MAP I-388

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

RECONNAISSANCE GEOLOGIC MAP OF CHICHAGOF ISLAND AND NORTHWESTERN BARANOF ISLAND, ALASKA

By

R. A. Loney, H. C. Berg, J. S. Pomeroy, and D. A. Brew

MISCELLANEOUS GEOLOGIC INVESTIGATIONS
MAP I-388

PUBLISHED BY THE U. S. GEOLOGICAL SURVEY
WASHINGTON, D.C.
1963

MAP I-388

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

TO ACCOMPANY MAP I-388

RECONNAISSANCE GEOLOGIC MAP OF CHICHAGOF ISLAND AND NORTHWESTERN BARANOF ISLAND, ALASKA

By R. A. Loney, H. C. Berg, J. S. Pomeroy, and D. A. Brew

CONTENTS

INTRODUCTION

This map presents the results of geologic mapping during the summer of 1961 and a compilation of the mapping of previous workers. For background material about the region mapped and its geological problems see the publications of these workers. Previous mapping is accepted without change except as noted in text. Where an unnamed unit of previous workers is believed to be equivalent to one of the new map units, the new unit name is used. The new mapping includes almost continuous traverses of the shores accessible from small boats and foot traverses of the ridges above timberline. The unconsolidated sedimentary deposits were mapped almost wholly by photogeologic methods.

The purpose of this text is to make available the information that has led the authors to revise the stratigraphy of some parts of the map area and to summarize the stratigraphy of the remaining areas. The new and revised stratigraphic units and some newly delineated metamorphic units are treated in greater detail than the others. Detailed descriptions of the structure, petrography, and other geologic features of the region, are to be published some time in the future.

CHICHAGOF ISLAND, FRESHWATER BAY AREA

The rocks of the Freshwater Bay area, in northeastern Chicagof Island, have been described in detail and named by Loney, Condon, and Dutro (1962). Summary descriptions of their units are given below. The units form a diverse assemblage of sedimentary and volcanic rocks of Silurian(?), Devonian, and Mississippian age that has a maximum cumulative thickness of more than 24,000 feet.

Graywacke and argillite

This unit, of Silurian(?) and Devonian(?) age, consists mainly of arkosic, feldspathic, and lithic graywacke, and argillite, with subordinate conglomerate, siltstone, and minor limestone. The conglomerate consists of clasts of chert, volcanic rock, argillite, graywacke, and limestone in a graywacke matrix. The base of the unit was not seen; about 5,000 feet of strata are exposed.

Kennel Creek Limestone

This formation, of Middle Devonian age, consists of thin- to very thick-bedded limestone that contains sparse dolomite beds and limestone breccia. The upper part of the formation is thin-bedded fossiliferous limestone with siliceous laminae. The unit has a maximum thickness of about 5,000 feet.

Cedar Cove Formation

The Cedar Cove Formation, of Middle and Late(?) Devonian age, consists of an upper limestone member and a lower member composed mainly of thin-bedded argillite with thin limestone beds near the base, and, locally, graywacke and conglomerate. The lower part of the upper member is mainly very thick-bedded limestone; the upper part is thin-bedded and fossiliferous, and contains minor thin tuff beds. The formation is about 2,660 feet thick at the type locality at Cedar Cove in Freshwater Bay.

Freshwater Bay Formation

The Freshwater Bay Formation, of Late Devonian age, is made up principally of andesite and basalt flows, breccia, and tuff that contain minor inter-

calated volcanic graywacke, limestone, and argillite. The upper part of the formation is mostly andesite, the lower part mostly basalt. The formation is about 6,500 feet thick and contains brachiopods near its base.

Iyoukeen Formation

The Iyoukeen Formation, of Mississippian age, consists of about equal parts of limestone and shale. The upper half of the formation consists of about 3,500 feet of thin- to medium-bedded limestone that contains variable amounts of nodular to bedded chert. The upper part of the limestone is less cherty than the lower, is locally gypsiferous, and contains abundant corals; the lower part is thinner bedded and contains abundant brachiopods. The lower 1,500 feet of the formation consists of grayish-black shale that contains variable amounts of limestone and shaly limestone. Abundant brachiopods, cephalopods, and gastropods occur in its upper part. To our knowledge neither the base nor the top of the formation has been seen.

