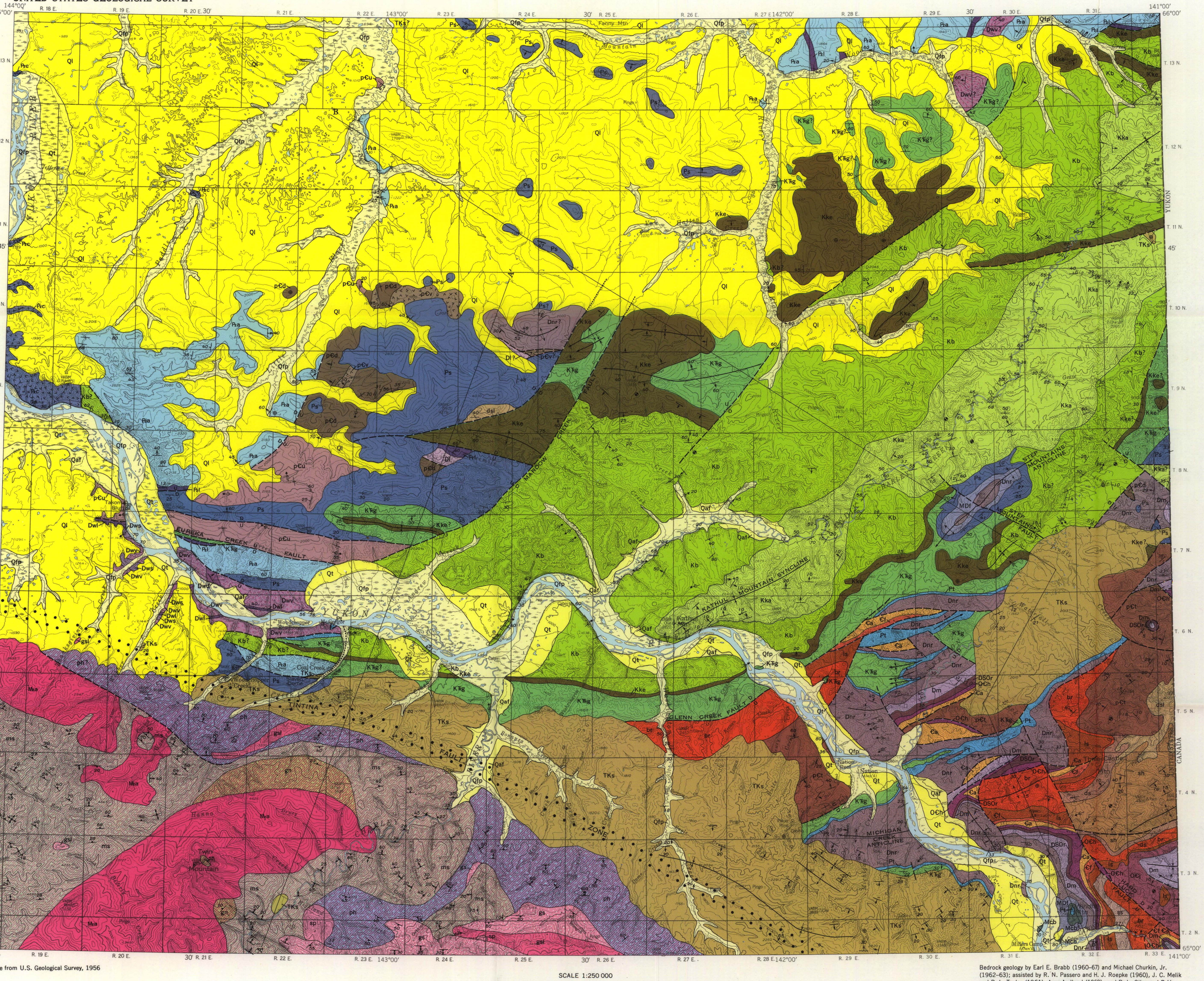
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS GEOLOGIC INVESTIGATIONS
MAP I–573



Base from U.S. Geological Survey, 1956

SCALE 1:250 000

5 0 5 10 15 MILES

5 0 5 10 15 KILOMETERS

CONTOUR INTERVAL 200 FEET
DATUM IS MEAN SEA LEVEL
1956 MAGNETIC DECLINATION AT SOUTH EDGE OF SHEET VARIES FROM 30°30′ TO 33° EAST

