

# Changes in Stratigraphic Nomenclature by the U.S. Geological Survey, 1978

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CONTRIBUTIONS TO STRATIGRAPHY

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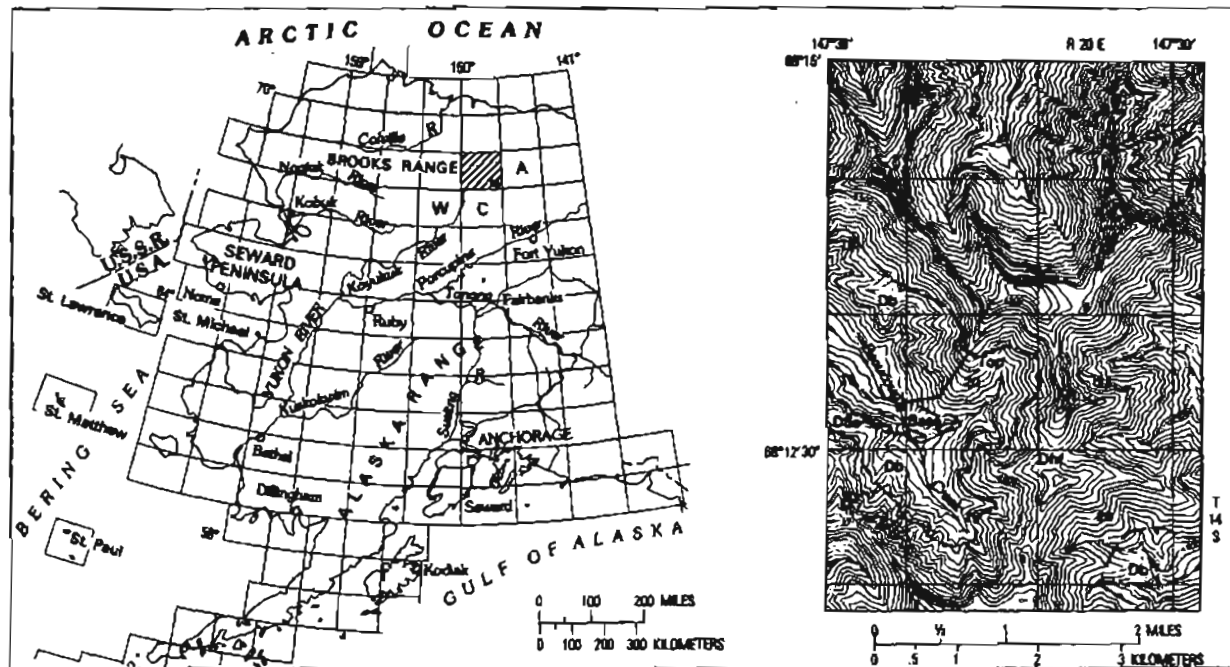


Figure 5.—Index map of Alaska showing location of Philip Smith Mountains quadrangle (cross-hatched), Arctic (A), Chandalier (C), and Whisman (W) quadrangles; and the type locality of the Basucoup Formation (dot). Inset map shows location of type section in the northwest corner of the Philip

Smith Mountains A-1 quadrangle, and the contacts of the Basucoup Formation (Db) with the underlying Skagit Limestone (DSa) and the overlying Hunt Fork Shale (Dhf) as enlarged from the original 1:250,000 scale mapping. Contacts of other rocks with the Hunt Fork Shale are omitted.



BEAUCOUP FORMATION, A NEW UPPER DEVONIAN  
STRATIGRAPHIC UNIT IN THE  
CENTRAL BROOKS RANGE, NORTHERN ALASKA

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About 545 m of assorted clastic and carbonate rocks that form a mappable stratigraphic unit at the base of the Upper Devonian marine sequence in the Philip Smith Mountains area of northern Alaska (Dutro and others, 1977) are here named the Beaucoup Formation for exposures at its type locality in the valley of Beaucoup Creek. The type section (fig. 5) is designated as the section on the northeast side of Beaucoup Creek in sec. 19 and sec. 20, T. 14 S., R. 20 E., in the Philip Smith Mountains A-1 quadrangle, and the type area as the Philip Smith Mountains.

At its type section, the Beaucoup Formation is conformably overlain by the Upper Devonian Hunt Fork Shale (fig. 6) and rests unconformably on the Skajit Limestone, which in this area is Late(?) Silurian to Middle(?) Devonian in age on the basis of fossils found in the Philip Smith Mountains quadrangle (Brosge and others, 1979). The lithologic heterogeneity of the basal part of the Beaucoup in other parts of the type area probably reflects a mixture of source rocks for this early Late Devonian period of sedimentation.

