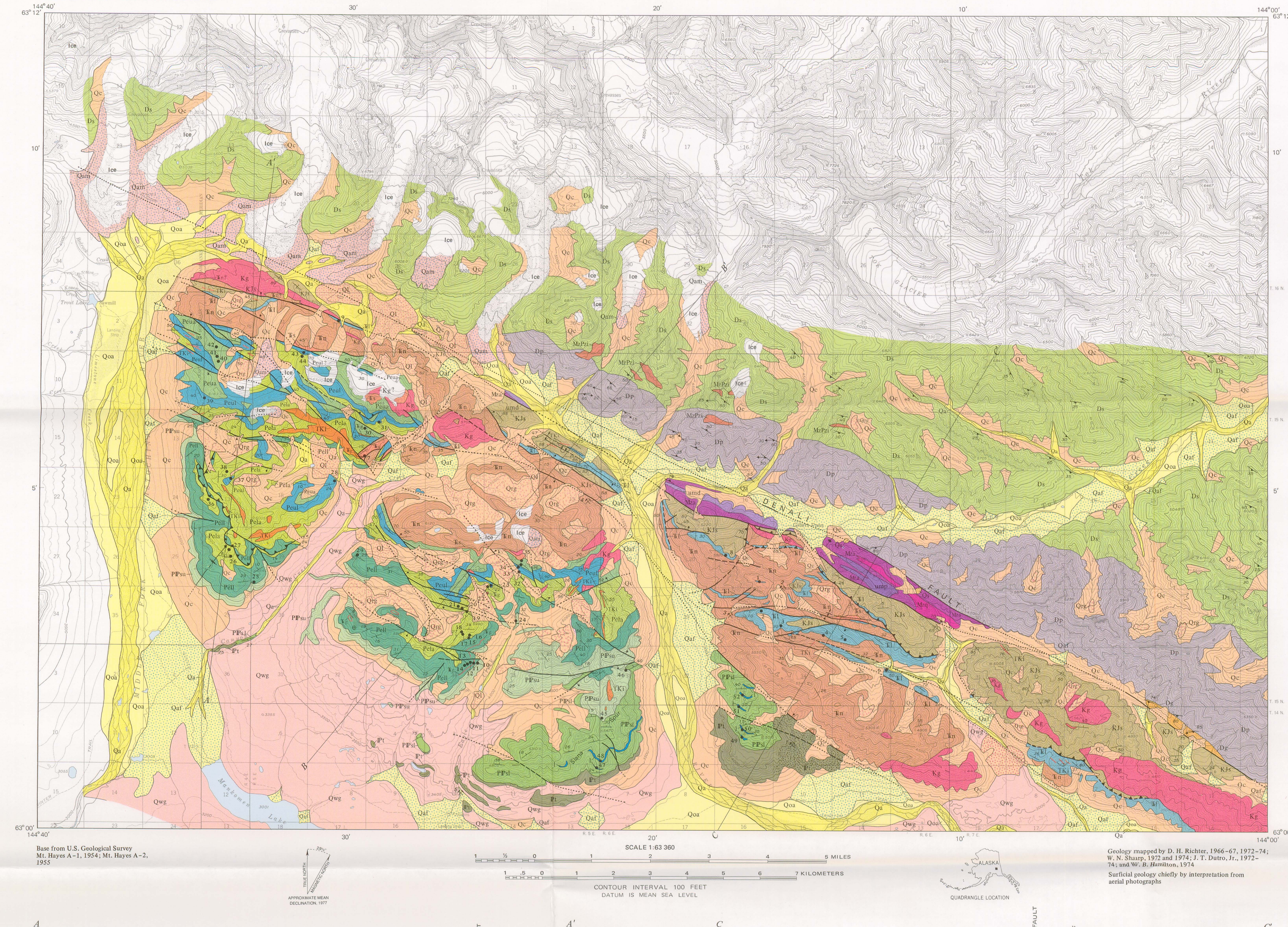
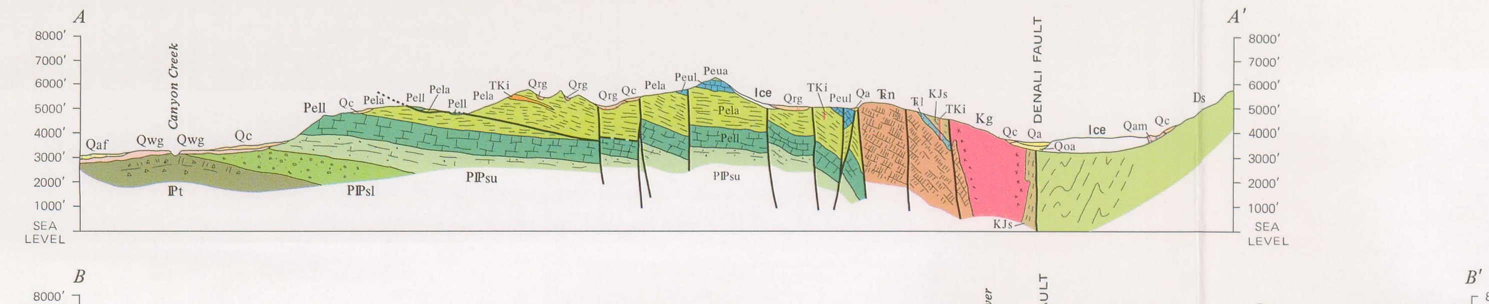
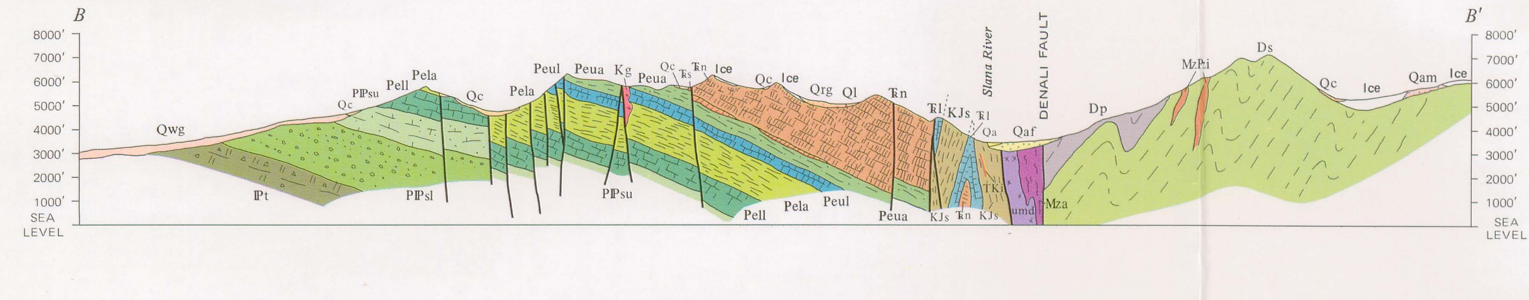
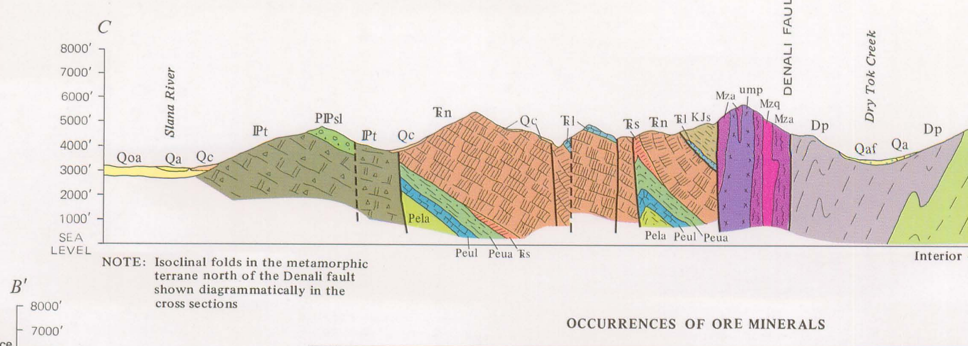
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS INVESTIGATIONS SERIES
MAP I - 1031





