

by peat along Beaver Creek

Younger alluvium Qal, alluvium on active flood plains and on lowest terraces of major streams. Chiefly gravel and sand.

Wrangell Lava QTwa, brownish-gray, massive augite-olivine andesite and basaltic andesite flows with well-developed columnar jointing. Generally OTwr, light gray, tan and buff, rhyolite or rhyodacite; probably massive flows or extrusive domes. Very fine grained, locally porphyritic with plagioclase, hornblende and biotite phenocrysts. Includes air fall deposits of pumice lapilli tuff on east side of Gold Hill and crystal-

SEDIMENTARY AND VOLCANIC ROCKS

Boulder and gravel deposits

pumice lapilli tuff between Carl and Beaver Creek

gold placers

Weakly consolidated and poorly sorted fluvioglacial(?) deposits locally interbedded with minor yellow-buff volcanic ash. Exposed between Carl and Beaver Creeks underlying massive basaltic andesite flow (QT wa) and on Gold Hill. Gold Hill gravels contain disseminated native gold (Moffit, 1954) and may be in part the source of the Bonanza

ANGULAR UNCONFORMITY

Continental sedimentary rocks

Drab brown, buff and greenish-gray conglomerate, coarse- to fine-grained sandstone, siltstone and mudstone. Conglomerate and coarse sandstone in thick beds prevalent near Beaver Lake; finer clastics in thinner beds prevalent in Erickson Gulch. Rocks generally contain carbonaceous debris, including lignitized wood fragments and locally exceptionally well-preserved leaves and plants

ANGULAR UNCONFORMITY

Chisana Formation

(new name) The name Chisana Formation, named for the nearby settlement of Chisana in the SE. part of the Nabesna A-3 quad., is here applied to a unit of marine and subaerial volcanic and volcaniclastic rocks more than 10,000 feet thick. The formation is locally gradational with underlying mudstones (within unit KJa) of Early Cretaceous (Valanginian) age and is intruded by granodiorite and associated plutonic rocks (Kg) of middle Cretaceous age. Formation is unconformably overlain by continental sedimentary rocks (Ks). Type section for lower part is in valley of Bonanza Creek (secs. 25, 35, and 36, T. 4 N., R. 19 E.), and for upper part is in valley of Toby Creek (secs. 28, 33, and 34, T. 4 N., R. 20 E.)

Upper part; maroon and dark-green amygdaloidal andesite flows, greengray to dark-green fragmental volcanic rocks and subordinate darkgreen dense porphyritic andesite flows (possibly in part shallow intrusives), thin-bedded green and maroon volcanic conglomerate, grit and sandstone and light gray tuffs. The fragmental volcanic rocks are apparently lahars and avalanche deposits with rounded to angular fragments of various volcanic rocks associated locally with nonvolcanic clasts and lignitized wood and other carbonaceous debris. Base locally (Toby Creek) marked by thick accumulation of amy gdaloidal flows but in most places broadly gradational into lower part Lower part; chiefly dark-green to gray-green fragmental volcanic rocks in massive units as much as 300 feet thick, with minor dark-green porphyritic flows, thin beds of maroon volcanic sandstone and siltstone and lenses of marine sedimentary rock rarely more than 100 feet thick. Fragmental volcanic rocks are similar to those in upper part but generally lack non-volcanic clasts and contain no carbonaceous debris; probably represent submarine lahar and avalanche deposits. The marine sedimentary rocks are apparently confined to lower 2000 feet of the formation and consist of dark gray argillite, thinbedded graywacke, pebble to cobble conglomerate and gray-green tuffaceous mudstone. Inoceramus locally abundant in the marine rocks and intervening fragmental volcanic rocks. A fragment of the ammonite Shasticrioceras, of Barremian age, indicates an Early

:::KJa::