Bedrock geology by Earl E. Brabb (1960–67) and Michael Churkin, Jr. (1962–63); assisted by R. N. Passero and H. J. Roepke (1960), J. C. Melik and R. L. Taylor (1961), Arne Aadland (1962), and D. L. Giles and R. H. Rohrbacher (1963). Surficial geology by Arne Aadland (1962) and Earl E. Brabb (1963)

EXPLANATION

QUATERNARY

Qfp, Qaf, Qt, Ql

Surficial deposits
Qfp, *flood-plain deposits*
Qaf, *alluvial fan deposits*
Qt, *river terrace deposits*
Ql, *loess*

CRETACEOUS AND TERTIARY

Upper Cretaceous to Pliocene(?)

TKs

Sandstone, mudstone, and conglomerate
Sandstone and conglomerate, poorly sorted, friable, composed mostly of lithic fragments and about 5 percent potash feldspar. Thin, lignitic coal beds common. Nonmarine. Thickness 200 to at least 3,000 feet

UNCONFORMITY

NORTH OF TINTINA FAULT ZONE
STRATIGRAPHIC POSITION REASONABLY CERTAIN

CRETACEOUS

Lower Cretaceous — Kandik Group

Kka

Kathul Graywacke
Sandstone, conglomerate, and argillite. Sandstone, dark-greenish-gray, feldspathic (about 25 percent potash and plagioclase feldspar) graywacke with secondary chlorite and epidote. Conglomerate clasts of chert, volcanic rocks, argillite, and sandstone in matrix of graywacke or argillite. Argillaceous rocks mainly dark-gray argillite but include olive-gray shale and mudstone. Contains a few stratigraphically long-ranging marine pelecypods. Seems correlative with nonmarine rocks in Eagle quadrangle to the south which contain plants of probable Albian age. Thickness several thousand feet. Named and described by Brabb (1969)

LOCAL UNCONFORMITY

Kb

Biederman Argillite
Rhythmically interbedded, dark-gray argillite and medium-gray siltstone and sandstone. Siltstone and sandstone mainly quartz arenite commonly with carbonate cement. Convolute structures and cross-laminations common. Includes a few beds of chert-pebble conglomerate, siliceous shale, chert-limestone breccia and limestone. Contains very few pelecypods of Valanginian age near base. Thickness at least 5,000 feet. Named and described by Brabb (1969)

Kke

Keenan Quartzite
Medium-gray massive quartzite and sandstone with a few interbeds of dark-gray siltstone and argillite. Weathers white and forms resistant ridges. Locally contains abundant Buchia "sublaevis" of Valanginian age. Thickness varies from 100 to 1,000 feet. Named and described by Brabb (1969)

TRIASSIC TO CRETACEOUS

Middle Triassic to Lower Cretaceous

KTrg

Glenn Shale
Mainly grayish-black carbonaceous shale. Minor siltstone and quartzite. Phyllite and quartz-chlorite semischist in vicinity of Indian Grave Mountain are probably local metamorphic facies. Lower few hundred feet of Glenn Shale near Nation consist of dark-gray limestone and oil shale with Monotis, Halobia, Daonella, Discophyllites, and Nathorstites of Middle Triassic (Ladinian) to Late Triassic (Norian) age. At other localities contains Otapiria of probable Jurassic age (Imlay, 1967, p. B7), Buchia okensis of Early Cretaceous (Berriasian) age, and Buchia cf. B. crassicollis of Early Cretaceous (probably Valanginian) age. Sparsely fossiliferous north of 65°25′N. Maximum thickness about 5,000 feet. Named and described by Brabb (1969)

UNCONFORMITY(?)

