′N, long. 136°26.5′W. Blow River map area, northern Yukon (NTS 117 A). Manuel Creek Formation. Aalenian.

Entolium sp.
Propeamussium (*Propeamussium*) sp.
Chlamys(?) sp.
Pleuromya sp.
Gresslya(?) sp.
Inoceramus (*Mytiloceramus*) sp. cf. *I.* (*M.*) *polyplocus* Roemer
Belemnites, indet.

94051. T.P. Poulton, 1976. Murray Ridge; lat. 68°01.5′N, long. 136°26.5′W. Blow River map area, northern Yukon (NTS 117 A). Manuel Creek Formation. Aalenian.

Pleuromya sp.
Camptonectes(?) sp.
Vaugonia sp. aff. *V. literata* (Young and Bird)
Corbicula(?) sp.
Isocyprina sp.
"*Ostrea*" sp.
Entolium sp.
Propeamussium (*Propeamussium*) *patriciae* n. sp.

94052. T.P. Poulton, 1976. Murray Ridge; lat. 68°01.5′N, long. 136°26.5′W. Blow River map area, northern Yukon (NTS 117 A). Manuel Creek Formation. Aalenian.

Entolium sp.
Ostrea(?) sp.
Oxytoma(?) sp.
Vaugonia sp. aff. *V. literata* (Young and Bird)
Propeamussium (*Propeamussium*) *patriciae* n. sp.

94053. T.P. Poulton, 1976. Murray Ridge; lat. 68°01.5′N, long. 136°26.5′W. Blow River map area, northern Yukon (NTS 117 A). Basal member, Murray Ridge Formation. Hettangian (?).

Badouxia(?) sp.
Ectocentrites(?) sp.
Pleuromya(?) sp.
Isocardia(?) sp.
"*Ostrea*" sp.
Grammatodon(?) sp.
Meleagrinella(?) sp.
Gryphaea(?) sp.
Oxytoma sp.
Entolium sp.
Oxytoma (*Oxytoma*) sp.
Kolymonectes staeschei (Polubotko)
Harpax sp. cf. *H. spinosus* Sowerby)
Corbicula(?) sp.
Homomya sp.
Lima (*Lima*) *parva* Milova
Pleuromya galathea Agassiz
Pseudomytiloides(?) sp.
Nucula(?) sp.
Cardinia(?) sp.
Liotrigonia atirdjakensis (Koschelkina)
Eopecten(?) sp.
Thracia(?) sp.
Gastropods, indet.
Rhynchonellid brachiopods
Crinoids, indet.

94055. T.P. Poulton, 1976. Murray Ridge; lat. 68°01.5′N, long. 136°26.5′W. Blow River map area, northern Yukon (NTS 117 A). Murray Ridge Formation. Upper Sinemurian, *Raricostatum* Zone.

Echioceras aklavikense Frebold

94059. T.P. Poulton, 1976. Near head of Almstrom Creek; lat. 68°06′N, long. 136°12′W. Blow River map area, northern Yukon (NTS 117 A). Almstrom Creek Formation. Upper Sinemurian or Pliensbachian.

Ostrea sp.

94075. T.P. Poulton, 1976. Mt. McGuire area; lat. 67°46.6′N, long. 137°18.5′W. Bell River map area, northern Yukon (NTS 116 P). Manuel Creek Formation. Middle Toarcian.

Dactylioceras sp. aff. *D. commune* (Simpson)

94087. T.P. Poulton, 1976. Mt. McGuire area; lat. 67°46.5′N, long. 137°18.5′W. Bell River map area, northern Yukon (NTS 116 P). Manuel Creek Formation. Toarcian.

Dactylioceras sp.

94091. T.P. Poulton, 1976. Bug Creek Canyon; lat. 68°04′N, long. 135°29′W. Aklavik map area, Northwest Territories (NTS 107 B). Scho Creek Member, Murray Ridge Formation. Fossils collected loose on top of Scho Creek Member. Upper Sinemurian.

Ammonite, indet.
Entolium sp.
Corbicula(?) sp.
Meleagrinella(?) sp.
Pleuromya galathea Agassiz
Corbula(?) sp.
Tellina(?) sp.
Gastropods, indet.

94106. T.P. Poulton, 1976. West of Cache Creek; lat. 68°10′55″N, long. 136°56′W. Blow River map area, northern Yukon (NTS 117 A). Manuel Creek Formation. Toarcian.

Dactylioceras sp.
Pseudolioceras sp.
Bivalves, indet.
Belemnites, indet.

94120. T.P. Poulton, 1976. West of Cache Creek; lat. 68°19.5′N, long. 136°30′W. Blow River map area, northern Yukon (NTS 117 A). Lower part, Almstrom Creek Formation. Upper Sinemurian or Pliensbachian.

Meleagrinella sp.
Pleuromya sp.
Oxytoma (*Oxytoma*) sp.
Pleuromya galathea Agassiz

94121. T.P. Poulton, 1976. Ridge between Big Fish River and Almstrom Creek, west of Cache Creek; lat. 68°19.5′N, long. 136°30′W. Blow River map area, northern Yukon (NTS 117 A). Manuel Creek Formation. Upper Aalenian. Poulton et al. (1982, Sec. PU-19-76).

Erycitoides sp.
Inoceramus sp.
Astarte sp.
Propeamussium (*Propeamussium*) *patriciae* n. sp.
Meleagrinella sp.
Belemnites, indet.

94135. T.P. Poulton, 1976. Cache Creek; lat. 68°25′N, long. 136°11′W. Blow River map area, northern Yukon (NTS 117 A). Almstrom Creek Formation. Upper Sinemurian or Pliensbachian.

"*Ostrea*" sp.
Pleuromya sp.
Aguilerella(?) sp.
Mactra(?) sp.
Eopecten(?) sp.
Terebratulid(?) brachiopods

94181. T.P. Poulton, 1976. Cache Creek; lat. 68°25′N, long. 136°11′W. Blow River map area, Northwest Territories (NTS 117 A). Almstrom Creek Formation. Upper Sinemurian or Pliensbachian.

Meleagrinella sp.
Liotrigonia sp.
"*Ostrea*" sp.
Oxytoma (*Oxytoma*) sp. cf. *O.* (*O.*) *inequivalvis* (Sowerby)
Harpax sp. cf. *H. spinosus* (Sowerby)
Harpax laevigatus (d'Orbigny)
Otapiria(?) sp. cf. *O. limaeformis* Zakharov
Seirocrinus sp.

94186. T.P. Poulton and D. Hope, 1976. Near Canoe Lake; lat. 68°12′N, long. 135°55′W. Aklavik map area, Northwest Territories (NTS 107 B). Almstrom Creek Formation. Upper Sinemurian or Pliensbachian.

Pholadomya sp.
Kolymonectes(?) sp.
Entolium(?) sp.
Pholadomya ambigua Sowerby
Meleagrinella(?) sp. aff. *M. ansparsicosta* (Polubotko)
Aguilerella sp.

94190. T.P. Poulton, 1976. Murray Ridge; lat. 68°01.5′N, long. 136°26.5′W. Blow River map area, Northwest Territories (NTS 117 A). Manuel Creek Formation. Upper Aalenian. See Poulton et al. (1982, Sec. PU-9-76).

Erycitoides(?) sp.
Entolium sp.
Propeamussium (*Propeamussium*) sp.

94192. T.P. Poulton, 1976. Murray Ridge; lat. 68°01.5′N, long. 136°26.5′W. Blow River map area, Northwest Territories (NTS 117 A). Manuel Creek Formation, Upper Aalenian. See Poulton et al. (1982, Sec. PU-9-76).

Pseudolioceras sp.
Erycitoides(?) sp.
Inoceramus sp.
Protocardia sp.
Meleagrinella(?) sp.
Oxytoma sp.
Gastropods, indet.
Belemnites, indet.

94193. T.P. Poulton, 1976. Section east of White Mountains; lat. 68°01.5′N, long. 136°26.5′W. Blow River map area, Northwest Territories (NTS 117 A). Manuel Creek Formation. Aalenian.

Pseudolioceras mclintocki (Haughton)

C-4215. D.K. Norris, 1969. North of Bonnet Lake; Blow River map area, northern Yukon (NTS 117 A). Kingak Formation. From same shale ridge as GSC locality 86821. Toarcian. See Frebold (1975, p. 5).

Dactylioceras commune (Simpson)
Hildaites(?) sp.
Harpoceras(?) sp.

C-4232. D.K. Norris, 1969. Jurassic Butte, Aklavik map area, Northwest Territories (NTS 107 B). Murray Ridge Formation. Upper Sinemurian. See Frebold (1960).

Aegasteroceras (*Arctoasteroceras*) *jeletzkyi* Frebold
Microderoceras(?) sp.
Oxynoticeras(?) sp.
Gleviceras sp.
"*Ostrea*"(?) sp.
Corbula sp.
Meleagrinella(?) sp.
Entolium(?) sp.
Gastropods, indet.
Seirocrinus sp.

C-6147. D.K. Norris, 1970. Hill above Canoe Lake; lat. 68°19′N, long. 135°48′W. Aklavik map area, Northwest Territories (NTS 107 B). Almstrom Creek Formation. Upper Sinemurian or Pliensbachian.

Modiolus sp.
Meleagrinella sp.
Entolium sp.
Chlamys(?) sp.
Kolymonectes(?) sp.
Gryphaea(?) sp.
Pholadomya(?) sp.
Oxytoma (*Oxytoma*) sp. cf. *O.* (*O.*) *inequivalvis* (Sowerby)
Pleuromya galathea Agassiz
Otapiria(?) sp. cf. *O. limaeformis* Zakharov
"*Seirocrinus*" sp.

C-6612. Elf Oil, 1970. Jurassic Butte; lat. 68°02′00″N, long. 135°28′00″W. Aklavik map area, Northwest Territories (NTS 107 B). Scho Creek Member, Murray Ridge Formation, 2.5 m above the top of the red Permian(?) conglomerates. Upper Sinemurian, *Oxynotum* Zone. See Frebold (1960).

Aegasteroceras (*Arctoasteroceras*) *jeletzkyi* Frebold
Pholadomya idea d'Orbigny
Pleuromya galathea Agassiz
Gastropods, indet.
Atractites(?) sp.

C-53351. T.P. Poulton, 1978. North of Canoe Lake; lat. 68°15′40″N, long. 135°49′30″W. Aklavik map area, Northwest Territories (NTS 107 B). Almstrom Creek Formation. Upper Sinemurian or Pliensbachian.

Oxytoma sp.
Liotrigonia atirdjakensis (Koschelkina)

C-53357. T.P. Poulton, 1978. Twenty-four km west-northwest of north end of Canoe Lake; lat. 68°18′30″N, long. 136°25′50″W. Blow River map area, Northwest Territories (NTS 117 A). Bug Creek Group. Talus. Lower Sinemurian.

Coroniceras(?) sp.

C-53361. T.P. Poulton, 1978. Murray Ridge, near south end; lat. 67°58′05″N, long. 136°23′20″W. Bell River map area, northern Yukon (NTS 116 P). Basal 1 m, Murray Ridge Formation, Hettangian(?).

Liotrigonia(?) sp.
Gryphaea(?) sp.
Meleagrinella(?) sp.
Lima (*Lima*) *parva* Milova
Harpax sp. cf. *H. spinosus* (Sowerby)
Pleurotomaria sp.
Rhynchonellid brachiopods, indet.

C-53364. T.P. Poulton, 1978. Murray Ridge, near south end; lat. 67°58′05″N, long. 136°23′20″W. Bell River map area, northern Yukon (NTS 116 P). Manuel Creek

Formation, 10 m below top of formation. See Poulton et al. [1982, Appendix (but wrongly given as Sec. PU-18-76)]. Aalenian.

Pseudolioceras mclintocki (Haughton)
"*Corbula*" sp.
Entolium sp.
Protocardia sp.
Oxytoma sp.
Inoceramus sp.
Oxytoma (*Oxytoma*) sp.
Inoceramus (*Retroceramus*) sp.
Propeamussium (*Propeamussium*) *patriciae* n. sp.
Astarte aalensis Oppel
Belemnites, indet.

C-53375. T.P. Poulton, 1978. Approximately 28 km west-northwest of Summit Lake, Mt. McGuire area; lat. 67°43′30″N, long. 137°08′05″W. Bell River map area, northern Yukon (NTS 116 P). Manuel Creek Formation. Toarcian.

Dactylioceras sp.
Eopecten(?) sp.
Propeamussium (*Propeamussium*) sp.
Belemnites, indet.

C-53376. T.P. Poulton, 1978. Approximately 28 km west-northwest of Summit Lake, Mt. McGuire area; lat. 67°43′30″N, long. 137°08′30″W. Bell River map area, northern Yukon (NTS 116 P). Manuel Creek Formation. Aalenian. See Poulton et al. (1982, Sec. PU-5-78).

Erycitoides howelli (White)
Protocardia sp.
Entolium sp.
Oxytoma sp.
Propeamussium (*Propeamussium*) sp.
Inoceramus sp.
Eopecten(?) sp.
Gastropods, indet.

C-53386. T.P. Poulton, 1978. Approximately 19 km southeast of Mt. McGuire; lat. 67°46′45″N, long. 137°07′25″W. Bell River map area, northern Yukon (NTS 116 P). Manuel Creek Formation. Toarcian.

Dactylioceras sp.

C-53387. T.P. Poulton, 1978. Approximately 19 km southeast of Mt. McGuire; lat. 67°46′45″N, long. 137°07′25″W. Bell River map area, northern Yukon (NTS 116 P). Anne Creek Member, Manuel Creek Formation. Aalenian. See Poulton et al. (1982, Sec. PU-6-78).

Pseudolioceras mclintocki(?) (Haughton)
Eopecten(?) sp.
Entolium sp.
Pleuromya sp.
Protocardia sp.
Propeamussium (*Propeamussium*) *patriciae* n. sp.
Astarte aalensis Oppel
Belemnites, indet.

C-53412. T.P. Poulton, 1978. 19 km southeast of Mt. McGuire; lat. 67°47′00″N, long. 137°06′05″W. Bell River map area, northern Yukon (NTS 116 P). Bug Creek Group. Poulton et al. (1982) wrongly attributed this collection, found loose on the surface, to the Aklavik Formation, which is Late Jurassic in age. Aalenian.

Erycitoides(?) sp.

C-53452. T.P. Poulton, 1978. Approximately 30 km southeast of Trout Lake; lat. 68°37′25″N, long. 138°19′00″W. Blow River map area, northern Yukon (NTS 117 A). Kingak Formation. Aalenian.

Pseudolioceras mclintocki (Haughton)
Erycitoides howelli (White)
Erycitoides spinatus Westermann (?)
Erycitoides(?) sp.

C-53453. T.P. Poulton, 1978. Approximately 30 km southeast of Trout Lake; lat. 68°37′30″N, long. 138°19′00″W. Blow River map area, northern Yukon (NTS 117 A). Kingak Formation. Aalenian.

Erycitoides(?) sp.
Pseudolioceras sp. aff. *P. whiteavesi* (White)

C-53455. T.P. Poulton, 1978. Approximately 30 km southeast of Trout Lake; lat. 68°37′35″N, long. 138°19′20″W. Blow River map area, northern Yukon (NTS 117 A). Kingak Formation. Aalenian.

Pseudolioceras mclintocki (Haughton)
Erycitoides howelli (White)
Inoceramus sp.

C-53456. T.P. Poulton, 1978. Approximately 30 km southeast of Trout Lake; lat. 68°37′25″N, long. 138°19′20″W. Blow River map area, northern Yukon (NTS 117 A). Kingak Formation. Aalenian.

Pseudolioceras m'clintocki (Haughton)
Erycitoides kialagvikensis (White)
Erycitoides sp.
Inoceramus (*Mytiloceramus*) sp. cf. *I.* (*M.*) *polyplocus* Roemer

C-53469. T.P. Poulton, 1978. 37.5 km southwest of old Herschel RCMP post, Firth River area; lat. 69°21′05″N, long. 139°37′40″W. Herschel Island map area, northern Yukon (NTS 117 D). Kingak Formation. Lower Toarcian(?).

Dactylioceras(?) sp.
Paltarpites(?) sp.
"*Harpoceras*" sp.
Pseudolioceras(?) sp.

C-53471. T.P. Poulton, 1978. Approximately 37.5 km southwest of old Herschel RCMP post, Firth River area; lat. 69°21′05″N, long. 139°38′15″W. Herschel Island map area, northern Yukon (NTS 117 D). Kingak Formation. Upper Pliensbachian.

Amaltheus sp.

C-53472. T.P. Poulton, 1978. Approximately 37.5 km southwest of old Herschel RCMP post, Firth River area; lat. 69°21′05″N, long. 139°38′15″W. Herschel Island map area, northern Yukon (NTS 117 D). Kingak Formation. Upper Pliensbachian.

Amaltheus stokesi (Sowerby)
Bivalves, indet.
Crinoids, indet.

C-53473. T.P. Poulton, 1978. Approximately 37.5 km southwest of old Herschel RCMP post, Firth River area; lat. 69°21′05″N, long. 139°38′15″W. Herschel Island map area, northern Yukon (NTS 117 D). Kingak Formation. Upper Pliensbachian.

Amaltheus stokesi (Sowerby)
Bivalves, indet.

C-53476. T.P. Poulton, 1978. Approximately 37.5 km southwest of old Herschel RCMP post, Firth River area; lat. 69°21′05″N, long. 139°38′45″W. Herschel Island map area, northern Yukon (NTS 117 D). Kingak Formation. Upper Pliensbachian.

Amaltheus sp.
Amaltheus stokesi (Sowerby)

C-53478. T.P. Poulton, 1978. Approximately 37.5 km southwest of old Herschel RCMP post, Firth River area; lat. 69°21′05″N, long. 139°38′45″W. Herschel Island map area, northern Yukon (NTS 117 D). Kingak Formation. Upper Pliensbachian.