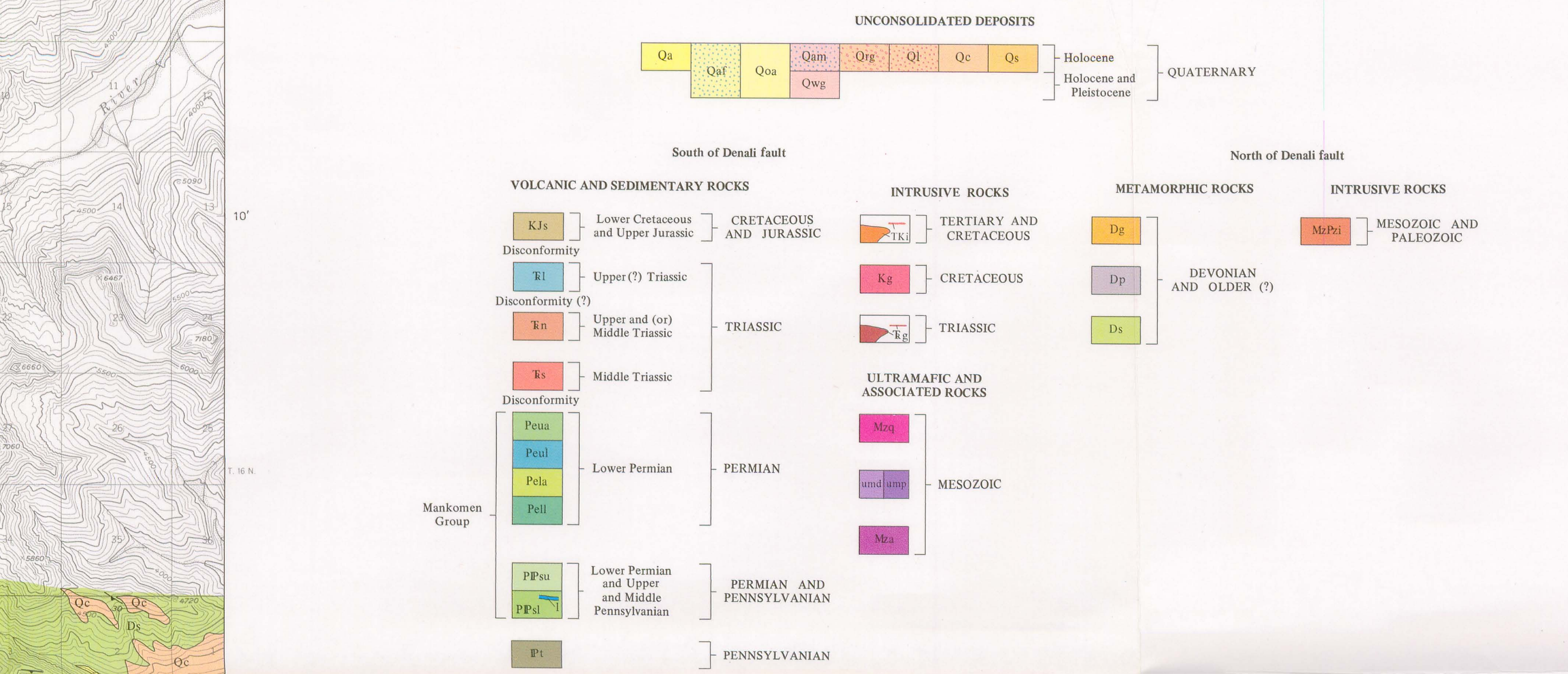




NOTE: Isoclinal folds in the metamorphic terrane north of the Denali fault shown diagrammatically in the cross sections

Interior – Geological Survey, Reston, Va. – 1977 – G76390

CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

UNCONSOLIDATED DEPOSITS

Qa — ALLUVIUM – On active flood plains and lowest terraces of major streams, and large alluvial fans. Chiefly boulders, gravel, and sand

Qaf — ALLUVIAL FANS AND CONES – Chiefly gravel and sand. Only large well-defined cones are differentiated from colluvium (Qc)

Qoa — ALLUVIUM IN HIGH TERRACES – Along major streams. Oldest deposits may represent outwash from a late advance of the Wisconsin Glaciation. Chiefly boulders, gravel, and sand

Qam — DRIFT OF THE ALASKAN GLACIATION – End and lateral moraines left after recession of existing glaciers. Chiefly rubble and diamicton

Qrg — ROCK GLACIER DEPOSITS – Includes active and recently active rock glaciers, tongue shaped in form. Chiefly rubble and diamicton

Ql — LANDSLIDE DEPOSITS – Principally young landslides as evidenced by freshness of form. Chiefly debris avalanches

Qc — UNDIVIDED COLLUVIUM AND OTHER DEPOSITS – On valley walls and hill slopes. Principally talus and other slope debris but includes alluvium of numerous minor streams and locally glacial, rock glacier, and mass-wasting deposits. Unit includes some solifluction and creep material on high-level, low-gradient slopes that are composed chiefly of bedrock rubble but may include drift from pre-Wisconsin glaciations. Chiefly rubble, gravel, sand, silt, and diamicton; generally poorly sorted

Qs — SPRING DEPOSITS – Small mounds of calcareous tufa-cemented talus along trace of Denali fault that mark sites of former carbonate-rich springs

Qwg — DRIFT OF WISCONSIN GLACIATION – Includes end, lateral, and ground moraine and locally fluvioglacial deposits of both main and late stages of Wisconsin Glaciation. Locally includes small postglacial pond and stream deposits in the extensive ground moraine near Mankomen Lake. At higher elevations, deposits merge with and are covered by colluvium (Qc). Chiefly diamicton with minor sand and gravel

South of Denali fault

VOLCANIC AND SEDIMENTARY ROCKS

KJs — MARINE SEDIMENTARY ROCKS – Principally deep marine turbidite deposits consisting of graded beds of dark-gray to gray argillite, siltstone, and graywacke that locally alternate with beds of graywacke, pebbly graywacke, pebble to cobble conglomerate, and argillite. Graded beds are well developed locally and consist of rhythmically alternating units that range from 1 cm to more than 30 cm in thickness. Massive graywacke and conglomerate beds are as much as 20 m thick; clasts are rounded and derived from the terranes both north and south of the Denali fault. Locally the rocks are isoclinally folded and exhibit a strong slaty cleavage. Nonfossiliferous, but similar strata in the Nabesna quadrangle contain locally abundant Buchia assemblages ranging in age from Late Jurassic to Early Cretaceous (Richter and Jones, 1973). Thickness probably greater than 1,000 m; top not exposed

Tl — LIMESTONE – Gray to dark-gray, fine-grained, medium- to massive-bedded 10 cm–2 m limestone with lenses and nodules of gray and black chert and irregular patchworks of disseminated fine-grained quartz. Weathers light gray. Chiefly micrite, dismicrite, or micropsparite, locally recrystallized and commonly brecciated and veined by coarsely crystalline calcite. Base of unit generally contains clasts of Nikolai Greenstone (Tn); in secs. 12 and 13, T. 15 N., R. 5 E., unit includes a megabreccia of carbonate-cemented blocks of Nikolai Greenstone (Tn) and limestone. Limestone shown on geologic map entirely enclosed in Nikolai Greenstone has probably been tectonically emplaced, but field data are insufficient to determine nature of emplacement. Typically unfossiliferous but contains sparse brachiopods, pelecypods, gastropods, corals, and spongiomorphs of Late(?) Triassic age. Thickness 20 to 150 m

