

GEOLOGIC MAP OF THE CENTRAL PART OF THE NORTHERN PARK RANGE,
JACKSON AND ROUTT COUNTIES, COLORADO

DESCRIPTION OF MAP UNITS

QUATERNARY DEPOSITS

(Resistant Precambrian lithologies dominate the clasts of all Quaternary deposits. Alluvial gravel clasts are well-rounded, vary from fine sand to boulder size, generally with a frequency peak in the pebble to cobble size range. Alluvial gravel deposits vary in thickness from a few feet to several tens of feet, possibly over 100 feet (30 m) in the larger valleys where the base of the deposits is not exposed. Progressively higher alluvial gravels show progressively more extensive weathering profiles (R. F. Madole, oral communication) and are covered locally with aeolian silt. Tills and other slope deposits contain angular to subrounded clasts that vary from clay size to boulders as large as 15 ft (5 m) in diameter; sorting is much poorer than in the alluvial gravels. Deposits of till exceed 200 ft (61 m) thickness under some morainal crests. Colluvium, ubiquitous but generally thin, is omitted as a map unit. No Quaternary deposits shown on sections.)

Qal ALLUVIUM (HOLOCENE)--Flood plain sand and gravel deposits and bouldery alluvial fans. May include older gravels in mountain basins

Qr ROCK GLACIER DEPOSIT (HOLOCENE)--Lipped and flow-form boulder deposit below cliffs, generally without soil or significant vegetation; includes talus in upper parts and protalus ramparts in lower parts of smaller bodies

Ql LANDSLIDE DEPOSIT (HOLOCENE AND PLEISTOCENE)--Jumbled rock and soil debris; includes unjumbled block slide deposit in southeast corner of map; all soled in Morrison Formation

Qt TALUS DEPOSIT (HOLOCENE)--Angular rock fragments in smooth aprons beneath cliffs

(Qge)
Qee TERRACE GRAVEL (HOLOCENE)--Gravel in terraces 0-10 ft (0-3 m) above modern flood plains

Qte CIRQUE AND UPLAND MORaine (HOLOCENE)--Inactive hummocky bouldery till with vegetation located below active rock glaciers or on uplands; may include some older till

(Qgd)
Qcd TERRACE GRAVEL (PLEISTOCENE)--Gravel in terraces 11-60 ft (3-18 m) above modern flood plains; includes Qg₃ of Hail (1965, 1968) on east side of range

Qtd TILL (PLEISTOCENE)--Hummocky, bouldery till with closed depressions and sharp lateral moraines; includes Qt₃ of Hail (1965, 1968) on east side of range

(Qgc)
Qcc TERRACE GRAVEL (PLEISTOCENE)--Gravel in terraces 61-100 ft (19-30 m) above modern flood plains; includes Qg₂ of Hail (1965, 1968) on east side of range

Kd DAKOTA SANDSTONE (LOWER CRETACEOUS)--Buff siliceous sandstone and quartz-pebble conglomerate; minor gray shale; 200-400 ft (61-122 m) thick

Jm MORRISON FORMATION (UPPER JURASSIC)--Calcareous purple and green shale and claystone, greenish white sandstone, gray algal limestone; local petrified wood. 500-900 ft (152-274 m) thick (may be tectonically thinned or thickened locally)

Js SUNDANCE FORMATION (UPPER JURASSIC)--Poorly exposed olive gray calcareous shale and sandstone and gray glauconitic oolitic limestone with belemnites, molluscs, and foraminifera in upper part; ledge-forming yellow to salmon-pink sandstone in lower part; one-pebble-thick chert-pebble-conglomerate at base. 100-250 ft (30-76 m) thick

Trc CHINLE FORMATION (TRIASSIC)--Thick-bedded red calcareous siltstone in upper part; reddish gray wavy-bedded limestone and pliable ocher to red clay in middle part; resistant red calcareous claystone-pebble conglomerate and impure sandstone (Jelm equivalent of Wyoming) in lower part; mapped only where Jelm equivalent well exposed. 100-600 ft (30-183 m) thick, may be tectonically thickened in fold troughs

(TrPch)
Trch CHUGWATER FORMATION (TRIASSIC AND PERMIAN(?))--Red calcareous siltstone and shale; contains 5 percent quartz pebbles in lower half. 400-800 ft (122-244 m) thick, may be tectonically thickened in fold troughs

