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PAPER 46-25

UPPER TRIASSIC FAUNAS
IN HALFWAY, SIKANNI CHIEF, AND PROPHET RIVER BASINS, NORTHEASTERN BRITISH COLUMBIA

(REPORT, FIGURE, THREE PLATES, AND APPENDIX)

BY

F. H. McLEARN

OTTAWA

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INTRODUCTION

Increased activity in the search for oil has recently stimulated geological investigation in northeastern British Columbia. In this intensified study stratigraphy has played an important part. Many collections of fossils have been made, and have been assembled and examined in Ottawa by the Palaeontological Section of the Geological Survey. Already preliminary reports have been issued on Lower Triassic, Middle Triassic, and Lower Cretaceous faunas, and on one Upper Cretaceous fauna (McLearn, 1945, 1945a, 1945b, and 1946)[1]. The present paper is a continuation of this series and deals with the stratigraphical relations of certain Upper Triassic faunas.

[1] Names and/or dates in brackets refer to publications listed in references at end of this report.

A large part of the area in northeastern British Columbia referred to in this report was examined by C. O. Hage for the Geological Survey in 1943, and reported on by him in the following year. Studies have also been made by S. S. Holland for the British Columbia Department of Mines, by A. O. Hayes, W. I. Wright, and others for the Socony Vacuum Oil Company, and by L. D. Burling and others for the Phillips Petroleum Company. In the field season of 1944 the writer made a detailed study of the Triassic stratigraphy at several localities in Halfway and Sikanni Chief Valleys.

Acknowledgment is made to Dr. J. F. Walker for the use of collections made by Dr. Holland for the British Columbia Department of Mines, to Dr. A. E. Fath for the use of collections made by geologists of Socony Vacuum Oil Company, and to Dr. J. K. Knox for the use of collections made by L. D. Burling for the Phillips Petroleum Company. K. C. McTaggart ably assisted the writer in the field in 1944 and made the telemeter traverse on which Figure 1B is based.

STRATIGRAPHY

Sikanni Chief River Basin

Mouth of Chicken Creek

Sikanni Chief River in the vicinity of Chicken Creek flows through a steep-walled canyon excavated mostly in resistant sandstones of the Lower Cretaceous, Bullhead group. In this canyon, a little below the mouth of Chicken Creek, the upper part of the Triassic succession is exposed for a short distance on the axis of an anticline (See locality 5, Figure 1A). The section on the west limb of this anticline was examined in 1943 by Hage (1944), Holland, and Hayes, and was studied in 1944 in considerable detail by the writer.

Measured from the top down, this section (See Figure 1B) is as follows:

		Approximate thickness Feet
(a)	Dark grey, carbonaceous, shaly, hard siltstone, with Spiriferina sp., Gervillia? sp., Monotis alaskana Smith var. (fairly abundant), Anodontophora? klingzutensis n.sp., and 'Clionites' (group of 'C'. ares) sp.	12
(b)	Beds, up to 2 feet, of massive, dark grey, calcareous siltstone and shaly, calcareous siltstone, with Orbiculoidea? sp., Gervillia? sp., Monotis alaskana Smith var., Myophoria laeta n.sp., Modiolus ahsisi var. stelcki McLearn, Goniomya sp., Himavatites columbianus McLearn, and Choristoceras? sp. In addition to these species the following were collected from little removed talus; Halobia sp. and Pleuromya sp.	13
(c)	Shaly to fissile, dark, calcareous siltstone and limestone with 'knobs' of Halobia coquina limestone and scattered shells of Monotis alaskana Smith var.	7
(d)	Hard but somewhat fissile limestone and calcareous siltstone, with abundant Monotis alaskana Smith var., forming in places almost a Monotis coquina; 'knobs' carry Halobia, reptilian bones, etc. Talus from this zone yields: Halobia sp., Proclydonautilus natosini n.sp., Placites sp., 'Pinacoceras' sp., 'Clionites' (group of 'C'. ares) sp., and Himavatites columbianus McLearn	9
(e)	Shaly to massive, calcareous siltstone, with in places 'knobs' or beds of Anodontophora? klingzutensis coquina limestone. M. alaskana var. is extremely rare. The fauna includes: Monotis alaskana Smith var., Halobia pacalis McLearn, Gryphaea chakii McLearn, Anodontophora? klingzutensis n.sp., Pecten sp., Modiolus sp., Proclydonautilus natosini n.sp., Parajuvavites sp., 'Clionites' (group of 'C'. ares) sp., Sirenites pardoneti McLearn, Himavatites columbianus McLearn, and Himavatites cf. watsoni Diener	10
(f)	Dark grey limestone, Halobia-coquina limestone, and shaly, calcareous siltstone with Halobia cf. dilatata Kittl and Halobia sp.	7