#### LITHOLOGY

Four different rock types are found in the type section. The most striking are the reefs and reefoid layers that occur throughout the section in the Beaucoup Creek area and also extend into nearby parts of the Philip Smith Mountains. The dominant, and geographically most persistent, rock type is the fine-grained clastic rocks represented by the yellow-brown weathering calcareous siltstone, silty limestone, and shale in the upper part of the section. Coarser clastic rocks in the upper part of the section are chert- and quartz-pebble conglomerate in a siliceous, ferruginous matrix and fine- to medium-grained ripple-marked sandstone. The fourth rock type is black, thin-bedded, cross-laminated limestone and calcareous black shale with calcareous siltstone nodules, which forms most of the lower third of the section.



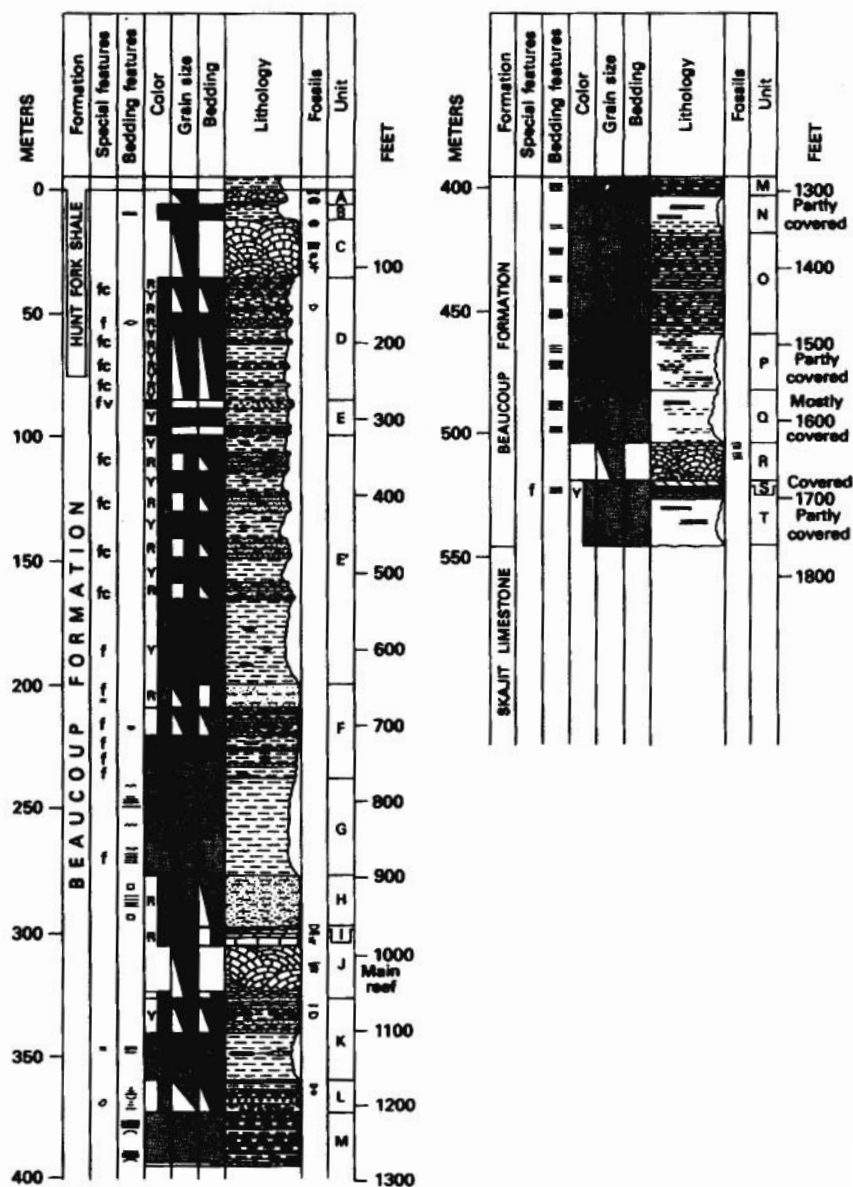


Figure 6.—Type section of Beaucoup Formation.