Cretaceous age for this formation

Argillite and mudstone Gray, greenish-gray and purplish-gray mudstone, siltstone and argillite with thin interbeds (less than 10 feet thick) of fine-to coarse-grained graywacke, dark brown biotite-bearing sandstone, intraformational pebble conglomerate, pebble mudstone, gray pelecypod coquina and dark gray dense silty limestone. Buff, medium-grained calcite-bearing sandstone in a lens more than 100 feet thick occurs at the head of Coarse Money Creek. Uppermost 1000 feet of unit characterized by locally tuffaceous mudstone and abundance of coquina interbeds. Subtle graded bedding, consisting of thin cross-bedded laminae of siltstone and graywacke in argillite, appears in lower part of unit and becomes increasingly better developed downward in section. Abundant Buchia indicate a Late Jurassic and Early Cretaceous (Tithonian to Valanginian) age. Rocks have been metamorphosed to purplish-gray hornfels, locally banded, near larger intrusive bodies

FAULT CONTACT

Graywacke-argillite

Exceptionally well-developed graded beds of dark-gray to gray rythymically interbedded argillite-siltstone-graywacke with lenses of massive graywacke, conglomeratic graywacke and pebble to cobble extraformational conglomerate as much as 100 feet thick. Upper part apparently gradational with overlying argillite (KJa) but contact is either structural or covered by surficial deposits in A-2 quadrangle. Graded beds range from ½ to 15 inches thick with graywacke generally predominant and locally exhibit a pronounced fracture cleavage. Sparse Buchia indicate a Late Jurassic (Tithonian) age. Unit may include younger and older argillite (K Ja and Ja) in structurally complex area between Chathenda Creek and Snag Creek. Rocks have been metamorphosed to cream, light-green and purplish-gray banded hornfels near larger intrusives

Dark-gray shaly argillite in poorly defined beds with minor interbedded calcareous siltstone, graywacke and dark-gray impure limestone. Apparently only in fault contact with younger graded beds (Jg) but similar strata of Late Jurassic age in the Nabesna C-5 quadrangle are gradational into overlying graded beds (Richter and DISCONFORMITY

Bedrock geology mapped by D.H. Richter, 1968-70, N.A. Matson, Jr.,

968-70, and D.L. Jones, 1969-70; assisted by D.F. Work, 1969,

and P. C. Lowe, 1969-70. Surficial geology chiefly by photointerpre-

tation in collaboration with H.R. Schmoll

Undifferentiated thin-bedded and massive limestone. Predominantly darkgray, fine-grained thin-bedded limestone in beds 3 inches to 5 feet thick with interbeds of black, cherty argillite and dark carbonaceous shale; contains the pelecypod Monotis. Dark-gray to gray fine-grained massive limestone, where present, underlies thin-bedded limestone with local unconformity. Limestones weather a conspicuous light

DISCONFORMITY(?)

Nikolai Greenstone

- 8000°

Green, dark-brown, reddish-brown and maroon subaerial amygdaloidal basalt flows separated locally by thin reddish-brown non-marine volcaniclastic beds. Intermixed aa and pahoehoe flows with individual flow units ranging from a few inches to more than 50 feet thick. Amygdules filled with quartz, calcite, chlorite, epidote, pumpellyite prehnite and some zeolite minerals. Native copper locally in flow tops, fracture zones and amygdules

Rock glacier deposits

SURFICIAL DEPOSITS

Includes active and recently active rock glaciers and deposits of Includes finer-grained alluvium commonly overlain formerly active rock glaciers. Chiefly rubble and diamicton Oaf, alluvial fans and cones. Chiefly gravel and sand. Only larger, better-developed cones differentiated

Older alluvium

Qao, alluvium on high terrace partly concealed beneath colluvium along the Chisana River. Chiefly gravel phase of Alaskan Glaciation left and sand after recession of existing glaciers. Qaof, dissected alluvial fans in the Chisana River Diamicton and rubble; gravel locally valley. Chiefly gravel and sand

Drift of the Alaskan Glaciation Chiefly end moraines of the younger

locally, glacial, rock glacier and mass-wasting deposits. Chiefly rubble, gravel, sand, silt and diamicton; usually poorly sorted Ocl, landslides, chiefly debris avalanches Os, solifluction and creep surfaces on high level low-gradient slopes. Chiefly bedrock rubble but may include older glacial drift deposits

Colluvial deposits

Ocu, undifferentiated colluvium on valley walls and

hill slopes. Chiefly talus and other slope debris

but includes alluvium of numerous minor streams and

Pond deposits

Chiefly silt, clay and White River ash (1400 years old) in depressions on surface of probable ground moraine in Beaver Creek valley, commonly overlain

FOSSIL LIST

Buchia sublaevis (Imlay)

Buchia crassicollis solida

Buchia sublaevis (Imlay)

Buchia crassicollis solida Buchia sublaevis (Imlay)

Buchia crassicollis solida

Buchia sublaevis (Imlay)

Buchia sublaevis (Imlay)

Buchia sublaevis (Imlay)

Buchia sublaevis (Imlay)

Buchia sp.