Tn — NIKOLAI GREENSTONE (Rohn, 1900) (Middle and (or) Upper Triassic) – Dark-gray-green, dark-gray-brown, reddish-brown, and maroon-gray subaerial amygdaloidal basalt flows separated locally by thin beds of reddish-brown nonmarine volcaniclastic rocks. Base generally marked by discontinuous conglomerate-breccia containing fragments of basalt and underlying sedimentary rocks. Predominantly intermixed aa and pahoehoe flows with individual flow units ranging from a few centimeters to more than 15 m thick. Rocks generally porphyritic containing phenocrysts of saussuritized plagioclase, subordinate clinopyroxene, and relict olivine in an intergranular groundmass of feldspar and pyroxene that has been largely altered to chlorite, epidote, and serpentine. Amygdules consist of quartz, potassium feldspar, calcite, chlorite, epidote, pumpellyite, prehnite, and zeolite minerals. A highly sheared and locally foliated amphibolite bordering the south side of a granodiorite pluton in sec. 25, T. 16 N., R. 4 E, and sec. 31, T. 15 N., R. 5 E. is questionably assigned to the Nikolai Greenstone (Tn?) Thickness of Nikolai is about 1,500 m

Ts — SHALE, LIMESTONE, AND CHERT – Interbedded black carbonaceous shale, gray thin-bedded argillite, light-colored chert, and light-gray limestone with minor gray siltstone and conglomerate. Irregular bodies and sills of gabbro (Tg), only a few shown, are locally abundant. Rocks generally nonfossiliferous; limestones contain a few crinoid fragments, and shale and argillite locally contain abundant Daonella of Middle Triassic age. Unit extremely discontinuous; and ranges in thickness from 0 to more than 40 m; locally appears gradational with marine sedimentary rocks of underlying upper argillite member of Eagle Creek Formation (Peua)

MANKOMEN GROUP – Includes Eagle Creek and underlying Slana Spur Formation.

EAGLE CREEK FORMATION (Richter and Dutro, 1975) (Lower Permian) – A conformable sequence of alternating shallow marine argillite and limestone. Abundant brachiopods, corals, cephalopods, and foraminifers indicate an Early Permian age. Thickness approximately 895 m

Peua — Upper argillite member. Chiefly thin-bedded dark-gray argillite with thin lenses and laminae of gray siltstone and minor bioclastic limestone, calcareous siltstone, and pyritic sandstone. Thickness about 125 m

Peul — Upper limestone member. Thin-bedded gray siliceous limestone that locally weathers an ocherous yellow orange and thin argillite interbeds and discontinuous lenses of massive light-gray-weathering limestone as much as 50 m thick. Argillite content increases in lower part of member. In secs. 4, 5, and 9, T. 15 N., R. 5 E., limestone has been locally metamorphosed to a conspicuous white crystalline marble. Thickness variable, probably between 75 and 150 m

Pela — Lower argillite member. Chiefly thin-bedded dark-gray shaly argillite and gray-green locally calcareous siltstone with subordinate dark-gray silty bioclastic limestone (bryozoan biostromes) and thin-bedded gray limestone. Gray limestone stone abundance in upper part of member, forming a ribboned unit that grades into limestone-argillite beds of upper limestone member. Member locally cut by a number of irregular intrusive masses, dikes, and sills of equigranular gabbro (Tg) and porphyritic diorite (TKi). Thickness of member about 400 m

Pell — Lower limestone member. Massive and thin-bedded gray limestone, locally contains nodules and lenses of black and light-gray chert, with subordinate beds of dark-gray calcareous volcanic grit, sandstone, and siltstone, and clastic limestone. Clastic beds generally graded and locally cross bedded. Gabbro sills (Tg), some as much as 25 m thick, relatively numerous. Thickness about 275 m

SLANA SPUR FORMATION (Richter and Dutro, 1975) (Middle Pennsylvanian to Lower Permian) – A thick sequence of marine calcareous and noncalcareous volcaniclastic rocks with subordinate limestone, tuff, and volcanic breccia. Brachiopods, corals, and foraminifers, locally abundant, indicate a Pennsylvanian and Permian age. Thickness 700 to 1,400 m

PPsu — Upper calcareous volcaniclastic member. Predominantly gray-green coarse clastic volcanic-rich limestone and gray-green coarse-grained calcareous sandstone with minor massive and bioclastic limestone and light-gray-green lapilli tuff. Authigenic analcite replaces and cements clasts in some calcareous sandstone strata. Thickness 350 to 450 m

PPsl — Lower volcaniclastic member. Dark-gray, dark-green, and maroon volcaniclastic rocks with interbedded lapilli tuff, volcanic breccia, and limestone. The volcanic rocks range from massive conglomerate and sandstone to thin-bedded grit, sandstone, and siltstone that commonly exhibit graded bedding. Limestone lenses (l), as much as 25 m thick, consist of thin- to medium-bedded gray and light-gray calcarenite. Thickness 300 to 950 m