EASTERN CHICHAGOF ISLAND EXCLUSIVE OF FRESHWATER BAY AREA

The rocks that crop out in this area comprise three formations: an argillite, graywacke, and limestone unit that is lithologically correlative with the graywacke and argillite unit of Freshwater Bay; a limestone and conglomerate unit that is probably correlative with part or all of the Kennel Creek Limestone and Cedar Cove Formation; and the Freshwater Bay Formation, which is essentially the same as its counterpart in Freshwater Bay and is not discussed in this section.

Argillite, graywacke, and limestone

The rocks of this unit are very similar to those of the graywacke and argillite unit of the Freshwater Bay area, but here limestone is more abundant. The limestone is thin to very thick bedded, and locally forms thick lenses and thinner discontinuous layers in the graywacke and argillite. The thin-bedded limestone commonly contains variable amounts of intercalated graywacke, argillite, and siltstone.

Hornfels

In the vicinity of intrusive bodies the rocks of the argillite, graywacke, and limestone unit have been metamorphosed to hornfelses. Most of the hornfelses belong to the hornblende hornfels facies and are similar to the hornfels, schist, and marble unit in the area on Chichagof Island northeast of the Peril Strait-Hoonah Sound-Lisianski Inlet fault. At the margins of contact metamorphic aureoles the hornfelses grade through incipiently recrystallized rocks, probably of the albite-epidote hornfels facies, into unmetamorphosed sedimentary rocks. Graywackes in these outer margins are characterized by partial recrystallization of the matrix to biotite or actinolite, irregular aggregates of epidote, and fine-grained intergrowths of quartz and sodic feldspar, presumably albite or sodic oligoclase. Limestone is recrystallized to marble in areas of hornfels, and is commonly a massive granoblastic calcite rock that contains disseminated flakes of graphite. Locally, the marble contains appreciable amounts of tremolite and probably other calc-silicate minerals, as well as streaks and disrupted layers of quartz - biotite - sodic plagioclase - actinolite hornfels, which are probably metamorphosed argillaceous rock.

Limestone and conglomerate

This unit consists mainly of intertonguing limestone and conglomerate. The conglomerate is thin and restricted areally in the eastern part of Chichagof Island, but thickens to the northwest at the expense of the limestone.

Most of the limestone is medium to thick bedded and sparingly fossiliferous. Subordinate thin-bedded calcareous shale and siltstone and a few layers of conglomerate are intercalated in the lower part of the section. Amphipora? sp., Favosites sp., and Thamnopora sp. occur in thin-bedded limestone north of Kook Lake, and suggest a Devonian age (W. A. Oliver, Jr., written communication, 1962). As a result of the facies relation with the conglomerate, the thickness of the main limestone varies from probably several thousand feet southeast of Port Frederick to about 800 feet northwest of Port Frederick.

Another limestone unit has been mapped in the upper part of the formation near and northwest of Port Frederick. This limestone is thin and irregularly bedded, and contains minor shaly layers. Brachiopods occur in the upper part and corals in the middle and basal parts of the unit. The limestone has a maximum thickness of about 2,500 feet, but is thinner or absent where eroded prior to the deposition of the overlying volcanic rocks.

The conglomerate consists of clasts of volcanic rocks, alaskite, syenite, graywacke, quartz, chert, and limestone in a matrix of fine conglomerate or graywacke. Interbedded with the conglomerate are graywacke, argillite, subordinate limestone breccia, siltstone, shale, and minor amounts of limestone. The limestone breccia, which is of limited areal extent, occurs in the upper part of the conglomerate; it consists of blocks of limestone as much as 6 feet in greatest dimension in a matrix of graywacke or fine conglomerate.