PERMIAN

Pt

Tahkandit Limestone
Very pale orange, coarse-grained bioclastic limestone. Forms massive cliffs. Grayish-green glauconitic sandstone and chert-pebble conglomerate in basal 75 feet. Contains abundant brachiopods and a few corals, arenaceous foraminifers and bryozoa. Maximum thickness about 350 feet

Ps

Step Conglomerate
Chert-pebble conglomerate and chert arenite. Minor siltstone, bioclastic limestone, and quartz arenite. Has Tahkandit fauna in Step Mountains area. Nonfossiliferous and of uncertain age in western and northern part of quadrangle except for single Permian fauna from sandstone near Takoma Bluff. Thickness about 2,000 feet. Named and described by Brabb (1969)

UNCONFORMITY

MISSISSIPPIAN

Upper Mississippian

Mcb

Calico Bluff Formation
Rhythmically interbedded, dark-brownish-gray and brownish-black limestone and shale. Maximum thickness approximately 1,000 feet

Upper Devonian to Upper Mississippian

MDf

Ford Lake Shale
Grayish-black laminated siliceous shale and chert. Minor dark-gray siltstone, quartzite and limestone. Plant stems common. Thickness about 1,000 feet. Named and described by Brabb (1969)

DEVONIAN

Upper Devonian

Dnr

Nation River Formation
Rhythmically interbedded, mudstone, sandstone, gritstone, and conglomerate. Graded beds common. Mudstone is olive gray and nearly everywhere contains plant fragments and spores of Late Devonian age. Sandstone is olive-gray chert-quartz arenite and wacke, commonly with carbonate cement. Gritstone and conglomerate composed mostly of varicolored chert granules and pebbles. Thickness approximately 2,000 to 4,000 feet. See reports by Brabb and Churkin (1967) and Scott and Doher (1967)

Lower, Middle(?), and Upper Devonian

Dm

McCann Hill Chert
Thin-bedded and laminated dark- to light-gray chert, siliceous shale, and minor chert gritstone. Contains plant fragments, poorly preserved spores, and rare conodonts, gastropods, and cephalopods. Basal part of formation has beds of dark-gray bioclastic limestone with remarkably varied fauna including corals, brachiopods, trilobites, tentaculitids, fish, and ostracods of Early Devonian (Emsian) age. Thickness 200 to 800 feet except near Jones Ridge where it may be a few thousand feet thick. Named and described by Churkin and Brabb (1965a). Additional faunas listed by Churkin and Brabb (1968)

Dl

Limestone
Medium-gray limestone and calcareous shale. Contains a few brachiopods, corals, and bryozoa of Devonian age. Thickness a few hundred feet

SILURIAN AND DEVONIAN / ORDOVICIAN

Lower Ordovician to Lower Devonian

DSOr

Road River Formation
Dark-gray graptolitic shale with lesser amounts of grayish-black laminated chert and very minor dark-gray limestone, greenish-gray dolomite, chert arenite, and conglomerate. Chert, chert arenite, and chert conglomerate occur mainly in basal part of formation. Graptolites indicate that most series of the Ordovician and Silurian are represented, and that the youngest rocks are Early Devonian (pre-Emsian). Thickness 400 to 900 feet. See reports by Churkin (1966) and Churkin and Brabb (1965a, 1967)

DISCONFORMITY

CAMBRIAN

Lower Cambrian to Lower Ordovician

O€h

Hillard Limestone
Very fine to medium-grained pale-yellowish-brown limestone. Laminated to very thick bedded, shaly to massive parting. Has interbeds of edgewise limestone conglomerate, oolitic limestone, and sandy limestone. Minor dolomite, grayish-black chert, dark-gray fissile shale and siltstone, and a basal limestone boulder conglomerate. Fossils, especially trilobites and brachiopods, are common. Age, Early, Middle, and Late Cambrian and (near Tatonduk River) earliest Ordovician. Thickness 100 to 500 feet. See reports by Brabb (1967) and Palmer (1968)

O€j

Jones Ridge Limestone
Lower 2,000 feet of lower member is mainly very light gray, massive limestone and dolomite. Extensively silicified and commonly oolitic, pisolitic, and laminated. Upper 940 feet of lower member is pale-yellowish-brown, very fine grained, thin- to thick-bedded limestone. Upper member 60 feet thick is pale-yellowish-brown thick-bedded bioclastic limestone.
Lower member has archaeocyathids of Early Cambrian age and trilobites and other fossils of Late Cambrian and Early Ordovician age. Upper member has rich fauna of Middle or Late Ordovician age. Age of Jones Ridge is therefore considered to be Early Cambrian to Middle or Late Ordovician. Total thickness about 3,000 feet. Named and described by Brabb (1967). Fossils described by Palmer (1968) and Ross and Dutro (1966)

