

Middle and Upper Paleozoic Section, Beehive Pass
Alberta and British Columbia

Geological Survey of Canada Open File No. 620

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1979

The following, unedited field notes describe the almost continuously exposed middle and upper Paleozoic section on the north side of Beehive Pass, Alberta and British Columbia. It was measured by D.K. Norris with the assistance of E.W. Mountjoy during the 1956 field season and is located in the southwest quarter of the Beehive Mountain map-area (Norris, 1958).

The section embraces the Exshaw, Banff, Livingstone and Mount Head Formations, the lower member of the Etherington Formation and the uppermost beds of the Palliser Formation in the immediate hanging wall of the Lewis Fault. The topmost bed included here is in contact with the type section of the Todhunter Member of the Etherington Formation (Norris, 1965, p. 58).

The top and bottom of the section described below can be located precisely on N.A.P.L. vertical air photograph A12740-85 at the following Cartesian coordinates measured with respect to the centre of the photograph, where the north direction is the positive Y-axis:

Top of section (contact with Todhunter Member of the Etherington Formation):	X = -5.51 cm Y = +1.70 cm
Bottom of section (base of exposure, corresponding roughly with the surface trace of the Lewis Fault).	X = +9.50 cm Y = -0.77 cm

Norris, D.K.

1958: Beehive Mountain, Alberta and British Columbia; Geological Survey of Canada, Paper 58-5, Report and Map 14-1958.

1965: Stratigraphy of the Rocky Mountain Group in the southeastern Cordillera of Canada; Geological Survey of Canada, Bulletin 125.

Unit	Description	Thickness (feet)	
		Unit	From Base
Etherington Formation (lower Member)			
31	Dolomite: medium and dark gray, finely crystalline, medium- to thick-bedded, arenaceous dolomite with stringers and blebs of light gray chert. Vugs lined with white chert. Occasional shaly intervals. Occasional zones of silicified brachiopods (<u>Spirifer leidyi</u>)	28	770
30	Sandstone: medium gray, medium-bedded, very fine grained, dolomitic, finely cross-bedded shown by relief weathering.	23	742
29	Dolomite: dark grey to black, fine-grained, thick-bedded, silty dolomite with occasional stringers of dark gray chert; vuggy zone (1 ft) at 5 to 6 feet from top of unit.	16	719
28	Dolomite: light gray, medium-bedded, finely crystalline, dolomite with occasional nodules of dark gray chert. Four-foot bed of black, finely crystalline limestone at 10 to 14 feet from base.	26	703
27	Dolomite: medium gray, finely crystalline, medium-bedded, silty dolomite with vuggy zone in upper 2 feet. Vugs lined with white chert. Vuggy bed (1 foot) at 3 to 4 feet from top dominantly white carbonate. Vugs lined with white chert common in lower 17 feet.	21	677
26	Limestone: very coarsely crystalline, medium-bedded, dark gray crinoidal limestone.	9	656

Unit	Description	Thickness (feet)	
		Unit	From Base
25	Covered.	6	647
24	Dolomite: dark gray, finely crystalline, limy, vuggy dolomite. Vugs lined with white chert and carbonate. One foot bed of dark gray crinoidal limestone as in Unit X at 4 to 5 feet from top. Medium- to thick-bedded. Occasional stringer of black chert.	25	641
23	Limestone: medium crystalline, medium-bedded limestone. Occasional stringer of black chert. Black in upper 13 feet. Dark gray and coarsely crystalline below.	19	616
22	Limestone: black, medium crystalline, massive limestone with frequent blebs of dark gray, limy chert. Shaly interval at 18 to 23 feet. Very crinoidal at 24 to 28 feet.	28	597
21	Dolomite: thick-bedded, black, finely crystalline, limy dolomite.	2.5	569
20	Limestone: interbedded thick-bedded, black, finely crystalline limestone, medium crystalline, black, silty, delicately cross-bedded limestone; coarsely crystalline crinoidal limestone at 20 to 29 feet.	29	566.5
19	Limestone: black, finely crystalline, crinoidal, thick-bedded limestone with occasional nodules of dark gray chert and vugs lined with white chert. Coarsely crystalline and crinoidal from 25 to 31 feet with abundant silicified brachiopods.	31	537.5