Amaltheus stokesi (Sowerby)

C-53480. T.P. Poulton, 1978. Approximately 37.5 km southwest of old Herschel RCMP post, Firth River area; lat. 69°21′05″N, long. 139°38′30″W. Herschel Island map area, northern Yukon (NTS 117 D). Kingak Formation. Upper Pliensbachian.

Amaltheus stokesi (Sowerby)
Ammonite, indet.
Oxytoma(?) sp.

C-53481. T.P. Poulton, 1978. Approximately 37.5 km southwest of old Herschel RCMP post, Firth River area; lat. 69°21′05″N, long. 139°38′30″W. Herschel Island map area, northern Yukon (NTS 117 D). Kingak Formation, second *Amaltheus* horizon. Upper Pliensbachian.

Amaltheus sp.
Entolium(?) sp.
Chlamys(?) sp.
Eopecten(?) sp.

C-53490. T.P. Poulton, 1978. South side of Loney Creek, Herschel Island map area, northern Yukon (NTS 117 D). Upper Pliensbachian.

Amaltheus stokesi (Sowerby)
Lytoceras(?) sp.

C-53491. T.P. Poulton, 1978. South bank of Loney Creek; lat. 69°21′20″N, long. 139°37′30″W. Herschel Island map area, northern Yukon (NTS 117 D). Kingak Formation. Upper Pliensbachian.

Amaltheus stokesi (Sowerby)

C-53492. T.P. Poulton, 1978. South side of Loney Creek; lat. 69°21′20″N, long. 139°37′30″W. Herschel Island map area, northern Yukon (NTS 117 D). Kingak Formation. Collected loose in lower part of section. Lower Toarcian.

Collina(?) sp.
Harpoceras sp.
Pseudolioceras sp. aff. *P. rosenkrantzi* Dagis
Calliphylloceras(?) sp.
Crinoids, indet.
Terebratulid brachiopod, indet.

C-53495. T.P. Poulton, 1978. South side of Loney Creek; lat. 69°21′30″N, long. 139°36′30″W. Herschel Island map area, northern Yukon (NTS 117 D). Kingak Formation. Upper Pliensbachian.

Amaltheus stokesi (Sowerby)
Amaltheus bifurcus Howarth

C-53496. T.P. Poulton, 1978. South side of Loney Creek; lat. 69°21′35″N, long. 139°35′W. Herschel Island map area, northern Yukon (NTS 117 D). Kingak Formation. Upper Pliensbachian.

Amaltheus sp.
Camptonectes sp.

Camptonectes (*Camptochlamys*) sp.

C-53497. T.P. Poulton, 1978. West wide of Firth River at head of delta, Firth River; lat. 69°24′15″N, long. 139°33′W. Herschel Island map area, northern Yukon (NTS 117 D). Kingak Formation. Assemblage of ammonites all from a single concretion. Lower Toarcian.

Ovaticeras sp. cf. *O. ovatum* (Young and Bird)
Collina(?) sp. aff. *C. simplex* (Fucini)

C-80309. P. Sherrington, Petro-Canada, 1978. South side of gorge, Bug Creek Canyon; lat. 68°42′N, long. 135°23.75′W. Aklavik map area, Northwest Territories (NTS 107 B). Murray Ridge Formation. Type section of Bug Creek Formation. Upper Sinemurian.

Echioceras aklavikense Frebold

C-81294. T.P. Poulton, 1979. Near head of Johnson Creek; lat. 68°03′N, long. 137°54′W. Blow River map area, northern Yukon (NTS 117 A). Kingak Formation. In situ, halfway up the shale slope to south of sandstone bluff against which it is faulted. Aalenian.

Erycitoides sp.
Erycitoides kialagvikensis (White)
Planammatoceras sp.
Entolium sp.

C-81295. T.P. Poulton, 1979. Near head of Johnson Creek; lat. 68°03′N, long. 137°54′W. Blow River map area, northern Yukon (NTS 117 A). Kingak Formation, all fossils from a single boulder near GSC locality 88097. Aalenian.

Pseudolioceras sp.
Entolium sp.
Propeamussium (*Propeamussium*) sp.
Inoceramus sp.
Oxytoma sp.
Belemnites, indet.

C-81296. T.P. Poulton, 1979. Near head of Johnson Creek; lat. 68°03′N, long. 137°54′W. Blow River map area, northern Yukon (NTS 117 A). Kingak Formation. Fossils collected loose in creek at or near GSC locality 88097. Aalenian.

Erycitoides howelli (White)
Pseudolioceras mclintocki (Haughton)
Inoceramus sp.

C-81297. T.P. Poulton, 1979. Near head of Johnson Creek; lat. 68°03′N, long. 137°54′W. Blow River map area, northern Yukon (NTS 117 A). Kingak Formation. All fossils collected from a single boulder. Aalenian.

Erycitoides howelli (White)
Pleuromya sp.
Inoceramus sp.
Propeamussium (*Propeamussium*) sp.

C-81329. T.P. Poulton, 1979. Head of Johnson Creek, 8.5 miles south-southeast of Bonnet Lake; lat. 68°03′40″N, long. 137°46.5′W. Blow River map area, northern Yukon (NTS 117 A). Kingak Formation. Sinemurian(?).

Pectinid bivalve
Other bivalves, indet.
Pleurotomaria sp.
"*Seirocrinus*" sp.

C-81330. T.P. Poulton, 1979. Head of Johnson Creek, 8.5 miles south-southeast of Bonnet Lake; lat. 68°03′40″N, long. 137°47′W. Blow River map area, northern Yukon (NTS 117 A). Kingak Formation. Lower Jurassic.

Oxytoma sp.
"*Chlamys*" sp.
"*Ostrea*" sp.
"*Gryphaea*"(?) sp.
Lima(?) sp.
Thracia(?) sp.
Rhynchonellid bivalves, indet.
Seirocrinus sp.

C-81332. T.P. Poulton, 1979. Head of Johnson Creek, 9.5 miles south-southeast of Bonnet Lake; lat. 68°03′30″N, long. 137°48′W. Blow River map area, northern Yukon (NTS 117 A). Kingak Formation. Hettangian(?).

Cardinia sp.

C-81334. T.P. Poulton, 1979. 15.3 km south-southeast of Bonnet Lake, head of Johnson Creek; lat. 68°02′50″N, long. 137°46′W. Blow River map area, northern Yukon (NTS 117 A). Kingak Formation. Lower Aalenian.

Leioceras sp. aff. *L. opalinum* (Reinecke)

C-81339. T.P. Poulton, 1979. 16 km south-southwest of Bonnet Lake, Johnson Creek; lat. 68°03′05″N, long. 138°02′40″W. Blow River map area, northern Yukon (NTS 117 A). Kingak Formation. *Gryphaea* beds. Lower Jurassic [Pliensbachian(?)]. See Poulton (1989b).

Gryphaea sp.

C-81340. T.P. Poulton, 1979. 16 km south-southwest of Bonnet Lake, Johnson Creek; lat. 68°03′05″N, long. 138°02′30″W. Blow River map area, northern Yukon (NTS 117 A). Kingak Formation. Collected in situ and loose. Aalenian.

Pseudolioceras mclintocki (Haughton)
Erycitoides howelli (White)
Propeamussium (*Propeamussium*) sp.
Inoceramus sp.
Oxytoma sp.
Entolium sp.
Bivalves, indet.
Belemnites, indet.

C-81341. T.P. Poulton, 1979. 16 km south-southwest of Bonnet Lake, Johnson Creek; lat. 68°03′05″N, long. 138°02′30″W. Blow River map area, northern Yukon (NTS 117 A). Kingak Formation. Aalenian.

Pseudolioceras mclintocki (Haughton)
Erycitoides howelli (White)
Entolium sp.
Inoceramus sp.
Propeamussium (*Propeamussium*) *patriciae* n. sp.
Belemnites, indet.

C-81346. T.P. Poulton, 1979. 16 km south-southwest of Bonnet Lake, Johnson Creek; lat. 68°03′N, long. 138°W. Blow River map area, northern Yukon (NTS 117 A). Kingak Formation. Aalenian.

Pseudolioceras sp.
Oxytoma sp.
Propeamussium (*Propeamussium*) sp.
"*Ostrea*"(?) sp.
Entolium sp.
Astarte sp.
Belemnites, indet.

C-106109. Marc Bardoux, 1982. Bug Creek; lat. 68°07′00″N, long. 135°25′00″W. Aklavik map area, Northwest Territories (NTS 107 B). Scho Creek Member, Murray Ridge Formation. Sinemurian.

Paltechioceras(?) sp.

C-128908. T.P. Poulton, 1981. North side of Porcupine River, Salmon Cache Canyon; lat. 67°26.5′N, long. 137°46′W. Bell River map area, northern Yukon (NTS 116 P). Bug Creek Formation. Sinemurian.

Echioceras(?) sp.

PLATES 1 to 18

The illustrated specimens are grouped primarily in assemblages, in stratigraphic order.

All the specimens illustrated are stored in the Type Collection, Geological Survey of Canada, 601 Booth Street, Ottawa, Ontario, Canada. The GSC fossil localities are described in the Appendix; individual specimens from these localities are numbered separately with specimen numbers that refer to the Type Collection Catalogue.

PLATE 1

All specimens are illustrated at natural size.

Hettangian and Sinemurian fossils, basal Bug Creek Group and basal Kingak Formation.

Figure 1. *Psiloceras*(?) sp.

Figured specimen GSC 92480 from GSC locality 92482. Lower Hettangian, basal unit of Kingak Formation, north of Bonnet Lake.

Figures 2-5. *Ectocentrites*(?) sp.

Lateral and ventral views of outermost preserved, and inner whorls of fragment, figured specimen GSC 92481 from GSC locality 94053. Hettangian(?) basal unit, Murray Ridge Formation, Murray Ridge.

Figures 6, 7. *Badouxia*(?) sp. indet.

Latex casts of whorl fragments, figured specimens GSC 92482 and 92483 from GSC locality 94053. Hettangian(?) basal unit, Murray Ridge Formation, Murray Ridge. Part of a poorly preserved septal suture can be seen in figure 6. It cannot be better illustrated because it is faintly preserved on an external mould.

Figures 8, 9. *Coroniceras*(?) sp.

Lateral and ventral views of whorl fragment, figured specimen GSC 92484 from GSC locality C-53357. Lower Sinemurian, Murray Ridge Formation, 24 km west-northwest of Canoe Lake.

Figures 10, 11. *Paltechioceras*(?) sp.

Lateral and ventral views of whorl fragment, figured specimen GSC 92485 from GSC locality C-106109. Upper Sinemurian, Scho Creek Member, Bug Creek Canyon.

Figures 12-17. *Arnioceras* sp. cf. *A. douvillei* (Bayle)

12, 13. Lateral and ventral views, figured specimen GSC 92486 from GSC locality 59295. Lower Sinemurian, Fish Creek.

14. Lateral view, figured specimen GSC 92487 from GSC locality 59295, Lower Sinemurian, Fish Creek.

15, 16. Lateral and ventral views, figured specimen GSC 92488 from GSC locality 59295, Lower Sinemurian, Fish Creek.

17. Lateral view, figured specimen GSC 92489 from GSC locality 59295, Lower Sinemurian, Fish Creek.

Figure 18. Bivalve, gen. et sp. indet.

Figured specimen GSC 92490 from GSC locality 92485. Lower Hettangian, basal unit, Kingak Formation, north of Bonnet Lake.

Figure 19. *Pleuromya galathea* Agassiz

Figured specimen GSC 92491 from GSC locality 92482. Lower Hettangian, basal unit, Kingak Formation, north of Bonnet Lake.

Figures 20, 21. *Cenoceras* sp. aff. *C. intermedius* Sowerby

Lateral and ventral views, figured specimen GSC 92492 from GSC locality 25762. Sinemurian, Scho Creek Member, Jurassic Butte area.

Figures 22-24. *Sagenopteris* sp.

22, 23. Figured specimens GSC 92493 and 92494 from GSC locality 92559. Probably Sinemurian sandstone near Salmon Cache Canyon, Porcupine River.

24. Figured specimen GSC 92495 from GSC locality 92581. Upper Sinemurian Scho Creek Member, Bug Creek Canyon.


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PLATE 2

All specimens are illustrated at natural size.

Upper Sinemurian ammonites, Murray Ridge and Almstrom Creek formations.

Figures 1, 2. *Aegasteroceras* (*Arctoasteroceras*?) sp.

Lateral and ventral views of whorl fragment, figured specimen GSC 92496 from GSC locality C-4232. Sinemurian, Scho Creek Member, Jurassic Butte.

Figures 3-6. *Aegasteroceras* (*Arctoasteroceras*) *jeletzkyi* Frebold

3. Lateral view of fragmentary specimen GSC 92497, GSC locality 25765. Upper Sinemurian, Scho Creek Member, near Jurassic Butte.

4. Lateral view of fragmentary specimen, figured specimen GSC 92498 from GSC locality 94027. Upper Sinemurian, Scho Creek Member, Jurassic Butte.

5, 6. Lateral and ventral views of small fragment, figured specimen GSC 92499 from GSC locality 26973. Upper Sinemurian, Scho Creek Member, near Jurassic Butte.

Figures 7-10. *Aegasteroceras* sp.

7, 8. Lateral and ventral views of whorl fragment, figured specimen GSC 92500 from GSC locality 88066. Sinemurian. See text, Ager and Westermann (1963) and Poulton et al. (1982) for a discussion of this anomalous locality.

9, 10. Lateral and ventral views of fragmentary specimen, figured specimen GSC 92501 from the same locality as figures 7, 8.

Figures 11, 13-15, 17, 18. *Echioceras aklavikense* Frebold

11. Lateral view of crushed specimen, figured specimen GSC 92502 from GSC locality C-80309. Upper Sinemurian, Murray Ridge Formation, Bug Creek Canyon.

13. Ventrolateral view of small whorl fragment, figured specimen GSC 92503 from GSC locality 94055. Upper Sinemurian, Murray Ridge Formation, Murray Ridge.

14, 15. Ventrolateral views of small fragments, figured specimens GSC 92504 and 92505 from GSC locality 26976. Upper Sinemurian, Murray Ridge Formation, Bug Creek Canyon.

17, 18. Lateral and ventral views of crushed whorl fragment, figured specimen GSC 92506 from GSC locality 92582. Sinemurian, Murray Ridge Formation, Bug Creek Canyon.

Figures 12, 16. *Echioceras*(?) sp.

12. Lateral view of fragmentary specimen, figured specimen GSC 92507 from GSC locality 92602. Sinemurian, Murray Ridge Formation, Murray Ridge.

16. Figured specimen GSC 92508 from GSC locality 92596. Upper Sinemurian(?), Almstrom Creek Formation, hills west of Canoe Lake. The ammonite whorls are preserved on an ostreiid(?) shell. This poorly preserved small specimen is of disproportionate significance because it is one of only two ammonites that occur in the Almstrom Creek Formation. Compare with specimen shown in Plate 2, figure 12.

Figures 19, 20. *Paltechioceras* (*Orthechioceras*) sp. cf. *P.* (*O.*) *radiatum* Trueman and Williams

Lateral and ventral views of whorl fragment, figured specimen GSC 92509 from GSC locality 85359. Sinemurian, Salmon Cache Canyon, Porcupine River.

Figure 21. *Microderoceras*(?) sp.

Lateral view of whorl fragment, figured specimen GSC 92510 from GSC locality C-4232. Sinemurian, Jurassic Butte.

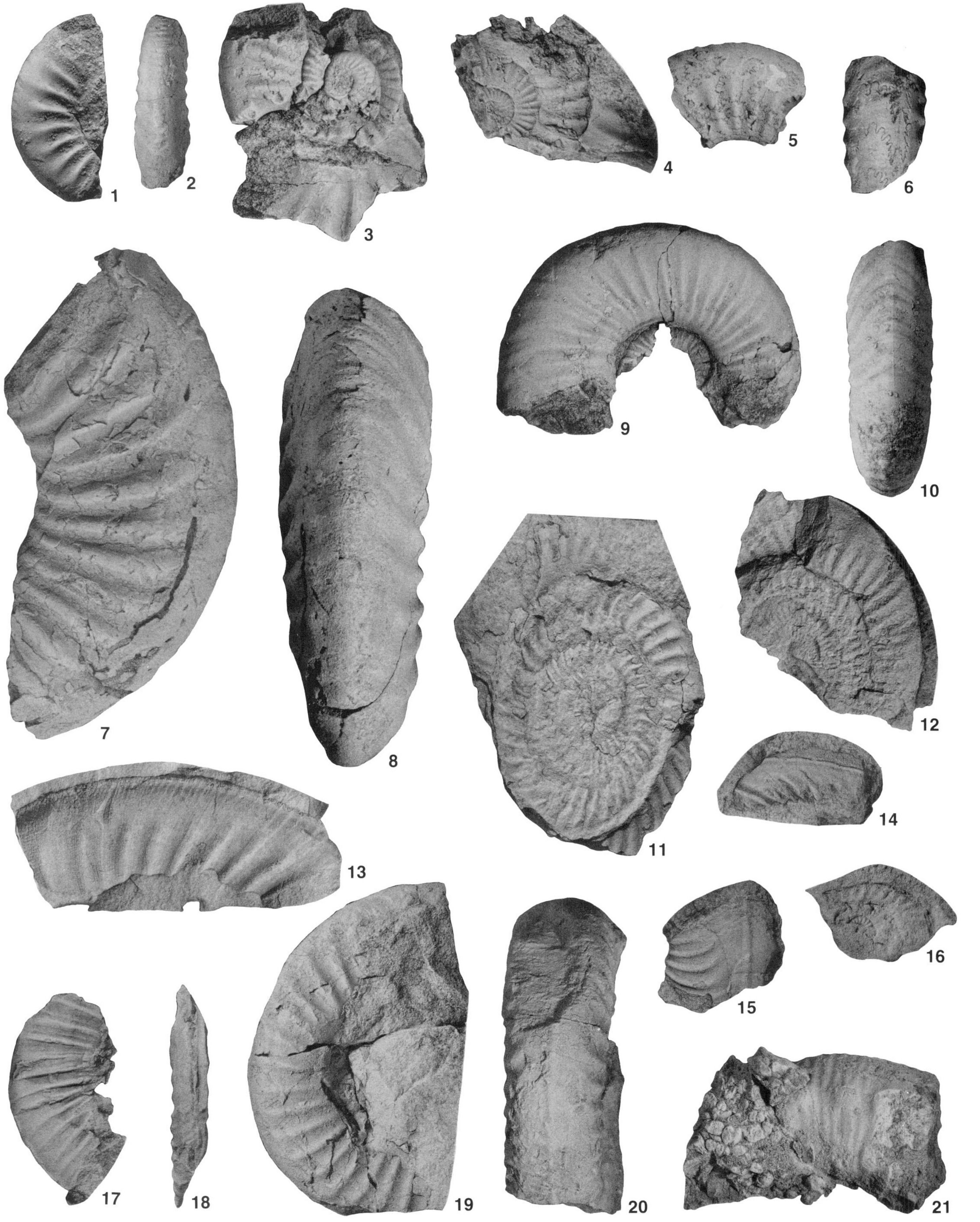
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PLATE 3

All specimens are illustrated at natural size.

