U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Reconnaissance Geologic Map of the MyrtleCreek 7.5' Quadrangle, Oregon

By
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U. S. Geological Survey Open-file Report 97-527

1997

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Introduction

The Myrtle Creek 7.5 minute quadrangle includes part of the northernmost Klamath Mountains province and part of the Mesozoic accretary complex of the southeastern Oregon Coast Ranges (Figure 1). Rocks of the Klamath Mountains province that lie within the study area include ultramafic, mafic, intermediate and siliceous igneous types (Diller, 1898, Ramp, 1972, Ryberg, 1984). Similar rock associations that lie to the southwest yield Late Jurassic and earliest Cretaceous radiometric ages (Dott, 1965, Saleeby, et al., 1982, Hotz, 1971, Harper and Wright, 1984). These rocks, which are part of the Western Klamath terrane (Western Jurassic belt of (Irwin, 1964), are considered to have formed within an extensive volcanic arc and rifted arc complex (Harper and Wright, 1984) that lay along western North America during the Late Jurassic (Garcia, 1979, Garcia, 1982, Saleeby, et al., 1982, Ryberg, 1984). Imbricate thrust faulting and collapse of the arc during the Nevadan orogeny, which ranged in age between about 150 to 145 Ma in the Klamath region (Coleman, 1972, Saleeby, et al., 1982, Harper and Wright, 1984) was syntectonic with, or closely followed by deposition of the volcano-lithic clastic rocks of the Myrtle Group. The Myrtle Group consists of Late Jurassic and Early to middle Cretaceous turbidity and mass flow deposits considered to be either arc basin and/or post-orogenic flysh basins that were syntectonic with the waning phases of arc collapse (Imlay et al., 1959, Ryberg, 1984, Garcia, 1982, Roure and Blanchet, 1983). The intermediate and mafic igneous rocks of the Rogue arc and the pre-Nevadan sedimentary cover (the Galice Formation, (Garcia, 1979)) east of the Myrtle Creek quadrangle are intruded by siliceous and intermediate plutonic rocks principally of quartz diorite and granodiorite composition (Dott, 1965, Saleeby, et al., 1982, Garcia, 1982, Harper and Wright, 1984).

The Jurassic arc rocks and sedimentary cover occur as a tectonic outlier in this region (Figure 2) as they are bound to the northwest and southeast by melange, broken formation and semi-schists of the Dothan Formation and Dothan Formation(?) that are considered part of a Late Mesozoic accretion complex (Ramp, 1972, Blake, et al., 1985) The plutonism that accompanied arc formation and tectonic collapse of the arc does not intrude the structurally underlying Dothan Formation, indicating major fault displacements since the Early Cretaceous. Semischistose and schistose rocks of the accretion complex have yielded metamorphic ages of around 125-140 Ma where they have been studied to the southwest (Coleman and Lanphere, 1971, Dott, 1965, Coleman, 1972). These rocks were unroofed and unconformably overlain by marine deposits by late early Eocene time (Baldwin, 1974). The early Tertiary history of this region is controversial. The most recent interpretation is that during the Paleocene and early Eocene the convergent margin was undergoing transtension or forearc extension as suggested by the voluminous extrusion of pillow basalt and related dike complexes to the northwest (Wells, et al., 1984, Snavely, 1987) . This episode was followed shortly by thrust and strike-slip faulting in the late early Eocene (Ryberg, 1984).

During the Eocene, the Mesozoic convergent margin association of arc, clastic basin, and accretion complex was partly unroofed and faulted against early Cenozoic rocks of the Oregon Coast Ranges to the west and north of the Myrtle Creek area (Ramp, 1972, Baldwin, 1974, Champ, 1969, Ryberg, 1984). Faults that are typical of this period of deformation include high-angle reverse faults with a very strong component of strike-slip displacement characterized by the low-angle rake of striae. Thrust and oblique-slip faults are ubiquitous in early Tertiary rocks to the northwest (Ryberg, 1984, Niem and Niem, 1990).

The Mesozoic and early Cenozoic arc and forearc rocks are unconformably overlain to the east by the late Eocene and younger, mainly continental fluvial deposits and pyroclastic flows of the Cascade arc (Peck, et al., 1964, Baldwin, 1974, Walker and MacLeod, 1991). Minor fossiliferous shallow marine sandstone is locally present. The volcanic sequence consists of a 1 to 2 km thick homoclinal section of andesitic to rhyolitic flows and ash flow tuff. The section is gently east-tilted and is only slightly disrupted by NE trending faults with apparent normal separation, thus putting a cap on the timing of much of the faulting seen in this area.

