UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

RECONNAISSANCE GEOLOGIC MAP OF THE NOME D-3 QUADRANGLE, SEWARD PENINSULA, ALASKA

By C. L. Sainsbury, Thomas E. Smith

and Reuben Kachadoorian

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This report is preliminary and has not been edited or reviewed for conformity with U.S. Geological Survey standards or nomenclature

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INTRODUCTION

The Nome D-3 quadrangle lies adjacent to the Bering Sea, some 40 miles west of Nome, Alaska. It adjoins on the west the Nome C-2 quadrangle mapped in 1971 (Sainsbury and others, 1971) and, on the south, a part of the Teller 1:250,000-scale quadrangle (Sainsbury, 1970). The coastal plain adjacent to the Bering Sea and the west end of the Kigluaik Mountains are included in the Nome D-3 quadrangle.

MAPPING METHODS

The rocks east of the road[1] between the Tisuk and Feather Rivers were mapped by foot traverse by Smith. Sainsbury correlated these rocks with those mapped in the Teller quadrangle, assigned ages to them, and modified the units in some details. Elsewhere, the rocks were mapped by use of a helicopter and light aircraft. Lithologic control was obtained by landings and spot checks by helicopter, supplemented by traverses as much as several miles in length away from the landed helicopter or light aircraft. Geologic units and structures were then extended by light-aircraft traverses using the lithologic control gained on the ground. Samples of altered rocks and of stream sediments were obtained by use of helicopter or from foot traverse.

GEOLOGY

The main bedrock units consist of 1) the "Slate of the York region" ("York Slate"), of Precambrian age, which comprises graphitic and calcareous siltite composed principally of quartz grains with calcite grains and layers, and its tectonic equivalents; 2) feldspathic and chloritic schists formerly assigned to the Nome Group of Precambrian age, but now believed to represent rocks intercalated in the York Slate; and 3) a large expanse of contorted marble and silicified marbles believed to be of Paleozoic age. Extensive surficial deposits include ground moraine, lateral moraine, and alluvium along major streams. The glacial moraine and the lowlands near the Bering Sea are covered by tundra, whereas the marbles are free of vegetation.

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[1]Road follows approximately along line marked "winter trail-approximate alignment" on map.

Stratigraphy

York Slate

Several diverse rock types are referred to the York Slate, of Precambrian age. In the extreme northwest corner of the quadrangle, these rocks are glistening siliceous phyllites with noticeable crinkling along microfolds. Slaty rocks with recrystallized quartz grains and biotite, derived from phengitic mica, are exposed in a belt that loops around the west end of the Kigluaik Mountains. Eastward, where the slaty rocks become complex, a belt of semigneiss was mapped by Smith. These gneissic rocks are extremely quartz rich; they contain graphite and biotite and are correlated by Sainsbury with tectonically deformed and recrystallized parts of the York Slate seen elsewhere on the Seward Peninsula.

The west part of the area of graphitic rocks contains two marble bands broken by faults. Elsewhere on the Seward Peninsula, marble or limestone beds are more common in the upper part of the slates. The marble beds in slates at the head of the Tisuk River are very schistose and folded.

Paleozoic Carbonate Rocks

Southwest of Fairview Creek, and probably continuing unbroken to the coast beneath the coastal plain, is a large expanse of intricately deformed marble and limestone bounded by faults. The marble is bare of tundra and forms hills of dazzling white to gray with contorted bedding. At places, color variations reflect original bedding; quartz lentils derived from chert are seen, and bedding is locally observed in the least deformed marble and limestone. No fossils have been found in these intricately deformed rocks.

Above a thrust fault along the east margin of the marble the rock is impure and contains graphite and mica, reflecting tectonic mixing of rock types above and below the thrust. The belt of mixed rocks is not continuous to the northwest; hence, the contact at the north end of the marble belt may be a high-angle fault.

East of Fairview Creek, silicified marble is exposed continuously for several miles, and is bounded by normal faults.