(g) Hard, massive to shaly, dark, calcareous siltstone and 'knobs' of coquina limestone with small smooth brachiopods, Oxytoma cf. mucronata Gabb, and Lima napii McLearn..... 15

(h) Massive to shaly, Halobia-bearing limestone and calcareous siltstone 4

(i) Massive to shaly, dark, calcareous siltstone and limestone and Halobia-coquina limestone; at 8 feet above base is a coquina limestone of shells of Anodontophora? klingzutensis and Halobia; below this large specimens of Halobia pacalis are common; at the base is a shell or coquina bed 25

(j) Dark, shaly, calcareous siltstone or impure limestone with, in places, Halobia and Gryphaea 30

(k) Dark, shaly, calcareous siltstone or impure limestone with in places many specimens of Gryphaea chakii McLearn 35

(l) Dark, shaly, calcareous siltstone or argillaceous limestone 40

(m) Grey limestone, with obscure specimens of pelecypods 50

From the uppermost 5 feet of this section Hage collected: Spiriferina sp., Gervillia? sp., Oxytoma sp., Monotis alaskana Smith var., Anodontophora? klingzutensis n.sp., and 'Clionites' (group of 'C'. ares) sp. From the uppermost 30 feet he collected: Monotis alaskana Smith var., Halobia sp., Gryphaea chakii McLearn, Anodontophora? klingzutensis n.sp., Myophoria laeta n.sp., Pleuromya? nidovana McLearn(cf. Posidonomya madisonensis Smith), Goniomya sp., and Himavatites columbianus McLearn. From this section Holland collected: Orbiculoidea? sp., Spiriferina sp., Monotis alaskana Smith var., Halobia sp., Gryphaea chakii McLearn, Anodontophora? klingzutensis n.sp., Pecten cf. otianus McLearn, Pecten sp., Lima napii McLearn, Proclydonautilus sp., Steinmannites sp., and Himavatites columbianus McLearn. Hayes and Wright collected: Orbiculoidea? sp., Monotis alaskana Smith var, Halobia sp., Anodontophora? klingzutensis n.sp., and Myophoria laeta var. eminens n.var.

Mount Hage

Mount Hage is on the south side of Sikanni Chief River, east of Mount Withrow and west of the Alaska Highway (See locality 2, Figure 1A, and Plate III). It is carved out of east-dipping strata on the east limb of an anticline. At the top of the hill is hard sandstone of the Bullhead group, forming a steep face to the west and a long dip-slope to the east. Below this, on the west face, is a low slope covered with large, angular blocks of Bullhead sandstone that are reported (Hage, 1944) to conceal an outcrop of shale of the Fernie group. Below this again, on a much lower slope of the west face, is a section of Upper Triassic beds. Yet lower, on a high shoulder and thence down a steep slope into Hage Creek, are Middle Triassic beds described in an earlier report (McLearn, 1946).

The Upper Triassic section from the top down is as follows:

		Approximate thickness Feet
(a)	Dark, shaly limestone and a coquina-like limestone with numerous shells of Monotis subcircularis Gabb	15
(b)	Dark, shaly limestone and calcareous siltstone with abundant Monotis alaskana Smith var., Gryphaea chakii McLearn, and Pecten sp.	25
	Concealed	170
(c)	Dark grey, carbonaceous limestone	150
	Concealed	10
(d)	Fissile, black, carbonaceous shale, and dark, calcareous siltstone, with very small specimens of Halobia	30
	Concealed	40
(e)	Fine, calcareous sandstone and fine-grained, grey limestone	35
	Concealed	40
(f)	Fine, grey limestone	20 +

Other Localities

Four and one-half miles up Sikanni Chief River west from the lower trail crossing Hage collected Monotis subcircularis Gabb (See locality 3, Figure 1A). About a mile west of the same crossing Hage collected Oxytoma cf. mucronata Gabb, Halobia sp., Gryphaea chakii McLearn, Pecten sp., Lima napii McLearn, Pleuromya? nidovana McLearn cf. Posidonomya madisonensis Smith) and Juvavites sp.