Upper Sinemurian ammonites, Murray Ridge Formation.

Figures 1-6, 9-12. *Gleviceras* sp.

1, 2. Lateral and ventral views of whorl fragment, figured specimen GSC 92511 from GSC locality 25762. Sinemurian, Scho Creek Member, Jurassic Butte area.

3, 4. Lateral and ventral views of whorl fragment, figured specimen GSC 92512 from GSC locality 92581. Upper Sinemurian, Scho Creek Member, Bug Creek Canyon.

5, 6. Lateral and ventral views, figured specimen GSC 92513 from GSC locality 92581. Upper Sinemurian, Scho Creek Member, Bug Creek Canyon.

9, 10. Lateral and ventral views, figured specimen GSC 92514 from GSC locality 92581. Upper Sinemurian, Scho Creek Member, Bug Creek Canyon.

11, 12. Lateral and ventral views of body whorl fragment, figured specimen GSC 92515 from GSC locality C-4232. Sinemurian, Jurassic Butte.

Figures 7, 8. *Oxynoticeras*(?) sp.

Lateral and ventral views of small fragment, figured specimen GSC 92516 from GSC locality C-4232. Sinemurian, Jurassic Butte.

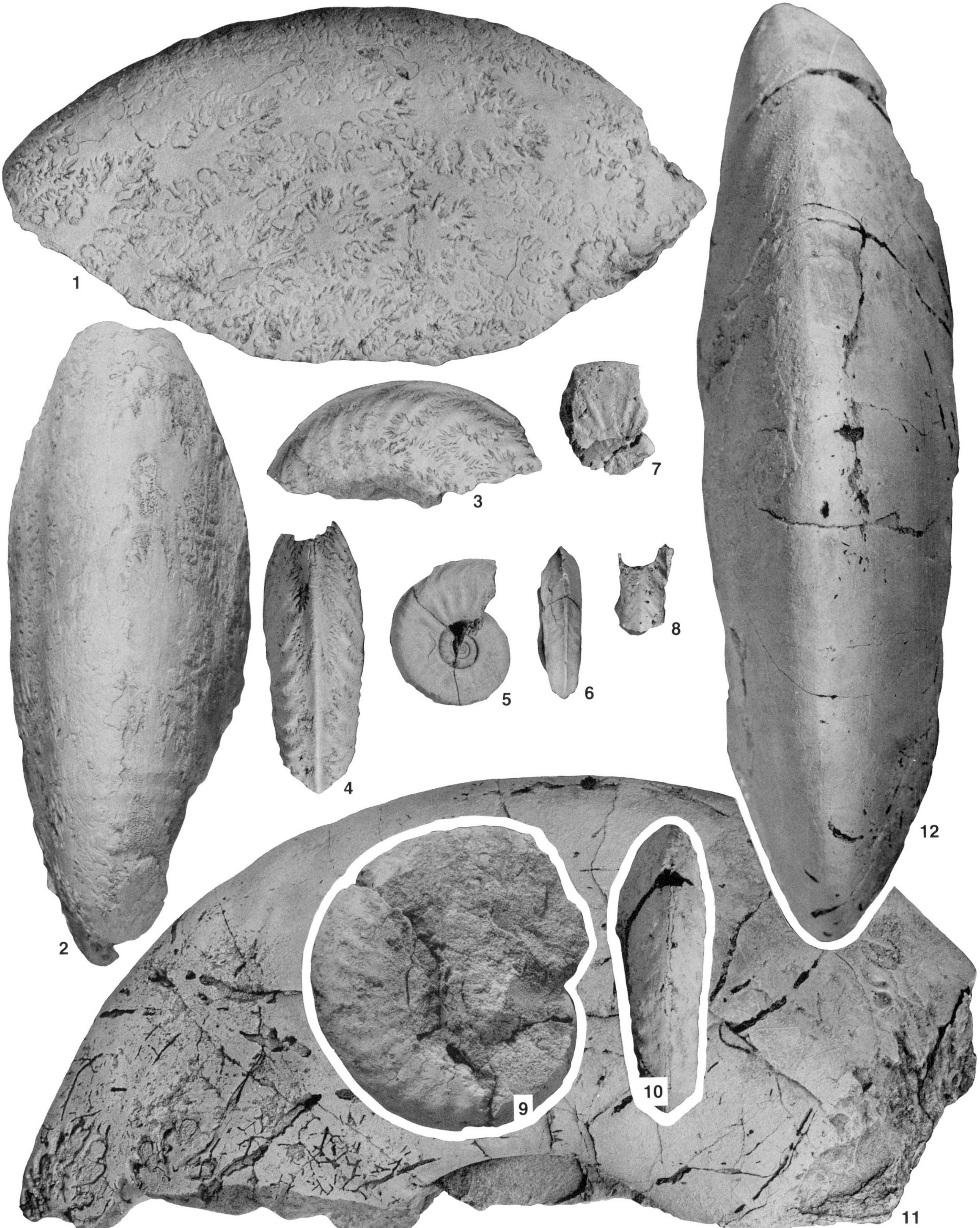
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PLATE 4

All specimens are illustrated at natural size.

Hettangian(?) and Sinemurian bivalves, Murray Ridge and Almstrom Creek formations.

Figure 1. *Inoceramus* (*Mytiloides*) sp. cf. *M. rassochaensis* (Polubotko)

Figured specimen GSC 92517 from GSC locality 26879. Upper Sinemurian, Scho Creek Member, Bug Creek Canyon.

Figure 2. *Pseudomytiloides*(?) sp.

Latex cast, figured specimen GSC 92518 from GSC locality 94053. Hettangian(?) basal unit, Murray Ridge Formation, Murray Ridge.

Figure 3. *Goniomya* sp.

Figured specimen GSC 92519 from GSC locality 92602. Upper Sinemurian, Murray Ridge Formation, Murray Ridge.

Figures 4-12, 14, 15. *Pholadomya idea* d'Orbigny

4, 5. Lateral and anterior views, figured specimen GSC 92520 from GSC locality 26925. Upper Sinemurian, Jurassic Butte area.

6, 7. Lateral and postero-anterior views, figured specimen GSC 92521 from GSC locality 92581. Upper Sinemurian, Scho Creek Member, Bug Creek Canyon.

8. Figured specimen GSC 92522 from GSC locality 92581. Upper Sinemurian, Scho Creek Member, Bug Creek Canyon.

9. Figured specimen GSC 92523 from GSC locality 94026. Upper Sinemurian, Murray Ridge Formation, Jurassic Butte.

10, 11. Lateral and dorsal views, figured specimen GSC 92524 from GSC locality 94027. Upper Sinemurian, Murray Ridge Formation, ridge east of Jurassic Butte.

12. Figured specimen GSC 92525 from GSC locality C-6612. Upper Sinemurian, Jurassic Butte area.

14, 15. Dorsal and lateral views, figured specimen GSC 92526 from GSC locality 92581. Upper Sinemurian, Scho Creek Member, Bug Creek Canyon.

Figure 13. *Pholadomya ambigua* Sowerby(?)

Figured specimen GSC 92527 from GSC locality 92596. Upper Sinemurian(?), Almstrom Creek Formation, west of Canoe Lake.

Figures 16-23, 25-27. *Gresslya*(?) sp.

16. Figured specimen GSC 92528 from GSC locality 92581. Upper Sinemurian, Scho Creek Member, Bug Creek Canyon.

17-19. Lateral, dorsal, and anterior views of figured specimen GSC 92529 from GSC locality 92581. Sinemurian, Scho Creek Member, Bug Creek Canyon.

20, 21. Lateral and anterior views, figured specimen GSC 92530 from GSC locality 92581. Upper Sinemurian, Scho Creek Member, Bug Creek Canyon.

22, 23. Lateral and dorsal views, figured specimen GSC 92531 from GSC locality 92581. Upper Sinemurian, Scho Creek Member, Bug Creek Canyon.

25-27. Lateral, anterior, and dorsal views, figured specimen GSC 92535 from GSC locality 92581. Sinemurian, Scho Creek Member, Bug Creek Canyon.

Figures 24, 28, 29. *Pleuromya galathea* Agassiz.

24. Figured specimen GSC 92532 from GSC locality 94091. Upper Sinemurian, Scho Creek Member, Bug Creek Canyon.

28. Figured specimen GSC 92533 from GSC locality 92581. Upper Sinemurian, Scho Creek Member, Bug Creek Canyon.

29. Figured specimen GSC 92534 from GSC locality 94120. Sinemurian, lower Almstrom Creek Formation, Cache Creek area.

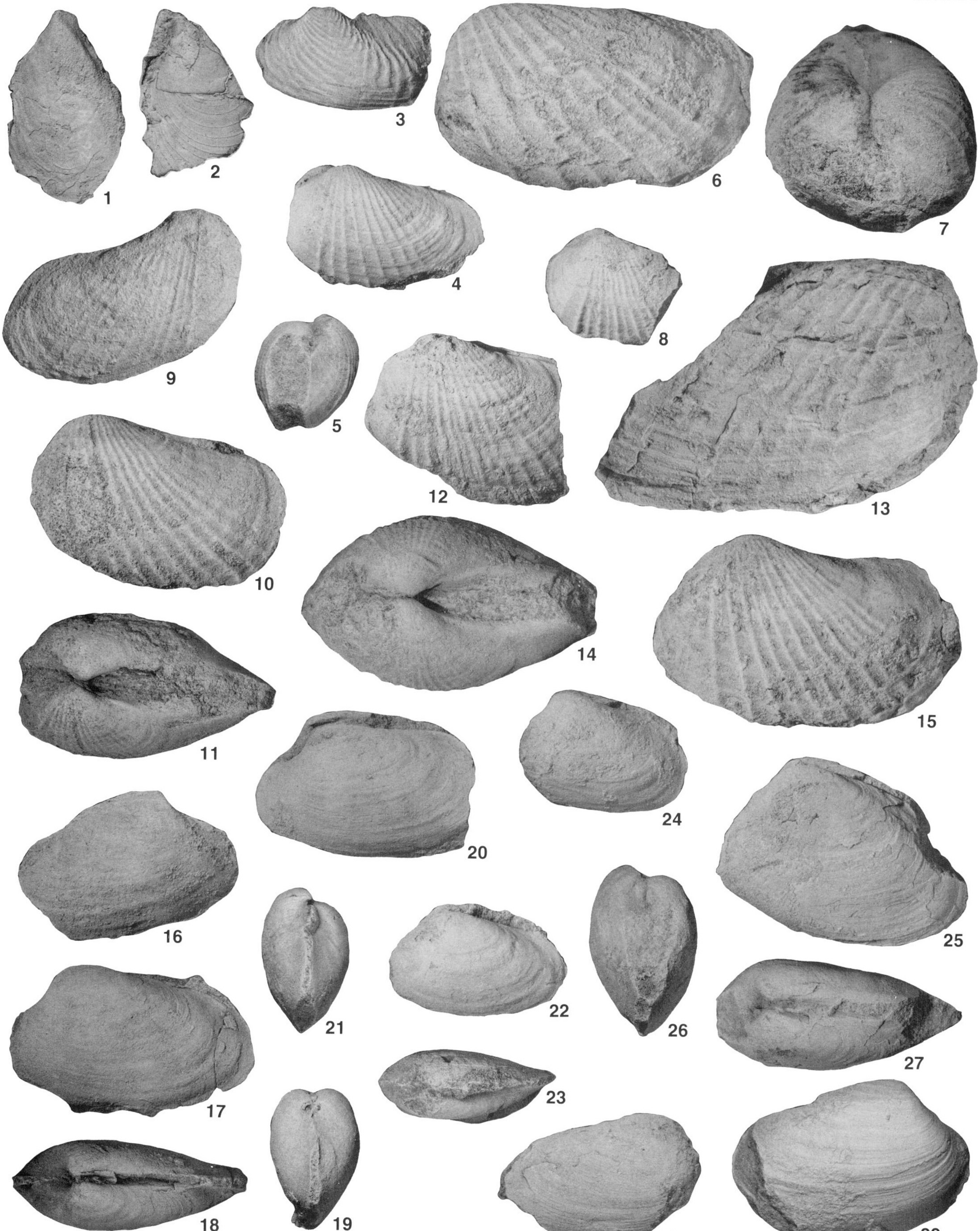
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PLATE 5

All specimens are illustrated at natural size.

Hettangian(?), Sinemurian and Pliensbachian(?) bivalves, Murray Ridge and Kingak formations.

Figures 1-3. *Pleuromya galathea* Agassiz

1. Figured specimen GSC 92536 from GSC locality 94053. Hettangian(?) basal unit, Murray Ridge Formation, Murray Ridge.

2. Figured specimen GSC 92537 from GSC locality C-6612. Upper Sinemurian, Scho Creek Member, Jurassic Butte area.

3. Figured specimen GSC 92538 from GSC locality C-6612, Upper Sinemurian, Scho Creek Member, Jurassic Butte.

Figures 4-13. *Gryphaea* spp.

4, 13. Figured specimens GSC 92539 and 92540 from GSC locality 59295. Lower Sinemurian, Fish Creek.

5, 6. Lateral and posterodorsal views, figured specimen GSC 92541 from GSC locality 92519. Pliensbachian(?), Johnson Creek *Gryphaea* beds, Kingak Formation.

7, 8. Figured specimens GSC 92542 and 92543 from GSC locality C-81339. Pliensbachian(?), *Gryphaea* beds, Kingak Formation, Johnson Creek.

9, 10. Lateral and dorsal views, figured specimen GSC 92544 from GSC locality C-81339. Pliensbachian(?), *Gryphaea* beds, Kingak Formation, Johnson Creek.

Figures 7-10 illustrate variable morphology, presumably due to crowding.

11, 12. Lateral and dorsal views, figured specimen GSC 92545 from GSC locality 92519. Pliensbachian(?), *Gryphaea* beds, Johnson Creek.

Figures 14-16. *Gryphaea*(?) sp.

14. Figured specimen GSC 92546 from GSC locality 92602. Upper Sinemurian, Murray Ridge Formation, Murray Ridge.

15. Figured specimen GSC 92547 from GSC locality 94053. Hettangian(?) basal unit, Murray Ridge Formation, Murray Ridge.

16. Figured specimen GSC 92548 from GSC locality 59295. Lower Sinemurian, Fish Creek.

Figure 17. *Cardinia*(?) spp.

Figured specimen GSC 92549 from GSC locality 94053. Hettangian(?) basal unit, Murray Ridge Formation, Murray Ridge.

Figures 18-21. *Liotrigonia atirdjakensis* (Koschelkina)

18. Oblique posterodorsal view, figured specimen GSC 92550 from GSC locality 41454. Hettangian(?) basal Jurassic unit, Murray Ridge. The associated gastropods, "*Pleurotomaria*", characterize the basal unit of the Murray Ridge Formation at Murray Ridge. They reach about twice the size of the specimens shown in this photograph.

19-21. Figured specimens GSC 92551, 92552, and 92553 from GSC locality 94053. Hettangian(?) basal unit, Murray Ridge Formation, Murray Ridge.

Figure 22. Entoliid bivalve, indet.

Figured specimen GSC 92554 from GSC locality 94053. Hettangian(?) basal unit, Murray Ridge Formation, Murray Ridge.