Unit	Description	Thickness (feet)	
		Unit	From Base
18	Sandstone: medium gray, medium-grained, strongly calcareous, thick-bedded, quartz sandstone. Buff weathering.	5	506.5
17	Covered.	5	501.5
16	Limestone: black, finely crystalline, medium-bedded to massive limestone.	15	496.5
15	Siltstone: light gray, thick-bedded, calcareous, quartz sandstone.	3	481.5
14	Dolomite: light gray, finely crystalline, thick bedded.	5	478.5
13	Limestone: dark gray, coarsely crystalline, silty limestone. One foot shale interval at 15 to 16 feet. Abundant crinoidal and brachiopod fragments in massive lower 8 feet.	24	473.5
12	Dolomite: medium gray, finely crystalline, massive dolomite.	2.5	449.5
11	Limestone: black crypto-crystalline, medium-bedded limestone	11	447
10	Limestone: dark gray, medium crystalline, medium-bedded limestone with abundant silicified brachiopods. Shaly in upper 6 feet.	20	436
9	Covered.	12	416
8	Dolomite: medium gray, strongly calcareous, medium-bedded, silty dolomite.	8	404

Unit	Description	Thickness (feet)	
		Unit	From base
7	Limestone: dark gray to black, coarsely crystalline, very thick- to massive-bedded limestone. Shaly, dark gray limestone at 24 to 28 feet and at 29 to 30 feet. Shaly at 46 to 50 feet. Occasional interbeds of approximately 1 foot crinoidal remains. One-to two-foot interbeds of medium- to fine-grained, medium to dark gray limestone - become dominant lithology in lower 100 feet. Covered at 69 to 73 feet. Occasional shale breaks appear to be weathered earthy green.	204	396
6	Limestone: dark gray, finely crystalline, medium-bedded, silty, buff weathering dolomitic limestone.	8	192
5	Limestone: interbedded light and dark gray, massive finely crystalline limestone banded with medium gray chert stringers and nodules, thick-bedded.	33	184
4	Limestone: light gray, coarsely crystalline, thick-bedded limestone with abundant fragments of crinoids, bryozons, and brachiopods. Occasional interbeds of greenish-gray earthy weathering shales. Thick interbeds of dark gray to black finely crystalline massive bedded limestone. Occasional nodules of light gray limy chert.	87	151
3	Limestone: covered but occasional beds of dark gray limestone and earthy, greenish gray shale showing through.	35	64

Unit	Description	Thickness (feet)	
		Unit	From base
2	Limestone: dark gray, finely crystalline, thick-bedded limestone with 1 to 2 inch partings of weathered greenish-gray, calcareous shale. Occasional blebs of light gray chert.	24	29
1	Covered. Abundance of earthy, greenish shale showing through.	5	5

Thickness of lower Member of Etherington Formation 770 feet

Mount Head Formation

Beds above this weather light gray and are generally thick- to massive-bedded; below this, beds weather medium to dark gray and are generally thin- to medium-bedded.

33	Limestone: black, crypto-crystalline, thick-bedded limestone with prominent dark gray and black chert beds up to 1 foot thick and nodules. One-to two-inch partings of greenish-gray shale. Shaly from 92 to 100 feet. Partings are of black shale from about 80 feet from top down. Contains <u>Faberophyllum</u> and <u>Koninokophyllum</u> 50 feet below top on Mt. Lyall	135	1091
32	Limestone: black, coarsely crystalline, thick-bedded, crinoidal limestone; 1-foot interval of black very calcareous shale.	11	956

Unit	Description	Thickness (feet)	
		Unit	From Base
31	Limestone: interbedded thin-bedded, silty, black, finely crystalline dolomitic limestone and thin-bedded, black, crypto-crystalline limestone. Occasional 1- to 2-inch partings of black shale. Shaly at 16 to 20 feet. Containing occasional horn corals. Shaly interval at 35 to 38 feet contains abundant horn corals (<u>Faberophyllum</u> c.f. <u>araneosum</u> , <u>Lithostratian banffense</u> with <u>Syringopora</u> c.f. <u>aculeata</u> at about this level on Mt. Lyall). Shaly from 45 to 48 feet.	48	945
30	Limestone: black, finely crystalline, thick-bedded, brownish black weathering limestone.	7	897
29	Limestone: black, crypto-crystalline, massive-bedded limestone.	12	890
28	Limestone: black, finely crystalline, medium bedded limestone with 1 to 2 inch partings of greenish-brown shale. Frequently shaly.	74	878
27	Limestone: black, coarsely crystalline, thick-bedded crinoidal limestone. Interbedded with black, finely crystalline limestone; latter frequently being shaly.	81	804
26	Dolomite: black, finely crystalline, brownish-grey weathering, thin- to medium-bedded, limy dolomite.	11	723