TrPc CHINLE AND CHUGWATER FORMATIONS, UNDIFFERENTIATED (TRIASSIC AND PERMIAN(?))--Red calcareous siltstone and shale

(Pfs)
RPfs FORELLE LIMESTONE AND SATANKA FORMATION, UNDIFFERENTIATED (PERMIAN)--Interbedded gray to black crystalline limestone, commonly containing 10 to 50 percent quartz pebbles in a groundmass of complexly intergrown secondary calcite crystals as much as 1/2 cm in diameter, and red and green calcareous shale. 0-50 ft (0-15 m) thick (locally exaggerated on map)

PRECAMBRIAN ROCKS

(Yxp)
Ycp PEGMATITE (PRECAMBRIAN Y AND X)--Generally small (only larger bodies mapped) coarse-grained bodies of granitic composition that were emplaced over a long span of geologic time. Age ranges from pegmatites cut by 1.7-b.y.-old quartz monzonite (Xb) of Buffalo Mountain to pegmatites dilating the younger members of the 1.4-b.y.-old Mount Ethel pluton

ROCKS OF THE MOUNT ETHEL PLUTON

Unsheared post metamorphic intrusive rocks dated by Rb/Sr whole rock isochron of rocks throughout pluton at 1.4 b.y. (Carl E. Hedge, written communication, 1972)

(Yd)
Ycd GRANODIORITE AND DIORITE (PRECAMBRIAN Y)--Dark gray medium-grained hornblende-biotite granodiorite and diorite

Qtc TILL (PLEISTOCENE)--Smooth surfaced till, less bouldery than Qtd; only remnants of lateral and terminal moraines are preserved, generally within or at mouths of canyons just beyond limit of Qtd; includes Qt₂ of Hail (1965, 1968) on east side of range

Qgb TERRACE GRAVEL (PLEISTOCENE)--Alluvial gravel in terraces 101-250 ft (31-76 m) above modern flood plains; may not be correlative with Qtb

Qtb TILL? (PLEISTOCENE)--Interfluve till(?), till(?) beyond Qtc terminal moraines, and diamicton of uncertain origin; includes Qt₁ of Hail (1965, 1968) on east side of range

Qga TERRACE GRAVEL (PLEISTOCENE)--Alluvial gravel in terraces 251-->360 ft (77-->110 m) above modern flood plains

Qf FELSENMEER DEPOSIT (PLEISTOCENE?)--Thin rock field on high mountain pre-canyon surfaces

FOR 1s
READ
QTls (1s)
(Rt1s) LIMESTONE of mixed origin and age--White limestone in massive unbedded deposits, clastic dikes, or limestone-cemented Precambrian breccia. Most limestone has probably been redeposited by ground water near the base of the Browns Park Formation; some may be hot spring tufa

TERTIARY ROCKS

Ta SILICIC INTRUSIVE PORPHYRY (MIOCENE)--Light gray feldspar-quartz-biotite porphyry intrusive of trachyandesite to quartz latite composition

(Yb)
Yfb COARSE-GRAINED QUARTZ MONZONITE (PRECAMBRIAN Y)--Red coarse-grained biotite-hornblende quartz monzonite containing large microcline phenocrysts

(Yq)
Yfq MEDIUM-GRAINED GRANITE AND QUARTZ MONZONITE (PRECAMBRIAN Y)--Gray variable but mainly medium-grained biotite granite and biotite quartz monzonite

(Yg)
Yfg FINE-GRAINED GRANITE (PRECAMBRIAN Y)--Pink fine-grained binary granite

(Ya)
Yca APLITE (PRECAMBRIAN Y)--Pink aplite and leucogranite

(Yp)
Ycp PORPHYRY DIKE (PRECAMBRIAN Y)--Light gray to black, fine-grained to diabasic and porphyritic dikes of silicic, intermediate, and mafic composition; form tabular sheets generally 5-30 ft (1.5-9 m), in one case 100 yards (91 m), thick; includes intrusives that span the age of unit Yq, as some Yp dikes cut Yq and other Yp dikes are cut by Yq. Distinguished from Tertiary dikes by altered groundmasses, total lack of pyroxene or olivine (mafic mainly hornblende)

