Measured section of the Upper Cretaceous Mesaverde Formation and lower part of the lower Tertiary Wasatch Formation, Rifle Gap, Garfield County, Colorado

By

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This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards (and stratigraphic nomenclature).
In the summer of 1978 a section was measured through the nearly vertical exposures of the Mesaverde Formation and lower part of the Wasatch Formation along the Grand Hogback at Rifle Gap on the eastern margin of the Piceance basin. The author was assisted by N. C. Dessenberger, M. P. Granica, and J. H. Whittke. The section starts approximately 50 feet above the Mancos-Mesaverde contact. The contact is below the level of Rifle Gap Reservoir and hence is not exposed. The top of the section is approximately the top of the Molina Member equivalent of the Wasatch Formation as defined by Donnell (1969, fig. 5). Nomenclature for the Mesaverde Formation is adapted from Warner (1964).

The lowest part of the Mesaverde Formation consists of the Corcoran and Cozzette Members (Young, 1955), a heterogeneous unit consisting of marginal marine blanket sandstones, probably distributary channels, marine shales containing oyster beds, carbonaceous shale, and coal. Above the Corcoran-Cozzette interval is a tongue of marine Mancos Shale about 270 feet thick. Overlying the marine tongue of the Mancos is the widespread marginal marine, regressive Rollins Sandstone Member. The Rollins or its equivalent Trout Creek Sandstone Member of the Iles Formation (Warner, 1964) are found throughout most of the Piceance basin. The Cameo-Fairfield coal zone is above the Rollins Member at Rifle Gap. Most of the coals have been clinkered. An unnamed marginal marine sandstone occurs above the Cameo-Fairfield coal zone. The sandstone is apparently found only along the southeastern margin of the basin. Above the unnamed sandstone is another clinkered coal zone about 450 feet thick. The remaining 3,000 feet of Mesaverde is thought to be largely fluvial. This part of the Mesaverde consists of a series of thick hogback-forming sandstone units containing such fluvial features as trough crossbeds, drift ripples, basal ripup zones, and large-scale lateral accretion. Intervals between the hogbacks are poorly exposed, and hence little is known about the lithologies present.

Fluvial Wasatch Formation unconformably overlies the Mesaverde. The well-developed paleoweathering profile found below the unconformity throughout much of the basin is locally absent at Rifle Gap (Hansley and Johnson, 1980). The Wasatch Formation is probably more than 5,000 feet thick in the vicinity of Rifle Gap (Donnell, 1961, p. 846). However, much of the unit is poorly exposed, and only the lower 1,550 feet was measured. The age of the Wasatch in the vicinity of Rifle Gap varies from Paleocene near the base (Gale, 1910) to middle early Eocene or late early Eocene near the top (Wood, 1962). Donnell (1969) subdivided the Wasatch into three members in the southwestern part of the basin and tentatively identified the members further to the east in the vicinity of Rifle Gap. Donnell's subdivisions are used in this report. The Atwell Gulch or oldest member consists of lenticular though crossbedded, conglomeratic sandstones and gray and maroon mudstone. The pebbles are dominantly dark volcanic and shallow intrusive rocks and minor varicolored cherts. A thin chert-pebble conglomerate found just above the unconformity was originally called the Ohio Creek Formation (Donnell, 1961) but was later found not to correlate with the type Ohio Creek (Johnson and May, 1980); hence, it is included in the Atwell Gulch in this report. Overlying the Atwell Gulch is the Molina Member. Unlike the Atwell Gulch, volcanic pebbles are not present in the sandstones. Pebbles consist of reworked sediments such as varicolored chert, quartzite, and limestone, possibly indicating a shift in source area. Molina sandstones are also more resistant and lighter colored than those in the underlying
Atwell Gulch and form a series of resistant hogbacks (Donnell, 1969). The top of the measured section is the top of the Molina.

REFERENCES


Index Map showing sample localities for measured section, Rifle Gap, Colorado.
UNWEATHERED COLOR

Thickness in hundreds of feet

Gray or green
Hatched pattern indicates olive green
LITHOLOGY

Relative resistance to weathering

Offset in section

Covered

Erosional base

Partially covered

clinkers from burning coal

clinkers and breccia

Ash layer from burned coal

Unit thickens and thins along outcrop

Sandstone

Siltstone

Claystone or clay shale

Limestone

Coal

Calcareous or dolomitic

Conglomeratic

Carbonaceous or woody material

Ripup clasts

Lateral accretion in sandstone

Ripups oriented along accretion partings

Claystone clasts cobble size
<table>
<thead>
<tr>
<th>Grain Size</th>
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<tbody>
<tr>
<td>Clay to fine silt</td>
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<tr>
<td>Medium to coarse silt</td>
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<tr>
<td>Very fine sand</td>
</tr>
<tr>
<td>Fine sand</td>
</tr>
<tr>
<td>Medium sand</td>
</tr>
<tr>
<td>Coarse sand</td>
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<tr>
<td>Small pebbles</td>
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</table>
PRIMARY BEDDING FEATURES

▲ Climbing ripples

△ Symmetrical ripples

----- Ripples nonspecific

//////// Medium scale crossbeds (.3-1 m)

\\\\\\ Small scale crossbeds (<.3 m)

--- Subhorizontal laminae

----- Parallel laminae, indistinct

---------- Parallel laminae, distinct

Massive or indistinct laminae

○○○ Lenticular beds

<< Irregular laminae
OTHER FEATURES

Ls. Limestone pebbles
ch+ Chert pebbles
Ø Limestone concretion
çi Bedding features shown are cyclic
Cl in k. Clinker

Gyp Gypsum veinlets
Ø Ammonite
Ø Gastropod
Ø Bivalve
œ Fossil wood
Ø Leaf
ø Root casts

 Branching burrows
× Oblique burrows
|| Horizontal burrows
ï Vertical burrows
ï Burrows nondescriptive

Contorted laminae
ø Dolomite concretion
## Internal Characteristics

<table>
<thead>
<tr>
<th>Primary Bedding Features</th>
<th>Other General Features</th>
<th>Notes</th>
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<tbody>
<tr>
<td>CaCO₃</td>
<td></td>
<td></td>
</tr>
<tr>
<td>λ</td>
<td>fissile</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sharp tip and base</td>
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LIST OF ABBREVIATIONS

abnd-abundant
bdg-bedding
bds-beds
biot-bioturbated
brn-brown
calc-calcareous
carb-carbonaceous
cgl-conglomerate
cht-chert
cly-claystone
conc-concretion
darks-biotite and other dark colored minerals
dia-diameter
frags-fragments
gn-green
gy-gray
gyp-gypsum
hem-hematite
ig-igneous
interbed-interbedded
irreg-irregular
lam-laminated
lent-lenticular
mot-mottled
nods-nodules
olv-olive
oph-Ophiomorpha
org-organic
oyst-oysters
pbls-pebbles
persist-persistent
porc-porcelaneous
poss-possible
prob-probably
ptgs-partings
purp-purple
sh-shale
sl-slightly
silt-siltstone
strigs-stringers
thk-thick
vns-veins
volc-volcanic