Surficial Deposits

Glacial moraine mantles much of the quadrangle. In the northeast corner, a large ridge is formed by a lateral moraine from a glacier that flowed northwest down Canyon Creek. Elsewhere, an extensive moraine was deposited by a large glacier flowing west along the south front of the Kigluaik Mountains. Near the coast, the moraine is truncated by a marine strandline referred to the Sangamon interglaciation, for this strandline is continuous over much of the coastal areas of the western Seward Peninsula (Sainsbury, 1967) and is commonly referred to the Sangamon interglaciation.

Igneous Rocks

Numerous outcrops of igneous rocks, ranging in size from dikes to a stock and in composition from metagabbro to granite, have been mapped. The few metagabbros examined in thin sections contain relict pyroxene and are correlated with similar rocks in nearby areas (Sainsbury and others, 1970). Although they are believed to be of Precambrian age, they may be much younger.

The granitic rocks are diverse. A stock at the headwaters of Hume and Crete Creeks ranges in composition from medium-grained biotite granite containing 72.4 percent SiO_2 to coarse-grained biotite granite containing 75 percent SiO_2. A small intrusive of tourmalinized granite lies west of Martha Creek, and gneissic fine-grained granite intrudes slate east of Martha Creek. Between the Tisuk River and Canyon Creek, gneissic coarse-grained granitic rock crops out in the lateral moraine. Locally, the rock is crushed, and it is assumed to be near quartz monzonite in composition.

Numerous dikes, not mapped separately, are composed of fine-grained granite, pegmatite, or diabase. Within the Paleozoic carbonate rocks west of Fairview Creek, small irregular altered granitic dikes bordered by iron-stained carbonate rocks are so numerous that no attempt was made to map them.

The larger bodies of granitic rocks are lithologically similar to others in the Kigluaik Mountains and are assigned a Late Cretaceous age. However, some of the dikes may be as young as Tertiary.

Structure

Throughout the quadrangle cleavage is developed in all rocks of pre-Cretaceous age and, for the most part, dips westward. Deformation of the rocks is so intense that bedding was rarely seen. Because contacts between different rock types commonly are parallel to cleavage, one cannot be certain that the present contact is the original sedimentary one, for beds of limestone have been completely reconstituted. The numerous folds in the large marble belt southwest of Fairview Creek consistently trend northwest with limbs dipping steeply. A marked cleavage was everywhere observed. Within the Kigluaik Mountains, the carbonate rocks are marble schists; the marble at the head of Blume Creek is sharply folded and highly cleaved.

The structure is most easily explained as the result of eastward thrusting of the rocks, with development of well-marked cleavage, followed by uplift on the east-west axis of the Kigluaik Mountains. This later uplift gave rise to the arcuate outcrop patterns of rock units at the west end of the mountains.

ECONOMIC GEOLOGY

Owing to the widespread glacial deposits, and also to glacial scouring, practically no gold has been produced from the Nome D-3 quadrangle, although Collier (1908, p. 215-218) noted several localities where small amounts of placer gold have been recovered.

Lode prospects are more promising than placer deposits. During the mapping in 1967, many altered iron-stained rocks along fault zones in the Kigluaik Mountains were sampled. Some contained anomalous amounts of bismuth, tin, lead, antimony, and gold, especially on the west slope of Martha Creek. Some specimens of mineralized rocks in Smith's collection contained large amounts of sulfide minerals. A semiquantitative spectrographic analysis of one specimen collected somewhere in Martha Creek contained the following elements, in parts per million: Ag, 30; B, 15,000; Be, 7; Bi, 5,000; Mo, 70; Pb, 10,000; Sb, 1,500; Sn, 300; W, 500.

Sainsbury revisited this area briefly in 1970, and resampled several oxidized quartz-breccia zones on the west slope of Martha Creek within 1.5 miles of its confluence with the Tisuk River. These oxidized zones are irregular in form and as much as 100 feet across; all are easily visible from the creek bed. Spectrographic analyses showed low but anomalous amounts of lead, copper, and bismuth. Nothing approaching the values found in the unnumbered samples by Smith was found.

