DEPARTMENT OF THE INTERIOR
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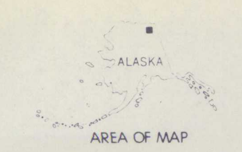
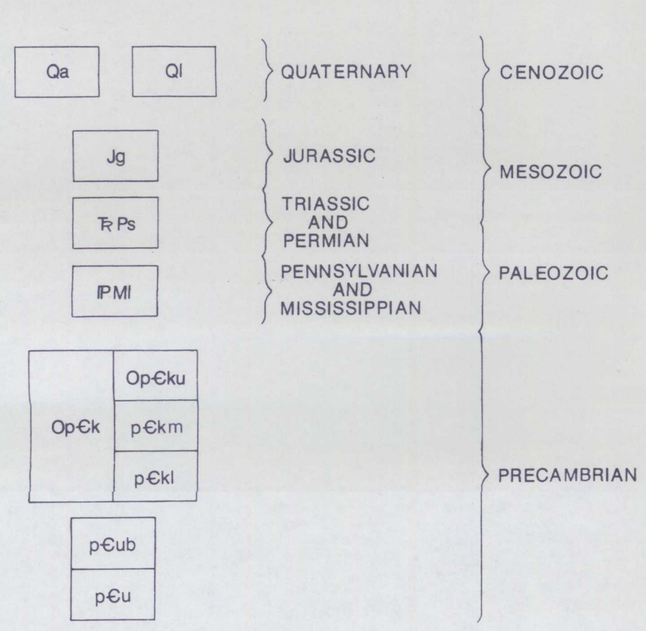
Geology by C. T. Wrucke, A. K. Armstrong, and J. S. Kelley, 1988, and J. S. Kelley and C. M. Molenaar, 1985. Contact at base of unnamed basalt (p€ub), for part of the contact between the Katakturuk Dolomite and the unnamed rocks (p€u) west of Itkilyariak Creek, and for the gabbro (Jg) west of Itkilyariak Creek are from Reiser and others (1970).



CORRELATION OF MAP UNITS



EXPLANATION

CONTACT--Dashed where approximately located, dotted where concealed

FAULT--Dashed where approximately located, dotted where concealed

THRUST FAULT--Dashed where approximately located, dotted where concealed, queried where probable. Sawteeth on upper plate, solid where thrusting has emplaced older rocks on younger rocks, open where detachment is uncertain and parallel to bedding

MAJOR FOLD

Anticline

Syncline

30

STRIKE AND DIP OF INCLINED BEDS

.1

CHEMICAL ANALYSIS SAMPLE LOCALITY--See table 1 for chemical analysis

DESCRIPTION OF MAP UNITS

Qa **Alluvium (Quaternary)**--Sand, silt, and gravel in lower parts of valleys and along streams and rivers. Includes some coalluvium and fan deposits

Ql **Landslide deposits (Quarternary)**-- Dislocated mass of Lisburne Group at northern edge of the area about 2.5 km west of Itkilyariak Creek

Jg **Gabbro (Jurassic)**--Dark-gray, reddish-brown-weathering, fine- to medium-grained rock intruded into unnamed Proterozoic shale, siltstone, and quartzite. Consists of approximately equal amounts of labradorite and augite and accessory amounts of opaque crystals and apatite. Labradorite crystals are subhedral to anhedral and commonly 0.6-1.0 mm long. Augite occurs between labradorite grains as separate anhedral crystals or, more commonly, as clusters of mutually interfering crystals 0.5-0.8 mm across. Augite crystals have abundant exsolution laminae and have been partly converted to chlorite. The chemical composition is given in table 1. The age of the rock, as determined by K-Ar methods on plagioclase, is 161±5 Ma (Reiser and others, 1970). Thickness is several tens of meters

TRPs **Sadlerochit Group (Triassic and Permian)**--Consists of the Lower Triassic Ivishak Formation and the Upper Permian Echooka Formation. The Ivishak is composed mostly of silty shale and siltstone and subordinate clean, massive quartzite. The Echooka is dark orthoquartzite, sandstone, and siltstone together with calcareous siltstone and lime mudstone. Rocks of the Sadlerochit Group are exposed in steep slopes and ridges along the southern part of the map area. Thickness is at least 200 m

IPMl **Lisburne Group (Pennsylvanian and Mississippian)**--Consists of the Wahoo Limestone of Early and Middle Pennsylvanian age and the Alapah Limestone of Late Mississippian age. The Wahoo is mainly a sequence of shoaling -upward cycles of shallow marine, bryozoan-echinoderm calcareous algae packstones to ooid-foraminiferal grainstones that grade upward into supratidal dolomite. The underlying Alapah consists of lime mudstone and bryozoan-echinoderm- brachiopod wackestones and packstones, and it contains thin dolomite beds. The Alapah was deposited in a shallow marine environment to possibly subtidal and intertidal environments. Thickness ranges from 450 m in the western part of the range, where the Alapah makes up 350 m of the section, to 520 m in the eastern part, where the two formations are of about equal thickness