CHICHAGOF ISLAND NORTHEAST OF PERIL STRAIT-HOONAH SOUND AND IN VICINITY OF LISIANSKI INLET

Hornfels, schist, and marble

This unit consists largely of intensely folded, interbedded hornfels, marble, schist, and amphibolite that occur as septa and roof pendants in and bordering plutons. These rocks are probably in large part metamorphic equivalents of the rocks of Silurian(?) and Devonian age at Freshwater Bay, Chichagof Island, but correlation is uncertain. Rocks of Mesozoic age may be included in this unit along Hoonah Sound and on northwestern Chichagof Island.

The most abundant rock type is a distinctly layered, fine- to medium-grained hornfels in which hornblende dominates over biotite. The chief mineral assemblages, in order of their decreasing abundance, are as follows: quartz - andesine - hornblende -

biotite, andesine - hornblende - biotite, andesine - hornblende, quartz - andesine - hornblende - diopside, and quartz - oligoclase or andesine - biotite. In places the hornfelses grade into more coarsely crystalline granofels in which the chief mineral assemblages are: quartz - oligoclase or andesine - potassium feldspar - biotite and (or) hornblende, garnet - oligoclase - potassium feldspar - hornblende - diopside, calcite - diopside - garnet - wollastonite, and andesine - diopside. The hornblende of these rocks is generally bluish green (Z), and the biotite generally brownish red (Z); sphene, apatite, and magnetite or ilmenite are common accessory minerals. Medium- to coarse-grained light-gray marble forms a conspicuous but minor part of the unit. Nearly pure calcite marble is common, but other mineral assemblages observed are as follows: calcite - diopside, calcite - talc, calcite - serpentine - periclase - scapolite, and calcite - cummingtonite.

The hornfelses and granofelses generally show granoblastic textures without noticeable preferred orientation of minerals. In places schists and amphibolites show a distinct planar preferred orientation of mica and hornblende respectively.

The above mineral assemblages indicate that the rocks of the unit belong in general to the hornblende hornfels facies. Locally minor amounts of lower grade metamorphic rocks of the albite-epidote facies or the greenschist facies occur, as, for example, in the cataclastic zone lying along the northeast shore of Peril Strait where quartz - albite - chlorite - calcite greenschist and quartz - albite - muscovite phyllite occur together with metachert and cataclasites derived from plutonic igneous rock. The abundance of hornblende-rich rocks in the unit as a whole suggests that they were chiefly derived from subsilicic volcanic rocks and sediments. The garnet-bearing quartzofeldspathic granofels was probably derived from igneous dikes or sills of granodioritic composition.

WESTERN CHICHAGOF AND BARANOF ISLAND

Goon Dip Greenstone

The name Goon Dip Greenstone is given to the sequence of greenstone, greenschist, and marble, several thousand feet thick, that crops out in a belt more than 30 miles long in western Chichagof Island. The type section crops out in the upper valley of the Goon Dip River east of Portlock Harbor. The lower contact is everywhere obscured by plutonic igneous intrusions. The Goon Dip is overlain in the type locality by the Whitestripe Marble; however, southeast of Pinnacle Peak the Whitestripe is represented only by a few widely separated thin lenses of marble, and the Goon Dip is largely overlain by the Pinnacle Peak Phyllite. Although the Goon Dip Greenstone and the overlying formations are in general structurally concordant, the nature of the upper contact is unknown because of intense folding, faulting, and absence of marker beds.

The Goon Dip Greenstone is equivalent to the "greenstone" unit of Rossman (1959, p. 157-161) in northwestern Chichagof Island. It is also largely equivalent to both the "greenstone schist" and "greenstone" units mapped by Reed and Coats (1941, p. 14-22) in the Chichagof mining district. These two units could not be differentiated and are here mapped together as the Goon Dip Greenstone. The older of them, the "greenstone schist" unit, may contain metamorphic rocks equivalent in part to the amphibolite and schist unit of this report. Reed and Coats assigned a Triassic(?) age to their "greenstone" unit because of its supposed conformity with their overlying "limestone" and "schist" units, of possible Triassic age. They assigned a "pre-Triassic(?)" age to the underlying "greenstone schist" unit. These age assignments are followed here with the modification that the "pre-Triassic(?)" is more probably Permian because of lithologic similarity with rocks of known Permian age elsewhere in southeastern Alaska.