## EXPLANATION FOR FIGURE 6

## Lithologic symbols

	Limestone
	Coquinoid limestone
	Sandy limestone
	Reef limestone
	Limestone breccia
	Silty shale
	Sandstone
	Quartzitic sandstone
	Silty sandstone
	Calcareous sandstone
	Conglomerate
	Pebbles of chert and limestone
	Clay ironstone concretions
	Siliceous concretions

## Special features

c	Calcareous
f	Ferruginous
v	Siliceous
—	Micaceous
o	Shale fragments

## Bedding features

◊	Lenticular
•	Clay ironstone
~	Wave ripple marks
≡	Laminated
□	Blocky fracture
▲	Graded bedding
~	Channeled
≡	Cross laminated
^	Load casts
≡	Platy fracture
≡	Shaly fracture

## Color

	Black and dark gray
	Medium gray
	Light gray
	Medium red
	Medium yellow

## Grain size

	Fine to very fine
	Medium
	Coarse
	Fine to medium
	Fine to coarse

## Bedding

	Thin (less than 1 cm)
	Medium (1 to 10 cm)
	Thick (more than 10 cm)
	Thin to medium

## Fossils

∞	Corals
≡	Stromatoporoids
e	Gastropods
Y	Bryozoans
∇	Brachiopods
•	Crinoid stems
~	Worm trails



In the upper two-thirds of the type section at least four depositional cycles, each initiated by sandy or conglomeratic strata, are present. In each cycle, these elastic rocks grade upward into dark-gray to black noncalcareous shale with siliceous nodules. Two of the cycles are capped by major carbonate reef units 25 to 30 m thick. Two other reefoid bodies, although present in the type section, do not extend far beyond the immediate area of Beaucoup Creek valley.

The basal 25 m of the type section, although mostly covered, consists of thin-bedded ferruginous calcareous fine-grained sandstone that weathers yellowish brown. These beds are immediately overlain by a 15-m-thick stromatoporoid reef that is not found beyond the Beaucoup Creek valley. The next 140 m is thin-bedded black cross-laminated limestone and calcareous shale. Fifteen meters of conglomeratic strata initiate the lowest distinct cycle above the black limestone unit. This cycle is about 75 m thick and is capped by the main reef, about 20 m thick. Reefs at this horizon are mapped throughout most of the southeast part of the Philip Smith Mountains quadrangle (A-1 and A-2, 1:63,360 quadrangles).

Two succeeding cycles above the main reef consist of basal sandstone that grades upward into dark-gray shale. No reefs were formed in these cycles, and the upper cycle is a compound one. Black shale deposited in these cycles contains dark siliceous and ironstone nodules at several levels. The lower cycle is about 90 m thick, and the upper compound cycle is about 125 m thick.

An uppermost cycle is well shown in the type section. A 3-m-thick conglomerate at the base of the cycle is overlain by calcareous ferruginous siltstone, shale, and silty limestone that weather yellowish brown. Discrete reef bodies as much as 25 m thick and several hundred meters in diameter are found high in this cycle. In the type section, and at a few other places, small patch reefs as much as 6 m thick cap the formation. They are separated from the larger reefs below by 5 to 10 m of noncalcareous black shale like that in the overlying Hunt Fork Shale.

The Beaucoup Formation at its type section is conformably overlain by the Hunt Fork Shale. The upper boundary of the Beaucoup is drawn at the top of the highest reef or, in the absence of reefs, at the level where the dominantly calcareous, yellow-weathering beds are succeeded by the dark-gray, noncalcareous siltstone and shale of the Hunt Fork. Where mapped only on the change in lithologic character of the shale beds, this boundary is not sharp and has probably been located at slightly different horizons in different places.

Four other rock types occur in the Beaucoup Formation in the type area, but are not present in the type section. Limestone-pebble conglomerate and conglomeratic limestone near the base of the formation are exposed in an anticlinal area on the north side of the structural high composed of Skajit



Limestone about 5 to 10 km west of the type section. Phyllite-pebble conglomerate is developed locally at the base of the formation and is especially conspicuous about 5 km southwest of the type section on the south side of the same structural high. Mafic volcanoclastic rocks and flows, including pillow basalt, are found in the upper and middle parts of the formation at scattered localities west and south of the type section in the southern Philip Smith Mountains quadrangle. Finally, maroon and green mudstone and siltstone are found in a few places in the quadrangle, usually associated with the coarser clastic rocks near the base of the formation.