Pt — TETELNA VOLCANICS (Mendenhall, 1905) (Pennsylvanian) – Chiefly dark-green, dark gray-green, and purplish-gray-green volcanic flows, volcanic mud and debris avalanches, and lapilli-pumice tuffs interbedded with fine- to coarse-grained volcaniclastic rocks. Flows generally massive porphyritic andesites; locally amygdaloidal. Volcaniclastic rocks range from mudstone to conglomerate and are locally graded. Thickness greater than 1,000 m, base nowhere exposed

INTRUSIVE ROCKS

TKi — UNDIFFERENTIATED INTRUSIVE ROCKS – Chiefly a variety of dikes and small irregular masses of gray-green porphyritic rocks and dark-brown-gray fine-grained mafic rocks. Porphyritic rocks contain phenocrysts of augite or hornblende generally with plagioclase in a fine-grained intergranular to trachytic groundmass. Only larger bodies shown on geologic map. Intrusives may be hypabyssal equivalents of Cretaceous granodiorite (Kg)

Kg — GRANODIORITE – Small plutons consisting chiefly of granodiorite; include quartz monzonite, syenodiorite, and quartz diorite. Rocks are fresh, medium-grained, subhedral granular, and nonfoliate. Chiefly hornblende bearing but locally contain biotite. Plutons have thermally metamorphosed peripheral country rock to banded hornfels (clastic sedimentary rocks), amphibolite (Nikolai Greenstone), and marble (limestone). Cretaceous age based on K–Ar age dates from similar plutonic rocks in Nabesna quadrangle (Richter and others, 1975)

Tg — GABBRO – Small irregular bodies, dikes, and sills of dark-gray medium- to coarse-grained gabbro. Restricted to Nikolai Greenstone and older rocks; sills numerous in the lower limestone member of the Eagle Creek Formation (Pell) and irregular bodies numerous in the lower argillite member of the Eagle Creek Formation (Pela) and the Middle Triassic shale, limestone, and chert unit (Ts). Only larger bodies shown on geologic map

ULTRAMAFIC AND ASSOCIATED ROCKS

This group of rocks is restricted to a terrane representing a crustal-suture belt trending northwestward across east-central Alaska. In the map area, the suture belt is as much as 1 km wide and is bounded on the northeast by the Denali fault and on the southwest by faults of a pre-Denali fault system. Chiefly amphibole-rich metamorphic rocks with lenses of dunite and pyroxenite-peridotite locally intruded by tonalite and quartz monzonite. Rocks moderately to intensely tectonically deformed and have been locally altered by magnesium metasomatism

Mzq — TONALITE AND QUARTZ MONZONITE – Mottled light-gray to light-greenish-gray tonalite and quartz monzonite including high-soda and high-alumina variants of these types. Rocks are fine to medium grained with a porphyritic to porphyroblastic texture. The mineral assemblage is partly metamorphic. Sodic plagioclase, occurring as large phenocrysts or porphyroblasts, and commonly altered to white mica and clinozoisite, is the dominant constituent. Interstitial minerals are quartz, occurring as fine-grained clots, and minor pyroxene and amphibole, generally altered to chlorite. The rocks form small elongate plutons intruding the amphibole-rich metamorphic rocks of the terrane

ump — PYROXENITE AND PERIDOTITE – Forms a crudely layered, elongate body with two distinct phases within the amphibole-rich metamorphic rocks (Mza). Pyroxenite appears to be the dominant, but late phase, occurring both as discrete masses and as thin layers in peridotite and also as veinlike features crosscutting peridotite. The peridotite, with minor dunite, has been largely altered to serpentine. A light-grayish-green to dark-greenish-gray gabbroic phase composed of sodic plagioclase and a calcic cummingtonitelike amphibole containing clinopyroxene phenoblasts to 4 cm in diameter forms a discontinuous outer zone to the body. The pyroxenes of both the pyroxenite and peridotite phases appear to be entirely monoclinic with compositions within the diopside-hedenbergite field. The larger pyroxene grains show strong lameliar structure; schiller inclusions are common locally. Remnant olivine in the peridotite ranges between Fo 80 and 85, using Jackson's method (1960). All phases contain larger scattered angular grains of magnetite, mostly along grain boundaries, and disseminated dusty magnetite

umd — DUNITE – Forms two elongate masses separated from the pyroxenite-peridotite body by amphibole-rich metamorphic rocks (Mza). The dunite is light-gray to greenish-gray, massive, generally fine grained (1–2 mm), and where unsheared, virtually unaltered. Locally the rocks appear to have a cataclastic fabric in which large olivine grains (>10 mm) are surrounded by finer grained olivine. Many of the olivine grains show planar shattering. Olivine composition ranges from Fo 81 to 87 (Jackson, 1960). The rock is commonly spotted unevenly with grains and crude crystals of chromite that locally are arranged in short layers. Magnetite occurs as scattered angular grains and a fine dust. Cracks throughout the body generally filled with serpentine, talc, and iddingsite

Mza — AMPHIBOLITE AND HORNBLENDE-PLAGIOCLASE GNEISS – Chiefly fine- to medium-grained metamorphic rocks with granoblastic textures ranging from massive dark-green amphibolites to finely banded gneissic rocks consisting chiefly of dark-green amphibole, white calcic plagioclase, and locally, quartz. Banding thickness and amphibole-feldspar ratio extremely variable. Interlayered with the gneiss are rare thin lenses of light-green and gray epidote-bearing marble and zones of dark-gray graphitic schist. Pegmatoid variants of the amphibolite, some quartz rich, locally abundant. The metamorphic mineral assemblage is: green hornblende, calcic plagioclase, quartz, minor clinopyroxene, sulfides, and black oxides. Feldspar generally altered to epidote-clinozoizite, carbonate occurs throughout the rock in granular masses and veinlets. Rocks form host of ultramafic rocks (ump and umd) and are intruded by tonalite and quartz monzonite bodies (Mzq)