Unit	Description	Thickness (feet)	
		Unit	From Base
25	Limestone: black, thick- to massive bedded, finely crystalline limestone.	45	712
24	Dolomite: medium gray, finely crystalline, silty, massive bedded dolomite.	7	667
23	Limestone: coarsely crystalline, thick bedded, black limestone.	76	660
22	Dolomite: medium gray, finely crystalline, gray-buff weathering, silty, medium-bedded dolomite. Largely screed over.	12	584
21	Limestone: black, coarsely crystalline, medium- to thick bedded limestone.	35	572
20	Limestone: black, finely crystalline, sandy, thick bedded, dolomitic limestone interbedded with medium gray chert.	12	537
19	Limestone: black, finely crystalline, medium bedded limestone with light gray chert stringers	5	525
18	Limestone: black, thick bedded, coarsely crystalline limestone	31	520
17	Limestone: black, finely crystalline, thick bedded, silty, limestone interbedded with light gray, rusty-brown weathering chert. Beds are ones capping cliff in contact with ½ inch limestone: dark khaki brown, fibrous, porous, vuggy, very coarsely crystalline, thin to medium bedded, dirty brown weathering limestone with strong fetid odor.	35	489

Unit	Description	Thickness (feet)	
		Unit	From Base
16	Limestone: coarsely crystalline, ridge-forming, medium gray, porous weathering, massive, crinoidal limestone which continues to brown weathering beds capping the cliff (see Unit 22 above). This unit is largely inaccessible and hence thickness is an estimate only.	50±	454
15	Dolomite: light gray, thick-bedded, finely crystalline dolomite with silicified horn corals.	6	404
14	Limestone: coarsely crystalline, dark gray, porous weathering.	2	398
13	Dolomite: light gray, finely crystalline, medium bedded dolomite with dark gray nodules of slightly calcareous chert.	10	396
12	Limestone: light gray, coarsely crystalline, very thick bedded, crinoidal limestone.	74	386
11	Dolomite: light gray, finely crystalline, vuggy weathering, limy dolomite.	5	312
10	Limestone: light gray, coarsely crystalline, medium to thick bedded limestone with frequent interbeds consisting almost entirely of crinoidal remains.	20	307
9	Limestone: light gray, medium bedded, porous, medium crystalline limestone with occasional thin bedded interbeds of silty, buff limestone. With lacy network of medium gray, siliceous limestone in upper 3 feet.	12	287

Unit	Description	Thickness (feet)	
		Unit	From Base
8	Limestone: dark gray, coarsely crystalline, medium bedded, crinoidal limestone. Partially covered.	49	275
7	Limestone: medium crystalline, light gray, medium bedded limestone (vuggy) with vugs frequently filled or lined with white chert.	7	226
6	Limestone: light gray, very coarsely crystalline, massive limestone.	94	219
5	Limestone: dark gray, coarsely crystalline, thick bedded limestone; 3-foot bed of medium crystalline, dark gray limestone with prominent blebs of light gray limy chert at 17 to 20 feet from top.	45	125
4	Limestone: medium gray, finely crystalline, vuggy, medium to thick bedded, silty, dolomitic limestone	22	80
3	Limestone: covered but probably a finely crystalline, porous, light gray thin bedded limestone.	7	58
2	Limestone: dark gray, silty, coarsely crystalline, thick bedded limestone.	16	51
1	Dolomite: light gray, finely crystalline, buff weathering, medium bedded silty, limy dolomite with vugs up to 1 inch diameter lined frequently or filled with white chert. Weathers back in prominent platy to flaggy fragments (top of mountain).	35	35

Thickness of Mount Head Formation

1091 feet

Unit	Description	Thickness (feet)	
		Unit	From Base
Livingstone Formation			
25	Limestone: dark gray, medium crystalline, thick bedded limestone with abundant lacy stringers of dark gray chert. Irregular contact with undulations up to 2' and cut surfaces with underlying unit.	7	1240
24	Dolomite: finely crystalline, thin bedded, light brownish gray dolomite.	3	1233
23	Limestone: light gray buff, coarsely crystalline, thick bedded to massive, crinoidal limestone. 3-ft interbed at 9' to 12' of finely crystalline, medium gray brown limestone with abundant blebs of dark gray limy chert. Occasional interbeds of medium crystalline beds. Medium brownish gray in upper 30 feet.	183	1230
22	Dolomite: light gray, finely crystalline, medium- to thick-bedded dolomite.	8	1047
21	Limestone: dark gray, very coarsely crystalline, vuggy, massive limestone with occasional bands dominantly of crinoidal remains. Vugs up to 1 inch diameter frequently lined with white chert. Occasional blebs of dark gray, limy chert. One-foot interbed medium gray, finely crystalline dolomite at 28 to 29 feet. Occasionally medium crystalline.	77	1039