Klingzut Mountain

In the Prophet River basin Holland has collected a fauna with Himavatites on the north side of Klingzut Mountain "north of Pocketknife River" (See locality 1, Figure 1A). His collection includes: Spiriferina sp., Monotis alaskana Smith var., Gryphaea chakii McLearn, Anodontophora? klingzutensis n.sp., Modiolus ahsisi var. stelcki McLearn, 'Clionites' ('C'. ares group) sp., Steinmannites? sp., and Himavatites sp.

Pink Mountain

Pink Mountain is a long, narrow, high ridge west of the Alaska Highway, between Halfway and Sikanni Chief Rivers, and at about 122 degrees, 52 minutes west longitude.

At the 'Notch' on the west side of this mountain, about 3½ miles north of Halfway River (See locality 8, Figure 1A, and Hage, 1944) and immediately below beds recorded as Jurassic, Hage (1944) collected Monotis alaskana Smith var. and small specimens of Halobia sp. Another collection made in a nearby locality by Hage contains 'Rhynchonella' sp., Gryphaea chakii McLearn, and Pecten sp.

Hage also collected from what he called the Pink Mountain Pass, Pink Mountain, about 9 miles north of Halfway River (See locality 7, Figure 1A). Here he found: Monotis alaskana Smith var., Halobia sp., and Gryphaea chakii McLearn.

Halfway River Basin

About 35 to 40 miles west of the Alaska Highway, on the north side of Halfway River is Mount Wright (See Plate III, and locality 6, Figure 1A), already mentioned, but not named in an earlier report (McLearn, 1946). At the west end of this hill in a narrow gully; the section is as follows:

	Approximate thickness Feet
(a) Dark grey limestone with numerous shells of Monotis subcircularis Gabb	30
(b) Dark grey, carbonaceous limestone with numerous shells of Monotis alaskana Smith var., and also shells of Oxytoma sp., many small shells of Halobia sp., Placites sp., and Sirenites pardoneti McLearn	40
(c) Fissile, dark, carbonaceous limestone, with numerous shells of Halobia sp., and some specimens of Gryphaea chakii McLearn	100
(d) Dark, carbonaceous, shelly and crinoidal, impure? limestone with 'Terebratula' sp., Myophoria heslingtonensis var. regalis n.var., Pecten sp., Lima napii McLearn, Modiolus sp., and Sirenites sp.	200
(e) Dark, carbonaceous, calcareous sandstone, dark grey, carbonaceous siltstone, and argillaceous, shelly limestone, with an inflated species of Spiriferina, Pleuromya sp., Pleurophorus sp., and Cardita? sp.....	110
(f) Dark, argillaceous limestone, dark, calcareous siltstone, and dark, carbonaceous, calcareous sandstone	110

FORMATIONAL CLASSIFICATION

The upper Triassic beds of the Halfway, Sikanni Chief, and Prophet River basins lithologically resemble those to the south in the Peace River Foothills, but how much so has not yet been determined. In the section on Sikanni Chief River below the mouth of Chicken Creek, at

the section on Sikanni Chief River below the mouth of Chicken Creek, at least 200 feet of the measured section, including beds (a) to (l) (See Section, pp. 2-3) can be compared lithologically with the Pardonet beds of the Schooler Creek formation in the Peace River Foothills. The underlying grey limestone, bed (m), may be compared with the top of the Grey beds, although, of course, it is not proved that other dark, carbonaceous beds of the 'Pardonet' lithology do not lie beneath this grey zone on the apex of the anticline. The section exposed farther west on Mount Hage is incomplete. The uppermost 400 feet, beds (a) to (d), seem, however, to conform with the lithology of the Pardonet beds in the Peace River Foothills, and the beds below (d) resemble the Grey beds of those hills. The thickness of the 'Pardonet' beds at Mount Hage, however, is twice that of the similar beds measured to the east in the Chicken Creek section. This may be due to thickening of beds to the west or to lack of uniformity in drawing the base of the dark or 'Pardonet' strata. The same lithological unit is suggested by the matrix of fossil specimens obtained by Hage at 1 and 4½ miles west of the lower trail crossing of Sikanni Chief River, and the matrix of specimens from Pink Mountain record the same lithology.

All of the section, beds (a) to (f), approximately 590 feet thick, measured at the west end of Mount Wright in Halfway River basin conform to 'Pardonet' lithology. Below this, but not recorded, are strata resembling the 'Grey beds' comparable to these below the Pardonet unit in the Peace River Foothills. The thickness, 590 feet, is greater than that of the 'Pardonet' beds on Mount Hage and near the mouth of Chicken Creek, due, perhaps, to the more westerly position of Mount Wright (cf. locality 6 with localities 2 and 5, Figure 1A).