The predominant greenstone consists of dark-greenish-hued altered volcanic flows and sills that are commonly amygdaloidal. Interbedded with the flows are lesser amounts of volcanic breccia, greenschist, and rarely limestone. The original minerals of the volcanic rocks have largely been replaced by albite, epidote, chlorite, actinolite, prehnite, calcite, pyrite, and sphene. Rare relict crystals of labradorite and augite indicate an original basaltic composition. The amygdules commonly are composed of quartz, prehnite, epidote, and minor amounts of copper-bearing sulfides (for further petrographic details see Reed and Coats, 1941, p. 14-22). Some of the massive-appearing "greenstones" are penetratively foliated and are technically greenschists. Fissile albite - chlorite - epidote greenschist is more abundant in the area southeast of Waterfall Lake.

Whitestripe Marble

The name Whitestripe Marble is given to the prominent light-gray marble, averaging several hundred feet in thickness, that crops out discontinuously for more than 25 miles near the west coast of Chichagof Island. The formation is named for its type locality, Whitestripe Mountain about 4½ miles east of Portlock Harbor. Near Pinnacle Peak the marble is abruptly terminated by a fault, and is represented to the southeast by a few scattered thin lenses. The Whitestripe is underlain by the Goon Dip Greenstone with apparent conformity; greenstone and marble are interlayered above and below the contact. The overlying Pinnacle Peak Phyllite is intensely folded and foliated, and its contact with the marble is unclear and may be tectonic. The Whitestripe is here assigned a probable Triassic age. The marble is white to light-gray, massive, and generally fine-grained nearly pure calcite rock. It weathers to a medium gray, rugged surface on which karst topography is commonly developed (for details see Reed and Coats, 1941, p. 22-24).

Schist

In this report the "schist" unit of Reed and Coats (1941, p. 24-30), and of Rossman (1959, p. 163-166) is assigned a Triassic(?) and Jurassic(?) age. It is here divided in the western part of Chichagof Island into the following formations listed from base upward: Pinnacle Peak Phyllite, Waterfall Greenstone, and Kelp Bay Group. Reed and Coats suggested a Triassic(?) age for the "schist" unit because of fossiliferous limestone float of possible Triassic age which they thought might have come from limestone in the lower part of the unit. During the present

mapping fossil corals suggestive of a Triassic and (or) Jurassic age were found in limestone in the Kelp Bay Group not far from the contact with the overlying Sitka Graywacke of Late Jurassic and Early Cretaceous age; these fossiliferous beds probably represent the uppermost part of the "schist" unit.

Pinnacle Peak Phyllite

The name Pinnacle Peak Phyllite is given to the thinly laminated, siliceous phyllite of possible Triassic age that crops out in a belt averaging about one mile wide near the west coast of Chichagof Island. The phyllite as mapped extends from Pinnacle Peak, the type locality, southeastward for a distance of at least 15 miles. In the region north of Pinnacle Peak, which was not mapped during the present work, the Pinnacle Peak Phyllite correlates with the basal part of the "schist" unit of Reed and Coats (1941, p. 24-30) and Rossman (1959, p. 163-166), but was not differentiated by these workers. The Pinnacle Peak is underlain generally by the Goon Dip Greenstone and locally by the intervening Whitestripe Marble, and overlain by the Waterfall Greenstone. Because of the intense folding of the phyllite, the nature of the lower and upper contacts as well as the stratigraphic thickness is unknown.

The phyllite is generally a dark-gray fine-grained rock that contains abundant light-gray and yellowish-gray siliceous laminae, ranging in thickness from 1 to 25 mm. The rock displays a well-developed lustrous foliation or cleavage about parallel to the siliceous laminae, and commonly contains abundant folds and lineations. The dark phyllite is composed largely of muscovite and dark graphitic dust and contains lesser amounts of chlorite, epidote, calcite, and actinolite. The foliation is defined by elongate wisps of the dark dust and by the planar preferred orientation of the micaceous minerals. The lenticular siliceous laminae consist of fine mosaics of quartz and albite around which the foliation bends. The phyllite was probably largely derived from thinly interbedded argillite and chert.

