AREAL GEOLOGY

U. S. GEOLOGICAL SURVEY
GEORGE OTIS SMITH, DIRECTOR.

COLORADO
MANITOU QUADRANGLE

LEGEND

SEDIMENTARY ROCKS
(continued)

- Om — Manitou limestone *(red to gray limestone)* — ORDOVICIAN
- Cs — Sawatch sandstone *(white quartzose to reddish calcareous sandstone)* — CAMBRIAN

IGNEOUS ROCKS
(Areas of igneous rocks are shown by patterns of triangles and rhombs)

- Ph — Phonolite *(dense, fine-grained, dark gray to brownish-gray rock)* — TERTIARY
- Sy — Syenitic dikes *(dense, black, aphanitic rock)*
- Pt — Pegmatite dikes *(coarse feldspar, quartz, and numerous accessory minerals)*
- mrg — Mount Rosa granite *(fine-grained gray amphibole granite in masses, dikes, and sheets)*
- wpg — Windy Point granite *(brownish-red biotite granite)*
- ccg — Cripple Creek granite *(pink biotite granite and fine-grained micaceous dikes)*
- PPg — Pikes Peak granite *(coarse pink biotite granite)* — PRE-CAMBRIAN

Faults

Concealed faults *(covered by younger deposits)*

40° Strike and dip of stratified rocks

* *Coal mines and limestone quarries*

× *Metalliferous prospects, unproductive*

Economic note. Workable coal beds occur in the Laramie formation; the Niobrara formation is suitable for the manufacture of cement; building stone can be obtained from the Dakota and Sawatch sandstones and from the various granites; lime from Manitou limestone and Niobrara formation; gypsum from Lykins formation; clay for brick from the Pierre shale; and sand and gravel from the mesa gravels. Minerals used as semi-precious stones or of value to collectors, including microcline (amazon-stone), topaz, smoky quartz, and phenacite, occur in the Pikes Peak granite in Crystal Park and vicinity, southwest of Manitou.

LEGEND

SEDIMENTARY ROCKS
(Areas of subaqueous deposits are shown by patterns of parallel lines, subaerial deposits by patterns of dots and circles)

- Qal / Qt — Alluvium and talus *(only larger areas shown)*
- Qls — Landslide *(small mass on south slope of Cow Mountain)*
- Qtg — Terraced stream gravels
- Qmg — Mesa gravels *(rock from the mountain slopes, in part equivalent to Nussbaum formation)* — Pleistocene — QUATERNARY
- Qgd — Glacial drift *(chiefly beyond moraines of local valley glaciers)*
- sd — Sandstone dikes in Pikes Peak Granite *(along or closely associated with fault planes)*
- Td / Tds — Dawson arkose *(conglomerate, sandstone, and shale, with andesitic sandstone member, Tds, at the base)* — Eocene — TERTIARY

UNCONFORMITY

- Kl — Laramie formation *(white quartz sandstone, black clay shale, and coal beds)*
- Kfh — Fox Hills sandstone *(friable greenish and brownish quartz sandstone)*
- Kp — Pierre shale *(dark clay shale containing limestone concretions)* — Montana group — Upper Cretaceous — Colorado group
- Kn — Niobrara formation *(lower part bluish-gray limestone mapped in some areas as Timpas limestone, and upper part bluish-black calcareous shale, mapped in some areas as Apishapa shale)*
- Kcr — Carlile shale *(black clay shale with thin, yellow sandstone at top)*
- Kgn — Greenhorn limestone *(light bluish-gray limestone with thin calcareous shale partings)*
- Kgs — Graneros shale *(dark-gray clay shale)* — Equivalent to Benton shale elsewhere
- Kd — Dakota sandstone *(light-colored coarse-bedded quartz sandstone)* — CRETACEOUS

UNCONFORMITY

- Kfp / Kly — Purgatoire formation *(Lytle sandstone member, Kly, sandstone with intercalated grit and shale; Glencairn shale member, Kg, dark shale with a little sandstone)* — Lower Cretaceous

- Km — Morrison formation *(green to maroon shale with some sandstone and thin limestone)* — JURASSIC OR CRETACEOUS

UNCONFORMITY

- Cl — Lykins formation *(thin-bedded red sandstone and shale, with gypsum at top)* — Permian? — Permian
- Cly — Lyons sandstone *(brick-red and white sandstone)*
- Cf / Cfe — Fountain formation with Glen Eyrie shale member *(arkose, conglomerate, sandstone, shale, and Glen Eyrie shale member, Cfe, composed of sandy shale and sandstone)* — Pennsylvanian — CARBONIFEROUS

UNCONFORMITY

Legend to be continued on the left margin.

105°05' 45" R. 69 W. — 105°00' R. 68 W. — R. 67 W. — R. 66 W. 104° 47' 30" — 38° 54' — T. 13 S. — T. 14 S. — T. 15 S. — 38° 43' 30"

E. M. Douglas and E. C. Barnard, Geographers in charge.
Topography by R. T. Evans, D. F. C. Moor, and H. R. Elliott.
Control by Coast and Geodetic Survey.
Surveyed in 1906-1907.

Geology by George I. Finlay.
Surveyed in 1906-1912.

APPROXIMATE MEAN DECLINATION 1907.

Scale 1/18000

1 0 1 2 3 4 Miles

1 1/2 0 1 2 3 4 5 Kilometers

Contour interval 50 feet.
Datum is mean sea level.
Edition of April 1915.

DIAGRAM OF QUADRANGLES.

MANITOU
COLORADO SPRINGS