Belemnite scrap

Buchia cf. B. okensis

Buchia sp. cf. B. fischeriana

Buchia sublaevis (Imlav)

Buchia sublaevis (Imlay)

Buchia sublaevis (Imlay)

large Belemnite Buchia cf. B. uncitoides

Buchia okensis

Buchia okensis (juv.)

Inoceramus sp. indet.

Buchia fischeriana

Buchia sp., mainly scraps

Buchia cf. B. okensis(?)

Buchia n. sp. cf. B. tolmatschowi

Buchia n. sp. cf. B. tolmatschowi

Buchia n. sp. cf. B. tolmatschowi

or lower Valanginian species

Tollia sp. cf. T. paucicostata (Donovan)

Buchia sp., probably an upper Berriasian

Buchia fischeriana

Buchia fischeriana

(Upper Chathenda Creek and tributary going down in section)

(Gold Run Creek - Glacier Creek going down in section)

Buchia okensis Buchia okensis Ammonite scrap

Buchia fischeriana

Buchia fischeriana

Inoceramus sp. cf. I. ovatoides (?)

Probably Buchia sublaevis (Imlay)

Buchian. sp.(?) cf. B. tolmatschowi(?)

Buchia tolmatschowi, transitional to Buchia pacifica

Buchia n. sp. cf. B. tolmatschowi

Buchia n. sp. cf. B. tolmatschowi

Buchia n. sp. cf. B. tolmatschowi

Tollia sp. cf. T. paucico stata (Donovan)

Crushed Buchia sublaevis or crassicollis?

Buchia sp. juv. cf. B. majuscula(?)

Buchia n. sp. cf. B. tolmatschowi

Tollia cf. T. paucicostata (Donovan)

Scrap of Buchia crassicollis or sublaevis?

Buchia tolmatschowi transitional to Buchia pacifica

Crushed Buchia n. sp. cf. B. tolmatschowi

(Bonanza Creek - Coarse Money Creek going down in section)

Inoceramus sp.

Identification

Owg. O Owm 0 000000000 Drift of Wisconsin age

Owg, undifferentiated glacial and fluvioglacial deposits of probably more than one episode of Wisconsin glaciation. Chiefly diamicton and gravel. In southwest part of quadrangle chiefly poorly stratified boulder, gravel, sand and silt deposits as much as 500 feet thick. Deposits merge with and are covered by colluvium (Qcu) at higher elevations and are veneered locally by Holocene alluvium Owm, well-defined end moraines at mouth of Carl Creek and in the Chathen-

da-Beaver Creek divide. Chiefly diamicton

Map No. U.S.G.S. No.

M5409

M5373

M5371

M5414

M5415

M5416

M5417

M5418

M5421

M5425

M5377

M5374

M5559

M5563

M5564

M5568

M5594

M5386

M5429

and N. J. Silberling (40, 41).

(Erickson Gulch)

(Chathenda Creek - Carl Creek divide)

(Chathenda Creek going down in section)

Drift of older glaciations Undifferentiated glacial deposits between Chavolda and Chathenda Creeks. Forms veneer of unconsolidated gravel and sand over weathered bedrock. Locally contains fragments of lignitized wood

INTRUSIVE ROCKS HYPABYSSAL ROCKS

Plagioclase-hornblende porphyry Light-gray porphyritic rocks, probably rhyodacite or dacite in composition, with abundant phenocrysts of andesine and altered hornblende as much as 6 mm long in a fine-grained potassium feldsparrich groundmass. May represent intrusive phases of Wrangell Lava

Andesite porphyry

Light gray-green massive andesite porphyry with conspicuous phenocrysts of altered plagioclase, as much as 1 cm long, in a fine-grained altered groundmass. May be related to Chisana Formation (Kc)