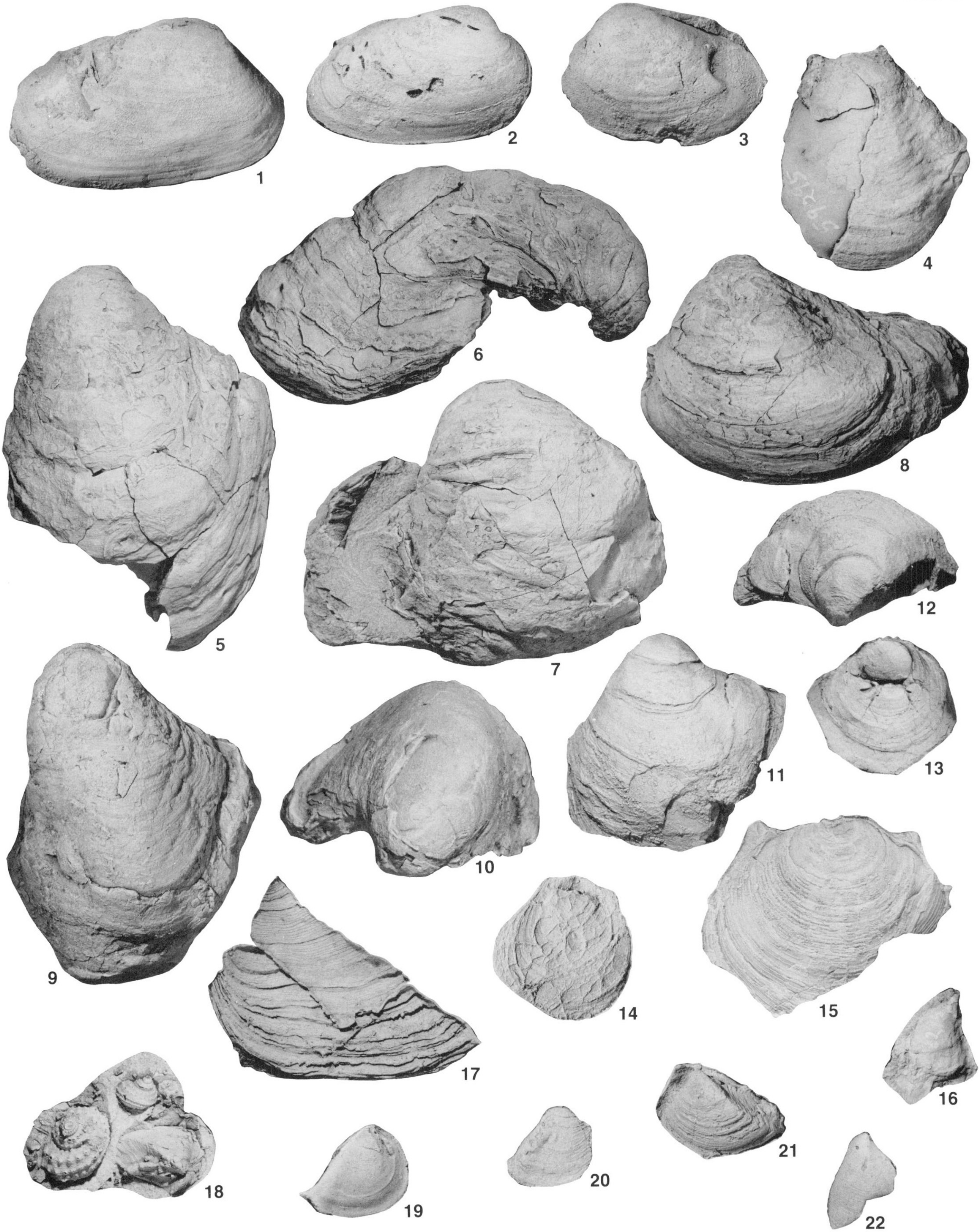
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PLATE 6

All specimens are illustrated at natural size.

Sinemurian and Hettangian(?) pectinacean bivalves, Murray Ridge and Almstrom Creek formations.

Figures 1-7. *Lima* (*Lima*) *parva* Milova

1-3. Figured specimens GSC 92555, 92556, and 92557 from GSC locality 94053. Hettangian(?) basal unit, Murray Ridge Formation, Murray Ridge.

4, 5. Figured specimens GSC 92558 and 92559 from GSC locality 92581. Upper Sinemurian, Scho Creek Member, Bug Creek Canyon.

6. Figured specimen GSC 92560 from GSC locality C-53361. Hettangian(?) basal unit, Murray Ridge Formation, Murray Ridge.

7. Figured specimen GSC 92561 from GSC locality 35919. Sinemurian, basal coquina, Salmon Cache Canyon, Porcupine River.

Figures 8-11. *Meleagrinella* sp.

8, 9. Figured specimens GSC 92562 and 92563 from GSC locality 94120. Upper Sinemurian or Pliensbachian, west of Cache Creek.

10. Figured specimen GSC 92564 from GSC locality 59295. Lower Sinemurian, Fish Creek.

11. Figured specimen GSC 92565 from GSC locality 92602. Upper Sinemurian, Murray Ridge Formation, Murray Ridge.

Figures 12, 13, 32, 38. *Eopecten*(?) sp.

12, 13. Figured specimens GSC 92566 and 92567 from GSC locality 35919. Sinemurian, basal coquina, Salmon Cache Canyon, Porcupine River. The slab shown in figure 12 also contains *Lima* (*Lima*) *parva* (top right) and *Oxytoma cygnipes* (bottom left).

32. Figured specimen GSC 92568 from GSC locality 59295. Lower Sinemurian, Fish Creek. The characteristic wavy radial ribs are seen on the left side of the picture. The internal mould exhibits a very weak, irregular, radial ornament.

38. Figured specimen GSC 92569 from GSC locality 94053. Hettangian(?) basal unit, Murray Ridge Formation, Murray Ridge.

Figures 14-16. *Oxytoma* (*Palmoxytoma*) *cygnipes* (Young and Bird)

Figured specimens GSC 92570, 92571, and 92572 from GSC locality 35919. Sinemurian, basal coquina, Salmon Cache Canyon, Porcupine River.

Figures 17, 20. *Oxytoma* (*Oxytoma*) sp.

Figured specimens GSC 92573 and 92574 from GSC locality 94053. Hettangian or Sinemurian, basal unit, Murray Ridge Formation, Murray Ridge.

Figures 18, 19. *Oxytoma* (*Oxytoma*) sp. cf. *O.* (*O.*) *sinemuriensis* (d'Orbigny)

18. Figured specimen GSC 92575 from GSC locality 94047. Upper Sinemurian, Murray Ridge Formation, east of head of Little Bell River.

19. Figured specimen GSC 92576 from GSC locality 94120. Sinemurian, west of Cache Creek.

Figures 21-28. *Kolymonectes staeschei* (Polubotko)

21-24. Figured specimens GSC 92577 to 92580 from GSC locality 94053. Hettangian(?) basal unit, Murray Ridge Formation, Murray Ridge.

25, 26. Figured specimens GSC 92581 and 92582 from GSC locality 41454. Hettangian or Sinemurian, basal unit, Murray Ridge Formation, Murray Ridge.

27. Figured specimen GSC 92583 from GSC locality 26979. Sinemurian, Jurassic Butte.

28. Figured specimen GSC 92584 (top specimen) from GSC locality 26979. Sinemurian, Jurassic Butte. Bottom specimen is *Entolium* sp.

Figures 29, 30. *Entolium* sp.

29. Figured specimen GSC 92585 from GSC locality 94047, Sinemurian, east of head of Little Bell River.

30. Figured specimen GSC 92586 from GSC locality 92602. Upper Sinemurian, Murray Ridge Formation, Murray Ridge.

Figures 31, 33-36. *Entolium*(?) sp.

31. Figured specimen GSC 92587 from GSC locality 92596. Upper Sinemurian(?), Almstrom Creek Formation, west of Canoe Lake.

33. Figured specimen GSC 92588 from GSC locality 41454. Hettangian(?) basal unit, Murray Ridge Formation, Murray Ridge.

34, 36. Figured specimens GSC 92589 and 92590 from GSC locality 94053. Hettangian(?) basal unit, Murray Ridge Formation, Murray Ridge.

35. Figured specimen GSC 92591 from GSC locality 59295. Sinemurian, Fish Creek.

Figure 37. *Camptonectes* (*Camptonectes*) sp.

Internal mould, figured specimen GSC 92592 from GSC locality 41454. Hettangian or Sinemurian(?) basal unit, Murray Ridge Formation, Murray Ridge.

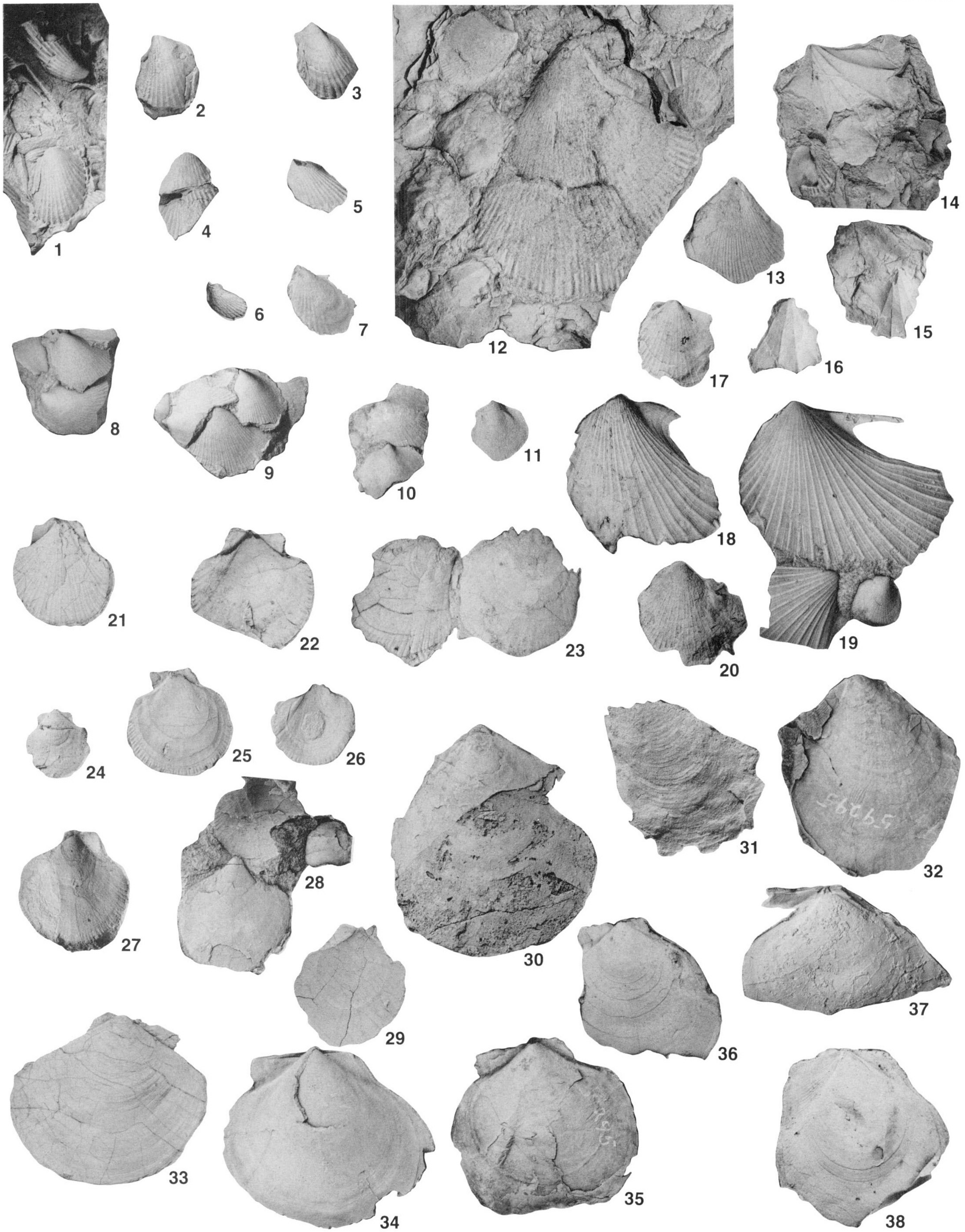
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PLATE 7

All specimens are illustrated at natural size except figures 26-28.

Hettangian(?), Sinemurian, and Pliensbachian bivalves, Murray Ridge and Kingak formations.

Figure 1. *Harpax laevigatus* (d'Orbigny)

Figured specimen GSC 92593 from GSC locality 39368. Upper Pliensbachian, Bonnet Lake area.

Figures 2-7, 27, 28. *Harpax* sp. cf. *H. spinosus* (Sowerby)

2. Figured specimen GSC 92594 from GSC locality C-53361. Hettangian(?) basal unit, Murray Ridge Formation, Murray Ridge.

3-5, 7, 27. External and internal views, figured specimens GSC 92595 to 92598 from GSC locality 94053. Hettangian(?) basal unit, Murray Ridge Formation, Murray Ridge. 27: same specimen as figure 5, x2.

6, 28. Internal view, figured specimen GSC 92599 from GSC locality 94053. Hettangian(?), basal Murray Ridge Formation, Murray Ridge. 6, x1; 28, x2.

Figures 8-10. *Corbula*(?) sp.

8, 10. Figured specimens GSC 92600 and 92601 from GSC locality 59295. Lower Sinemurian, Fish Creek.

9. Figured specimen GSC 92602 from GSC locality 94091. Upper Sinemurian, Scho Creek Member, Bug Creek Canyon.

Figures 11-14. *Mactra*(?) sp.

11, 14. Figured specimen GSC 92603 and 92604 from GSC locality 94023. Upper Sinemurian(?), Almstrom Creek Formation, Bug Creek Canyon.

12, 13. Figured specimen GSC 92605 and 92606 from GSC locality 92581. Upper Sinemurian, Scho Creek Member, Bug Creek Canyon.

Figure 15. *Homomya* sp.

Figured specimen GSC 92607 from GSC locality 94053. Hettangian(?) basal unit, Murray Ridge formation, Murray Ridge.

Figures 16, 24. *Thracia*(?) sp.

Figured specimens GSC 92608 and 92609 from GSC locality 94053. Hettangian(?) basal unit, Murray Ridge Formation, Murray Ridge.

Figures 17-21. *Corbicula*(?) sp.

17. Figured specimen GSC 92610 from GSC locality 94091. Upper Sinemurian, Scho Creek Member, Bug Creek Canyon.

18. Figured specimen GSC 92611 from GSC locality 59295. Lower Sinemurian, Fish Creek.

19, 20. Lateral and dorsal views, figured specimen GSC 92612 from GSC locality 94053. Hettangian(?) basal unit, Murray Ridge Formation, Murray Ridge.

21. Figured specimen GSC 92613 from GSC locality 94053. Hettangian(?) basal unit, Murray Ridge Formation, Murray Ridge.

Figures 22, 23. *Tellina*(?) sp.

Figured specimens GSC 92614 and 92615 from GSC locality 94091. Upper Sinemurian, Murray Ridge Formation, Bug Creek Canyon.

Figures 25, 26. *Nucula*(?) sp.

Latex cast, impressions of small shells, specimen with arrow is figured specimen GSC 92616 from GSC locality 94053. Hettangian(?) basal unit, Murray Ridge Formation, Murray Ridge. These shells occur in great abundance in small nests, preserved in concretions. 26, x3.

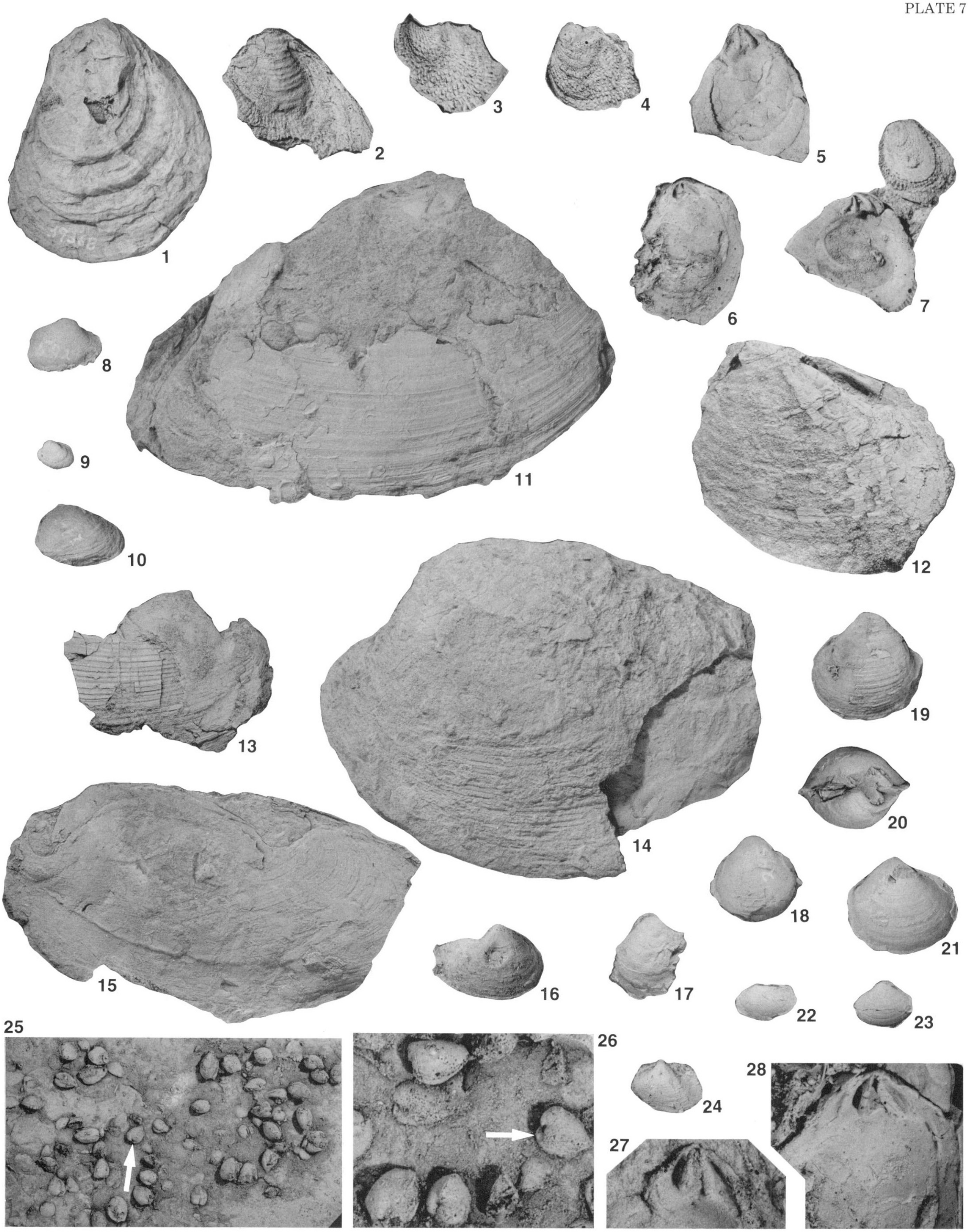
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PLATE 8

All specimens are illustrated at natural size.

Upper Pliensbachian ammonites and Upper Sinemurian or Pliensbachian bivalves, Kingak and Almstrom Creek formations.