North of Denali fault

METAMORPHIC ROCKS

Metamorphic rocks north of the Denali fault are isoclinally folded and exhibit a well-defined axial-plane schistosity deformed by at least one later period of kink-folding; all have been subject to low greenschist facies metamorphism. No fossils have been found in the map area; the Devonian part of their age designation is based on the presence of Middle Devonian corals in similar metamorphic rocks in the Nabesna quadrangle (Richter, 1975)

Dg — GREENSTONE – Dark-gray-green, massive, fine-grained greenstone, generally highly fractured with serpentine on fracture surfaces. Probably of volcanic origin but may include some metaintrusive rocks (MzPzi)

Dp — PHYLLITE – Chiefly dark-gray, thinly fissile phyllite cut by numerous quartz veinlets. In southeast corner of map area, contains interbedded gray calcareous mica schist, tan metaconglomerate, and thin lenses of marble

Ds — SCHIST, PHYLLITE, AND MARBLE – Interbedded dark-gray phyllite, green phyllite, gray marble, light-gray mica schist, and micaeous quartzite

INTRUSIVE ROCKS

MzPzi — METADIORITE – Gray-green, fine- to medium-grained intrusive rocks, probably largely diorite in composition. Rocks are nonfoliate but strongly altered to albite, chlorite, and epidote. Only larger bodies shown

GEOLOGIC MAP SYMBOLS

3 • Fossil locality – Numbers refer to collections described in accompanying table

5 ⚒ Occurrence of ore minerals – Numbers refer to occurrences described in accompanying table

Area of strong iron oxide staining, principally due to oxidation of iron sulfide minerals

Note – Commonly used geologic symbols are printed on the map jacket; a separately printed list is available on request from the U.S. Geological Survey.

REFERENCES

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Rohn, Oscar, 1900, A reconnaissance of the Chitina River and the Skolai Mountains, Alaska: U.S. Geol. Survey 21st Ann. Rept., pt. 2, p. 393–440.

OCCURRENCES OF ORE MINERALS

No.	Location	Description
1	Sec. 3, T. 14 N., R. 6 E.	Copper-stained quartz veins with minor chalcopyrite and pyrite in large altered area
2	Sec. 27, T. 15 N., R. 6 E.	Native copper float
3	Sec. 28, T. 15 N., R. 6 E.	Float from chalcocite vein
4	Sec. 13, T. 15 N., R. 5 E.	Lens of massive pyrrhotite with minor chalcopyrite, approximately 30 m long and 3 m thick, in Nikolai Greenstone
5	Sec. 10, T. 14 N., R. 5 E.	Placer gold deposit; very minor production

FOSSIL COLLECTIONS[1]