Porphyritic diorite

Small complex intrusive masses consisting of diverse augite-hornblende diorites. Rocks locally equigranular but generally are conspicuously porphyritic with augite, hornblende and plagioclase phenocrysts. Biotite present locally

Undifferentiated intrusive rocks Gray to dark-colored dikes and sills probably of andesitic and basaltic composition and irregular bodies of gray feldspar porphyry. Dikes and sills are fine-grained, locally porphyritic with sparse phenocrysts of plagioclase and hornblende and generally altered. Feldspar porphyry contains conspicuous zoned phenocrysts of feldspar, as much as 2 cm

in diameter, and minor hornblende in a fine-grained altered ground-

mass. Only larger dikes and sills shown PLUTONIC ROCKS

#Kdm +

Pyroxene diorite-monzonite Dark gray-green to pinkish-gray, medium-to coarse-grained subhedral granular. Gradational from pyroxene diorite west of Red Hill Creek to potassic pyroxene diorite, pyroxene monzonite and hornblende monzonite east of Red Hill Creek. Locally biotite-bearing. Pyroxene largely altered to actinolite and chlorite

Granodiorite and associated plutonic rocks Biotite-hornblende granodiorite, with biotite quartz diorite, biotite gabbro and biotite quartz monzonite. Gray to pinkish-gray, medium- to coarse-grained subhedral granular. Locally strongly hydrothermally altered and iron stained. K/Ar dates on 3 samples indicate an age of 111 m.y. (M. A. Lanphere, writ. comm., 1970)

Approximate contact Triangles indicate selected localities where contact was well exposed at the time of mapping

Fault, showing dip Dashed where approximate or inferred; dotted where concealed. U, upthrown side; D, downthrown side _____

Contact between individual alluvial fans or cones

Thrust fault Dashed where approximate or inferred; dotted where concealed. Sawteeth on upper plate www www www www www

Disturbed zone

Syncline Showing trace of axial plane.

Altered area

Principally limonite- and sulfate-stain-

ing due to oxidation of iron-bearing

Dotted where concealed

Probably indicative of fault or shear zone Anticline Showing trace of axial plane. Dotted where concealed + +

Prospect or mineral occurrence

Showing principal mineral commodity

Strike and dip of beds or flows Arrow indicates direction of tops in vertical beds 80 Inclined · Vertical

Inclined Overturned Vertical Horizontal

Strike and dip of slaty cleavage

Fossil locality Numbers refer to collections described in accompanying list and localities shown on cross sections

Gold placer

(Snag Creek) Monotis sp. indet., possibly M. subcircularis (Gabb). Badly deformed, probably Halobia dilitata (Kittl) (Bryan Creek) 9109 Shasticrioceras sp.

39 11263 Ferns and conifers of Cretaceous age

The zonation of the Buchias reported above is interpreted as follows:

Identification by D. L. Jones (1-38 and 42), J. A. Wolfe (39)

Buchia sublaevis (Imlay) Valanginian Buchia crassicollis solida (Lahusen Buchia n. sp. cf. B. tolmatschowi Upper Berrias Cretaceous Buchia okensis (Pavlow) Buchia fischeriana (d'Orbigny) Jurassic

REFERENCES

Moffit, F. H., 1954, Geology of the eastern part of the Alaska Range and adjacent area: U.S. Geol. Survey Bull. 989-D, p. 65-218. Richter, D. H., and Schmoll, H. R., Geologic map of the Nabesna C-5 quadrangle, Alaska: U.S. Geol. Survey Geol. Quad. Map GQ-1062 (in press).

RECONNAISSANCE GEOLOGIC MAP OF THE NABESNA A-2 QUADRANGLE, ALASKA

SCALE 1:63 360

CONTOUR INTERVAL 100 FEET DATUM IS MEAN SEA LEVEL

DEPARTMENT OF THE INTERIOR

UNITED STATES GEOLOGICAL SURVEY

Base from U.S. Geological Survey, 1960

10,000-foot grid based on Alaska coordinate system, zone 2

1000-meter Universal Transverse Mercator grid ticks, zone 7 shown

D. H. Richter and D. L. Jones 1973

For sale by U.S. Geological Survey, price 75 cents