Waterfall Greenstone

The name Waterfall Greenstone is given to the sequence consisting predominantly of greenstone, but also containing lesser amounts of graywacke, greenschist, radiolarian chert, and marble, typically exposed in the ridge lying immediately east and north of Waterfall Lake in western Chichagof Island. The Waterfall Greenstone is underlain by the Pinnacle Peak Phyllite; the nature of this contact is unknown because of the intense folding of the phyllite. The Waterfall is probably transitional both upward and laterally with the Kelp Bay Group, and appears to wedge out to the southeast near Cobol on Slocum Arm by intertonguing with strata of the Kelp Bay Group. In the region north of Rust Lake, not mapped during the present work, the Waterfall Greenstone was not differentiated by previous workers, and is included in the "schist" unit of Reed and Coats (1941, p. 24-30) and Rossman (1959, p. 163-166). The greenstone is here assigned a probable Triassic age.

The greenstone and graywacke are generally dark green and thick bedded, and characteristically weather reddish brown. The greenstone is altered volcanic rock in which original minerals have been largely replaced by epidote, chlorite, albite, calcite, and prehnite; relict crystals of plagioclase (An_{20-30}) and augite occur sparsely. The greenstone is generally unfoliated, but locally it grades into greenschist with an intense cataclastic foliation. The graywacke is fine to medium grained and consists of subangular clasts of plagioclase (An_{20-30}), quartz, greenstone, and chert embedded in an abundant matrix composed largely of chlorite, prehnite, epidote, calcite, and clay minerals. The radiolarian chert ranges from light gray to medium greenish gray and weathers white; it commonly is recrystallized to very fine-grained quartzite containing scattered chlorite and albite.

Kelp Bay Group

The Kelp Bay Group, as mapped by Berg and Hinckley (1963) along the northwest coast of Baranof Island, is here extended to southwestern Chichagof Island. In northwestern Chichagof Island the Kelp Bay correlates with the uppermost part of the "schist" unit of Reed and Coats (1941, p. 24-30) and of Rossman (1959, p. 163-166). The Kelp Bay Group was tentatively assigned a Triassic age by Berg and Hinckley, but fossil evidence was lacking. A scleractinian coral that could be of Triassic or Jurassic age (Helen Duncan, written communication, 1961) was found in thin limestone on the northeast shore of Slocum Arm during the present mapping. On this basis the Kelp Bay Group is considered to be of Triassic or Jurassic age.

The Kelp Bay Group appears to be transitional with the underlying formations. In general as mapped here it consists of greenstone, greenschist, graywacke, metachert, phyllite, and minor limestone that closely resemble lithic types in the Pinnacle Peak Phyllite and the Waterfall Greenstone. The Kelp Bay Group is distinguished from them, however, in containing rock types characteristic of each of these two formations chaotically interbedded. The same distinction holds for Chichagof Island south of Slocum Arm and in northwestern Baranof Island where the Kelp Bay Group overlies the Katlian Group, which in part is equivalent to the Pinnacle Peak Phyllite and the Waterfall Greenstone. The Kelp Bay Group characteristically contains a larger proportion of graywacke than the underlying formations, and in places seems transitional with the Sitka Graywacke, but this relation could not be proved.

Cataclasites are abundant in the Kelp Bay Group. These are streaked greenschist and phyllite in which lenses of more resistant rock swim in a highly foliated mylonitic matrix. The matrix generally consists of epidote, chlorite, muscovite, sphene, calcite, and angular grains of quartz and plagioclase that grade from a few millimeters in diameter down to dark submicroscopic, mylonitic material. The resistant lenses are most commonly radiolarian metachert and greenstone. For further details see descriptions of greenstone, graywacke, and metachert above under Waterfall Greenstone and of phyllite under Pinnacle Peak Phyllite (also see Berg and Hinckley, 1963).