Previous Work

The first major geologic study of the Roseburg and adjacent areas was carried out by Diller (1898) and Wells and Peck (1961) who mapped the basic geologic framework of the region. More detailed mapping relevant to this map area was carried out through a concerted effort at University of Oregon, Eugene, under the direction of E.M. Baldwin. This resulted in the completion of four Masters theses (Hixson, 1965, Johnson, 1965, Champ, 1969, Seeley, 1974) which helped refine major unit boundaries (See index to geologic mapping). The map area included in a regional compilation of Douglas County by Ramp and Beaulieu (Ramp, 1972) was primarily generalized from Diller (1898). Ryberg (1984) and Niem and Niem (1990) provided major regional tectonic syntheses concerning the evolution of early Tertiary sedimentary rocks of the region.

This present study was undertaken as part of a contribution to 1:100,000 mapping of the Roseburg 30' x 60' quadrangle. Field studies were made during the middle summer months of 1992, 1993 and 1994. The mapping was greatly facilitated by the numerous logging roads that lace the national forests lands, otherwise heavy vegetation and deep weathering of the region limit access to rock exposure.

Several important modifications to the regional mapping (Walker and MacLeod, 1991) have resulted from this investigation. The sense of displacement on the major bounding structures was given careful attention. Transpressive flower and box structures dominate in this region, particularly along the serpentinite bearing melange zone between the rocks of the Myrtle Group to the southeast and the Dothan Formation to the northwest.. Also units within the Dothan Foramtion were subdivided based on variations in textural reconsitution and sandstone composition.

Stratigraphy

The rocks of the area can be separated into three major sequences: 1.) the Late Jurassic Rogue arc complex of the Klamath Mountains, 2.) the Upper Jurassic? and Lower Cretaceous sedimetary cover; and 3.) the melange, broken formation and semi-schists of the late Mesozoic accretion complex represented by the Dothan Formation.

The Rogue arc complex in this area consists of a disrupted and tectonized igneous complex that includes predominantly hornblende gabbro, hornblende diorite, and diabase rocks that are commonly slightly to strongly foliated. The extrusive part of the complex is characterized by blocks of quartz keratophyre, keratophyre, plagioclase porphyry flows, pillows, hypabyssal dikes and flows, flow breccia, and minor tuffaceous sedimentary rock. These rocks are commonly tectonically brecciated and have undergone low to moderate greenschist facies metamorphism. They are locally intruded by quartz diorite, granodiorite and similar siliceous plutonic rocks that are generally unfoliated or weakly foliated near the margins.

The Rogue arc complex is unconformably overlain by unmetamorphosed clastic rocks of the Myrtle Group which includes the Riddle and Days Creek Formations that in this area range span the Early Cretaceous (Berriasian to Albian). The basal part of the section includes tuffaceous sedimentary rocks and volcanic breccia suggesting that deposition was in part coeval with arc volcanism. Conglomerates in the lower part of the section are rich in mafic to intermediate volcanic clasts and dark chert or cherty tuff, and lack any significant component of plutonic rock.

The Dothan Formation is considered to be part of a subduction-accretion complex that formed during latest Jurassic and Cretaceous time (Ryberg, 1984, Blake, et al., 1985). It consists of very low grade, sub-pumpellyite faces and pumpellyite bearing, graywacke and semischitose graywacke with very minor scattered blocks of greenstone, chert and limestone, including blocks of shallow water, Upper Cretaceous Whitsett Limestone (Diller 1898).

Structure

The structural grain of the region, as well as this quadrangle, is strongly dominated by north 30° to 40° east trending faults and lithic belts. The central part of the quadrangle is dominated by high angle, predominantly strike-slip faults, and high-angle reverse faults particularly bounding the serpentinite body. Units within the Dothan Formation are bound by southeast dipping thrust faults. The Myrtle Group rocks are locally overtured to the northwest approaching the ultramafic body in the central part of the quadrangle as well as locally overturned to the southeast in the southeastern part of the quadrangle, forming a box-like transpressive structure.