Figures 1-8. *Amaltheus stokesi* (J. Sowerby)

1. Figured specimen GSC 92617 from GSC locality C-53491. Upper Pliensbachian, Kingak Formation, Loney Creek.

2, 4. Figured specimens GSC 92618 and 92619 from GSC locality C-53476. Upper Pliensbachian, Kingak Formation, Loney Creek.

3, 6. Figured specimens GSC 92620 and 92621 from GSC locality C-53478. Upper Pliensbachian, Kingak Formation, Loney Creek.

5. Figured specimen GSC 92622 from GSC locality C-53495. Upper Pliensbachian, Kingak Formation, Loney Creek.

7, 8. Figured specimens GSC 92623 and 92624 from GSC locality 39368. Upper Pliensbachian, Kingak Formation, north of Bonnet Lake.

Figures 9, 12-15. *Amaltheus bifurcus* Howarth.

9. Figured specimen GSC 92625 from GSC locality C-53495. Upper Pliensbachian, Kingak Formation, Loney Creek.

12. Figured specimen GSC 92626 from GSC locality 52693. Upper Pliensbachian, Kingak Formation, Loney Creek.

13. Small fragment, figured specimen GSC 92627 from GSC locality 88278. Upper Pliensbachian, Almstrom Creek Formation, Old Crow Flats, south of Porcupine River. This poor specimen is of great significance, being only one of two ammonites found in the Almstrom Creek Formation and thus indicating its extension southwest of the northern Richardson Mountains.

14. Figured specimen GSC 92628 from GSC locality 39368. Upper Pliensbachian, Kingak Formation, north of Bonnet Lake.

15. Figured specimen GSC 92629 from GSC locality 92586. Upper Pliensbachian, Kingak Formation, north of Bonnet Lake.

Figures 10, 11. *Pleuroceras*(?) sp.

Lateral and ventral views of whorl fragment, figured specimen GSC 92630 from locality 39368. Upper Pliensbachian, Kingak Formation, about 16 km north of Bonnet Lake.

Figures 16-19. *Liotrigonia atirdjakensis* (Koschelkina)

16, 18. Figured specimens GSC 92631 and 92632 from GSC locality 92580. Upper Sinemurian or Pliensbachian, Almstrom Creek Formation, Canoe Lake.

17, 19. Cast and internal mould, figured specimens GSC 92633 and 92634 from GSC locality C-53351. Upper Sinemurian or Pliensbachian, Almstrom Creek Formation, Canoe Lake.

Figure 20. *Pleuromya galathea* Agassiz

Figured specimen GSC 92635 from GSC locality C-6147. Upper Sinemurian or Pliensbachian, Almstrom Creek Formation near Canoe Lake.

Figure 21. *Mactra*(?)

Figured specimen GSC 92636 from GSC locality 94135. Upper Sinemurian or Pliensbachian, Almstrom Creek Formation, Cache Creek.

Figures 22, 23. *Pleuromya* sp.

22. Figured specimen GSC 92637 from GSC locality 94135. Upper Sinemurian or Pliensbachian, Almstrom Creek Formation, Cache Creek.

23. Figured specimen GSC 92638 from GSC locality 92580. Upper Sinemurian or Pliensbachian, Almstrom Creek Formation, near Canoe Lake.

Figures 24, 25. Bivalve, gen. et sp. indet.

Lateral and anterodorsal views, figured specimen GSC 92639 from GSC locality 94135. Upper Sinemurian or Pliensbachian, Almstrom Creek Formation, Cache Creek.

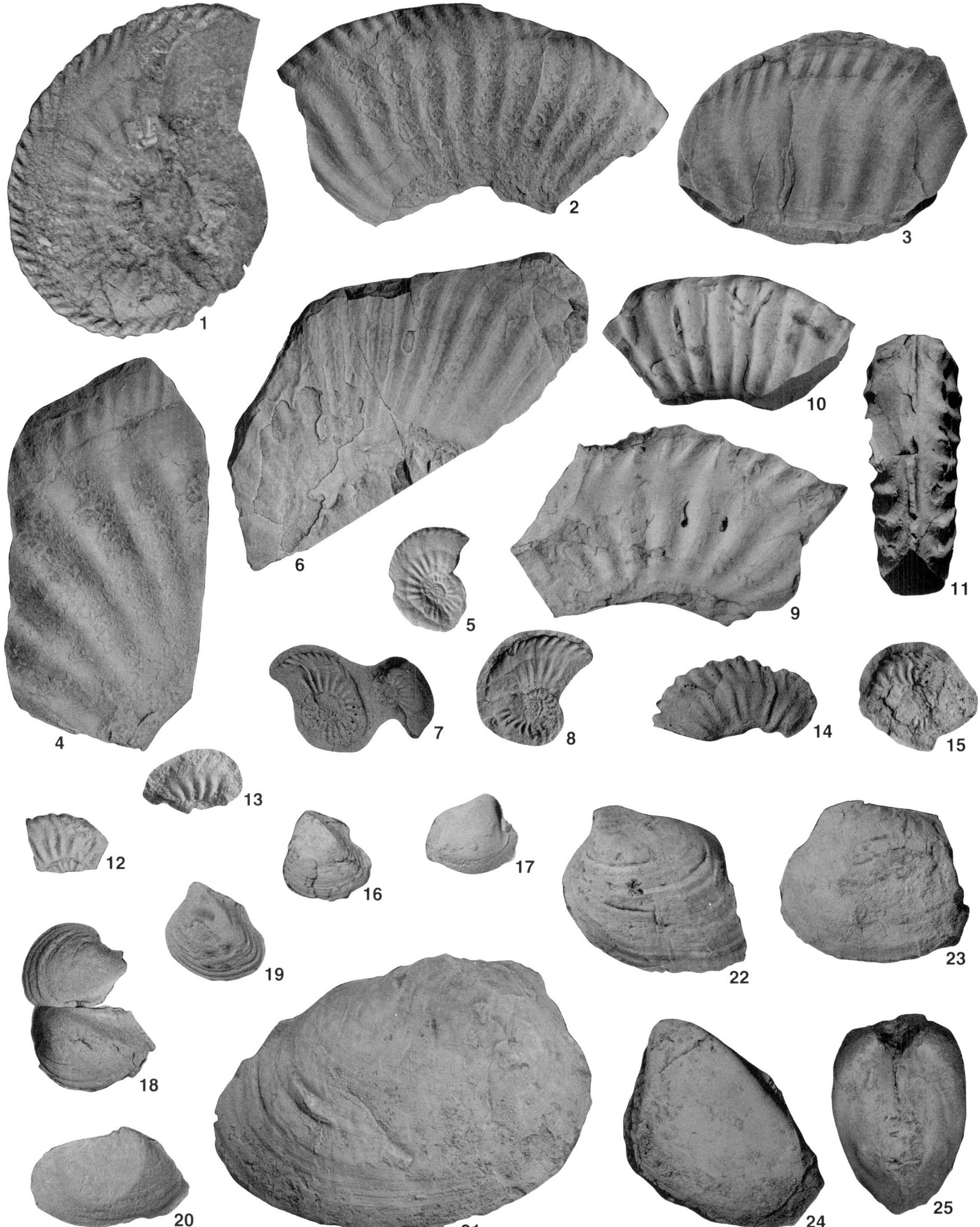
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PLATE 9

All specimens are illustrated at natural size.

Upper Sinemurian or Pliensbachian bivalves, Almstrom Creek and Kingak formations.

Figures 1-4, 10, 11. *Aguilerella* sp.

1-3. Figured specimens GSC 92640, 92641, and 92642 from GSC locality 94135. Upper Sinemurian or Pliensbachian, Almstrom Creek Formation, Cache Creek area.

4. Figured specimen GSC 92643 from GSC locality 92580. Upper Sinemurian or Pliensbachian, Almstrom Creek Formation, Canoe Lake area.

10. Figured specimen GSC 92644 from GSC locality 92580. Probably Pliensbachian, Almstrom Creek Formation, Canoe Lake area.

11. Figured specimen GSC 92645 from GSC locality 94186. Probably Pliensbachian, Almstrom Creek Formation, Canoe Lake.

Figure 5. *Modiolus* sp.

Figured specimen GSC 92646 from GSC locality C-6147. Upper Sinemurian or Pliensbachian, Almstrom Creek Formation, Canoe Lake area.

Figures 6, 13, 14. *Otapiria*(?) sp. cf. *O. limaeformis* Zakharov

6. Right valve, figured specimen GSC 92647 from GSC locality 52698. Upper Pliensbachian, Kingak Formation, Loney Creek.

13, 14. Figured specimens (arrows) GSC 92648 and 92649 from GSC locality 52698. Upper Pliensbachian, Kingak Formation, Loney Creek. The smaller, smooth or feebly concentrically ornamented shells are assumed to be right valves of the same genus.

Figures 7, 12. *Harpax* sp. cf. *H. spinosus* (Sowerby)

7. Figured specimen GSC 92650 from GSC locality 94181. Upper Sinemurian or Pliensbachian, Almstrom Creek Formation, Cache Creek area.

12. Slab with shell debris, including *H.* sp. cf. *H. spinosus* (bottom centre), figured specimen GSC 92651 from GSC locality 94181. Upper Sinemurian or Pliensbachian, Almstrom Creek Formation, Cache Creek area. This is a typical slab from certain parts of the Almstrom Creek Formation, with abundant *Oxytoma* (top centre), *Meleagrinella* (lower left), and other bivalves.

Figure 8. *Harpax laevigatus* (d'Orbigny)

Figured specimen GSC 92652 from GSC locality 94181. Upper Sinemurian or Pliensbachian, Almstrom Creek Formation, Cache Creek area. This specimen exhibits unusually strongly developed growth rugae.

Figures 9, 15, 16. *Meleagrinella* sp.

9. Figured specimen GSC 92653 from GSC locality 92586. Probably Pliensbachian, Kingak Formation, north of Bonnet Lake.

15, 16. Figured specimens GSC 92654 and 92655 (shown by arrows) from GSC locality 94181. Probably Pliensbachian, Almstrom Creek Formation, Cache Creek area. The slabs are typical of certain intervals in the formation, with *Oxytoma* next in abundance to *Meleagrinella*.

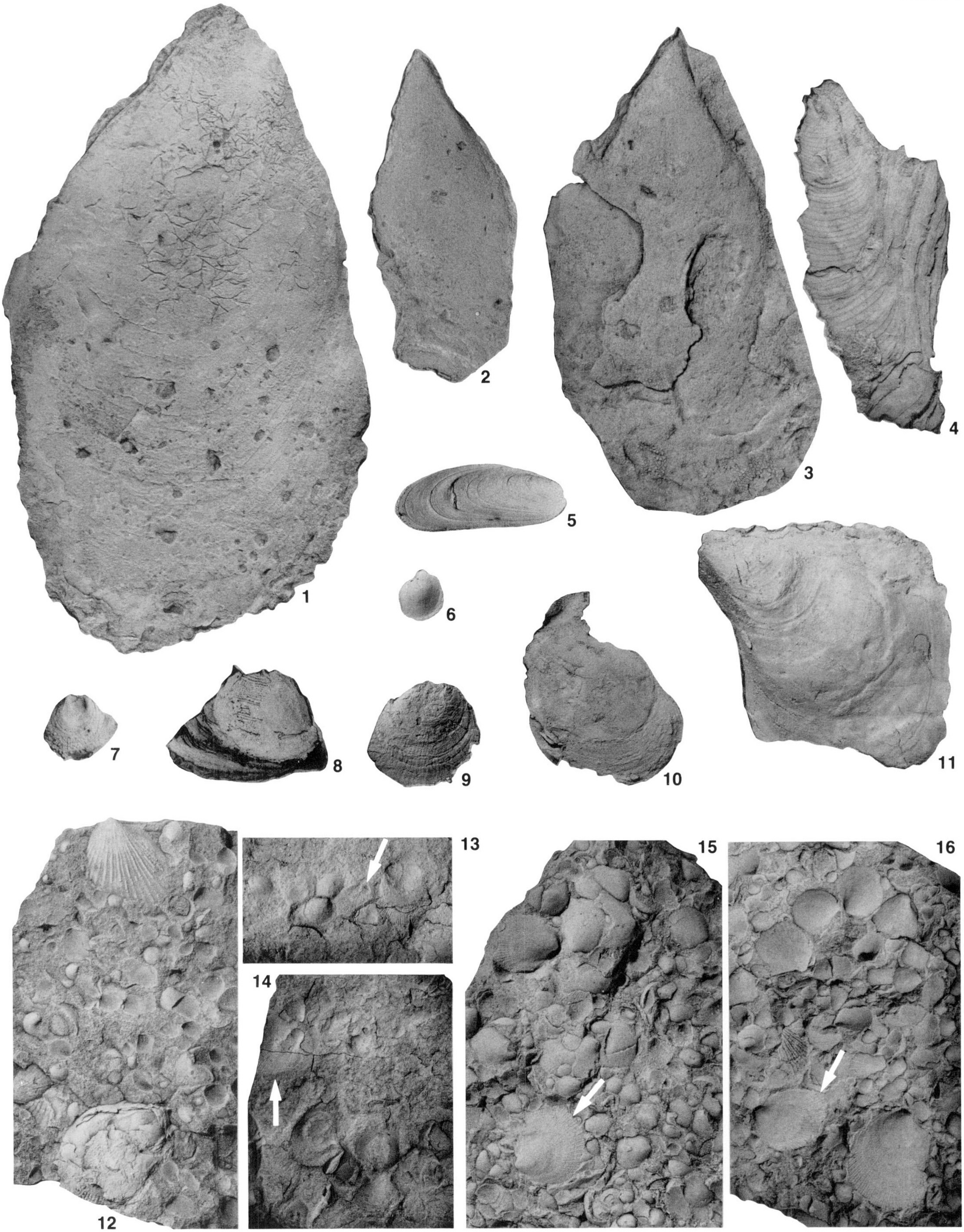
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PLATE 10

All specimens are illustrated at natural size.

Upper Sinemurian or Pliensbachian *Ostrea*, Almstrom Creek Formation, northern Richardson Mountains.

Figures 1-11. *Ostrea* sp.

1. Figured specimen GSC 92656 from GSC locality 92580. Upper Sinemurian or Pliensbachian, Almstrom Creek Formation, Canoe Lake area.

2, 3, 5, 7, 8. External views, figured specimens GSC 92657 to 92661 from GSC locality 94135. Upper Sinemurian or Pliensbachian, Almstrom Creek Formation, Cache Creek area.

4, 6, 11. Internal views, figured specimens GSC 92662, 92663, and 92664 from GSC locality 94135. Upper Sinemurian or Pliensbachian, Almstrom Creek Formation, Cache Creek area.

9, 10. Figured specimens GSC 92665 and 92666 from GSC locality 94059. Upper Sinemurian or Pliensbachian, Almstrom Creek Formation, near the head of Almstrom Creek.

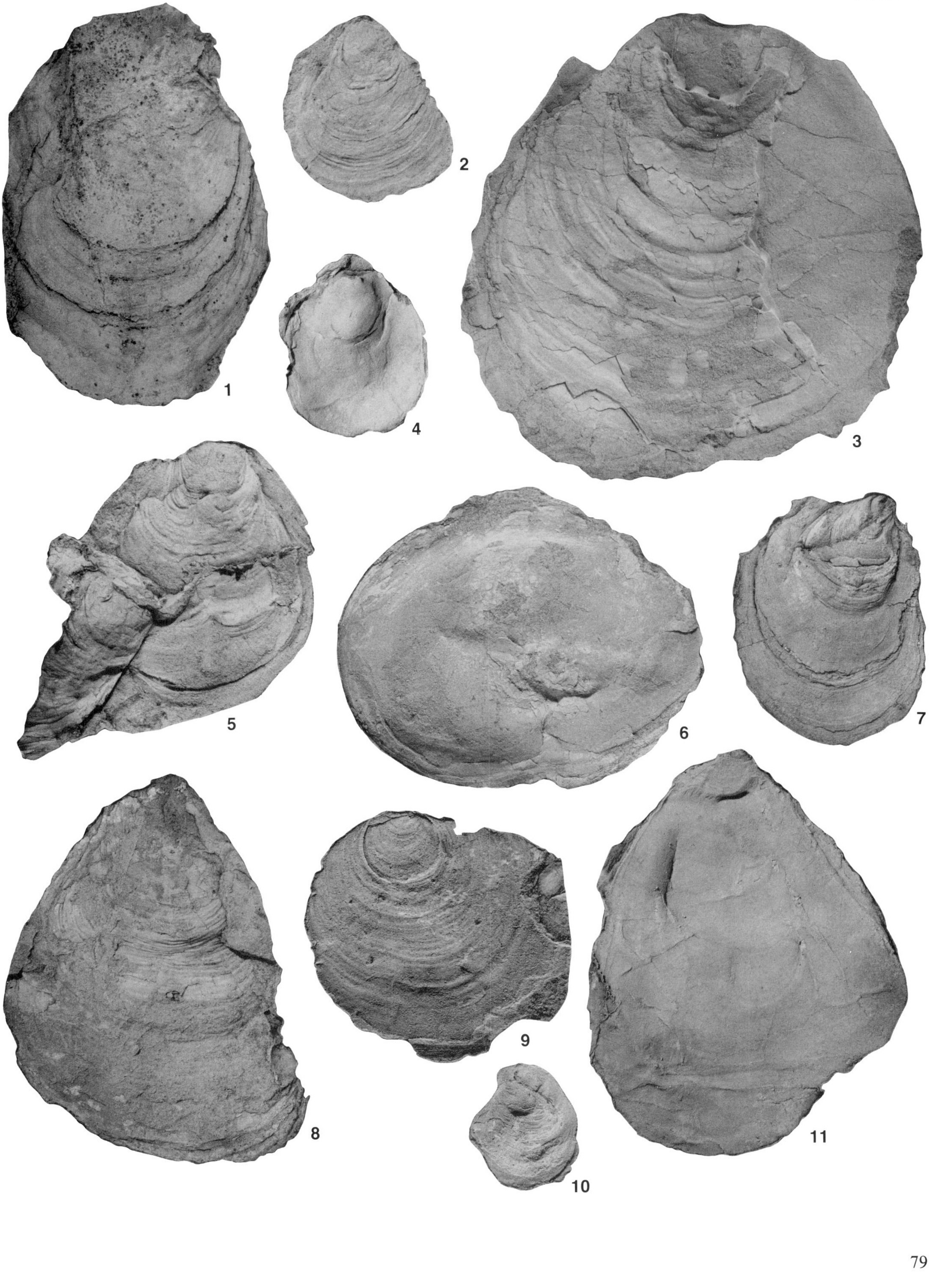
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PLATE 11

All specimens are illustrated at natural size.