#### DISTRIBUTION AND MAPPING

The Beaucoup Formation includes several units that were mapped by Brosge, Reiser, Dutro, and Detterman (1979) in the Philip Smith Mountains quadrangle as four of the members of an unnamed unit of brown calcareous clastic rocks. Most of the strata in the type section were mapped as the "brown sandstone, shale, and limestone member" of this unit. The main reef limestone and other larger reefoid masses were mapped as the "limestone member." In other places, where the reefs are missing and the sandstone is inconspicuous, the yellow-weathering calcareous shale directly beneath the darker Hunt Fork Shale was mapped as the "brown shale member." Where conspicuous, the conglomeratic limestone and limestone-pebble conglomerate were mapped separately as the "conglomerate member" of this unit. The largest area where this conglomerate was mapped is along an anticlinal trend 5 to 10 km west of the type section. Phyllite-pebble conglomerate, which occurs 5 km southwest of the type section, was mapped as part of the "conglomerate member."

The Beaucoup Formation also includes several units that previously were mapped separately in the Chandalar and Arctic quadrangles. These units are: in the northern part of the Chandalar quadrangle (Brosge and Reiser, 1964), the "limestone and siltstone" unit (D1) and the brown-weathering phyllite member of that unit (D1s), the green phyllite member (Dsp), black siltstone member (Dst), basal conglomerate member and some of the slates of the "slate and sandstone" unit (Ds); in the southwestern Arctic quadrangle (Brosge and Reiser, 1965), both members of the "slate, conglomerate, and limestone" unit (Dsc and Dif) and all the "calcareous shale and limestone" unit (Dsl). Recognition of the depositional continuity of these rocks in the southern part of the Philip Smith Mountains quadrangle and to the south and east clarifies the stratigraphic relations among most of these pre-Hunt Fork Upper Devonian units.

At this time, we are excluding from the Beaucoup Formation the wackes of Frasnian Age mapped separately in the eastern Philip Smith Mountains and



southwestern Arctic quadrangles (Brosge and others, 1979; Brosge and Reiser, 1965), because their relations to the Beaucoup are not yet clearly established. For the same reason we are, at this time, also excluding the conglomerate in the Savioyuk synclinorium south of Slatepile Mountain in the Wiseman quadrangle, which has been described previously as the basal conglomerate of the Hunt Fork Shale (Tailleur and others, 1967; Dutro and others, 1976). Although this conglomerate rests on red and green shale and Upper Devonian reefs correlative with the Beaucoup Formation, whether the conglomerate itself is within the Beaucoup Formation or within the Hunt Fork Shale is not clear.

#### AGE AND CORRELATION

Fossils are abundant at several levels in the type section. The reefs themselves are composed predominantly of stromatoporoids. The upper two reefs contain rugose and tabulate corals of Frasnian (early Late Devonian) Age. Among these are Pachyphyllum, Macgeea, and Alveolites. Shelly beds occur both above and below the reefy masses and include the brachiopods Schizophoria, Nervostrophia, Atrypa, Spinatrypa, Warrenella, and Gypidula together with the coral Macgeea and bryozoan and echinoderm debris. These assemblages are also of Frasnian Age.

As the overlying shaly beds of the Hunt Fork Shale also contain Frasnian fossils (Atrypa, Spinatrypa, and Macgeea), the Beaucoup is Late Devonian, probably early Frasnian, in age; the occurrence of Warrenella supports this conclusion because that genus is not known in beds of late Frasnian Age.

#### REFERENCES CITED

- Brosge, W. P., and Reiser, H. N., 1964, Geologic map and section of the Chandalar quadrangle, Alaska: U.S. Geol. Survey Misc. Geol. Inv. Map I-375, 1:250,000.
- , 1965, Preliminary map of the Arctic quadrangle, Alaska: U.S. Geol. Survey Open-File Report, 1:250,000.
- Brosge, W. P., Reiser, H. N., Dutro, J. T., Jr., and Detterman, R. L., 1979, Bedrock geologic map of the Philip Smith Mountains quadrangle, Alaska: U.S. Geol. Survey Misc. Field Studies Map MF-879-B, 1:250,000.





- Dutro, J. T., Jr., Brosgé, W. P., and Reiser, H. N., 1977, Upper Devonian depositional history, central Brooks Range, Alaska, in Accomplishments during 1976: U.S. Geol. Survey Circ. 751-B, p. B16-B18.
- Dutro, J. T. Jr., Brosgé, W. P., Lanphere, M. A., and Reiser, H. N., 1976, Geologic significance of Doonerak structural high, central Brooks Range, Alaska: Am. Assoc. Petroleum Geologists Bull., v. 60, no. 6, p. 952-961.
- Tailleur, I. L., Brosgé, W. P., and Reiser, H. N., 1967, Palinspastic analysis of Devonian rocks in northwestern Alaska, in Oswald, D. H., ed., v. 2 of International symposium on the Devonian System (Proc.), Calgary, Alberta, Alberta Soc. Petroleum Geologists, v. 2, p. 1345-1361.