Some evidence seems to be at hand to indicate that the nomenclature adopted for the Peace River Foothills can be applied to the Halfway, Sikanni Chief, and Prophet River basins. Its adoption is postponed for the present, however; the evidence is not yet complete, and, moreover, as already noted (McLearn, 1946), a practical formational classification in any field can be best decided when extensive mapping is undertaken, and field experience indicates the best practice.

FAUNAS AND CORRELATION

The Upper Triassic faunal succession is not so complete in the Halfway, Sikanni Chief, and Prophet River basins as to the south in the Peace River Foothills. The Himavatites fauna, however, can be recognized and is the most widely spread Upper Triassic fauna in northeastern British Columbia. The Monotis subcircularis fauna also is present, but is distributed over a smaller area. No Upper Triassic faunas have been recorded in the Muskwa or Liard drainage areas, in extreme northeastern British Columbia. The Upper Triassic seas do not appear to have extended as far east or northeast as the Middle and Lower Triassic seas. With our present knowledge, however, or rather lack of it, no one could attempt to draw palaeogeographic maps of the Triassic of northern or possibly any part of British Columbia.

Correlations are set forth diagrammetically in Figure 1C.

Monotis subcircularis Fauna

The Monotis subcircularis fauna is represented mostly by one species only, the species that gives it its name. This species at times has been referred to the genera Pseudomonotis and Monotis, and it is probable that in the future it will be included in Marwick's genus

Entomonotis (Marwick, 1935). To avoid present confusion, however, it is left in the genus Monotis, which is more familiar to Canadian geologists. It has been compared with Monotis ochotica Keyserling, which occurs in beds representing the Norian stage in Siberia, Indian Archipelago, and other northern and eastern areas (Smith, 1927).

On Sikanni Chief River this fauna appears to be absent in the section east of Chicken Creek. It is, however, found farther west in the same river valley 4½ miles west of the lower trail crossing, and at the top of the exposed Triassic section on Mount Hage. It appears to be absent on Pink Mountain and in the eastern part of Halfway Valley. It is present, however, farther west in this valley at the top of the section on Mount Wright.

Monotis subcircularis has also been recorded from other parts of northeastern British Columbia, for example at the top or very near the top of the Pardonet beds in the Peace River Foothills, and from Pine River (Williams and Bocock, 1932).

Elsewhere in British Columbia Monotis subcircularis has been found on the north shore of Pinchi Lake in limestone of an unnamed formation (Armstrong, 1942). It has also been identified from near the top of the Parson Bay formation at Parson Bay, Harbledown Island (Crickmay, 1928); in the Vancouver group on One Tree Island, west coast of Vancouver Island (Dolmage, 1921); in the Bonanza group on the east bank of Nimpkish River (Gunning, 1932); and in the 'Maude' formation of Frederic Island and at Skidegate Inlet, Queen Charlotte Islands (Mackenzie, 1916).

In the Yukon Monotis subcircularis has been recorded from the Lewes River group (Lees, 1934) and from an unnamed formation near the forks of Rakla River, a tributary of Stewart River (Keele, 1906).

In Alberta, Parajas (1929) has recorded 'Pseudomonotis cf. subcircularis Gabb' from Vine Creek, a tributary of the Athabaska in the Rocky Mountains.

In Alaska Monotis subcircularis has been found in the McCarthy formation in Chitina Valley, and in unnamed formations at other localities (Martin, 1926).

In the western United States this fauna has been recorded from the Swearinger formation in Plumas county, California, from the Brock formation in Shasta county, California, from Humboldt county, California; and from the Blue Mountains of northeastern Oregon (Smith, 1927). Beds of similar age, but with different fauna and facies probably occur in the Gabbs formation of Hawthorne and Tonopah quadrangles, Nevada (Muller and Ferguson, 1939).

Himavatites Fauna

In the measured section on Sikanni Chief River below Chicken Creek the ammonoid genus Himavatites ranges from beds (b) to (e), and 'Clionites' ('C'. ares species group) from (a) to (e). The pelecypod Monotis alaskana var. ranges from (a) to (e), but is extremely rare in (e). Other species, mostly rare, seem to be confined to some part of the same range, that is they do not, in this section, occur below (e); these species are Myophoria laeta, Goniomya sp., Choristoceras? sp., Placites sp., 'Pinacoceras' sp., Sirenites pardoneti, and Modiolus ahsisi var. stelcki. Other species in zones (a) to (e) extend down into lower layers and are comparatively long ranging. It may be noted that in the

Peace River Foothills M. ahsisi var. stelcki and the ammonoid genus Placites are long ranging within the Pardonet beds and are not confined to the Himavatites zone.