Sitka Graywacke

Dark-gray, medium- to thick-bedded, medium-grained graywacke dominates this formation, which is here called the Sitka Graywacke instead of Sitka Group (Berg and Hinckley, 1963). Less abundant rock types, in order of decreasing abundance, are thin-bedded graywacke, dark-gray argillite, conglomerate, and breccia. Minor rock types are interbedded volcanic rock and chert, and interbedded greenschist, slate and limestone. Fossils, including several species of Buchia indicative of Late Jurassic and Early Cretaceous age (D. L. Jones, written communication, 1962), occur in argillite and graywacke at several localities along the southwest shore of Slocum Arm and the formation is assigned this age. Inoceramus prisms indicative of a probable Jurassic or Cretaceous age (D. L. Jones, written communication, 1961) were found in calcareous slate interbedded with pillow lava, argillite, greenstone, and limestone on the southwest side of Emmons Island in Hoonah Sound; these beds probably correlate with the Sitka Graywacke.

Feldspathic graywacke is the most abundant type of graywacke, followed, in order of decreasing abundance, by lithic and arkosic graywacke. The detrital grains are angular to subrounded and range in size from very fine sand to very coarse sand. The principal grain constituents are as follows: quartz, undulatory, 5-30 percent; plagioclase (An_{27-37}), 10-30 percent; lithic fragments, composed mostly of argillite, greenstone, and chert, 10-40 percent; potassium feldspar 0-15 percent. The matrix forms on the average about 40 percent of the rock, and consists mainly of chlorite, very fine aggregates of authigenic quartz and albite, sericite, clay minerals, and fine detritus. For further petrographic descriptions see Reed and Coats (1941, p. 33-35), and Rossman (1959, p. 167).

Hornfels

Where the Sitka Graywacke has been intruded by granitic rocks, it has been converted to hornfels of the hornblende-hornfels facies. The hornfelses are generally fine grained and porphyroblastic or granoblastic in texture; some of the rocks interbedded with typical hornfels show marked planar preferred orientation of micas, but this foliation is probably mimetic.

The hornfels ordinarily consists of plagioclase (An_{25-40}), quartz, and reddish-brown (Z) biotite or pale-green (Z) hornblende, with subordinate amounts of potassium feldspar and muscovite, and accessory sphene, apatite, zircon, graphite, tourmaline, pyrite, and magnetite or ilmenite. Locally, the hornfels contains as much as 20 percent of cordierite, and in a few places as much as 10 percent of pink garnet. Andalusite and sillimanite have been reported in hornfels of the Sitka Graywacke on northwestern Chichagof Island. Contact metamorphism of calcareous rocks in the Sitka Graywacke has produced hornfelses consisting mainly of diopside, quartz, and plagioclase, with subordinate calcite, sphene, and pyrite.

In the outer margins of contact metamorphic aureoles, these hornfelses grade through partly recrystallized rocks that are probably in the albite-epidote hornfels facies into rocks that show only the effects of diagenesis. Typically, graywacke from the periphery of a contact metamorphic aureole shows incipient recrystallization of the matrix to biotite or actinolite, fine-grained granoblastic aggregates of epidote, quartz, and albite (?), and overgrowths of quartz and sodic feldspar on detrital quartz and plagioclase fragments.

Edgecumbe Volcanics

The Edgecumbe Volcanics consist mainly of basalt flows of tholeiitic affinities extruded from Mt. Edgecumbe and nearby vents. Deposits of ash, lapilli, and, rarely, tuff-breccia are associated with the flows. The basalt is porphyroaphanitic to aphanitic with large phenocrysts and scoriaceous flow tops characterizing the dominant rock type; less common is massive nonvesicular lava with small phenocrysts or none at all. The different flows vary in thickness from 0.5 to several meters, and most are columnar jointed and contain small domes. Most of the flows are dark gray and contrast with the yellow and reddish-orange ash and lapilli that mantle the upper slopes of Mt. Edgecumbe. Berg and Hinckley (1963) consider the volcanics to be Quaternary in age.

