
Title: Structural Geology of the Southeast Quarter of the Dutchman Butte Quadrangle, Oregon.

APPROVED BY THE MEMBERS OF THE THESIS COMMITTEE:

Field work in the southeast quarter of the Dutchman Butte Quadrangle, which lies within the Klamath Mountains geomorphic province of southwestern Oregon, was completed during the summers of 1973 and 1974. The objectives of the study were fourfold: (1) to produce a geologic map of the southeast quarter of the Dutchman Butte Quadrangle, (2) to determine the nature of the contact between the Dothan and Rogue formations, (3) to construct a stratigraphic column of the Dothan Formation in the area, and (4) to attempt to determine the nature of the deformation occurring in the area.
Nearly ninety percent of the study area is underlain by sedimentary rocks of the Dothan Formation. Approximately one-half of the formation is composed of graywacke, one-third is composed of shale, and the remainder is basalt, conglomerate, and chert. The rocks of the Dothan Formation have been tightly folded, resulting in a general northeast strike and moderate to steep dips to the southeast. The Rogue Formation, which occupies the southeast corner of the study area, is in contact with the Dothan Formation along a northeast trending reverse fault. The andesitic to basaltic volcanic rocks of the Rogue Formation have been intruded by granodiorite and serpentinite, which was emplaced along a second northeast trending reverse fault. A small block of amphibolite, probably tectonically rafted to the surface along with the serpentinite, occupies the extreme southeast corner of the study area.

The Dothan Formation is divided into three members, which correspond in part to three of the four zones described by Wells and Walker (1953) in the Galice Quadrangle to the immediate south of the study area. The uppermost member (member 4, corresponding to zone IV of Wells and Walker) is composed of shale at the base followed by rhythmically bedded sandstone and siltstone. Present at the top of the member are 275 meters of basalts. The middle member (member 3, corresponding to zone III of
Wells and Walker) is composed primarily of massive, medium-grained sandstone units separated by thin shale partings. The lowermost member (member 2, corresponding to zone 2 of Wells and Walker) is composed of rhythmically interbedded sandstone and shale, with sandstone predominating slightly in abundance over shale.

The nature of the contact between the Dothan and Rogue formations has been a subject of controversy until the early 1970's. Within the study area highly sheared sandstones and shales of the Dothan Formation were found to pass abruptly into greenschist facies rocks of the Rogue Formation. The transition is not gradational. At one point a large block of serpentinite was found emplaced in the contact zone, further substantiating the view that the Dothan and Rogue formations are in contact along a northeast trending reverse fault.

The dominant structural trend in the Dothan and Rogue formations is northeast with moderate to steep dips to the southeast, the result of very tight isoclinal folding. The analysis of sixteen domains utilizing the techniques of Turner and Weiss (1963) reveals the presence of an east-southeast fold axis trend superimposed on the stronger northeast trend. The northeast trend probably results from Middle Cretaceous eastward underthrusting of oceanic crust while the east-southeast trend probably results from Early Tertiary deformation.
The Rogue Formation represents an island arc assemblage that was metamorphosed, uplifted, and deformed in the Late Jurassic Nevadan Orogeny, while the Dothan Formation represents a younger, post-Nevadan arc-trench gap sedimentary assemblage that was deposited primarily by turbidity currents and obducted onto the North American plate during Middle Cretaceous times.