The Upper Triassic beds on Mount Hage are not very fossiliferous, but bed (b) carries Monotis alaskana var., which is so common in beds (a) to (d) and so rare in (e) in the Chicken Creek section. The Himavatites fauna is definitely recorded on Klingzut Mountain by 'Clionites' ('C'. ares group), Steinmannites sp., and Himavatites sp. In Pink Mountain Pass and at 'the Notch', Pink Mountain, the beds with Monotis alaskana var. are of this faunal zone, but do not contain other characteristic species. On Mount Wright bed (b), although it does not contain Himavatites, does have species characteristic of this fauna, namely Monotis alaskana var. and Sirenites pardoneti.

The known Himavatites fauna of the Halfway, Sikanni Chief, and Prophet River basins includes Monotis alaskana var. and other pelecypods, and the ammonoids 'Pinacoceras' sp., Parajuvavites sp., 'Clionites' of the 'C'. ares group, Steinmannites sp., Sirenites pardoneti, Himavatites columbianus, Himavatites cf. watsoni, and Choristoceras? sp. It is similar to what the writer has called the Distichites fauna in the Peace River Foothills. There the Distichites fauna immediately underlies the Monotis subcircularis fauna, and includes M. alaskana var. and other pelecypods and the ammonoids 'Pinacoceras' sp., Parajuvavites sp., 'Clionites' of the 'C'. ares group, Sirenites pardoneti, Himavatites columbianus, Himavatites cf. watsoni, several species of Distichites, typical Helictites, and species of Helictites described by the writer but not so typical of this genus. In places M. alaskana var. enters a little later in the section than the first appearance of Himavatites and extends a little higher. As the genus Distichites has a narrow, and the genus Himavatites a wide, geographic distribution in northeastern British Columbia, it is better to call this fauna the Himavatites or Himavatites-Distichites rather than the Distichites fauna.

This is an interesting fauna and of considerable importance. It makes possible a correlation of beds (a) to (e) of the section on Sikanni Chief River at Chicken Creek with at least bed (b) of the Mount Hage section; with the Himavatites beds of Klingzut Mountain; with the Monotis alaskana var. beds of Pink Mountain; with at least bed (b) in the section at the west end of Mount Wright in Halfway River basin; and with the Himavatites-Distichites beds near the top of the Pardonet lithological unit of the Schocler Creek formation in the Peace River Foothills.

Not much is known of this fauna in other parts of North America. Crickmay has recorded the presence of Monotis alaskana from just below the zone of Monotis subcircularis in the Parson Bay formation of Harbledown Island (Crickmay, 1928). In the Yukon it is probably represented in the section near the forks of Rakla River, a tributary of Stewart River (Keele, 1906), for a small collection from that locality includes Monotis subcircularis and Monotis alaskana var.?; the two species do not occur in a single rock specimen but in different specimens, and so may very well represent two faunal zones, the fossils of which have been mixed in collecting.

In Alaska, Smith (1927) reports that Monotis alaskana occurs in the Monotis subcircularis zone in Milk Creek, in the Copper River area. As Crickmay (1928) notes, the two may be in different zones.

In the classical Hallstatt region, Austria, as described by Mojsisovics, the genus Steinmannites is recorded in the Norian zone of Sagenites giebeli, in the Norian Gastropod-Marmor, and in the Norian Someraukogel (Mojsisovics, 1893). In India the genera Himavatites, Parajuvavites, and Steinmannites occur in the fauna of the Tropites limestone of Byans (Diener, 1906), but this is a mixed fauna. Parajuvavites and Steinmannites occur in the Halorites limestone, of Norian age, in the Bambanag section (Mojsisovics, 1896). There is also considerable resemblance to the Upper Triassic of Timor. Thus, comparing the list published for locality Bihatil (Diener, 1923) with a list of our Canadian fauna the genera Steinmannites and Himavatites are in common, and the Canadian species Sirenites pardoneti resembles the Timor species Sirenites elegantiformis (Diener, 1923).

A more extended discussion of the age of this fauna will be presented in a later paper when the more complete faunas of Pardonet Hill in the Peace River Foothills are studied. The Himavatites fauna is certainly of Norian, but neither earliest nor latest, Norian age.