OLDER METAINTRUSIVE ROCKS

(Xb)
Ycb QUARTZ MONZONITE (PRECAMBRIAN X)--Red medium- and coarse-grained biotite-hornblende quartz monzonite augen gneiss of Buffalo Mountain. Sheared synkinematic intrusive rocks dated, in Buffalo Mountain area, by Rb/Sr whole rock techniques at 1.7 b.y. by Carl E. Hedge (written communication, 1972)

Tb MAFIC DIKE (MIOCENE)--Dense blue-black olivine-bearing dike of trachybasalt to dark latite (Rittmann, 1952) composition

Tbp BROWNS PARK FORMATION (MIOCENE)--Mainly buff calcareous to noncalcareous, silt to siltstone, sand to sandstone, and gravel to conglomerate, of alluvial, colluvial, and aeolian origin; rare undisturbed ash beds. Conglomerate pebbles and cobbles predominantly Precambrian rock, 1-5 percent altered pumice or ash-bed fragments, local clasts of resistant Mesozoic rocks. 300-500 ft (91-152 m) exposed. Equivalent to North Park Formation; may include cover of oldest till

Tc COALMONT FORMATION (EOCENE AND PALEOCENE)--Buff to gray noncalcareous arkosic sandstone and conglomerate; 150 ft (46 m) exposed

MESOZOIC AND PALEOZOIC ROCKS

Kpsh PIERRE SHALE (UPPER CRETACEOUS)--Gray shale, noncalcareous except near base; 700 ft (213 m) exposed

Kn NIOBRARA FORMATION (UPPER CRETACEOUS)--Blue-gray, calcareous, platy, white-spotted shale with locally abundant Inoceramus and oyster fossils; 600-700 ft (183-213 m) thick

Kb BENTON SHALE (UPPER AND LOWER CRETACEOUS)--Gray petroliferous calcarenite coquina in upper part; nonresistant noncalcareous black shale near middle; hard siliceous black shale with abundant chirocentrid fish scales at base; 100-550 ft (30-168 m) thick

(Xmg)
Ycmg MEDIUM-GRAINED QUARTZ MONZONITE AND GRANITE (PRECAMBRIAN X)--Gray medium-grained biotite quartz monzonite and granite (only larger bodies mapped); probably a textural phase of Xb

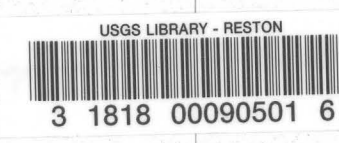
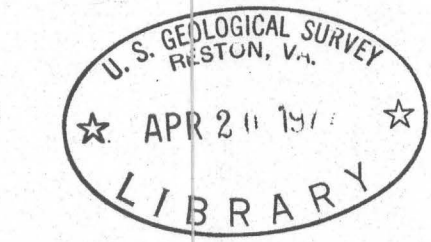
(Xgl)
Yfgl QUARTZ DIORITE (PRECAMBRIAN X)--Medium-grained speckled biotite-hornblende quartz diorite of Gilpin Lake; gradational with 1.7 b.y. granodiorite north of this area

(Xmp)
Ycmf MAFIC AND ULTRAMAFIC INTRUSIVES (PRECAMBRIAN X)--Dark mafic and ultramafic intrusive rocks; includes ophitic hypersthene gabbro, peridotite, dunite, hornblendite (only larger bodies mapped). Partly serpentinized coronitic dunite on hill east of Wapiti Ranch weathers to distinctive beet red soil

METASEDIMENTARY AND METAVOLCANIC ROCKS

Layered metamorphic rocks of sillimanite grade but of uncertain stratigraphic sequence due to lack of top and bottom criteria. Lithologies below listed in order of abundance, most abundant first; within lithologic descriptions minerals are listed in order of abundance, most abundant first

(Xcn)
Ycgn FELSIC GNEISS TO AMPHIBOLITE METAVOLCANICS (PRECAMBRIAN X)--Mainly strongly to faintly layered pink to gray plagioclase-quartz-biotite gneiss, plagioclase-quartz-biotite-hornblende gneiss, and many varieties of felsic to mafic green amphibolite. Includes plagioclase-quartz-biotite-magnetite streaky gneiss, plagioclase-quartz-biotite-garnet gneiss, biotite schist, very rare feldspathic quartzite, and small lenses of all other Precambrian rocks not otherwise mapped



Colorado (Northern Park Range)
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