ABSTRACT—Three roadcut exposures of Carboniferous (Upper Mississippian-Lower Pennsylvanian) rocks along westbound and eastbound lanes of Interstate 24 on Mount Eagle Mountain in eastern Tennessee are described. The Upper Mississippian Pennsylvanian Formation, tidally flat complex containing red, green, and black shales with thin-bedded, nearshore carbonates as well as orthoquartzitic offshore bars. With localized exceptions, the Mississippian-Pennsylvanian system is of transitional marginal marine to landward. Quartz sandstone, bioclasts, and bioclast-bound sandstone were deposited as braided stream complexes made of partial to complete cycles of sedimentary structures ranging from in-channel basal slumps, trough crossbeds, and cross channel bars through rippled sandflats to vertical accumulations of silts and shales.

In the spring of 1972, Fern et al. (1972) led a field trip to Mount Eagle Mountain, located on the western rim of the Cumberland Plateau in northwestern Marion and southeastern Grundy county in southeastern Tennessee. This 1972 trip was a part of a Carboniferous symposium associated with the Southeastern Section Meeting of the Geological Society of America held in Tuscaloosa, Alabama. On part of this trip, Darrell Bragg and James Eason described roadcuts on eastbound and westbound lanes of Interstate 24 on the east and west sides of Mount Eagle Mountain, respectively. These workers considered Carboniferous rocks located at this area to have formed in marginal marine tidal flat and tidal delta paleoenvironments.

Later, Moore and Bragg (1978) published a geologic map of the Mount Eagle Quadrangle in Tennessee. They mapped Mississippian formations ranging from the St. Louis Limestone through the Pennsylvanian Formation and from the Racoon Mountain Formation through the Whitehall Shale. In a regional sense, rocks of the Pennsylvanian System on the Cumberland Plateau are considered to have pregraded over the Mississippian System with the regional direction of sediment transport located in the southwestern quadrant of the compass.

In 1983, the eastbound lane of Interstate 24 on the east side of Mount Eagle Mountain was re-excavated to alleviate driving hazards. Schematic diagrams of rock exposures have been prepared from extensive Polaroid filmstripes.

DESCRIPTION OF ROADCUT EXPOSURES

Mount Eagle Mountain Roadcut, Westbound Lane, Interstate 24, Upper Mississippian and Lower Pennsylvanian System. The rock record exposed in roadcuts along the westbound lane of Interstate 24 on the east side of Mount Eagle Mountain contains Upper Mississippian and Lower Pennsylvanian sedimentary rocks (Fig. 3). In this area, the Upper Mississippian Pennsylvanian Formation is composed of red, green, and dark gray (siderite-bearing) shales interbedded with scour-filling dolomierite and thin- to thick-bedded fragmental carbonates. Figure 3 shows the Pennsylvanian to be in transitional contact with the overlying lowermost Mississippian Racoon Mountain Formation.

At this site, the Racoon Mountain contains quartz arenite bodies, surrounded by dark gray shale. One of these arenite bodies has a mound-like shape and rests sharply on Pennington limestone. This may be considered as a very local unconformable contact, but eastward of the arenite mound are thin beds of fossiliferous green and red shale plus 0.61 m of red limestone (fossil fragments), all of which grade upward into crossbedding, dark gray shale. This situation likely represents a transitional systematic boundary. At the top of the Racoon Mountain, there is a 30-m-thick coal, interbedded with gray sandstone.

Overlying Pennsylvanian deposits are composed of fine-grain (cycles 1 to 5), fine-grain, upward-coarsening sequences. Largely of quartz arenite sandstone that have been assigned to the Warren Point Sandstone, Signal Point Shale, and Seawave Sandstone stratigraphic units. Cycle 1 shows shallow water filled with structureless sand at the base that are overlain by thin-bedded, rippled sandstone which, in turn, overlain by thin-bedded dark gray shale. Cycle 2 is a repetition of cycle 1. Cycle 3 shows shallow water at the base (influenced by structureless sandstone). These give way vertically to medium- to large-scale trough crossbeds and medium- to large-scale foresets (planar tabular crossbeds). Cycle 3 is capped by thin-bedded, rippled, shaly siltstone layers. All of cycles 1 to 5 and the troughs and troughs of cycle 3 are mapped as Warren Point Sandstone. The top of cycle 3 marks the Signal Point Shale. Cycle 4 is similar to cycle 3 in that sand is the base are overlain by medium- to large-scale troughs and foresets.