Map No.	Field No.	Location	Description	Studied by
			Triassic[2]	
1	72–ARh–431	Sec. 21, T. 15 N., R. 6 E.	Massive hexacoral? Silicified bivalve fragments	J. T. Dutro, Jr.
2	72–ARh–428	Sec. 28, T. 15 N., R. 6 E.	Two kinds of hexacorals including possible *Thamnastrea* or *Isastraea*; pelecypod and terebratuloid brachiopod fragments	J. T. Dutro, Jr.
3	72–ARh–427	Sec. 27, T. 15 N., R. 6 E.	Fragmentary hexacoral	J. T. Dutro, Jr.
4	72–ARh–401	Sec. 27, T. 15 N., R. 6 E.	Fragments of chaetetiform coral Hexacoral	J. T. Dutro, Jr.
5	72–ARh–433	Sec. 26, T. 15 N., R. 6 E.	Two kinds of spongiomorphs including *Heptastylis* and stromatomorphs Several hexacorals, including possible *Isastraea, Thamnastraea*, and *Montlivaltia* High-spired gastropods Terebratuloid brachiopods	J. T. Dutro, Jr.
6	72–ARh–400	Sec. 35, T. 15 N., R. 6 E.	Silicified bivalve fragments, possibly large terebratuloid brachiopods such as *Rhaetina* or a related form	J. T. Dutro, Jr.
7	73–ARh–13	Sec. 8, T. 15 N., R. 5 E.	Pelecypods *Daonella* cf. *D. frami* Kittl	N. J. Silberling and K. M. Nichols
8	74–ARh–100	Sec. 21, T. 15 N., R. 6 E.	Hexacorals	J. T. Dutro, Jr.
9	74–ARh–128	Sec. 33, T. 15 N., R. 5 E.	Coralline debris	J. T. Dutro, Jr.
			Permian	
10	72–ARh–10	Sec. 34, T. 15 N., R. 5 E.	Echinoderm debris Horn coral, indet. Brachiopods *Kochiproductus*? *Neospirifer* *Bathymyonaria*? *Spiriferella*	J. T. Dutro, Jr.
11	72–ARh–18	Sec. 34, T. 15 N., R. 5 E.	Foraminifer *Eoparafusulina mendenhalli* Petocz *Schwagerina rowetti* Petocz Corals *Sinopora*? *Caninia*?	J. T. Dutro, Jr. and R. C. Douglass
12	72–ARh–25	Sec. 34, T. 15 N., R. 5 E.	Foraminifer *Eoparafusulina waddeli* Petocz	R. C. Douglass
13	72–ARh–28 72–ARh–29	Sec. 34, T. 15 N., R. 5 E.	Foraminifer *Schwagerina* sp. Brachiopods *Calliprotonia* *Neospirifer* *Penicularis*? *Rhynchopora* *Anemonaria* *Kochiproductus*? *Reticulatia* Ramose bryozoans	J. T. Dutro, Jr. and R. C. Douglass
14	72–ARh–30	Sec. 34, T. 15 N., R. 5 E.	Foraminifer *Eoparafusulina* aff. *E. alaskensis* Dunbar	R. C. Douglass
15	72–ARh–39	Sec. 27, T. 15 N., R. 5 E.	Cephalopods *Artinskia*?	MacKenzie Gordon, Jr.
16	72–ARh–40	Sec. 27, T. 15 N., R. 5 E.	Cephalopods *Artinskia*? Brachiopods *Neochonetes*	MacKenzie Gordon, Jr. and J. T. Dutro, Jr.
17	72–ARh–44	Sec. 27, T. 15 N., R 5 E.	Brachiopods *Reticulatia* *Bathymyonia* *Anemonaria* *Penicularis*? Ramose bryozoans	J. T. Dutro, Jr.
18	72–ARh–45	Sec. 27, T. 15 N., R 5 E.	Brachiopods *Reticulatia* *Anemonaria*? *Spiriferella*? *Neospirifer* (perhaps *Septospirifer*) Ramose bryozoans	J. T. Dutro, Jr.
19	72–ARh–48	Sec. 27, T. 15 N., R. 5 E.	Brachiopods *Reticulatia* *Neospirifer* *Penicularis*? *Pseudomartinia* Ramose bryozoans	J. T. Dutro, Jr.
20	72–ARh–50	Sec. 27, T. 15 N., R. 5 E.	Brachiopods *Reticulatia* *Penicularis*? *Anemonaria* *Neospirifer*	J. T. Dutro, Jr.
21	72–ARh–54	Sec. 27, T.15 N., R. 5 E.	Brachiopods *Reticulatia*? *Neospirifer*	J. T. Dutro, Jr.
22	72–ARh–55	Sec. 23, T. 15 N., R. 5 E.	Brachiopods *Anemonaria* *Neospirifer* Ramose bryozoans	J. T. Dutro, Jr.
23	72–ARh–56	Sec. 23, T. 15 N., R. 5 E.	Brachiopods *Horridonia* *Spiriferella* *Reticulatia*?	J. T. Dutro, Jr.
24	72–ARh–72	Sec. 26, T. 15 N., R. 5 E.	Brachiopods *Orthotichia*? *Horridonia* *Linoproductus* *Waagenoconcha* *Kochiproductus*?	J. T. Dutro, Jr.
25	73–ARh–9	Sec. 19, T. 15 N., R. 5 E.	Foraminifer *Schwagerina* sp. possibly related to *S. jenkensi* Thorsteinsson	R. C. Douglass
26	73–ARh–10	Sec. 24, T. 15 N., R. 4 E.	Brachiopods *Reticulatia*? *Neospirifer* *Bathymyonia*? *Spiriferellina* Pelecypods *Acanthopecten* *Aviculopecten* Fenestrate and ramose bryozoans	J. T. Dutro, Jr.
27	73–ARh–11	Sec. 24, T. 15 N., R. 4 E.	Brachiopods *Derbyia*? *Neospirifer* *Reticulatia* Productoid, indet. Pelecypods *Aviculopecten*? Fenestrate and ramose bryozoans	J. T. Dutro, Jr.
28	73–ARh–1	Sec. 17, T. 15 N., R. 5 E.	Brachiopods *Chonetina*? cf. *C. superba* Gabbett *Chonetinella* *Anemonaria*? *Calliprotonia*? (fragment) *Horridonia* *Punctospirifer*? Echinoderm debris Fenestrate and ramose bryozoans	J. T. Dutro, Jr.