Lower Cambrian

€a

Adams Argillite
Light-olive-gray argillite, siltstone, and cross-laminated quartzite. Worm(?) burrows occur in quartzite; Oldhamia (see Churkin and Brabb, 1965b) in argillite. Oolitic and sandy limestone near base has archaeocyathids, and trilobites of Early Cambrian age (Palmer, 1968). Thickness 300 to 600 feet. Named and described by Brabb (1967)

€f

Funnel Creek Limestone
Light-gray fine- to medium-grained laminated limestone and dolomite. Extensively silicified and commonly oolitic. Forms massive cliffs. Non-fossiliferous. Thickness 50 to approximately 1,300 feet. Named and described by Brabb (1967)

PRECAMBRIAN

Upper Precambrian — Tindir Group

ls

Limestone
Dark-gray and brownish-black laminated limestone with platy and slabby parting. Has interbeds of greenish-gray shale, siltstone, and sandstone, and minor pale-yellowish-brown sandy and gritty limestone, light-gray dolomite, and chert-carbonate gritstone. Thickness approximately 500 to 1,500 feet. Unit A of Mertie (1933, p. 370)

UNCONFORMITY(?)

ss

Dolomitic sandstone and shale
Mainly light-gray thin- to medium-bedded sandstone (doloarenite) and olive-gray shale. Minor gritstone and conglomerate. Doloarenite composed mostly of rounded dolomite grains with subordinate chert and quartz grains. Cross-laminations common. Weathers very pale orange and resembles crystalline dolomite at a distance. Gritstone and conglomerate composed mostly of dolomite and chert clasts and some granules, pebbles, and cobbles of granitic, volcanic, and metamorphic rocks. Maximum thickness about 2,400 feet. Unit B of Mertie (1933, p. 372)

br

Basalt and red beds
Dark-greenish-gray basalt, commonly amygdaloidal and with pillow structures. Feldspar and pyroxene mainly unaltered but at a few localities they are chloritized, and the rock is a greenstone. Minor basaltic tuff with pebbles and cobbles of basalt. Red beds mostly grayish-red shale and siliceous shale. Minor greenish-gray shale and siliceous shale, jasper, greenstone-dolomite conglomerate, hematitic doloarenite, and vitric tuff and lava largely replaced by hematite and carbonate. Thickness 300 to at least 2,500 feet. Units C, D, and part of G of Mertie (1933)

ds, dsl

Dolomite and shale
Light- to medium-gray laminated dolomite and grayish-black shale. Minor chert, doloarenite, and dolomite-chert gritstone. The dolomite weathers very pale orange and is cut by diabase dikes. Thickness about 3,000 feet. Part of units E, F, and G of Mertie (1933)
dsl; *medium-gray stromatolite-bearing limestone with slabby and massive parting. Seems to be a lentil within the dolomite and shale unit. Thickness approximately 100 to 500 feet. Part of Unit F of Mertie (1933)*

sh

Shale
Grayish-black carbonaceous shale with minor interbeds of quartzite, dark-gray limestone, oolitic limestone, laminated dolomite, massive dolomite, and dolomite conglomerate. Cut by diabase dikes. Shale is a few thousand feet thick. Part of units E, F, and G of Mertie (1933)

p€t

Tindir Group, undivided
Mainly dolomite and shale

STRATIGRAPHIC POSITION UNCERTAIN

UPPER PALEOZOIC

Pza, Pzl

Argillite
Dark-gray argillite and chert with minor interbeds of sandstone (chert and quartz arenite) and chert-pebble conglomerate. Contains goniatites of late Paleozoic age near intersection of Wood and Black Rivers. May include some Precambrian and Mesozoic rocks. The argillite is probably several thousand feet thick
Pzl; *limestone and dolomite. Contains a few poorly preserved brachiopods. Few hundred feet thick*