Other Upper Triassic Faunas

Upper Triassic faunas earlier than the Himavatites fauna in the Halfway, Sikanni Chief, and Prophet River drainage basins are represented by only a few preserved species, and these are mostly long ranging. Their zonal arrangement and correlation are, therefore, not satisfactory.

In the section in Sikanni Chief Valley near the mouth of Chicken Creek the bed (f) is below the zone of Himavatites and carries Halobia cf. dilatata Kittl. In the Peace River Foothills this species likewise occurs below the range of the Himavatites-Distichites fauna, and with a species of Drepanites (McLearn, 1940). It is of Norian age, but probably of earlier Norian age than the Himavatites-Distichites fauna. Beds below (f) in the Chicken Creek section, that is beds (g) to (k) contain only comparatively long-ranging species of pelecypods, such as Oxytoma cf. mucronata Gabb, Lima napii, and Gryphaea chakii. In the Peace River Foothills these species are confined to the Pardonet beds, but range through beds probably of both Karnian and Norian ages. The few shells collected in (m) are indeterminate, and no correlation can be made with their aid.

In the Mount Hage section fossils are too rare below the beds with Monotis alaskana var. for zoning or correlation.

In the section on Mount Wright, Halfway River basin, beds below (b) contain only long-ranging species of pelecypods, indicative, however, of the Pardonet member in the Peace River Foothills, or contain only rare species of unknown range.

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APPENDIX. NEW UPPER TRIASSIC SPECIES from Northeastern British Columbia, by F. H. McLearn.

Myophoria laeta n. sp. Pl. I, fig. 4. Moderately to fairly convex, semi-ovate shells. Marginal carina not prominent. Area wide, with median furrow and closely spaced, concentric, very fine striations. Disk with reticulate ornament consisting of fine, distantly spaced pseudoconcentric costae, more closely spaced at maturity, and radial costae of equal or greater strength, covering most of the disk. In *M. zeballos* McLearn marginal carina is much more elevated, and mesh of reticulate ornament finer than in *M. laeta*. In *M. wohrmanni* Bittner, *M. adornata* McLearn, and *M. grahami* McLearn radial costae are fewer and cover much smaller part of disk. G. S. c.: hol., 9250.

Myophoria laeta var. *eminens* n. var. Pl. I, fig. 3. Has somewhat stouter pseudoconcentric costae, and more prominent thickening and incipient tuberculation at intersection of radial and concentric costae than typical species. Anteriorly pseudo-concentric costae almost horizontal. Radial costae mostly stronger on posterior than on anterior part of disk. As in typical species marginal carina not prominent. G. S. c.: hol., 9251.

Myophoria heslingtonensis var. *regalis* n. var. Pl. II, figs. 4, 5. Sharply angular marginal carina and in front of it a broad, slightly concave space with two, finely tuberculate radial costae; anterior to them two fairly stout costae with large, but few, tubercles; anterior to this and to within one-quarter distance of anterior margin are both radial and pseudoconcentric costae with low nodes at their intersection. At anterior end of disk are nearly horizontal but somewhat curved costae only. Compared with the species this variety is larger, has a less elevated marginal carina, probably even finer tubercles on the area, has two radial tubercular costae in space before marginal carina, and more radial costae. G. S. c.: hol., 9252; par., 9253.

Anodontophora ? klingzutensis n. sp. Pl. II, fig. 3. Interior and generic characters unknown, but described because of stratigraphic value. Very convex, sub-quadrate outline, elevated but somewhat flattened umbones, a little in advance of middle and rising high above hinge-line; beaks curved forward a little. Postumbonal slope abruptly rounded. Surface has fine, irregularly spaced varices of growth. Outline more quadrate and umbones turned less forward than in *Anodontophora donacina* Schlotheim. G. S. c.: hol., 9255.