Upper Sinemurian(?) or Pliensbachian bivalves, Almstrom Creek and Kingak formations.

Figures 1-3. *Oxytoma* (*Oxytoma*) sp. cf. *O.* (*O.*) *inequivalvis* (J. Sowerby).

1. Figured specimen GSC 92667 from GSC locality 94181. Upper Sinemurian or Pliensbachian, Almstrom Creek Formation, Cache Creek area. Slab is littered with small shells of *Meleagrinella*.

2. Figured specimen GSC 92668 from GSC locality C-6147. Upper Sinemurian or Pliensbachian, Almstrom Creek Formation, Canoe Lake. The ribs are unusually irregular for the genus, and the primary ribs unusually broad.

3. Figured specimen GSC 92669 from GSC locality 92580. Upper Sinemurian or Pliensbachian, Almstrom Creek Formation, Canoe Lake area.

Figures 4, 5, 11. *Meleagrinella*(?) sp. aff. *M.*(?) *ansparsicosta* Polubotko

4, 5. Figured specimens GSC 92670 and 92671 from GSC locality 94186. Upper Sinemurian or Pliensbachian, Almstrom Creek Formation, Aklavik Range.

11. Figured specimen GSC 92672 from GSC locality 92580. Upper Sinemurian or Pliensbachian, Almstrom Creek Formation, Canoe Lake area.

Figures 6, 8-10. *Eopecten*(?) sp.

6, 10. Figured specimens GSC 92673 and 92674 from GSC locality 92580. Upper Sinemurian or Pliensbachian, Almstrom Creek Formation, Canoe Lake area. In figure 6, specimens of *Oxytoma* (*Oxytoma*) (top left) and "*Ostrea*" (top right) also can be seen.

8, 9. Figured specimens GSC 92675 and 92676 from GSC locality 94135. Upper Sinemurian or Pliensbachian, Almstrom Creek Formation, Cache Creek area.

Figure 7. *Lima* (*Lima*) sp.

Figured specimen GSC 92677 from GSC locality 92580. Upper Sinemurian or Pliensbachian, Almstrom Creek Formation, Canoe Lake area.

Figures 12, 13. *Meleagrinella* sp.

12. Figured specimen GSC 92678 from GSC locality C-6147. Upper Sinemurian or Pliensbachian, Almstrom Creek Formation, Canoe Lake area.

13. Figured specimen GSC 92679 from GSC locality 94181. Upper Sinemurian or Pliensbachian, Almstrom Creek Formation, Cache Creek.

Fiures 14-16. *Oxytoma* (*Palmoxytoma*) *cygnipes* (Young and Bird)

14. Figured specimen GSC 92680 from GSC locality 92586. Upper Sinemurian or Pliensbachian, Kingak Formation, north of Bonnet Lake.

15, 16. Figured specimens GSC 92681 and 92682 from GSC locality 92580. Upper Sinemurian or Pliensbachian, Almstrom Creek Formation, Canoe Lake area.

Figures 17-22. *Camptonectes* (*Camptochlamys*) sp.

17. Figured specimen GSC 92683 from GSC locality C-53496. Pliensbachian, Kingak Formation, Loney Creek.

18, 20. Figured specimens GSC 92684 and 92685 from GSC locality 92586. Upper Sinemurian or Pliensbachian, Almstrom Creek Formation, north of Bonnet Lake.

19, 21. Figured specimens GSC 92686 and 92687 from GSC locality 92580. Upper Sinemurian or Pliensbachian, Almstrom Creek Formation, Canoe Lake area.

22. Figured specimen GSC 92688 from GSC locality 92586. Upper Sinemurian or Pliensbachian, Kingak Formation, north of Bonnet Lake.

Figures 23-25. *Gryphaea* sp.

23. Figured specimen GSC 92689 from GSC locality 92586. Upper Pliensbachian(?), Kingak Formation, north of Bonnet Lake.

24, 25. Figured specimens GSC 92690 and 92691 from GSC locality 92518. Pliensbachian(?), Kingak Formation, Johnson Creek.

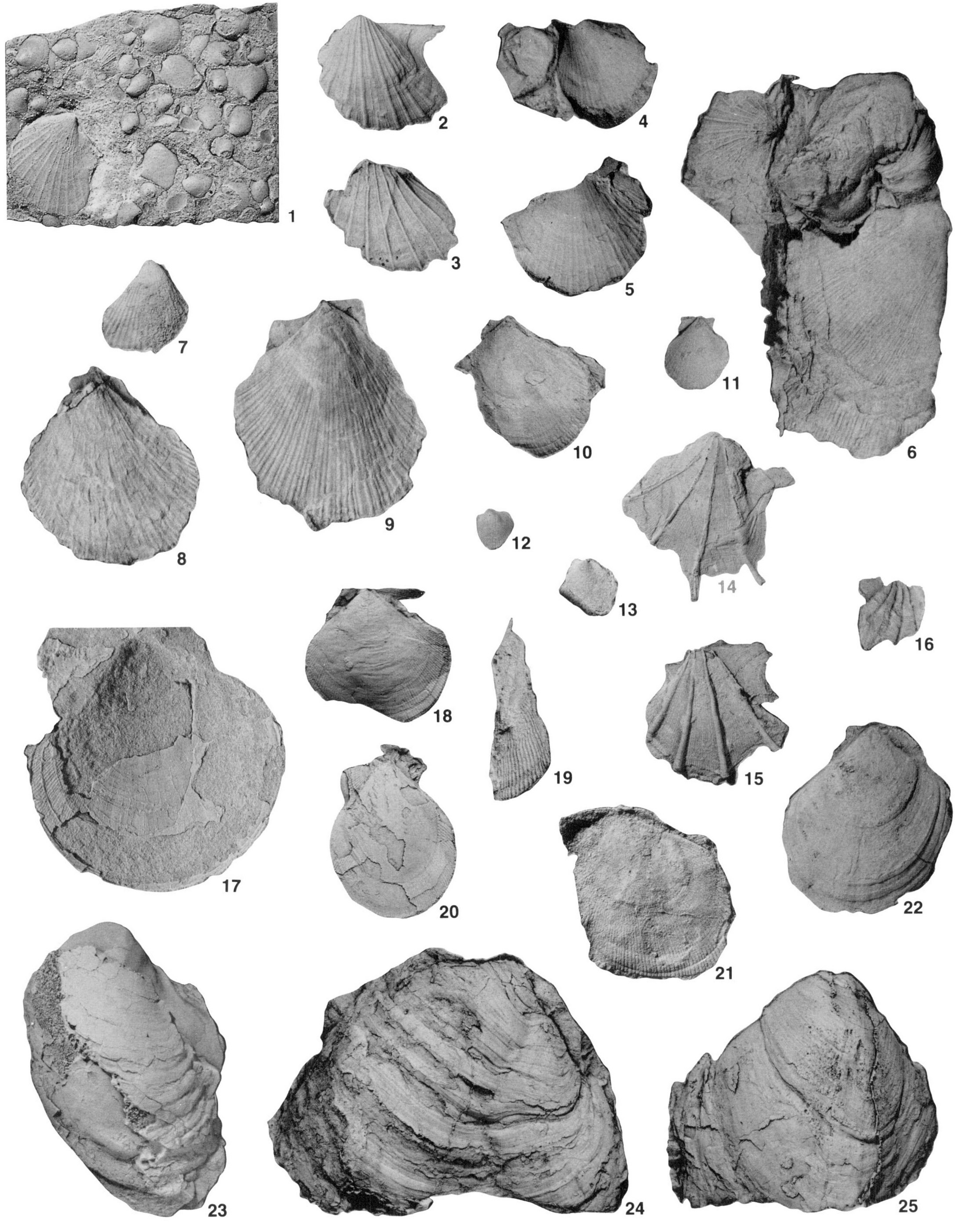
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PLATE 12

All specimens are illustrated at natural size.

Probable Pliensbachian bivalves, brachiopods, and crinoids, Almstrom Creek and Kingak formations.

Figures 1-4. *Pholadomya ambigua* Sowerby

1, 2. Lateral and anterior views, figured specimen GSC 92692 from GSC locality 94186. Upper Sinemurian or Pliensbachian, Almstrom Creek Formation, Aklavik Range.

3, 4. Anterodorsal and lateral views, figured specimen GSC 92693 from GSC locality 92580. Upper Sinemurian or Pliensbachian, Almstrom Creek Formation, Canoe Lake area.

Figure 5. *Lingula* sp.

Slab littered with small specimens, including figured specimen GSC 92694 (arrow) from GSC locality 88278. Upper Pliensbachian, Almstrom Creek Formation, Old Crow Flats.

Figures 6-8. *Spiriferina*(?) sp.

6. Figured specimen GSC 92695 from GSC locality 92586. Upper Pliensbachian, Kingak Formation, north of Bonnet Lake.

7, 8. Figured specimens GSC 92696 and 92697 from GSC locality 92586. Upper Pliensbachian, Kingak Formation, north of Bonnet Lake.

Figures 9-11. *Seirocrinus* sp. aff. *S. subangularis* (Miller)

9, 11. Articulated and broken columns, with cirri, figured specimens GSC 92698 and 92699 from GSC locality C-53477. Upper Pliensbachian, Kingak Formation, Loney Creek.

10. Columnal ornament, isolated columnal, figured specimen GSC 92700 from GSC locality 92586. Upper Pliensbachian, Kingak Formation, north of Bonnet Lake.

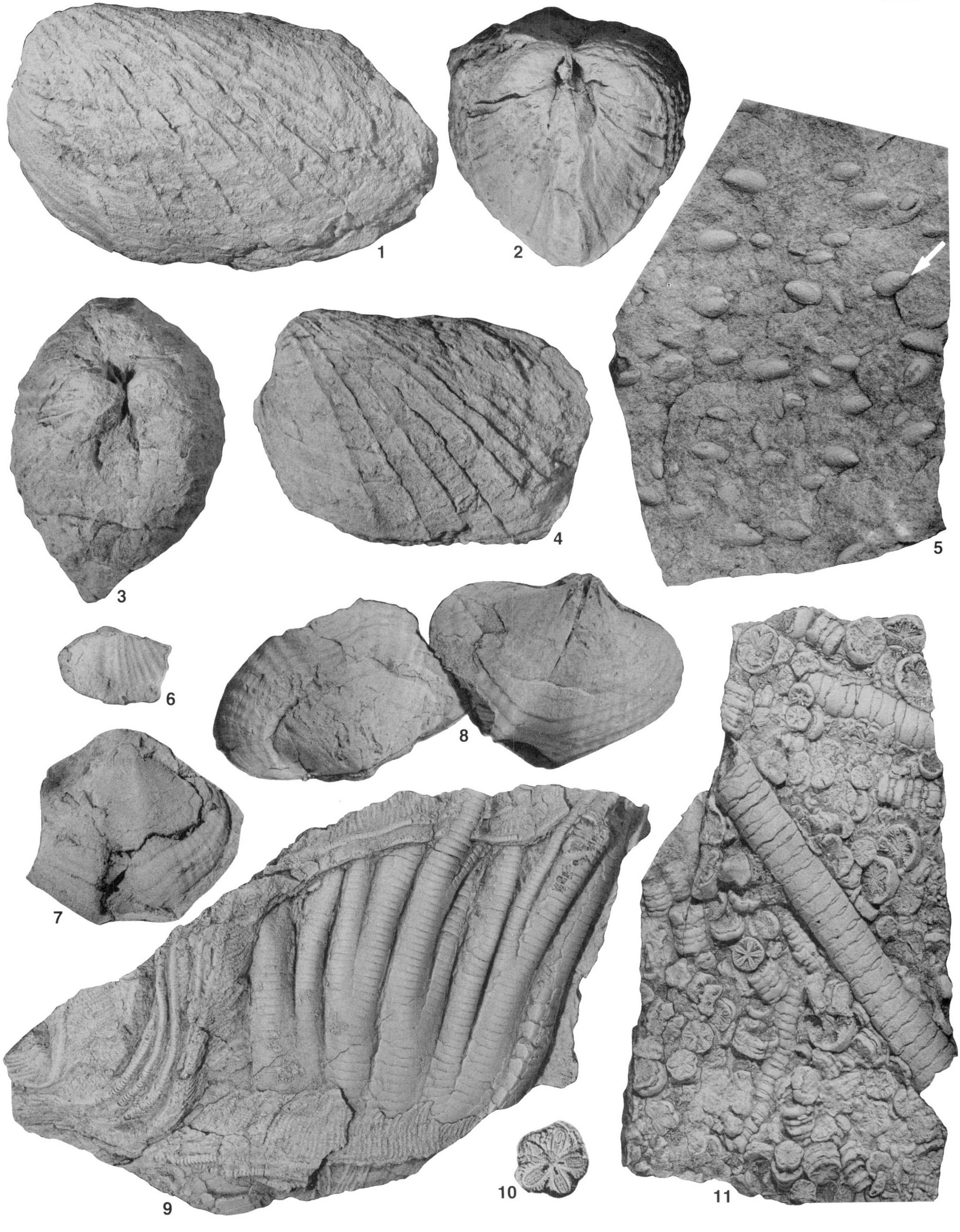
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PLATE 13

All specimens are illustrated at natural size.

Toarcian ammonites, Kingak Formation.

Figure 1. *Pseudolioceras kedonense*(?) Repin

Figured specimen GSC 92701 from GSC locality 92588. Toarcian, Kingak Formation, north of Bonnet Lake.

Figures 2-5. *Hildaites*(?) sp.

2, 3. Lateral and ventral views of whorl fragment, figured specimen GSC 92702 from GSC locality C-4215. Toarcian, Kingak Formation, north of Bonnet Lake.

4, 5. Lateral and ventral views, figured specimen GSC 92703 from GSC locality C-4215. Toarcian, Kingak Formation, north of Bonnet Lake.

Figure 6. Ammonite gen. et sp. indet.

Figured specimen GSC 92704 from GSC locality C-4215. Toarcian, Kingak Formation, north of Bonnet Lake.

Figures 7, 11. *Ovaticeras* sp. cf. *O. ovatum* (Young and Bird)

7. Figured specimen GSC 92705 (larger specimen on slab), from GSC locality C-53497. Toarcian, Kingak Formation, Firth River.

11. Figured specimens GSC 92706 (smaller specimen) and 92707 (larger specimen) from same locality as figure 7.

Figure 8. *Harpoceras*(?) sp.

Figured specimen GSC 92708 from GSC locality C-53469. Toarcian Kingak Formation, Loney Creek.

Figures 9, 10. *Calliphylloceras*(?) sp.

Lateral and ventral views of whorl fragment, figured specimen GSC 92709 from GSC locality C-53492. Toarcian, Kingak Formation, Loney Creek.

Figure 12. *Pseudolioceras* sp. aff. *P. rosenkrantzi* Dagis

Figured specimen GSC 92710 from GSC locality C-53492. Toarcian, Kingak Formation, Loney Creek.

Figures 13-15. *Pseudolioceras lectum* (Simpson)

Figured specimens GSC 92711 to 92713 from GSC locality 92515. Toarcian, Kingak Formation, Johnson Creek.

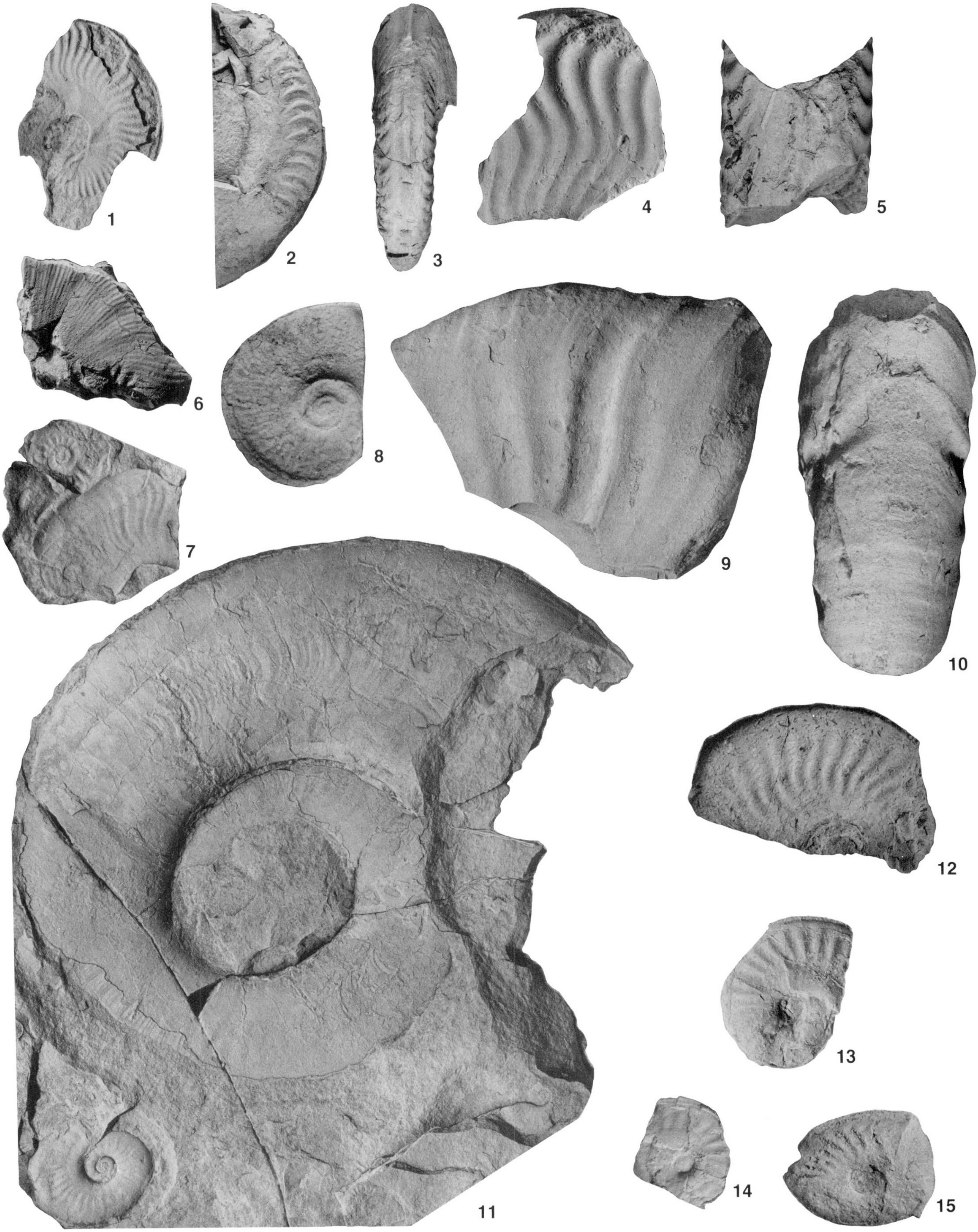
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PLATE 14

All specimens are illustrated at natural size.