29	73–ARh–7	Sec. 20, T. 15 N., R. 5 E.	Foraminifer *Eoparafusulina mendenhalli* Petocz	R. C. Douglass
30	73–ARh–14	Sec. 8, T. 15 N., R. 5 E.	Brachiopods *Anemonaria* *Spiriferellina*? *Waagenoconcha* *Rhynchopora*? *Septospirifer*? Productoid, indet. Pelecypods *Wilkingia* Echinoderm debris	J. T. Dutro, Jr.
31	73–ARh–15	Sec. 9, T. 15 N., R. 5 E.	Brachiopods *Anemonaria*? *Megousia*?	J. T. Dutro, Jr.
32	72–ARh–59	Sec. 23, T. 15 N., R. 5 E.	Foraminifer *Pseudofusulinella* sp. *Schwagerina* aff. *S. hyperborea* Salter *Schwagerina* sp. Brachiopods *Anemonaria* *Spiriferella* *Bathymyonia* *Cleiothyridina* *Horridonia* *Spiriferellina* *Kochiproductus*? Ramose bryozoans	J. T. Dutro, Jr. and R. C. Douglass
33	72–ARh–62	Sec. 23, T. 15 N., R. 5 E.	Brachiopods *Anemonaria* *Bathymyonia*? *Thamnosia* *Spiriferella*? Fenestrate bryozoans	J. T. Dutro, Jr.
34	72–ARh–63	Sec. 23, T. 15 N., R. 5 E.	Brachiopods *Waagenoconcha* *Neospirifer* *Yakolevia*? Ramose bryozoans	J. T. Dutro, Jr.
35	72–ARh–64	Sec. 23, T. 15 N., R. 5 E.	Brachiopods *Megousia* *Waagenoconcha* *Cancrinella* *Neospirifer* Pelecypods *Wilkingia*? Cephalopods *Daubichites*?	J. T. Dutro, Jr. and MacKenzie Gordon, Jr.
36	74–ARh–114	Sec. 13, T. 15 N., R. 4 E.	Cephalopods *Daubichites* sp. indet. *Peritrochia* aff. *P. typica* (Ruzhencev)	MacKenzie Gordon, Jr.
37	74–ARh–116	Sec. 13, T. 15 N. R. 4 E.	Brachiopods *Thamnosia* *Neospirifer* *Spiriferella* Smooth spiriferoid, perhaps *Martinia* Productoids, indet.	J. T. Dutro, Jr.
38	74–ARh–117	Sec. 13, T. 15 N., R. 4 E.	Echinoderm debris, indet. Crinoid calyx, indet. Bryozoan debris, indet. Brachiopods *Thamnosia*? *Neospirifer* *Spiriferella*	J. T. Dutro, Jr.
39	74–ARh–115	Sec. 1, T. 15 N., R. 4 E.	Echinoderm debris, indet. Ramose bryozoans Brachiopods *Anemonaria*?	J. T. Dutro, Jr.
40	74–ARh–118	Sec. 1, T. 15 N., R. 4 E.	Brachiopods *Chonetina* cf. *C. superba* *Thamnosia*? *Neospirifer* *Anemonaria* *Stenoscisma*? *Linoproductus* *Rhynchopora* *Spiriferella* Punctate spiriferoid, indet. Productoids, indet.	J. T. Dutro, Jr.
41	74–ARh–119	Sec. 1, T. 15 N., R. 4 E.	Brachiopods *Megousia*? Ramose bryozoans	J. T. Dutro, Jr.
42	74–ARh–120	Sec. 36, T. 16 N., R. 4 E.	Brachiopods *Anemonaria*? *Rhipidomella* Productoid, indet. Echinoderm debris Crinoid calyx, indet.	J. T. Dutro, Jr.
43	74–ARh–122	Sec. 6, T. 15 N., R. 5 E.	Brachiopods *Megousia*? Fenestrate bryozoans, indet.	J. T. Dutro, Jr.
44	74–ARh–123	Sec. 6, T. 15 N., R. 5 E.	Cephalopods *Paragastrioceras* cf. *P. kirgizhorum* Voinova *Uraloceras* cf. *U. federowi* (Karpinsky)	MacKenzie Gordon, Jr.
45	74–ARh–103	Sec. 6, T. 14 N., R. 6 E.	Brachiopods *Waagenoconcha*?	J. T. Dutro, Jr.
46	74–ARh–104	Sec. 31, T. 15 N., R. 6 E.	Brachiopods *Horridonia* Productoid, indet.	J. T. Dutro, Jr.
			Pennsylvanian	
47	72–ARh–76	Sec. 12, T. 14 N., R. 5 E.	Foraminifer *Fusulinella*	R. C. Douglass
48	72–ARh–78	Sec. 6, T. 14 N., R. 6 E.	Foraminifer *Fusulinella* *Climacammina* *Bradyina*	R. C. Douglass
49	74–ARh–111	Sec. 4, T. 14 N., R. 6 E.	Horn corals	J. T. Dutro, Jr.
50	74–ARh–110	Sec. 4, T. 14 N., R. 6 E.	Echinoderm debris, indet. Spiriferoid brachiopods, indet. Horn corals	J. T. Dutro, Jr.
51	74–ARh–109	Sec. 4, T. 14 N., R. 6 E.	Echinoderm debris, indet. Brachiopods *Derbyia*?	J. T. Dutro, Jr.
52	74–ARh–108	Sec. 23, T. 15 N., R. 6 E.	Echinoderm debris, indet. Horn corals Ramose bryozoans Gastropods, indet. Brachiopods *Linoproductus* Productoids, indet.	J. T. Dutro, Jr.

[1]Collections 10–24, 32–35, and 47–48 are from measured sections in the Eagle Creek and Slana Spur Formations (Richter and Dutro, 1975).

[2]Descriptions of collections 1–6 and 8 and 9 are preliminary but indicate a Late Triassic age. Collection 7 is of Middle Triassic age.

GEOLOGIC MAP OF PARTS OF THE MOUNT HAYES A-1 AND A-2 QUADRANGLES, ALASKA

By

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