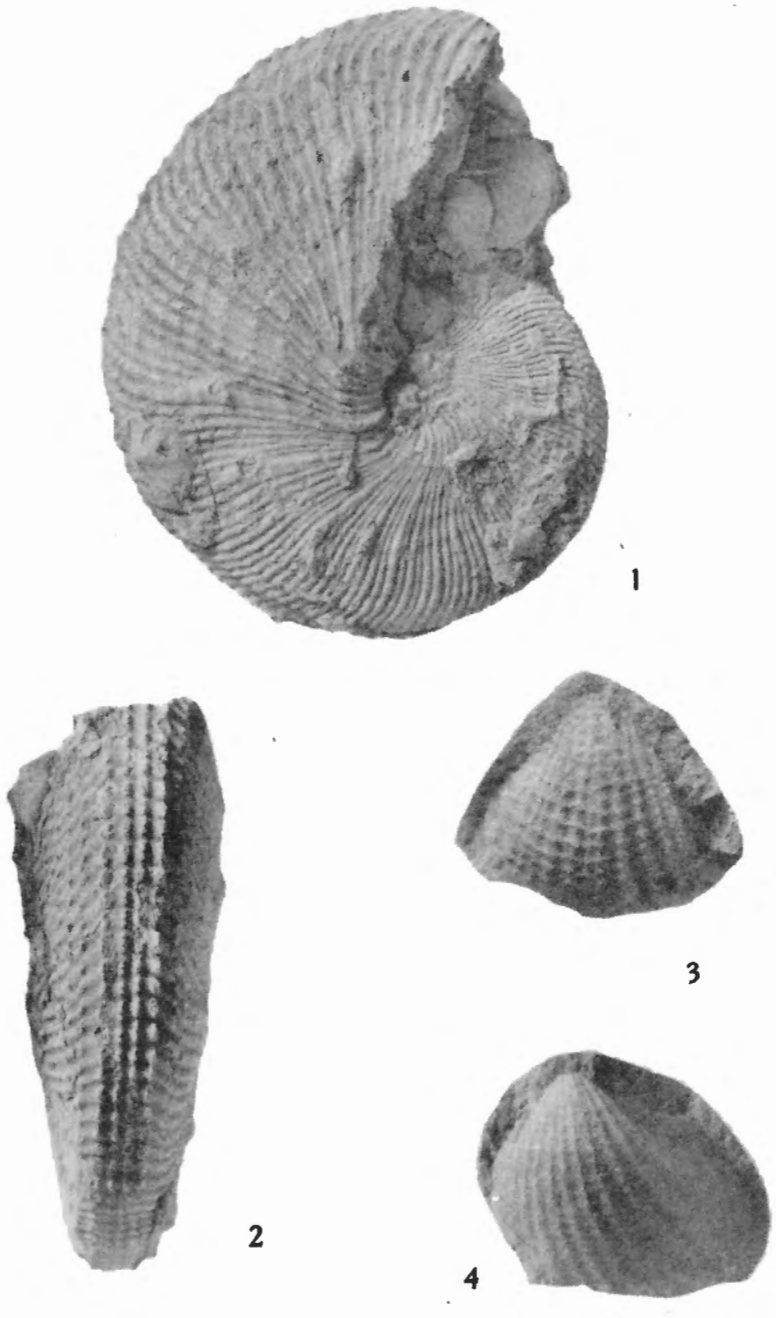
Proclydonautilus natosini n. sp. Pl. II, figs. 1, 2. The holotype is an incomplete shell of 90 mm. in diameter; robust, involute, thicker than high whorls, with almost flat, converging sides, well-rounded ventral shoulder, low, rounded venter and nearly central siphuncle. Surface has fine, transverse, costae, nearly straight on sides, but bending back in a broad curve on venter; also longitudinal, short, low, closely spaced costae, forming with the transverse costae a delicate, textural ornament. Some specimens are larger than holotype. Largest known specimen 200 mm. in diameter, at which stage venter is wide and flat. Measurement of holotype is 90; 66; - ; - ; 80; 65; 69; - . Suture line like those of *P. spirolobus* Dittmar, *P. goniatites* Hauer and *P. angustus* Kieslinger; the ornament is different from these species, however, in having longitudinal as well as transverse ornament. G. S. c.: hol., 9257; par., 9260.

Himavatites columbianus McLearn. Pl. I, figs. 1, 2. A good specimen of this diagnostic species illustrated. G. S. c.: ples., 9265.

Ottawa, Canada,
August, 1946.

HIMAVATITES FAUNA

"PARDONET BEDS" (SHEET 1)



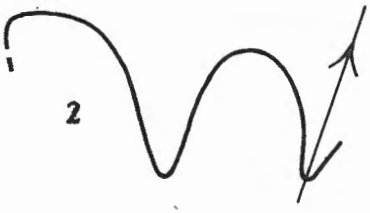
Figures 1, 2. *Himavatites columbianus* McLearn. Plesiotype.
Figure 3. *Myophoria laeta* var. *eminens* McLearn n. var. Holotype.
Figure 4. *Myophoria laeta* McLearn n. sp. Holotype.