Metamorphism

Regional, contact, and hydrothermal metamorphic rocks are present within the study area. Regional metamorphic rocks include low-grade schists and semi-schists of prehnite-pumpellyite facies are characteristic of the higher-grade accretion complex rocks of the Dothan Formation in this area. These rocks generally structurally underlie major thrust faults that have the Rogue arc complex in the hanging wall. Schists of the Dothan Formation are generally partially reconstituted meta-sedimentary rocks with a moderately developed pressure solution fabric and incipient development of chlorite, white mica, ± pumpellyite. Detrital tourmaline, epidote, biotite, muscovite, hornblende and pyroxene are common constituents of these rocks, but are not indicative of the metamorphic grade.

In addition, low to moderate-grade greenschist facies rocks of the arc complex are inferred to have formed during the Nevadan orogeny of Late Jurassic age. Metamorphic rocks that formed during this event, which represents imbrication of the Late Jurassic arc, are typically greenschist and lower amphibolite facies.(Champ, 1969, Hotz, 1971, Garcia, 1982, Coleman and Lanphere, 1991).

Retrograde assemblages with epidote-pumpellyite and lower greenschist facies assemblages are commonly associated with cataclastic fabrics particularly near the major fault contacts which bound the arc complex units. This post plutonic semi-brittle deformation may be post-Nevadan and Cretaceous in age. The cataclastic fabrics are inferred to have formed during extension associated with uplift and unroofing of the plutonic rocks.

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DESCRIPTION OF MAP UNITS

Qls **Landslide deposits (Holocene and Pleistocene?)**--chaotic mixture of clay, silt, sand, gravel and boulders of weathered and fresh bedrock composition

Qal **Alluvial deposits (Holocene and Pleistocene?)**--alluvial deposits consisting of unconsolidated or poorly consolidated; angular and sub angular cobbly, pebble, gravel, and sand sized clasts, commonly reddish or yellow orange weathering

Qt **Terrace deposits (Holocene and Pleistocene?)**--terrace deposits consisting of unconsolidated or poorly consolidated; rounded andsubrounded cobbly, pebble, gravel, and sand sized clasts

Accretionary Complex

The Dothan Formation is a Early Cretaceous and Late Jurassic strongly deformed trench and trench-slope basin deposit that was metamorphosed during the Cretaceous. The unit includes sporadic occurrences of greenstone (gs), chert (cht), limestone (ls) and serpentinite (sp). It has been subdivided into the following units:

KJda **Dothan Formation, unit a (Early Cretaceous and Late Jurassic)--**fine and medium grained metagraywacke, common to locally abundant pebble and cobble conglomerate, abundant detrital white mica and biotite, 5-12% potassium feldspar, abundant calcite and zeolite veins, generally resistant and forms steeper slopes

KJdb **Dothan Formation, unit b (Early Cretaceous and Late Jurassic)--** argillaceous mudstone, and minor pebble and cobble conglomerate. Graywackes are micaceous quartzofeldspathic to lithic composition, contain about 3-7% potassium feldspar, quartz veins tend to dominate; the unit contains blocks of accreted oceanic crust that includes greenstone, pillow basalt, radiolarian chert, and shallow marine algal limestone, pelagic foraminiferal limestone (Whitsett Limestone of Diller 1898) and blocks of metamorphic rock including blueschist, metatuff, metachert and amphibolite

KJdd **Dothan Formation, unit d (Early Cretaceous and Late Jurassic)**--phyllitic siltstone, fine and medium grained metagraywacke, argillaceous mudstone with minor pebble and cobble conglomerate, blocks of accreted oceanic crust that includes greenstone, pillow basalt, radiolarian chert, weakly to moderately foliated where thick-bedded, semi-schistose where thin-bedded, pumpellyite facies metamorphism?; detrital potassium feldspar absent

KJd2 **Dothan Formation, semi-schistose unit (Early Cretaceous and Late Jurassic)**--slate, phyllitic siltstone, fine and medium grained metagraywacke, weakly to moderately foliated where thick-bedded, semi-schistose where thin-bedded, pumpellyite facies metamorphism?, argillaceous mudstone with minor pebble and cobble conglomerate. Graywackes are micaceous feldspathic to lithic in composition, locally contains abundant detrital epidote, white mica, chlorite and lesser biotite, rare detrital quartzo-feldspathic clasts containing fine-grained euhedral brown hornblende; detrital potassium feldspar absent; locally very orange-red weathering; includes blocks of greenstone, pillow basalt and radiolarian chert,