Eastbound Lanes of Interstate 24, West Side of Mount Eagle Mountain. Carboniferous rocks exposed in this roadcut are mapped as Upper Mississippian Pennsylvanian Formation, Lower Pennsylvanian Racoon Mountain Formation, and Warren Point Sandstone are exposed in roadcuts along the eastbound lane of Interstate 24 on the east side of Mount Eagle Mountain (Fig. 4). In these exposures, the Pennsylvanian is composed of red and green shales as well as thin-bedded, fragmental limestones and scour-filling dolomierite. At the top of the Pennsylvanian is a unique, white, quartz-rich sandstone body (orthquartzite) that displays a scoured base filled with massive, structureless, coarse sand that contains what appears to be granule-sized, re-marred siderite clasts. This orthquartzite unit "fines upward" with small-scale, rippled layers of fine-grained, angular quartz sand with a kaolinitic clay base that passes upward. The thin-section is not shown that the inner-grained, rounded quartz grains from a scour fill that is largely cemented with siderite (an iron-bearing dolomite). Thus, the so-called siderite clasts are actually diagenetic growths of siderite crystals that have occurred several quartz grains.

Placement of the Mississippian-Pennsylvanian systematic boundary here is largely dependent on the bias of the observer. If one chooses to mark the boundary at the base of the orthquartzite, then the systematic boundary is unformable. However, if the boundary is placed at the top of the orthquartzite, then the contact may be considered as transitional. I have chosen to place the contact at the top of the orthquartzite. The Pennsylvania Racoon Mountain Formation is considered as a fining-upward sequence (siltstone to shale). A 0.5- to 1.2-m-thick deposit of dark gray siltstone conformably overlies the orthquartzite. A 15- to 20 cm-thick coal seam overlies this siltstone unit. Laterally, the upper surface of the 0.5- to 1.2-m-thick siltstone has been scoured to a depth of 1.2 m and is overlain with dark gray shale. The coal seam also has been eroded by the scouring process. Beneath the siltstone unit, there is a 12.5-3 cm-thick, dark gray shale unit. Dark gray shale makes up the upper part of the Racoon Mountain.

Carboniferous rocks exposed in this roadcut are mapped as Upper Mississippian Pennsylvanian Formation, Lower Pennsylvanian Racoon Mountain Formation, and Warren Point Sandstone are exposed in roadcuts along the eastbound lane of Interstate 24 on the east side of Mount Eagle Mountain (Fig. 5). In these exposures, the Pennsylvanian is composed of red and green shales as well as thin-bedded, fragmental limestones and scour-filling dolomierite. At the top of the Pennsylvanian is a unique, white, quartz-rich sandstone body (orthquartzite) that displays a scoured base filled with massive, structureless, coarse sand that contains what appears to be granule-sized, re-marred siderite clasts. This orthquartzite unit "fines upward" with small-scale, rippled layers of fine-grained, angular quartz sand with a kaolinitic clay base that passes upward. The thin-section study shows that the inner-grained, rounded quartz grains from a scour fill that is largely cemented with siderite (an iron-bearing dolomite). Thus, the so-called siderite clasts are actually diagenetic growths of siderite crystals that have occurred several quartz grains.

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The sandstone body overlying the slump, lithofacies complex (Raccoon Mountain Formation) is considered as part of the Warren Point Sandstone and is made up of vari-sized and vari-shaped trough crossbedded, sedimentary structures. Near the erosional top of the Warren Point are scours infilled with structureless, quartz arenite. The trough crossbedded units likely represent one cycle of sedimentation, and the scours near the top of the roadcut exposure mark the beginning of a second cycle.

**INTERPRETATION**

Figure 6 shows the correlation of three roadcut exposures of Carboniferous (Raccoon Mountain Formation) on the east side of Interstate 24. The eastbound lane of Interstate 24 (marked A) and the eastbound lane of Interstate 24 (marked B) are located on the east side of the mountain. The eastbound lane of Interstate 24 (marked C) is situated on the west side of the mountain.

**Pennsylvanian Raccoon Mountain Formation**—Marginal marine arenite in the form of the Pennsylvanian Raccoon Mountain Formation in exposures A, B, and C. This interpretation is in agreement with Briggs and Edson (1972).

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basal scour in cycles 4 and 5 of the braided stream cycles may mark oscillations (e.g., midcontinent cyclothemes), but, without very precise paleontologic control, the detailed correlation of scour structures among three roadcut exposures within a 158-km² area is impossible. Therefore, inasmuch as data are limited, it seems reasonable to suggest that the scour structures in this area represent localized gaps in the rock record and are simply related to channel switching within a braided stream complex.

LITERATURE CITED


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