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DIORITE INTRUSIONS BETWEEN SIXES AND PISTOL RIVERS, SOUTHWESTERN OREGON

Ernest H. Lund and Ewart M. Baldwin*

Introduction

Many small stocks and irregularly shaped plutons of dioritic composition are present between the Sixes and Pistol Rivers in Curry and Coos Counties in southwestern Oregon. The plutons have been of interest as a possible source of gold. The junior author paid particular attention to the location and



shape of these plutons during an investigation of heavy minerals which was supported by a grant for the U.S. Geological Survey (Baldwin and Boggs, 1969). Geologic maps of the Agness quadrangle and the Powers quadrangle are in preparation.

Pioneer work in this part of Oregon was done by Diller (1903), who mapped the 30-minute Port Orford quadrangle. The northern two-thirds of the region discussed in this paper is included in this quadrangle. Difficulties encountered by Diller in mapping such a large, rugged area which had few roads resulted in some striking errors in contacts, a situation that can readily be appreciated by those working there now. Diller included the greenstone and associated small gabbroic intrusions at Rusty Butte and those in the upper part of Elk River with some of the dioritic rock. Dott (1966) mapped in reconnaissance a smaller area showing the headwaters of the South Fork of the Sixes River and the North and South Forks of Elk River. He recognized more diorite than did Diller, but he included without appreciable change many of Diller's contacts. Both show a belt of intrusive rock trending eastward across the forks of Elk River, but no diorite was found in this area by the junior author. Only small, for the most part landslide, blocks of greenstone are present.

Intrusions of altered gabbro are also common, but most appear to be associated with the Galice greenstone and probably represent small dikes

* Department of Geology, University of Oregon, Eugene, Oregon.

and plugs that may have acted as feeders. Similar bodies, perhaps even more altered, are in the Colebrooke Schist. Most of these bodies may be readily separated from the younger dioritic intrusions, and they are not shown on figure 1. One large intrusion extending from the north fork of Lobster Creek eastward through Boulder Creek was tentatively mapped with the diorites (figure 1), but petrographic examination shows that it is related to the gabbros.

Burt (1963) mapped the Collier Butte area and shows the intrusion as a diorite plug in serpentine. Koch (1966) mapped the Port Orford and Gold Beach 15-minute quadrangles and described the Pearse Peak pluton. It is the largest and most accessible pluton and therefore serves as a type for correlation. Baldwin (1968) mapped the area that includes Gray Butte and the pluton at Game Lake Lookout.

Most of the intrusive bodies were emplaced during the Nevadan orogeny and correlate with the Pearse Peak pluton both in age and general composition, but several are questionable. Although Pearse Peak yielded K-Ar dates for biotite (Kulp in Koch 1966, p. 53) of 141 ± 7 m.y. and 146 ± 4 m.y., it also yielded an anomalous date based on hornblende of 275 ± 20 m.y. (Koch, 1966). The Saddle Mountain-Lawson Creek pluton yielded a date of 285 ± 25 m.y., also on the basis of K-Ar from hornblende (Koch, 1966, p. 53).

The writers acknowledge the support of field work by the U.S. Geological Survey and advice by H. E. Clifton of the U.S. Geological Survey.

Petrographic Procedure

In the rocks for which a mode was determined, 1000 points were counted. All the rocks examined are hydrothermally altered in varying degree, and the secondary minerals were counted along with the minerals from which they were derived. In some rocks where biotite has been almost completely converted into the secondary minerals chlorite, epidote, and white mica, it appears in the mode though not in the rock in its present state. It is recognized that some secondary minerals draw their components from more than one source mineral and that for some grains the parent mineral is not definitely known. These conditions introduce some error into the determination of the mode, but it is believed that the error is small and that the modes as stated are fair representations of the original rock compositions (table 1).

Pearse Peak and Related Plutons

Pearse Peak pluton (1)*

The rock of the Pearse Peak pluton is a medium gray, medium granitoid,

* Numbers refer to map locality (see figure 1).