Pzc

Circle Volcanics
Dark-greenish-gray basalt, diabase, and gabbro. Minor interbedded chert, quartzite, and argillite. Nonfossiliferous but considered Early Mississippian by Mertie (1930) based on correlation with a sparsely fossiliferous volcanic sequence near Rampart, about 175 miles west of the Charley River quadrangle. Marvin A. Lanphere [of the U.S. Geological Survey] (written commun., 1968) obtained a minimum potassium-argon date of about 220 million years for an intrusive(?) rock within the Circle Volcanics and a minimum date of about 200 million years for a similar intrusive(?) within the volcanic sequence near Rampart indicating that these volcanic rocks could be as young as Triassic. Pending further study, the Circle Volcanics are here considered provisionally to be of late Paleozoic age

DEVONIAN

Middle Devonian

Dwv, Dwd, Dwl, Dws

Woodchopper Volcanics
Mostly dark-greenish-gray spilitic basalt and lapilli tuff. Amygdules and pillow structures common. Minor thin interbeds(?) of shale, chert, sandstone, siltstone, limestone, and dolomite. Probably a few thousand feet thick. Age uncertain
Dwd; *dark-gray laminated dolomite with minor interbeds of chert. Age uncertain. Probably several hundred feet thick*
Dwl; *dark-gray bioclastic limestone with brachiopods, corals, and other fossils of Middle Devonian age. The relation of the limestone to the volcanic rocks is uncertain. The limestone is a few hundred feet thick*
Dws; *dark-gray laminated shale with minor interbeds of limestone. Age uncertain. The shale is several hundred feet thick*

PRECAMBRIAN(?)

p€d

Dolomite
Light-gray laminated dolomite. Chert laminae common. Minor dolomite-cobble conglomerate, sandy dolomite, laminated limestone, sandy limestone, shale, argillite, and quartzite. Probably Precambrian but could be Paleozoic. Few thousand feet thick

p€v

Volcanic rocks
Amygdaloidal basalt flows, pillow lavas, tuff breccia, tuff, and minor interbeds of dolomite, limestone, chert, argillite, and quartzite. Probably Precambrian but could be Paleozoic. Few thousand feet thick

p€u

Sedimentary rocks, undivided
Dark-gray laminated limestone and sandy limestone; olive-gray and grayish-red shale, argillite, and phyllitic argillite; chert, chert-gritstone, and quartzite; and laminated dolomite. Includes a diabase dike along Edwards Creek. Probably Precambrian but may be Paleozoic. Few thousand feet thick

SOUTH OF TINTINA FAULT ZONE

MESOZOIC(?)

Mza

Adamellite
Medium- to coarse-grained adamellite. Biotite is chief accessory mineral. Hornblende less abundant. Muscovite and garnet occur locally. Adamellite has zenoliths of schist and is cut by aplite dikes. The adamellite forms generally structureless bodies discordant with surrounding schist, but in some places the adamellite seems to grade into quartz biotite gneiss

AGE RELATIONSHIPS UNCERTAIN

PRECAMBRIAN(?) AND PALEOZOIC(?)

gn

Gneiss
Quartz-plagioclase-biotite or muscovite gneiss

sp

Serpentine
Greenish-black antigorite

ms

Mica schist
Mostly quartz-plagioclase-biotite or muscovite schist. Includes a few beds of white marble as much as 25 feet thick. The schist has thin interlayers of, or is closely associated with amphibolite that has the chemical composition of basalt. Chlorite is a common constituent in all of the rocks, Garnet, andalusite, and staurolite occur locally, particularly near the adamellite. The unit is probably a sandstone or graywacke sequence with interbeds of limestone, shale, tuffaceous sedimentary rock and basalt that has been regionally metamorphosed

ph

Phyllite
Mainly fine-grained grayish-black and grayish-green phyllite. Minor massive dark-gray chert and stretched pebble-conglomerate. The unit was originally a carbonaceous and siliceous shale with a few interbeds of chert and chert-pebble conglomerate

gs, gsi

Greenstone
Fine-grained massive greenish-gray greenstone composed mostly of amphibole, plagioclase, chlorite, epidote, and minor quartz. Chemical analyses indicate that the rock was originally a basalt. At a few localities the greenstone is well foliated
gsi; *coarse-grained massive greenstone similar in composition to the fine-grained greenstone. Represents basic intrusive rocks that were regionally metamorphosed*