Detailed prospecting and geochemical studies along the east border of the quadrangle near lat 64°55' N. may disclose worthwhile lode prospects. Fluorite pipes exist at the west edge of the Nome D-2 quadrangle (Sainsbury and others, 1970) and there are numerous tourmalinized granitic rocks in this general area.

It is especially interesting to note that a bismuth-rich province apparently corresponds with the west and southwest sides of the Kigluaik Mountains, extending over parts of the Nome D-3, Nome D-2, and Nome C-2 and C-3 quadrangles.

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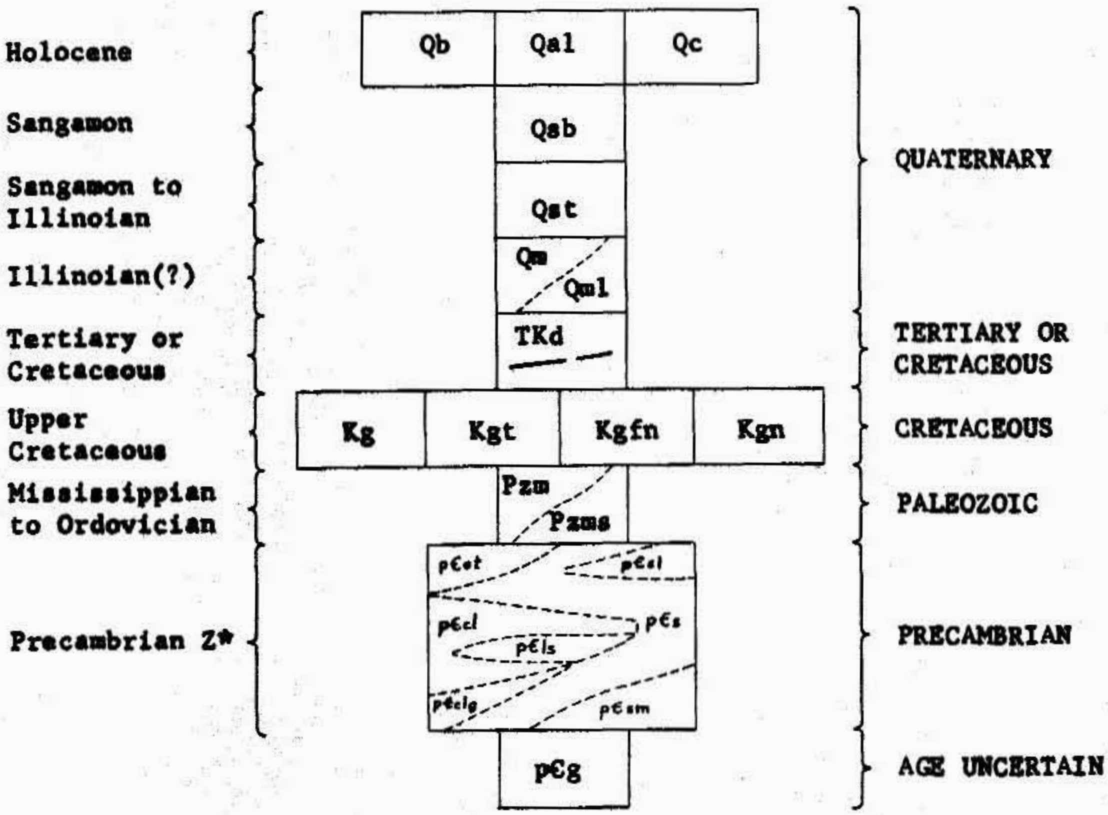
EXPLANATION

Correlation of map units



*In accord with an interim scheme for subdivision of Precambrian time recently adopted by the U.S. Geological Survey -- Precambrian Z: base of Cambrian to 800 m.y.; Precambrian Y: 800-1,600 m.y.; Precambrian X: 1,600-2,500 m.y.; Precambrian W: older than 2,500 m.y.

