

LEGEND
(continued)

IGNEOUS ROCKS
Sequence not fully known
(Areas of igneous rocks are shown by patterns of triangles and rhombs)

- Tva**
Volcanic ash
(white and buff unconsolidated silty material)
- Ta**
Andesitic extrusive rocks
(chiefly tufts of coarse to medium facies, some near western margin of quadrangle)
- Tgc**
Porphyritic muscovite-biotite granite
- Tpbg**
Porphyritic biotite granite
- Tgdl**
Acidic granodiorite
(fresh quartz contains hornblende locally; fingers out into granodiorite porphyry)
- Tg**
Nonporphyritic muscovite-biotite granite
- Tbg**
Nonporphyritic biotite granite
(contains a little muscovite; plagioclase is oligoclase; chloritoid is absent and tourmaline is present; chloritoid is abundant and chiefly andesine)
- Tgd**
Medium and basic granodiorite
(hornblende and biotite usually nearly equal in quantity; includes some diorite and some decomposed porphyritic diorite)
- Tbd**
Basic diorite
(dark rocks of fine to medium grain, with more or less plagioclase hornblende)
- Tad**
Acidic diorite
(quartz-mica diorite, coarse grained, largely granitic, with characteristic hornblende)

bs
Basic sills
(see partly altered to quartzite in quartzite and other altered rocks in Cretaceous sediments)

Fault
Fault
(by surficial deposits)

Inverted fault
Inverted fault
(thrown side of drop fault west side of thrust fault and dip of stratified rocks and overturned dip of vertical strata and dip of cleavage of vertical strata)

and names of mines are in the topographic map

Approximate mean declination 1905.

Scale 1:50,000

Contour interval 100 feet.

Datum is mean sea level.

A later level adjustment shows the elevations on this sheet to be 42 feet too high.