Contact, approximately located

Fault
Dashed where approximately located; dotted where concealed. U, upthrown side; D, downthrown side

Fault zone
Inferred and approximately located; concealed beneath sedimentary rocks and alluvium

FOLDS

Anticline showing trace of axial plane and plunge of axis

Syncline showing trace of axial plane and plunge of axis

Plunge of minor anticline

Plunge of minor syncline

BEDDING

Field measurement — Photogeologic interpretation or distant measurement from helicopter

Strike and dip of beds

Strike of vertical beds

Strike and dip of overturned beds

Horizontal beds

FOLIATION

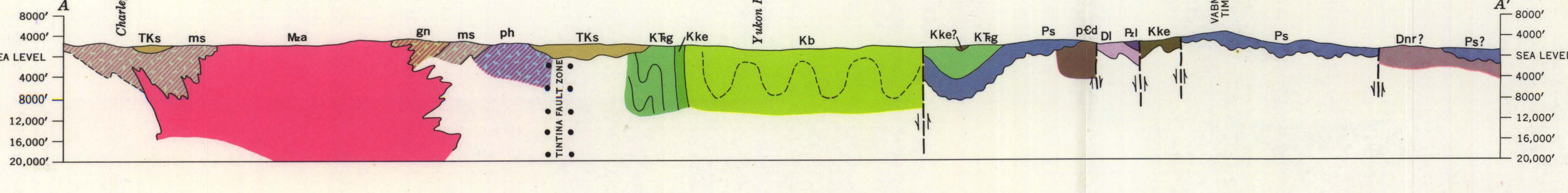
Field measurement — Photogeologic interpretation or distant measurement from helicopter