Western Klamath terrane

Sedimentary cover

Myrtle Group (Cretaceous to Late Jurassic)--Mudstone, sandstone and conglomerate of the Days Creek and Riddle Formations. These units represent forearc or foreland mass flow and channel deposits that were deposited during the waning stages of the Nevadan orogeny or just following. The Riddle Formation unconformably overlies Rogue Volcanics

KJr **Riddle Formation (Early Cretaceous to Late Jurassic?)**--Well bedded pebble to cobble conglomerate, volcanic sandstone and shale turbidites and mass flow deposits; locally interbedded tuffacous sedimentary rock and volcanic breccia near the base; conglomerate (KJrc) dominated by volcanic and dark chert rich clast types; unit is unmetamorphosed and moderately indurated; locally silicified with quartz veins near major faults, thin-bedded siltstone and shale slightly concretionary, locally very fossiliferous and bioturbated. Conglomerate clasts are very well-rounded, poorly sorted and consist predominantly of mafic and felsic volcanic rock, dark to gray chert, diabase and volcanic sandstone; dark green-brown weathering. Contains abundant *Buchia uncitoides* of Lower Cretaceous, (Berriasian age) and possible *Buchia elderensis* or *piochii* of Late Jurassic, Tithonian age (William Elder, Per. comm.)

Jurassic continental arc complex

Jrv **Rogue Volcanics? (Late Jurassic)**--Extrusive and hypabyssal intrusive rocks of mafic and intermediate composition, commonly very fine grained aphyric or plagioclase-pyroxene porphyry, extrusive rocks commonly amygduloidal, extremey rare thin bedded intermediate and siliceous, thin-bedded, crystal-lithic, plagioclase phyric tuffs locally. Dense, dark green where fresh, weathers rusty, locally contains pillow and pillow breccia texture. Locally hydrothermally altered and leached of mafic constituents

Jri **Mafic intrusive unit (Late Jurassic?)**--Intrusive rocks, intermediate to mafic in composition (gabbro and diorite) here considered to be part the intrusive equivalent rocks to the Rogue volcanics, generally medium to coarse grained, metamorphosed to pumpellyite facies and lower greenschist facies. Unit tends to weather dark rusty red

Jrs **Serpentinized ultramafic rock (Jurassic?)**--commonly foliated dark to pale green serpentinized peridotite and serpentinite, where fresh weathers rusty, locally occurs in fault zones

KJdi **Diorite and Granodiorite (Cretaceous? and/or Jurassic)**--White weathering, coarse and medium grained quartz, plagioclase, microcline, hornblende ± biotite bearing rock. Commonly unfoliated to very weakly foliated texture

Fossil Localities in the Myrtle Creek quadrangle

Sample No	**Fossil Name**	**Age**
94 M-14	*Buchia sp.*	Oxfordian—Valanginian
94 M -6	*Buchia uncitoides*	Berriasian
92 MC-92	*Buchia sp.*	Oxfordian—Valanginian
93 MC-92	*Buchia sp.*	Oxfordian—Valanginian

***Fossils identified by Will Elder**

Map Symbols

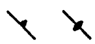
Attitudes

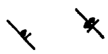
 Bedding: Inclined, vertical, horizontal

 Bedding: Top direction known

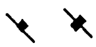
 Bedding: Overturned

 Crumpled or disrupted bedding

 Foliation: Inclined, vertical, horizontal

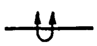
 Foliation and Bedding: Inclined and vertical

 Brittle or cataclastic foliation

 Dike orientation: Inclined and vertical

 Lineation

 Overturned syncline, dashed where approximately located

 Overturned anticline, dashed where approximately located

Contacts

 Depositional contact: dashed where approximately located, dotted where concealed, queried where inferred

 Fault, ball on down-thrown block, open arrow indicates dip where known, lineation symbol indicates rake of striae, dashed where approximately located, dotted where concealed, queried where inferred

 Thrust fault, teeth on hanging-wall, dashed where approximately located, dotted where concealed, queried where inferred

 Low-angle normal fault, dashed where approximately located, dotted where concealed, queried where inferred

 Small faults with known dip

 Strike-slip fault, paired arrows indicate relative displacement