Unit	Description	Thickness (feet)	
		Unit	From Base
20	Dolomite: medium gray, finely crystalline, vuggy, thick bedded dolomite. Vugs occasionally lined with white chert; occasional blebs of dark gray limy chert. Strata thin-bedded in uppermost 6 feet.	19	962
19	Limestone: light gray, silty, very thick bedded, medium to coarsely crystalline limestone with frequent thin (less than 1 ft) interbeds of very coarsely crystalline limestone.	35	943
18	Dolomite: light gray, finely crystalline, medium bedded dolomite.	3	908
17	Limestone: medium gray, very coarsely crystalline, very thick bedded limestone. Occasional lensy interbeds up to 1 ft. thick consisting predominantly of crinoidal fragments. Five feet above base is 7-foot bed (5 feet to 12 feet) of medium brownish gray, finely crystalline, massive limestone with abundant blebs of limy black chert.	68	905
16	Dolomite: medium gray, finely crystalline, gray buff weathering, vuggy silty dolomite with disseminated blebs of dark gray limy chert. One-foot bed of dark gray, coarsely crystalline limestone at 9 to 10 feet.	16	837

Unit	Description	Thickness (feet)	
		Unit	From Base
15	Limestone: very coarsely crystalline, medium brownish gray, crinoidal limestone.	6	821
14	Dolomite: dark gray, finely crystalline, gray buff weathering, vuggy silty dolomite with abundant small blebs of dark gray, limy chert.	34	815
13	Limestone: very coarsely crystalline, light gray, massive, crinoidal limestone with frequent thin-bedded zones consisting pre lominantly of crinoidal remains.	251	781
12	Limestone: dark brownish gray, thick bedded, finely crystalline limestone with abundant thin (less than ½ inch) stringers of dark gray, limy chert in the lowest 12 feet. Frequent <u>fenestrellinid</u> bryozons.	20	530
11	Limestone: light gray, thick bedded to massive, very coarsely crystalline, crinoidal limestone. Beds may have slight thickening through minor faulting.	20	510
10	Limestone: dark gray, medium crystalline, massive bedded limestone with frequent blebs and stringers of dark gray limy chert. Crinoidal.	23	490
9	Limestone: medium to coarsely crystalline, medium gray weathering limestone. Contrast with underlying unit especially from weathering surface. Occasional stringers of light gray limy chert.	29	467

Unit	Description	Thickness (feet)	
		Unit	From Base
8	Limestone: coarsely crystalline, light brown gray (occasional dark gray), thick bedded to massive, crinoidal limestone. Partially screed over. Creamy gray weathering.	94	438
7	Limestone: dark gray to nearly black, finely crystalline, thick bedded limestone with frequent nodules and stringers of dark gray chert with scattered crinoid and silicified horn corals.	33	344
6	Limestone: medium gray, coarsely crystalline, thick bedded limestone with occasional shaly intervals and occasional lacy interbeds of cherty, dark gray limestone. Occasional thin (less than 1 foot) interbeds of very coarsely crystalline, light gray crinoidal limestone.	95	311
5	Limestone: light gray, massive coarsely crystalline limestone with frequent lensy interbeds consisting dominantly of crinoidal fragments; frequently shaly intervals.	50	216
4	Limestone: light and dark gray, coarsely crystalline, dominantly medium to thick bedded limestone with occasional intervals having lacy blebs of dark gray chert and occasional intervals of lensy coquina consisting dominantly of crinoidal fragments.	67	166

Unit	Description	Thickness (feet)	
		Unit	From Base
3	Dolomite: medium bedded, dark gray, finely laminated dolomite with lacy blebs of dark gray chert.	2	99
2	Limestone: medium gray, coarsely crystalline, medium bedded, crinoidal limestone. Occasional interbeds of lacy network of medium grained, coarsely crystalline limestone and dark gray, finely crystalline, silty, dolomitic limestone with profusion of fenestellinid bryozons. Occasional lacy stringers up to 3 inches thick, dark gray, limy chert.	75	97
1	Limestone: medium to coarsely crystalline, dark gray limestone, medium to thin bedded with lacy network of medium gray, limy chert.	22	22
Thickness of Livingstone Formation		1240 feet	
Banff Formation			
24	Limestone: dark gray, finely crystalline with some siliceous layers and medium to coarsely crystalline, dark gray limestone with black chert bed.	45	826
23	Limestone: black, finely crystalline to micro-crystalline, arenaceous limestone, weathering irregularly mottled due to siliceous content.	80	781
22	Covered.	10	701
21	Limestone: light to medium gray, finely crystalline, arenaceous, thin bedded limestone.	35	691