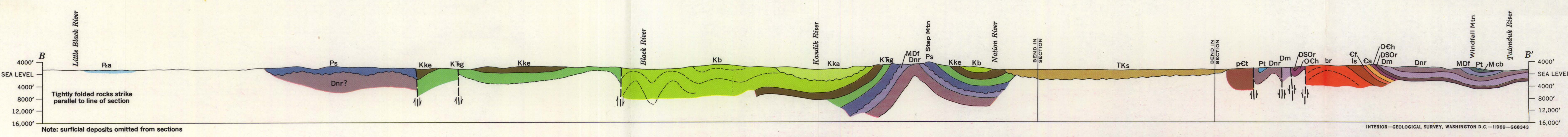
Strike and dip of foliation

Strike of vertical foliation

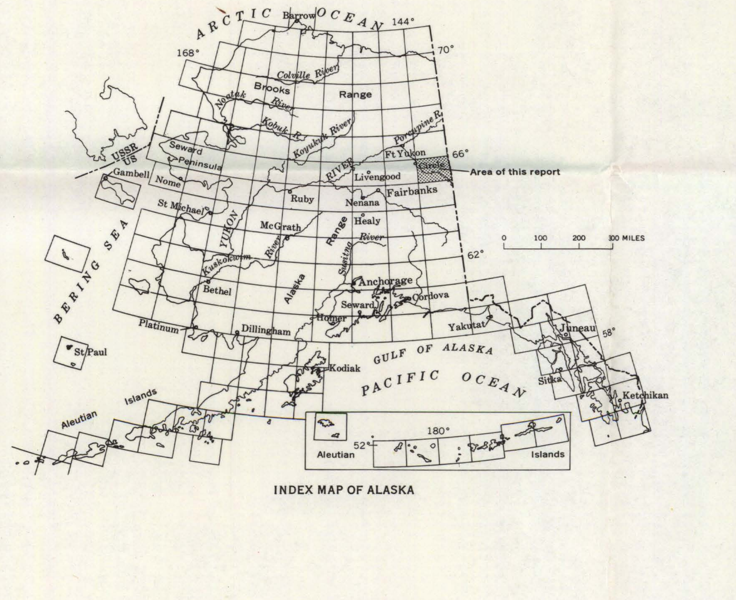
Horizontal foliation

Identification of fossils
(Identification and age of fossils by geologists in the U.S. Geological Survey, unless otherwise noted)
J. M. Berdan (Ordovician, Silurian, and Devonian ostracods)
H. R. Bergquist (Mesozoic foraminifers)
W. B. N. Berry (Ordovician and Silurian graptolites)
Michael Churkin, Jr. (Ordovician, Silurian and Devonian graptolites, tentaculitids and phyllocarid crustaceans; Cambrian trace fossils)
P. E. Cloud, Jr. (Cambrian trace fossils)
D. H. Dunkle, U.S. National Museum (Devonian fish)
H. M. Duncan (Devonian bryozoa)
J. T. Dutro, Jr. (Devonian brachiopods)
Mackenzie Gordon, Jr. (Paleozoic cephalopods)
J. W. Huddle (Ordovician and Devonian conodonts)
R. E. Grant (Permian brachiopods)
R. W. Imlay (Jurassic pelecypods)
D. L. Jones (Cretaceous mollusks)
S. H. Mamay (Paleozoic plants)
W. A. Oliver, Jr. (Ordovician and Devonian corals)
A. R. Ormiston, Harvard College (Devonian trilobites)
A. R. Palmer (Cambrian trilobites, brachiopods and archaeocyathids)
John Pojeta, Jr. (Paleozoic pelecypods)
R. J. Ross, Jr. (Ordovician and Silurian trilobites, brachiopods and graptolites)
R. A. Scott (Phanerozoic spores and pollen)
N. J. Silberling (Triassic mollusks)
I. G. Sohn (Carboniferous conodonts)
R. H. Tschudy (Cretaceous spores and pollen)
J. A. Wolfe (Cretaceous and Tertiary plants)
E. L. Yochelson (Paleozoic gastropods)

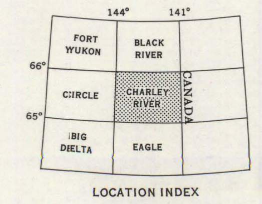




Note: surficial deposits omitted from sections



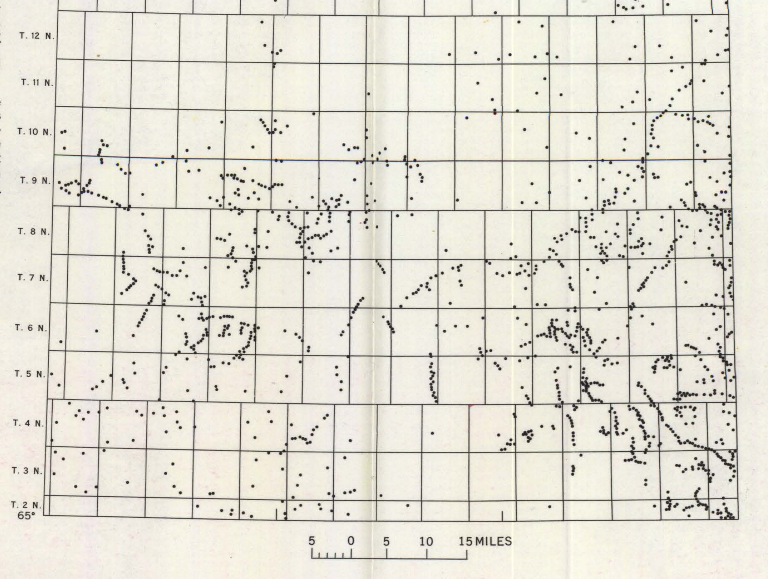
INDEX MAP OF ALASKA



LOCATION INDEX

INDEX MAP OF CHARLEY RIVER QUADRANGLE SHOWING LOCATION OF FIELD OBSERVATION POINTS

Bedrock contacts and structures have been extended between field stations by aerial reconnaissance and by interpretation of aerial photographs. The surficial deposits, which cover about one-third of the quadrangle, have been mapped mostly from aerial photographs.



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INTERIOR—GEOLOGICAL SURVEY, WASHINGTON D.C.—1969—G68343

GEOLOGIC MAP OF THE CHARLEY RIVER QUADRANGLE, EAST-CENTRAL ALASKA

By
Earl E. Brabb and Michael Churkin, Jr.

1969

For sale by U.S. Geological Survey, price $1.00