Toarcian and Aalenian ammonites and bivalves, Kingak and Manual Creek formations.

Figures 1-11. *Dactylioceras commune* (Simpson)

1-8. Lateral and ventral views of whorl fragments, from GSC locality C-4215. Toarcian, Kingak Formation, north of Bonnet Lake. Matching pairs are:
1 and 2 (figured specimen GSC 92714),
3 and 4 (figured specimen GSC 92715),
5 and 6 (figured specimen GSC 92716),
7 and 8 (figured specimen GSC 92717).

9. Figured specimen GSC 92718 from GSC locality C-4215. Toarcian, Kingak Formation, north of Bonnet Lake.

10. Figured specimen GSC 92719 from GSC locality 86821. Toarcian, Kingak Formation, north of Bonnet Lake.

11. Figured specimen GSC 92720 from GSC locality 86855. Toarcian, Kingak Formation, Bonnet Lake area.

Figures 12-15. *Collina*(?) sp. aff. *C.*(?) *simplex* (Fucini)

Figured specimens GSC 92721 to 92724 from GSC locality C-53497. Toarcian, Kingak Formation, Loney Creek.

Figures 16. *Harpoceras*(?) sp.

Figured specimen GSC 92725 from GSC locality C-4215. Toarcian, Kingak Formation, north of Bonnet Lake.

Figures 17, 18. *Vaugonia* n. sp.(?)

17. Figured specimen GSC 92726 from GSC locality 94052. Aalenian, upper beds, Manuel Creek Formation, Murray Ridge.

18. Figured specimen GSC 92727 from GSC locality 94051. Aalenian, upper beds, Manuel Creek Formation, Murray Ridge.

Figure 19. Ostreiid(?) bivalve, indet.

Figured specimen GSC 92728 from GSC locality 94052. Aalenian, Manuel Creek Formation, Murray Ridge.

Figures 20-22. *Astarte aalensis* Oppel

20. Figured specimen GSC 92729 from GSC locality C-53387. Aalenian, Anne Creek Member, Mt. McGuire area.

21, 22. Figured specimens GSC 92730 and 92731 from GSC locality C-53364. Aalenian, Manuel Creek Formation, Murray Ridge. These fossils occur in great abundance in small concretions. The specimen shown in figure 21 is illustrated x3 in Plate 16, figure 20.

Figure 23. *Inoceramus* (*Mytiloides*) sp.

Figured specimen GSC 92732 from GSC locality 92588. Toarcian, Kingak Formation, north of Bonnet Lake.

Figures 24, 25, 28, 29. *Inoceramus* (*Mytiloceramus*) sp. cf. *I.* (*M.*) *polyplocus* Roemer

24. Figured specimen GSC 92733 from GSC locality C-53456. Aalenian, Kingak Formation, Trout Lake area.

25. Figured specimen GSC 92734 from GSC locality 41483. Aalenian, Kingak Formation, Barn Mountains area.

28. Figured specimen GSC 92735 from GSC locality 94050. Aalenian, Manuel Creek Formation, Murray Ridge.

29. Figured specimen GSC 92736 from GSC locality 92605. Aalenian, Manuel Creek Formation, Murray Ridge.

Figures 26, 27. *Erycitoides howelli* (White)

Ventral and lateral views of whorl fragment, figured specimen GSC 92737 from GSC locality C-81341, Kingak Formation, Johnson Creek.

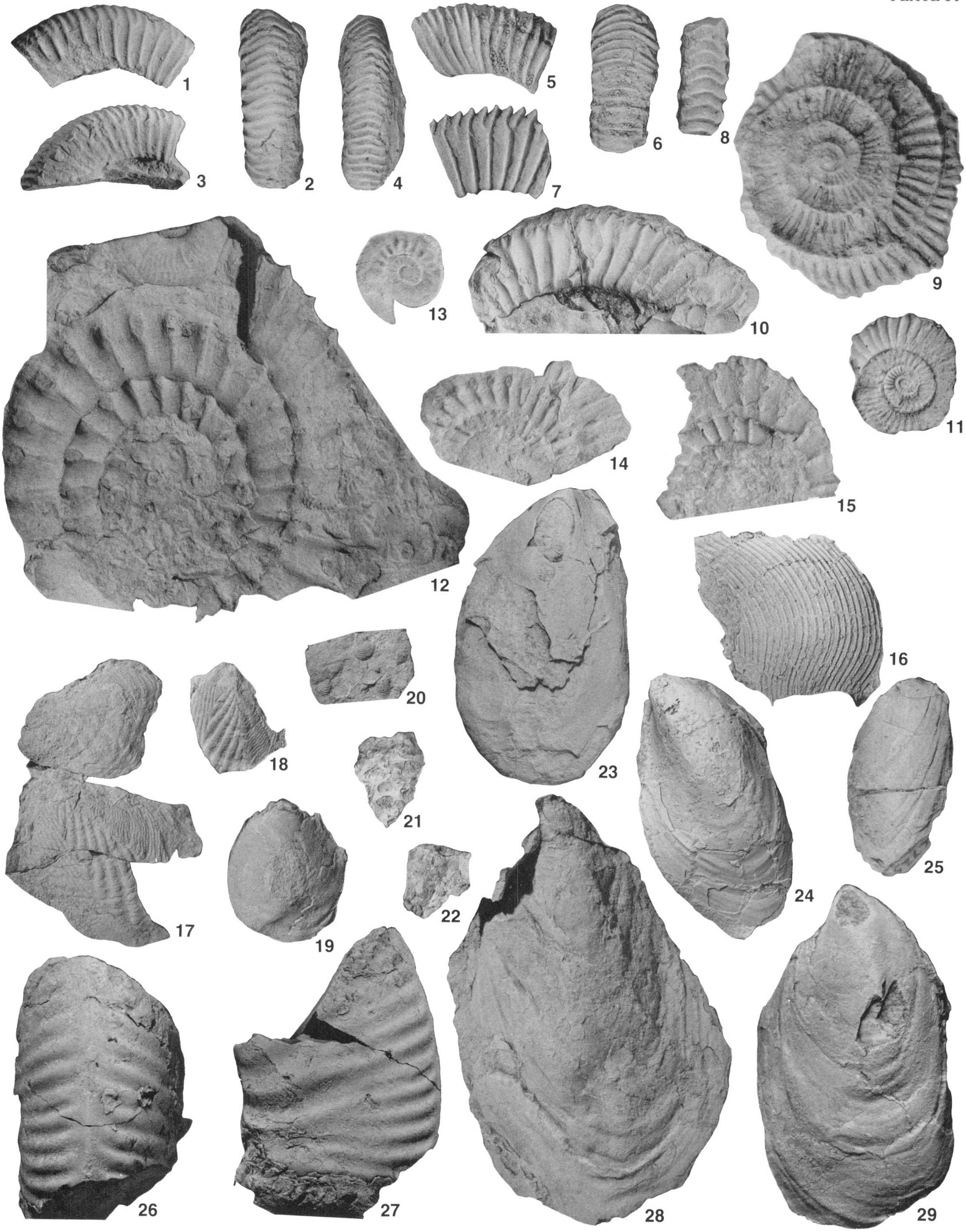
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PLATE 15

All specimens are illustrated at natural size.

Aalenian *Erycitoides* spp. and *Planammatoceras*(?) sp., Kingak and Manuel Creek formations.

Figures 1-3, 5-7, 15-19, 21-24, 28. *Erycitoides howelli* (White)

1. Figured specimen GSC 92738 from GSC locality 86854. Aalenian, Kingak Formation, north of Bonnet Lake.

2. Figured specimen GSC 92739 from GSC locality C-53452. Aalenian, Kingak Formation, Trout Lake area.

3, 7. Figured specimens GSC 92740 and 92741 from GSC locality 41483. Aalenian, Kingak Formation, Barn Mountains area.

5, 6, 28. Lateral and ventral views of broken specimen, and an attached juvenile (latex cast illustrated in figure 28), figured specimens GSC 92742 and 92743 from GSC locality 41483, Aalenian, Kingak Formation, Barn Mountains area.

15. Figured specimen GSC 92744 from GSC locality C-81296. Aalenian, Kingak Formation, Johnson Creek.

16, 17. Lateral and ventral views, figured specimen GSC 92745 from GSC locality C-81340. Aalenian, Kingak Formation, Johnson Creek.

18, 19, 22, 23. Small fragments, figured specimens GSC 92746, (figs. 18, 19; lateral and ventral) 92747 (lateral), and 92748 (lateral) from GSC locality C-53452. Aalenian, Kingak Formation, Trout Lake.

21. Ventral view of small whorl fragment of large specimen, figured specimen GSC 92749 from GSC locality C-53376. Aalenian, Manuel Creek Formation, Mt. McGuire area, west-northwest of Summit Lake.

24. Ventral view of small fragment, figured specimen GSC 92750 from GSC locality C-53455. Aalenian, Kingak Formation, Trout Lake.

Figure 4. *Planammatoceras* (*Pseudaptetoceras*?) sp.

Figured specimen GSC 92751 from GSC locality 41483. Aalenian, Kingak Formation, Barn Mountains area.

Figure 9. *Erycitoides* sp.

Figured specimen GSC 92752 from GSC locality 94121. Aalenian, Manuel Creek Formation, Cache Creek area.

Figures 8, 10, 14. *Erycitoides kialagvikensis* (White)

8. Figured specimen GSC 92753 from GSC locality 41483. Aalenian, Kingak Formation, Barn Mountains area.

10. Figured specimen GSC 92754 from GSC locality C-81294. Aalenian, Kingak Formation, Johnson Creek.

14. Figured specimen GSC 92755 from GSC locality C-53456. Aalenian, Kingak Formation, Trout Lake.

Figures 11-13, 20, 25-27. *Erycitoides*(?) sp.

11. Figured specimen GSC 92756 from GSC locality 41483. Aalenian, Kingak Formation, Barn Mountains area.

12. Figured specimen GSC 92757 from GSC locality 94192. Aalenian, Manuel Creek Formation, Murray Ridge.

13. Figured specimen GSC 92758 from GSC locality 94190. Aalenian, Manuel Creek Formation, Murray Ridge. This fragment and that shown in Plate 15, figure 12 are of great importance because they are the only ammonites that date the upper sandstone beds of the Manuel Creek Formation at Murray Ridge.

20. Small fragment, figured specimen GSC 92759 from GSC locality C-53452. Aalenian, Kingak Formation, Trout Lake.

25. Whorl fragment, figured specimen GSC 92760 from GSC locality C-53452. Aalenian, Kingak Formation, Trout Lake.

26, 27. Lateral and ventral views of small whorl fragment, figured specimen GSC 92761 from GSC locality C-53452. Aalenian, Kingak Formation, Trout Lake.

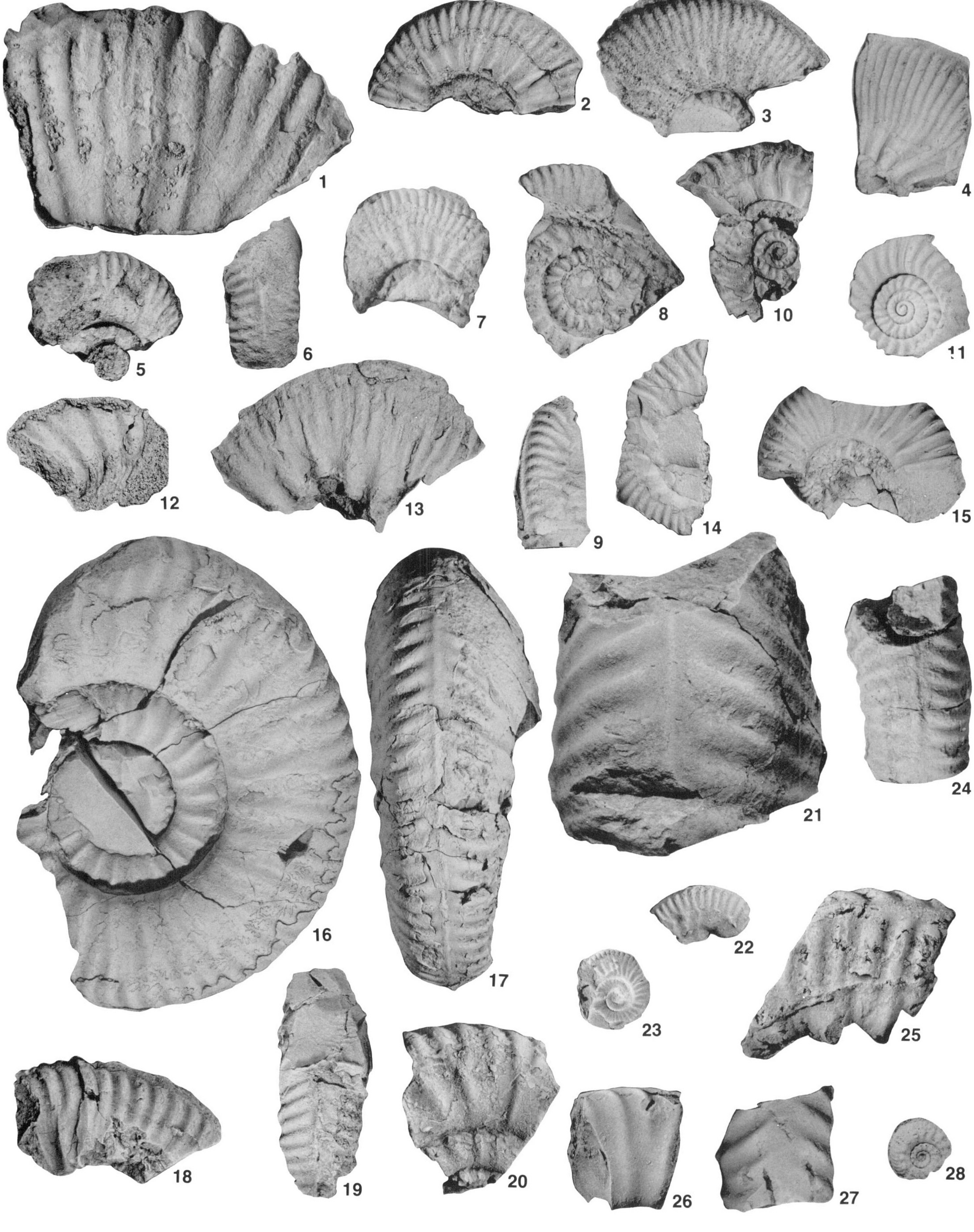
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PLATE 16

All specimens are illustrated at natural size, except figure 20.

Aalenian ammonites and bivalves, Kingak and Manuel Creek formations.

Figures 1-13, 15, 16. *Pseudolioceras mclintocki* (Haughton)

1. Figured specimen GSC 92762 from GSC locality C-53364. Aalenian, Manuel Creek Formation, Murray Ridge.

2. Figured specimen GSC 92763 from GSC locality 41483. Aalenian, Kingak Formation, Barn Mountains area.

3, 4. Lateral and ventral views, whorl fragment, figured specimen GSC 92764 from GSC locality C-53455. Aalenian, Kingak Formation, Trout Lake area.

5. Figured specimen GSC 92765 from GSC locality C-53455. Aalenian, Kingak Formation, Trout Lake area.

6-8. Figured specimens GSC 92766, 92767, and 92768 from GSC locality C-53452. Aalenian, Kingak Formation, Trout Lake area.

9, 10. Lateral, and cross-section/ventral views, figured specimen GSC 92769 from GSC locality C-81341. Aalenian, Kingak Formation, Johnson Creek.

11. Cross-section of figured specimen GSC 92770 from GSC locality C-81341. Aalenian, Kingak Formation, Johnson Creek. The keel has been broken off the outer preserved whorl.

12. Figured specimen GSC 92771 from GSC locality C-81296. Aalenian, Kingak Formation, Johnson Creek.

13. Figured specimen GSC 92772 from GSC locality C-81340. Aalenian, Kingak Formation, Johnson Creek.

15, 16. Lateral and ventral views, figured specimen GSC 92773 from GSC locality C-81341. Aalenian, Kingak Formation, Johnson Creek.

Figure 14. *Pseudolioceras* sp. aff. *P. whiteavesi* (White)

Figured specimen GSC 92774 from GSC locality C-53453, Aalenian, Kingak Formation southeast of Trout Lake.

Figure 17, 18. *Erycitoides howelli* (White)

Figured specimens GSC 92775 and 92776 from GSC locality C-81341. Aalenian, Kingak Formation, Johnson Creek.

Figure 19. *Erycitoides spinatus* Westermann(?)