The olivine content of the basalt ranges from 0 to 15 percent with most of the olivine occurring as anhedral phenocrysts a maximum of 3 mm in diameter. Many of the phenocrysts are rimmed by pyroxene. Scattered fine grain of olivine also occur in the intergranular mesostasis. Plagioclase phenocrysts (An_{50-87}) constitute 40-50 percent of the basalt. Plagioclase laths in the mesostasis have the composition An_{38-56}. Subhedral pyroxene phenocrysts make up 15-20 percent of the basalt; augite is most common, followed by hypersthene and enstatite. As much as one-half of the pyroxene in some of the olivine-poor basalt is pigeonite. Dark brown, partly devitrified glass forms 15-20 percent of the rocks and magnetite and secondary products make up about 10 percent.

NORTHWESTERN BARANOF ISLAND

Katlian Group

The name Katlian Group is here given to the low-grade metamorphic rocks that crop out in northwestern Baranof Island and correlate with rocks to the north on southwestern Chichagof Island. The type locality is Mt. Katlian, about 9 miles northeast of Sitka. The Katlian Group comprises the more deformed lithic equivalents of the Goon Dip Greenstone, Whitestripe Marble, Pinnacle Peak Phyllite, and Waterfall Greenstone, and is therefore considered to be probably Permian and Triassic in age. To our knowledge, the lower contact of the Katlian Group has not been seen; the upper contact with the Kelp Bay Group, although complicated by deformation, appears to be transitional. In general the Katlian Group is distinguished from its lateral equivalents listed above and from the Kelp Bay Group by the presence of an intense, pervasive foliation that has disrupted bedding and has prevented further subdivision of the group.

The Katlian Group is composed of intensely foliated fine-grained cataclastic phyllite, greenschist, and semischist through which are scattered sheared lenses, ranging in length from a few inches to several tens of feet, composed of thinly interbedded white-weather-

ing, radiolarian metachert and reddish-brown-weathering greenstone. Similar lenses of massive, reddish-brown-weathering greenstone are also common. Both types of lenses closely resemble the rock types characteristic of the Waterfall Greenstone. The phyllite and greenschist commonly contain abundant elongate augen of very fine-grained quartzite, which has been derived largely from radiolarian chert. The augen lie in a dark-gray foliated mylonitic matrix composed of newly formed albite, muscovite, chlorite, epidote, prehnite, biotite, and angular relict grains of quartz and plagioclase, which grade down in size to submicroscopic mylonitic dust. The phyllite grades into greenschist by an increase in chlorite and a decrease in muscovite. These rocks of the Katlian Group resemble closely those of the Pinnacle Peak Phyllite. Graywacke, semischist, and serpentine are minor constituents of the Katlian Group.

Hornfels

North of Katlian Bay, near a gabbroic plutonic body, the rocks of the Katlian Group have been metamorphosed to medium-grained, thinly layered quartz-andesine - hornblende - biotite hornfels. Mineralogically, these rocks are typical of the hornblende hornfels metamorphic facies, and the layered, granoblastic textures suggest the superposition of contact metamorphism on previously foliated rocks. The hornfels typically consists of alternating layers of dark-greenish-gray hornblende-rich and light-gray quartzofeldspathic rock, which average about 1 cm in thickness. The mineral constituents of the most abundant hornfels are as follows: 50 percent plagioclase (An_{28-47}), 20 percent hornblende (Z= deep green), 20 percent undulatory quartz, 8 percent biotite (Z= dark brown), and 12 percent accessory potassium feldspar, sphene, apatite, zircon, magnetite or ilmenite, pyrite, garnet, and muscovite. Common products of retrogressive metamorphism are epidote (after hornblende), chlorite (after biotite), and sericite and kaolinite (both after feldspar). The hornfels is cut by veinlets of prehnite, albite, and quartz.