PLATE I

HIMAVATITES FAUNA

"PARDONET BEDS" (SHEET 2)

1



2

3

UNNAMED FAUNA

"PARDONET BEDS"

4

5

Figure 1. *Proclydonautilus natosini* McLearn n. sp. Holotype.

Figure 2. Same species. Paratype

Figure 3. *Anodontophora ? klingzutensis* McLearn n. sp. Holotype.

Figure 4. *Myophoria heslingtonensis* var. *regalis* McLearn n. var. Holotype.

Figure 5. Same species. Paratype.

PLATE II

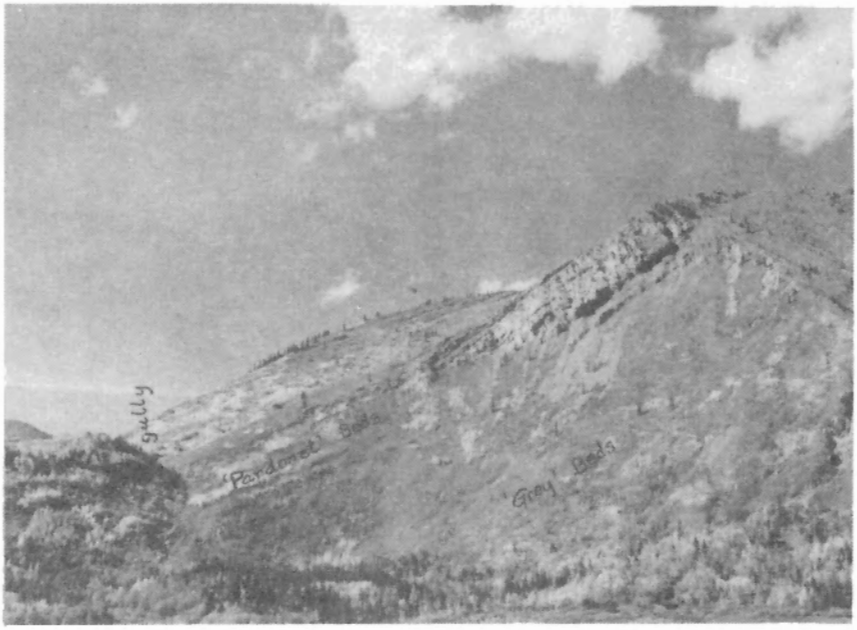


Figure 1. West end Mount Wright, north side Halfway Valley, B. C.

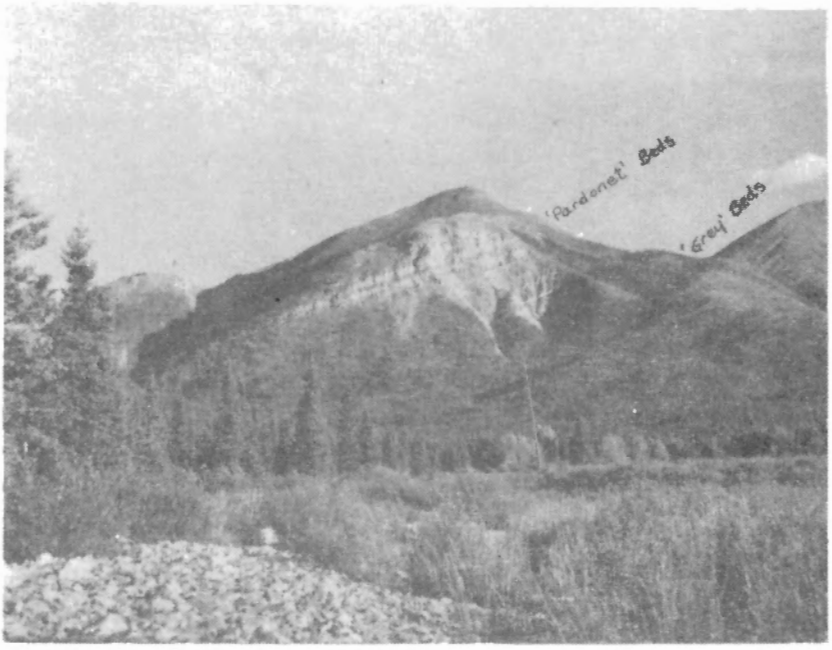


Figure 2. Mount Hage, south side Sikanni Chief Valley, B. C.

PLATE III