Op€k **Nanook Limestone (Ordovician) and Katakturuk Dolomite (Proterozoic) undivided** --Locally divided into:

Op€ku **Upper member (Ordovician and Proterozoic)**--As mapped includes light- to medium-gray limestone and dolomite of the upper part of the Nanook Limestone. Ordovician trilobites similar to those reported from the Nanook in the Shublik Mountains have been found in the Mt. Michelson C-2 quadrangle in NE1/4, SW1/4 sec. 19, T. 3 N., R. 30 E. (James Clough, oral commun., Feb. 8, 1989). Thickness of the Nanook may be as much as 100 m.

The Katakturk Dolomite is light- to dark-gray and pale brownish-gray, fine- to coarse-grained dolomite. Bedding commonly indistinct. Common sedimentary structures are birds-eyes, zebra beds with late, void-filling baroque dolospar, planar cryptoalgal laminites, intralaminar shrinkage cracks, contorted structures composed of algae laminae, rip-up clasts, small scale cut and fill structures, and cross beds. Some beds are formed of dolomicrite with crystals in the 2-6 μm size range and excellent preservation of original microfabric. The allochems are ooids, pisoids, peloids, mud pellets and coated grains, fragments of algal mats, cryptoalgal particles, stromatolites, and small grains with micritic envelopes. Many dolomite beds are composed of 200-500 μm anhedral crystals of dolomite in which the original microfacies are obliterated. Solution breccias several tens of meters thick composed of rounded to angular dolomite clasts from sand to blocks 1 m across near the top of the member in the central part of the area. Stromatolites as much as 51 cm high occur near the base at several localities. Dolomicrite packstones and grainstones have some intraparticle and interparticle porosity. Most of the member consists of shoaling-upward sequences deposited under subtidal-intertidal to supratidal environments. Thickness at least 1,200 m

p€km **Middle member (Proterozoic)**--Medium- to very dark-gray dolomite that from a distance commonly crops out in prominent, well defined beds, many of which weather black. Biscuit stromatolites present locally at the upper contact, and pisoid packstone beds totalling about 2 m thick commonly occur a few meters below the upper contact. The member is formed of shoaling-upward sequences deposited in subtidal to supratidal environments. Each cycle is of varying thickness and complexity and consists of massive dolomite. The sedimentary structures are algal-laminated sediments, rip-up clasts, mud cracks, birdseye structures, stromatolites, pseudomorphs of anhydrite diapirs, pseudomorphs of nodular anhydrite, and pseudomorphs of "chicken-wire" texture anhydrite to zebra beds (the voids of the pseudomorphs are filled with baroque dolomite and to a lesser extent with quartz). Some beds are dolomicrite packstones formed of cryptoalgal particles with rip-up clasts and flat pebble conglomerate. Cross-beds in sets 5-50 cm thick are present in dolomite beds in the middle of the member. The upper part of the lower quarter of the middle member has a prominent zone 2 m thick of ooid to pisoid packstone with some vuggy porosity. Well developed zebra beds with acicular and columnar dolomite cement, dolospar, and baroque dolomite together with sparse black chert nodules in dark-gray dolomite occur below the ooid-pisoid packstone beds. Some dolomicrites are formed of dolomite crystals in the 2-6 μm size range with excellent preservation of the original microfabric. The allochems are ooids, pisoids, peloids, mud pellets and coated grains, cryptogalgal particles, fragments of algal mats, stromatolites, and small grains with micritic envelopes. The pisoids and oncolite packstone beds are interpreted as having formed on very low energy evaporitic tidal flats. Cryptoalgal sedimentary structures in the form of oncolites, laminites, and stromatolites are common in the subtidal to supratidal carbonate rocks. These dolomites with 2-6 μm rhombs and well preserved sedimentary details result from the dolomitization of allochems and cements of the calcium carbonate precursor (Zempolich and others, 1988). The dolomite is thought to have replaced directly the primary aragonite and high magnesium calcite. Early and late baroque dolospar cements record dolomite cementation during continued open-space filling. Many dolomite beds are composed of 100- 500 μm anhedral crystals of dolomite with the destruction of the original microfacies and microfabric. In many of the dolomites, intercrystal pore space is in the micron to millimeter size range and has been filled with quartz. The resulting dolomite appears to be arenaceous. Thickness about 600 m