BARANOF ISLAND, VICINITY OF NAKWASINA SOUND

Nakwasina Group

The Nakwasina Group of Berg and Hinckley (1963) on the northwest coast of Baranof Island is mostly lithically equivalent to the Katlian Group, and partly equivalent to the Kelp Bay Group. The Nakwasina is composed largely of metachert, volcanic rocks, and greenstone; marble, graywacke, argillite, phyllite, calcareous siltstone, schist, and hornfels occur locally. Berg and Hinckley (1963) considered the Nakwasina Group to be Paleozoic (?) in age; in this report it is considered to be Permian (?) and Triassic (?) in age.

NORTHERN BARANOF ISLAND AND CHICHAGOF ISLAND BETWEEN SLOCUM ARM AND HOONAH SOUND

Amphibolite and schist

This unit largely includes the intensely folded, interbedded, medium- to coarse-grained amphibolite, quartzofeldspathic schist, and minor amounts of marble that crop out in the vicinity of the west arm of Peril Strait. It also includes lesser amounts of cataclasite and hornfels in the area between Hoonah Sound and Slocum Arm. In general these rocks are probably high-grade metamorphic equivalents of the greenstone, graywacke, phyllite, and marble of probable Mesozoic age that crop out along strike in the above area, but may include late Paleozoic rocks. The Paleozoic (?) "marble-gneiss" sequence of Rossman (1959, p. 149-156) mapped west of Lisianski Inlet is on strike with this unit and may be equivalent.

The chief rock types of the unit, in order of decreasing abundance, are as follows: quartz - andesine - hornblende - biotite amphibolite, andesine - hornblende amphibolite, and quartz - oligoclase or andesine - potassium feldspar - biotite - garnet schist. The amount of quartz and feldspar in these rocks varies considerably giving them a striking banded appearance caused by the alternation of light quartzofeldspathic and dark mafic layers. The rocks are characterized by a pronounced foliation defined by the planar preferred orientation of micaceous and prismatic minerals. Marble is a minor but prominent constituent of the unit; it is nearly pure calcite, but commonly contains small amounts of diopside, brucite, and calcic plagioclase (An_{86-90}). The hornblende of the above assemblages is bluish green (Z), and the biotite is reddish brown (Z). The association hornblende - plagioclase ($\geq An_{10}$) and the presence of garnet in both amphibolites and pelitic schists suggests the almandine amphibolite facies.

Locally, cataclastic deformation has produced zones of lower grade phyllite and schist in which the assemblage quartz - albite - muscovite - chlorite indicates the greenschist facies. Northwest of the west arm of Peril Strait the amphibolite and schist become finer grained, but no accompanying decrease in metamorphic grade was observed. A belt of cataclasites was mapped with this unit along the South Arm of Hoonah Sound. In places the cataclasites have been crystallized, possibly by contact metamorphism, to both albite - chlorite and oligoclase - or andesine - hornblende hornfels; some of the cataclasites have been derived from plutonic igneous rocks.

UNCONSOLIDATED SEDIMENTARY DEPOSITS

Unconsolidated sedimentary deposits of Quaternary age occur in lowlands throughout the map area. Included in the map unit are alluvium, colluvium, glacial till and outwash, and ash and lapilli from the eruptions of Mt. Edgecumbe volcano.

REFERENCES CITED

Berg, H. C., and Hinckley, D. W., 1963, Reconnaissance geology of northern Baranof Island, Alaska: U.S. Geol. Survey Bull. 1141-0.

Lathram, E. H., Loney, R. A., Condon, W. H., and Berg, H. C., 1959, Progress map of the geology of the Juneau quadrangle, Alaska: U.S. Geol. Survey Misc. Geol. Inv. Map I-303.

Loney, R. L., Condon, W. H., and Dutro, J. T., Jr., 1962, Geology of the Freshwater Bay area, Chichagof Island, Alaska: U.S. Geol. Survey Bull. 1108-C.

Reed, J. C., and Coats, R. R., 1941, Geology and ore deposits of the Chichagof mining district, Alaska: U.S. Geol. Survey Bull. 929, 148 p.

Rossman, D. L., 1959, Geology and ore deposits of northwestern Chichagof Island, Alaska: U.S. Geol. Survey Bull. 1058-E, p. 139-216.

INT.DUP.,D.C.63- 33319