Unit	Description	Thickness (feet)	
		Unit	From Base
20	Limestone: finely crystalline, dark gray, silty limestone as below with silty parts weathering out in irregular blotches and not in layers.	50	656
19	Covered.	15	606
18	Limestone: dark gray to black, finely crystalline limestone with irregular stringers and beds of calcareous sandstone and silty limestone giving rock thin- to medium bedded appearance. Unit very silty and light gray weathering in upper part.	48	591
17	Limestone: siliceous limestone, black becomes more numerous forming nearly 50% of rock and gives rock thin-bedded look but actually thick- to massive-bedded. Siliceous limestone weathering blue-black and other light gray. Silty limestone becomes less frequent towards top of this unit.	70	543
16	Limestone: irregular interbedded, medium gray, finely crystalline limestone and black, siliceous limestone weathering light gray.	40	473
15	Limestone: medium gray, finely crystalline limestone with irregular beds and blebs of black to dark gray chert. Chert becomes less and less frequent towards the top.	21	433
14	Limestone: black, finely crystalline limestone, medium to thick bedded with irregular interbeds of black chert and siliceous limestone (?). Chert beds up to 1 foot containing generally thin, irregular blebs of light gray weathering, black, finely crystalline limestone.	30	412

Unit	Description	Thickness (feet)	
		Unit	From Base
13	Dolomite: as below with thin irregular interbeds of black finely crystalline weathering very light gray limestone. Chert becomes less frequent and more irregular to top of this unit. Also limestone in part micro-crystalline.	32	382
12	Dolomite: finely crystalline, black dolomite, siliceous with some chert. In places becomes very thin bedded and cherty as in Unit 11.	40	350
11	Limestone: interbedded, thin bedded, black chert and dark gray to black, finely crystalline limestone.	65	310
10	Limestone: irregularly interbedded black, finely crystalline limestone. Black chert. Chert forms 50 to 60% of rock.	81	245
9	Partially covered probably limestone and chert.	6	164
8	Limestone: limestone and siltstone as below. Limestone varies from crypto-crystalline to medium to coarsely crystalline.	12	158
7	Limestone: silty limestone dark gray to black and siliceous siltstone and chert as below.	35	146
6	Limestone: becomes medium crystalline, still arenaceous and interbedded with chert.	5	111

Unit	Description	Thickness (feet)	
		Unit	From Base
5	Siltstone: black to dark gray, finely laminated, dolomitic siltstone and calcareous siltstone / or silty, finely crystalline limestone. Both irregularly bedded grading one into the other along strike. Bedding undulatory and wavy with minor rare drag folds. Along strike bed changes to about 75% banded chert.	35	106
4	Covered. Shale interval exposed further down slope. Black, very thin bedded almost fissile shale interbedded with more siliceous beds. Both are brown weathering.	28	71
3	Siltstone: thin to medium bedded, black, slightly calcareous, cherty siltstone and light gray blebs and beds of finely crystalline limestone. Fine laminations extend from limestone into siltstone and chert, silica secondary becoming black chert in places. Lithology similar to below 19 feet.	24	43
2	Limestone: dark gray to black, finely crystalline limestone interbedded in black chert. Sometimes chert forms 80% of rock, mostly bedded but some nodules. Limestone weathering light gray.	9	19
1	Dolomite: interbedded black, finely crystalline, silty dolomite and black, thin bedded chert. Both showing fine laminations on weathered surface. Black limestone shows peculiar swirls as if due to current bedding or similar agent.	10	10

Unit	Description	Thickness (feet)	
		Unit	From Base
Exshaw Formation			
5	Mudstone: thin bedded, calcareous mudstone as below with particular non-calcareous blebs.	2	94
4	Covered.	11	92
3	Mudstone: black, calcareous mudstone, thin bedded.	1	81
2	Covered.	77	80
1	Mudstone and siltstone. black, thin bedded, non- calcareous mudstone and fine siltstone, rusty- brown to yellow weathering.	3	3
Thickness of Exshaw Formation		94 feet	

Palliser Formation

Top of Palliser becomes thin bedded towards the top;

still finely crystalline to micro-crystalline.

Upper 1 foot very coarsely crystalline, crinoidal limestone.

Base of Palliser above Lewis Fault dark gray, finely

crystalline limestone with large fragments of

crinoids and calcite. Fine calcite stringers.

Medium to massive bedded.

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