2500 feet above sea level

2500 feet above sea level

2500 feet above sea level

2500 feet above sea level

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2500 feet above sea level

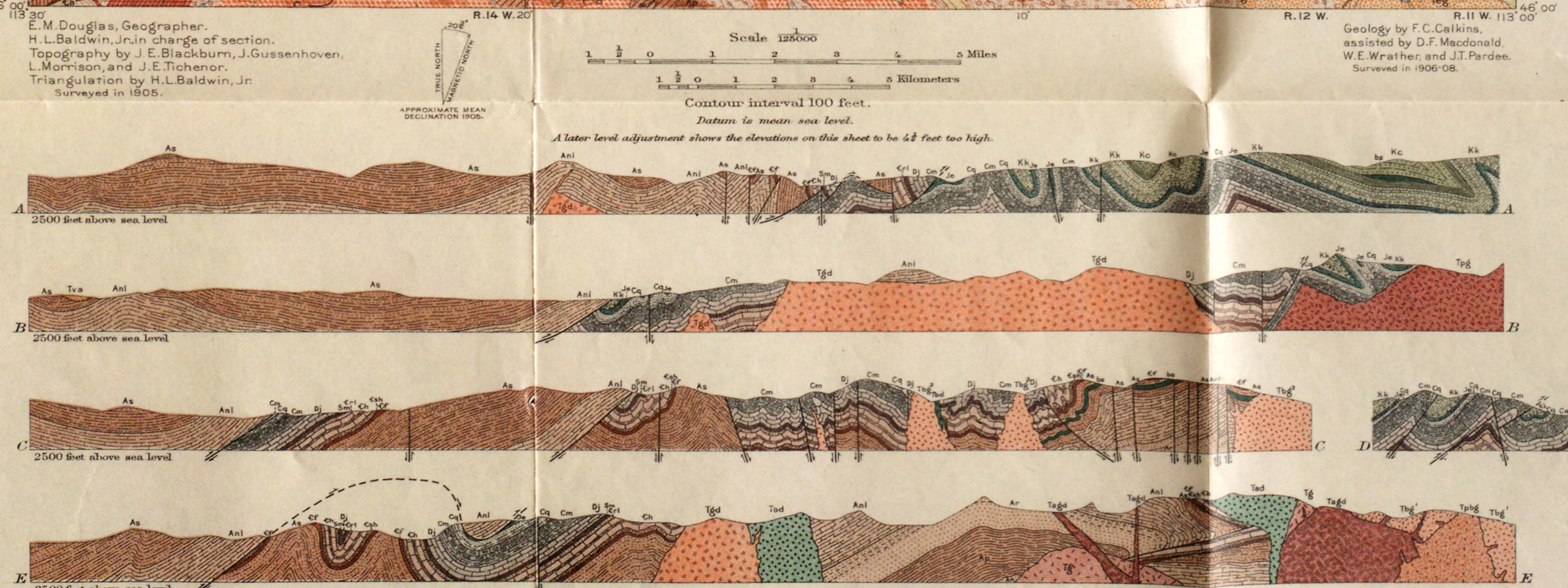
2500 feet above sea level

2500 feet above sea level

2500 feet above sea level



- SEDIMENTARY ROCKS**
(Areas of unconsolidated deposits are shown by patterns of small lines, scattered deposits by patterns of dots and circles; metamorphism is indicated by hachures combined with the line patterns)
- Recent**
Qal
Alluvium
(water-laid deposits on valley bottoms and low terraces)
 - Quaternary and Tertiary**
Qm
Moraines
(earlier and later moraines not distinguished)
 - Quaternary and Tertiary**
QTg
Later terrace gravels
(gravel capping high terraces)
 - Tertiary**
Teg
Earlier gravels
(somewhat consolidated and deformed, probably of two or more terraces)
 - Upper Cretaceous**
UNCONFORMITY
Kc
Colorado formation
(black shale overlain by gray sandstone with subordinate shale possibly including limestone formation in part)
 - Lower Cretaceous**
UNCONFORMITY
Kk
Kootenai formation
(chiefly red and green shale and sandstone, some limestone, local conglomerate in most places)
 - Jurassic**
UNCONFORMITY
Je
Ellis formation
(chiefly buff weathering calcareous shales and sandstones and impure limestone conglomerate near middle)
 - Permian**
UNCONFORMITY
Cq
Quadrant formation
(upper part mostly quartzite; lower part mainly reddish magnesian limestone and deep red shale)
 - Carboniferous**
UNCONFORMITY
Cm
Madison limestone
(upper part dark bedded white and gray; lower part dark gray and flaggy; chert abundant; fossils conspicuous)
 - Devonian**
Dj
Jefferson limestone
(white to black magnesian limestone with little chert; fossils usually monoplacoid)
 - Silurian?**
Sm
Maywood formation
(red, gray, and dark shales and flaggy magnesian limestone; calcareous near base)
 - Devonian**
UNCONFORMITY
Ch
Red Lion formation
(massive limestone with locally special thin siliceous laminae; calcareous shale at base)
 - Cambrian**
Csh
Hasmark formation
(upper part dark calcareous shale, locally weathering in middle white; gray magnesian limestone in lower part)
 - Algonkian**
Cf
Silver Hill formation
(upper part calcareous shale and limestone with siliceous laminae; lower part dark gray, slightly calcareous shale)
 - Algonkian**
UNCONFORMITY
As
Flathead quartzite
(light-colored vitreous quartzite)
 - Algonkian**
Anl
Spokane formation
(mid-crustal and ripple-marked sandstone and shale, prevailing red where unmetamorphosed)
 - Algonkian**
Ar
Newland formation including Greyson(?) shale
(calcareous shales and impure limestone characterized by buff tints on weathered surfaces)
 - Algonkian**
Ap
Ravalli formation
(chiefly gray quartzite sandstone with much dark shale in upper part)
 - Algonkian**
An
Richard formation
(schistose and gneissous, prevailing dark blue-gray, rusty on weathered surfaces, derived from clay shales)
 - Algonkian**
An
Nehalem quartzite
(pure chert bedded light-colored quartzite)



GEOLOGIC MAP AND SECTIONS OF THE PHILIPSBURG QUADRANGLE, MONTANA
1912