Description of map units

Qb	Beach deposits - modern beach only
Qal	Alluvium - includes reworked glacial deposits
Qc	Cover - tundra; not shown over glacial deposits; shown elsewhere only where it completely mantles bedrock
Qsb	Beach deposits - remnant of the Sangamon shoreline
Qst	Tundra-covered sand and silt - deposits cover a wave-planed platform of Sangamon age and an older platform of pre-Sangamon age
	MORAINAL DEPOSITS
Qm	Ground and terminal moraine
Qml	Lateral moraine; this unit and Qm unit include rounded outwash gravels
	DIKES
TKd	Diabase, granite, feldspar porphyry, and andesite dikes
	GRANITIC ROCKS
Kg	Medium- to coarse-grained granite and quartz monzonite
Kgt	Tourmalinized granite
Kgfn	Gneissic fine-grained granite
Kgn	Gneissic to faintly foliated coarse-grained quartz monzonite
	METAMORPHOSED CARBONATE ROCKS
Pzm	Marble, varies from white to medium dark gray; locally dolomitized, locally schistose. Cut by dikes and dikelets too numerous to show on map. Rocks are intensely contorted with fold axes trending northwest
Pzms	Silicified marble

YORK SLATE

p€sm — Metamorphosed graphitic rocks; includes graphitic siltite, calcareous graphitic siltite, and calcareous graywacke, and muscovite-chlorite graphitic schists; all are metamorphosed to varying degrees. North of Feather River, rocks are quartz-biotite-graphite schists with local development of calc-silicate rocks

p€st — Tectonically imprinted rocks subsequently thermally metamorphosed; now comprise quartz-biotite-graphite semigneiss with segregated quartz bands and relict folded quartz veinlets

p€sl — Gray to white graphitic marble and calcite schist representing beds originally intercalated in slates

p€cl — Chloritic and feldspathic schists and semischists; in part definitely represent altered volcanic and volcaniclastic rocks intercalated in slates; in part may represent intrusive rocks of much greater age difference

p€ls — Schistose marble with quartz grains; commonly contains intercalated(?) chloritic schists

p€s — Faintly metamorphosed graphitic quartz siltite with phengitic mica; locally calcareous

p€clg — Graphitic chloritic schist

UNITS OF UNCERTAIN AGE

p€g — Gabbro, metagabbro, and related rocks - believed to be Precambrian but may be much younger

NOTE: All the symbols shown below may not appear on this map

Veins and mineralized areas

A. Mineralized faults with old prospect pits or trenches containing elements as shown
B. Widespread gossans with old prospect pits or trenches; contained elements unknown
C. Placer gold mine extending along stream or beach as shown
D. Placer gold mine of localized extent. On coastal plain symbol represents surface placers as well as old drift mines on buried beaches. Symbols for metals contained in prospects or mines: Au, gold; Ag, silver; Pb, lead; Sb, antimony; Zn, zinc; Cu, copper; CaF_2, fluorite

Contacts

A. Transitional over a few feet to hundreds of feet
B. Sharp contact well exposed
C. Open ends indicate that bed continues an unknown distance beyond exposure

All contacts dashed where inferred or approximately located, dotted where concealed

Faults

A. Thrust fault; sawteeth on upper plate. Dashed where approximately located, dotted where concealed, queried where inferred or doubtful
B. High-angle fault, showing dip. U, upthrown side; D, downthrown side. Dashed where approximately located or inferred, dotted where concealed, queried where doubtful

15 A B 45 C D

Strike and dip of foliation or cleavage

A. Strike and dip estimated by observation from low-flying aircraft
B. Strike and dip direction as determined by observation from low-flying aircraft
C. Strike and dip as measured on the ground
D. Strike and dip direction as determined on the ground

Anticline Syncline 10 Drag folds

Folds

Showing approximate crestline and direction and amount of plunge where known

Prospect pit or trench

D

Abandoned dredge

Sinkhole

Cold-water spring

Landing area

Suitable only for high-performance short takeoff and landing (STOL) aircraft used during field operations in 1971; larger rocks removed