Latex cast, umbilical part of small ammonite, figured specimen GSC 92777 from GSC locality C-53452. Aalenian, Kingak Formation, southeast of Trout Lake.

Figure 20. *Astarte aalensis* Oppel

Same specimen as shown in Plate 14, figure 21; x3.

Figure 21. *Leioceras* sp. cf. *L. opalinum* (Reinecke)

Figured specimen GSC 92778 from GSC locality C-81334. Lower Aalenian, Kingak Formation, Johnson Creek.

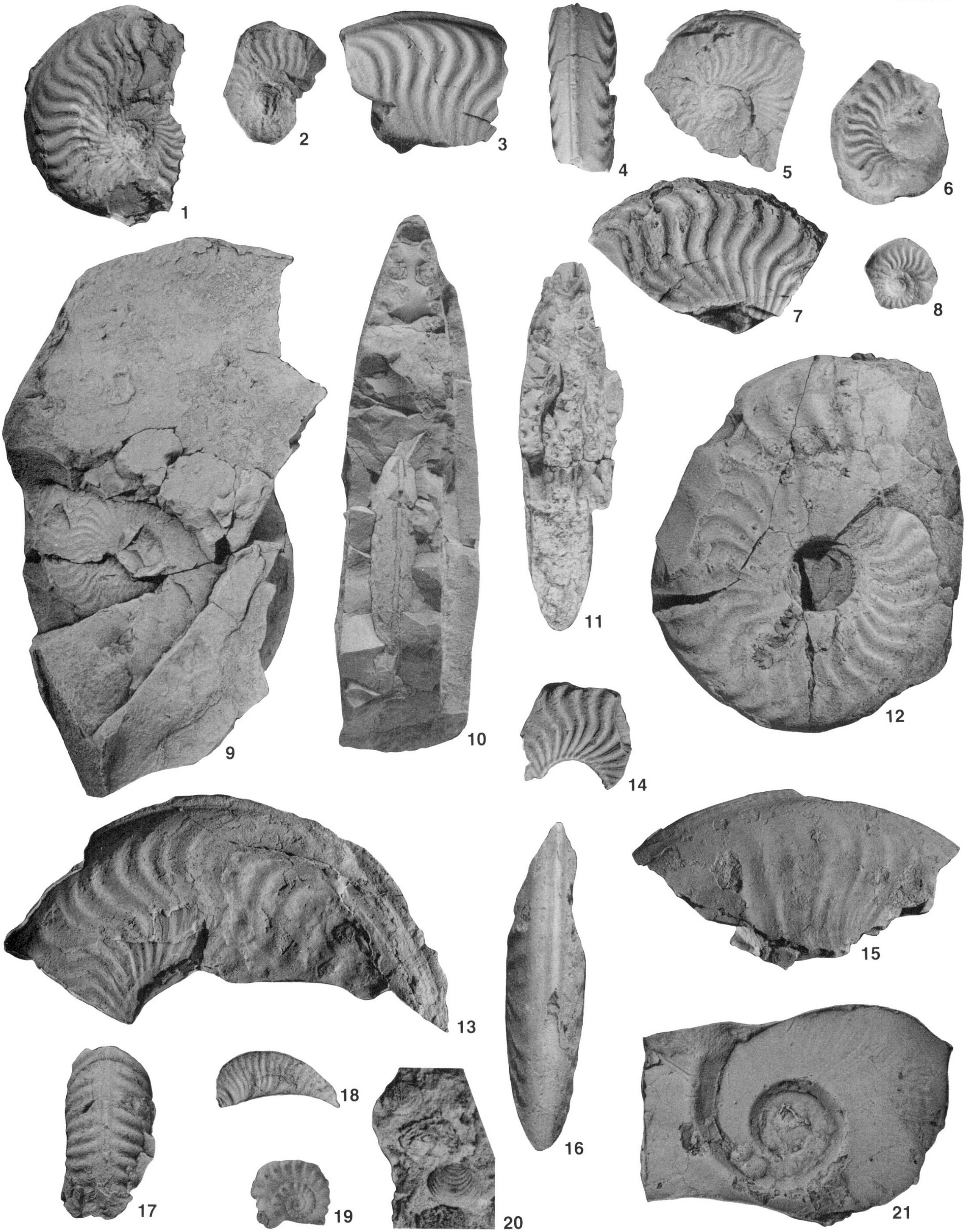
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PLATE 17

All specimens are illustrated at natural size.

Aalenian *Planammatoceras* and bivalves, Kingak and Manual Creek formations.

Figures 1-7. *Planammatoceras* sp.

1-4. Lateral and ventral views, whorl fragments, figured specimens GSC 92779 and 92780 from GSC locality C-81294. Aalenian, Kingak Formation, Johnson Creek.

5. Figured specimen GSC 92781 from GSC locality 41483. Aalenian, Kingak Formation, Barn Mountains area.

6, 7. Ventral and lateral views, whorl fragment, figured specimen GSC 92782 from GSC locality 92517. Aalenian, Kingak Formation, Johnson Creek.

Figures 8, 9. *Oxytoma* (*Oxytoma*) *ferrugineum* (Rollier)

Figured specimens GSC 92783 and 92784 from GSC locality 94041. Aalenian, Manuel Creek Formation, Murray Ridge.

Figure 10. *Oxytoma* (*Oxytoma*) sp.

Figured specimen GSC 92785 from GSC locality C-53364. Aalenian, Manuel Creek Formation, Murray Ridge.

Figure 11. *Meleagrinella* sp.

Figured specimen GSC 92786 from GSC locality 94121. Aalenian, Manuel Creek Formation, Cache Creek area.

Figures 12-18. *Entolium* sp.

12, 15. Figured specimens GSC 92787 and 92788 from GSC locality C-81295. Aalenian, Kingak Formation, Johnson Creek.

13. Figured specimen GSC 92789 from GSC locality C-81294. Aalenian, Kingak Formation, Johnson Creek.

14. Figured specimen GSC 92790 from GSC locality 94050. Aalenian, Manuel Creek Formation, Murray Ridge.

16. Figured specimen GSC 92791 from GSC locality 94041. Aalenian, Manuel Creek Formation, Murray Ridge.

17. Figured specimen GSC 92792 from GSC locality 94040. Aalenian, Manuel Creek Formation, Murray Ridge.

18. Figured specimen GSC 92793 (arrow) from GSC locality C- 53364. Aalenian, Manuel Creek Formation, Murray Ridge. This slab also shows *Inoceramus* s.l. and *Propeamussium* fragments.

Figures 19-21. *Eopecten*(?) sp.

19, 20. Figured specimens GSC 92794 and 92795 from GSC locality C-53387. Aalenian, Manuel Creek Formation, southeast of Mt. McGuire.

21. Figured specimen GSC 92796 from GSC locality 94040. Aalenian, Manuel Creek Formation, Murray Ridge.

Figure 22. Entoliid bivalve, indet.

Figured specimen GSC 92797 from GSC locality 94041. Aalenian, Manuel Creek Formation, Murray Ridge.

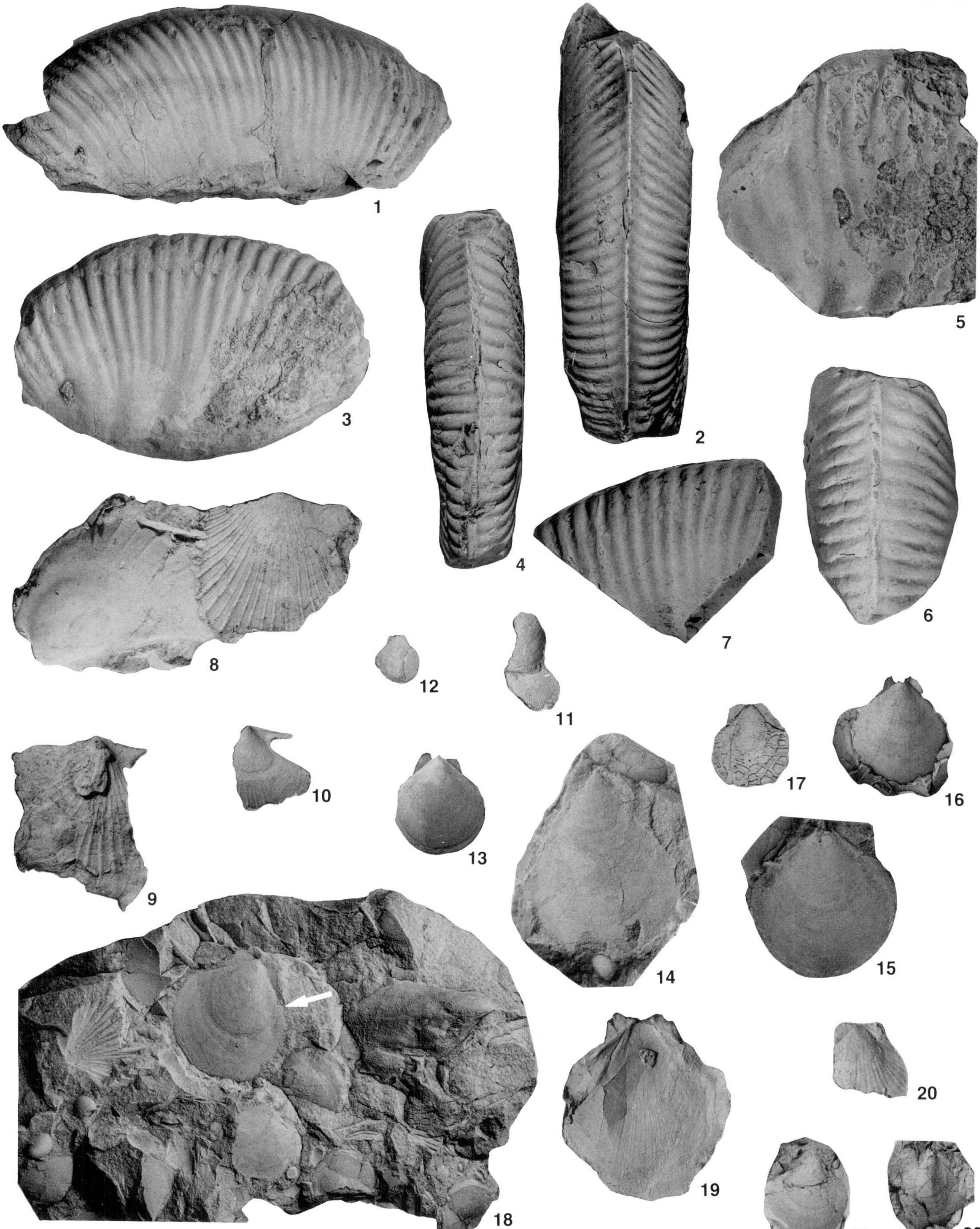
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PLATE 18

All specimens are illustrated at natural size.

Aalenian bivalves, Manuel Creek and Kingak formations.

Figures 1-25. *Propeamussium* (*Propeamussium*) *patriciae* n. sp.

1, 2. Figured specimens GSC 92798 and 92799 from GSC locality 94121. Aalenian, Manuel Creek Formation, ridge between Big Fish River and Almstrom Creek. External shell surface shown.

3, 4, 7. Figured specimens GSC 92800, 92801, and 92802 from GSC locality 94040. Aalenian, Manuel Creek Formation, Murray Ridge. Figure 3, shell partially removed exposing internal mould; figure 4, external ornament shown on slab with *Protocardia*(?) (bottom) and other bivalves; figure 7, internal mould.

5. Figured specimen GSC 92803 from GSC locality 41452. Aalenian, Murray Ridge.

6, 8. Figured specimens GSC 92804 and 92805 from GSC locality 94051. Aalenian, Manuel Creek Formation, Murray Ridge.

9. Figured specimen GSC 92806 from GSC locality 94052. Aalenian, Manuel Creek Formation, Murray Ridge. External (above) and internal (below) ornament shown.

10-12. Figured specimens GSC 92807, 92808, and 92809 from GSC locality 94041. Aalenian, Manuel Creek Formation, Murray Ridge. Figure 10, external mould, with external ornament; figure 11, external ornament; figure 12, internal surface of shell, partially removed where external ornament on external mould can be seen.

13, 19-21. Figured specimens GSC 92810 to 92813 from GSC locality C-53364. Aalenian, Manuel Creek Formation, Murray Ridge. Figures 13, 20, external ornament; figure 19, shell with external ornament partially broken away exhibiting ornament on internal mould; figure 21, internal mould.

14-16. Figured specimens GSC 92814, 92815, and 92816 from GSC locality C-53387. Aalenian, southeast of Mt. McGuire. Figure 14, small specimen, external ornament; figure 15, part of medium-sized specimen, external ornament; figure 16, latex cast of internal mould, showing raised riblets on internal shell surface of large specimen.

17, 18. External mould of medium-sized specimens, figured specimens GSC 92817 and 92818 from GSC locality 94052. Aalenian, Manuel Creek Formation, Murray Ridge.

22, 25. Internal ornament on large specimen, holotype GSC 92819, from GSC locality C-81341. Aalenian, Kingak Formation, Johnson Creek. Figure 22, internal shell surface; figure 25, internal mould. Raised riblets on internal surface of shell extend more than seven eighths of distance to ventral margin. Part of external mould with external ornament can be seen near beak, where shell is broken away.

23, 24. External ornament on medium-sized specimens, figured specimens GSC 92820 and 92821 from GSC locality 92605. Aalenian, Murray Ridge.

Figures 26, 27. *Gresslya* sp.

Lateral and anterior views, figured specimen GSC 92822 from GSC locality 94050. Aalenian, Manuel Creek Formation, Murray Ridge.

Figures 28-30. *Pleuromya* sp.

28, 29. Lateral and anterior views, figured specimen GSC 92823 from GSC locality 94050. Aalenian, Manuel Creek Formation, Murray Ridge.

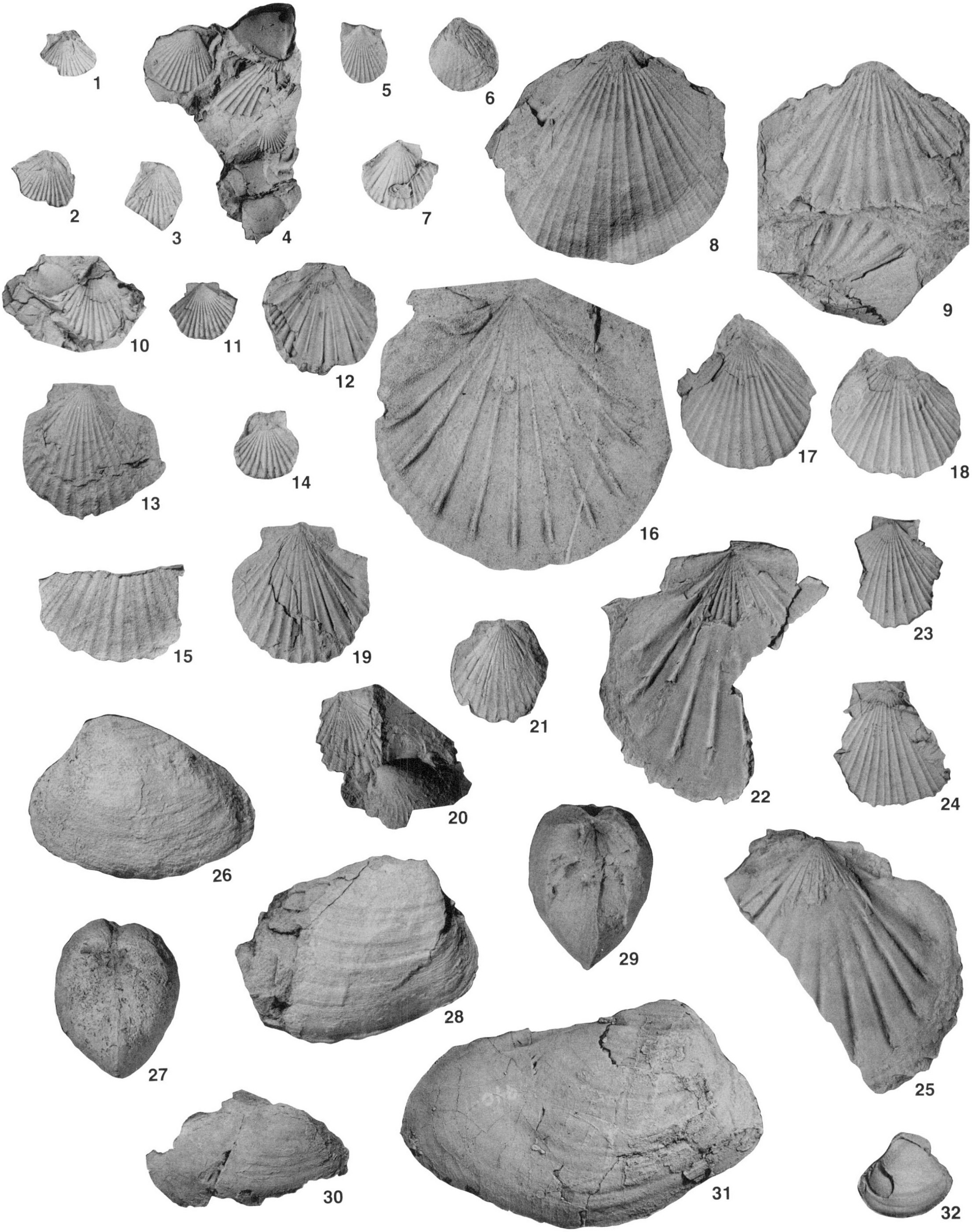
30. Figured specimen GSC 92824 from GSC locality 94051. Aalenian, Manuel Creek Formation, Murray Ridge.

Figure 31. *Homomya* sp.

Figured specimen GSC 92825 from GSC locality 94041. Aalenian, Manuel Creek Formation, Murray Ridge.

Figure 32. *Protocardia* sp.

Figured specimen GSC 92826 from GSC locality 94041. Aalenian, Manuel Creek Formation, Murray Ridge.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