p€kl **Lower member (Proterozoic)**--Mostly light- to medium-gray, fine- to medium-grained dolomite capped with a unit a few tens of meters thick of black shale, black calcareous sandstone, and tan-weathering platy dolomite. Dolomite below the upper unit appears to be a replacement of pelotoidal packstone. Well developed zebra beds with baroque dolospar are prominent 20 m below the top of the unit. These beds are a few centimeters thick and contain abundant chert. The chert is interpreted as vug-filling pseudomorphs of anhydrite. This part of the section has well developed stromatolites of the laterally linked hemispheroid type. Associated with the stromatolites are dolomicrites and partly silicified oolid to pisoid packstones. Some beds have abundant zebra structures formed by baroque dolospar pseudomorphs filling voids after nodular and "chicken wire" anhydrite. Associated with these shoaling-upward cycles are algal mats, stromatolites, peloids, mudcracks, chips, and intraformational conglomerates. Generally in this member, internal moldic voids in the halfmoon ooids, ooids, pisoids and small fenestral cavities in the algal mats and stromatolites have been partly filled with acicular, columnar cement, dolospar, baroque dolospar, crystal silt and internal sediment and/or spar dolomite and/or quartz. Intercrystal voids also have been filled with acicular cement and/or quartz. Dolomicrite ooid-pisoid packstones and grainstone have varying amounts of intraparticle and interparticle porosity. Vuggy porosity also occurs between the planar cryptoalgal laminites. The underlying dolomite that forms the bulk of this member is a monotonous sequence of dolomites and dolomicrites that locally contains coated chips, oolites, and zebra beds. Sedimentary structures indicate that the member was deposited in subtidal to supratidal environments as a sequence of complex shoaling-upward cycles. Locally weathers to prominent spires. Shaly beds at top are rarely exposed because of structural dislocation and cover of solifluction debris. Maximum thickness about 750 m

Unnamed Rocks (Proterozoic)--Divided into:

p€ub **Basalt**--Dark-gray, faintly reddish flows of porphyritic basalt occurs near the Nularvik River. Consists of dull greenish-gray plagioclase in glomeroporphyritic clots 2-4 mm across and phenocrysts 2 mm long in an intergranular groundmass of plagioclase laths and fine-grained augite(?), opaque grains, and chlorite. The plagioclase has been converted to albite flecked with white mica. Abundant amygdules are lined with chalcedony and filled with chlorite. Calcite fills some amydules and occurs locally in the groundmass. The texture and chemistry (table 1) of the rock show that it is basalt. The albite content suggests that the flows have been subjected to greenschist facies metamorphism. Thickness possibly 250 m, top not exposed

p€u **Sedimentary rocks**--Siltstone, shale, dolomite, and quartzite unconformably beneath the Katakturuk Dolomite. Siltstone occurs as fine laminations separated by greenish-black shale in layers commonly 0.5-5 mm thick. Breaks into shaly chips and thin plates. Locally cut by cleavage at low angle to bedding. The quartzite is nearly pure quartz arenite, very light-gray, fine-grained, well sorted, and structureless. Quartz grains are mostly subangular to subrounded, a few are rounded and have overgrowths. Most have nonundulatatory extinction. Also present are trace amounts of rounded tourmaline in grains about the same size as the quartz. A few quartzite beds have hematitic cement. Some quartzite beds are continuous, others are lenticular. Discontinuous beds probably are lenticular because of structural dislocations. Dolomite in the unnamed rocks west of Mount Weller is light- to medium-gray, commonly medium bedded, and forms a section 100 m or more thick. Unnamed rocks east of Mount Weller lack dolomite. Quartzite in that area is fine to medium grained and well sorted. A few beds have ripple marks. Some fine-grained quartzite in that area has black hematite between quartzite laminations. Interbedded with the quartzite is subordinate dark-gray siltstone in sections 3 m thick and minor black shale in sections 2-3 m thick. Thickness 1,000-1,500 m

Table 1.--Chemical analyses of basalt and gabbro from the Sadlerochit Mountains.

[Analyses by U.S. Geological Survey using X-ray spectrographic techniques. Analyst, D.V. Vivit. Wet chemical techniques used for FeO, H_2O^+, H_2O^-, and CO_2. Analyst, S.T. Pribble.]

Map unit Map no. Field no.	Jg 1 S66F	p€ub 2 S59A
SiO_2	46.5	47.0
Al_2O_3	12.3	16.1
Fe_2O_3	6.23	8.86
FeO	10.57	3.18
MgO	5.8	5.3
CaO	10.6	10.1
Na_2O	1.9	3.0
K_2O	0.32	1.0
H_2O^+	1.83	1.71
H_2O^-	0.30	0.41
TiO_2	2.34	0.90
P_2O_5	0.12	0.08
MnO	0.22	0.14
CO_2	<0.01	1.49
SUM	99.0	99.2
Rock type	Gabbro	Basalt

GEOLOGIC MAP OF THE KATAKTURUK DOLOMITE, SADLEROCHIT MOUNTAINS, ALASKA

BY

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1989