Table 1. Modes of quartz diorites (volume percentages).											
Locality	Pearse Peak	Benson Creek			Josh Creek		Dixie Creek	Granite Peak	Johnson Creek	Gray Butte	Lawson Creek
	1	2	3	4	5	6	7	8	9	10	11
Andesine	59	60	63	62	64	60	62	55	54	63	57
Quartz	15	13	17	17	13	12	15	15	10	21	21
Orthoclase	4	3.5	2	4	6	3	5	6	2	0	0
Hornblende	15	16	11	10	11	17	10	14	30	10	16
Biotite	7	7	5	6	5	7	7	9	2	5	5
Minor accessories	tr	0.5	2	2	1	1	1	1	2	1	1
(Magnetite, apatite, zircon, sphene)											

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1. BPO 67-1B Along Elk River road at the mouth of Platinum Gulch.
2. BP 67-1 Where Rusty Butte logging road meets Benson Creek drainage; edge of pluton at west side of saddle.
3. BP 68-16 Along logging road that skirts north side of Benson Creek west of saddle and BP 67-1 locality.
4. BP 68-33 Logging road that follows south side of Benson Creek. Second saddle west of its crossing at the extreme end of Benson Creek.
5. BP 67-24 At mouth of Josh Creek a few yards above its junction with Benson Creek.
6. BP 67-23 At 1600-foot elevation in upper Josh Creek.
7. BP 67-3 In Dixie Creek a few yards above the junction of Dixie Creek and Benson Creek.
8. BP 68-37 In Granite Creek on north edge of Granite Peak.
9. BP 67-31 In Johnson Creek a short distance below the mouth of Poverty Gulch and above the mouth of a small tributary called Boulder Creek.
10. BCB 67-8 The extreme tip of Gray Butte.
11. BCB 69-1 By waterfall in narrow gorge about 150 yards below prominent forks in upper Lawson Creek. Pluton extends into Saddle Peak.

equigranular, massive quartz diorite. Minerals identifiable in hand specimens are plagioclase, quartz, hornblende, and biotite. Orthoclase, present in minor amount, is not readily distinguishable in hand samples of the Pearse Peak rock.

Significantly abundant minerals, the amounts of which are shown in table 1, are plagioclase (andesine), quartz, hornblende, and biotite. Orthoclase is present but not in essential amounts, and minor accessories include magnetite, apatite, zircon, and sphene.

The plagioclase is distinctly zoned, with some grains showing oscillatory zoning, and its average composition is about medium andesine, perhaps a little on the sodic side of the midpoint in the andesine range. The grains are mainly subhedral but range from anhedral to nearly euhedral. The mineral has been considerably altered to sericite and lesser amounts of zoisite, and alteration is compositionally controlled. The central calcic part of most grains is altered, and the more sodic outer rim is generally clear. In the grains that show oscillatory zoning, bands of alteration reflect the compositional zoning.

Hornblende is mainly in subhedral grains, and shapes range from anhedral to euhedral. It is mostly unaltered and clear, but a few grains have small amounts of chlorite and epidote.

Biotite was derived from hornblende during the late magmatic stage and is closely associated with hornblende. Much of it is fresh, but a considerable amount has been altered to chlorite, epidote, and an unidentified colorless mineral, the optical properties of which suggest prehnite. This colorless mineral occurs in elongate lenses that lie along the cleavage planes of the biotite and appears not so much a product of alteration as something introduced. Its growth has forced apart the folia of biotite to conform to the shape of the mineral lenses. Alteration in most biotite grains is only partial, but some have been completely converted to secondary minerals.

Quartz is anhedral and, like orthoclase, occupies interstices between the earlier-formed hornblende and plagioclase. The mineral is clear except for liquid gas inclusions, which occur in irregular patches and in alignment.

Orthoclase crystallized at about the same time as quartz and is in anhedral grains, the shapes of which are determined by the interstices between the plagioclase and hornblende. Except for small inclusions and possibly incipient kaolinization, the mineral is clear and has not undergone the hydrothermal alteration that affected the plagioclase.

According to the mode of one Pearse Peak sample, the rock is classified as hornblende-biotite quartz diorite. Though it is near granodiorite, there is not quite enough orthoclase to place it in this class.

Benson Creek pluton (2 - 7)

Samples from a quartz diorite intrusion, here referred to as the Benson

Creek pluton, were collected from localities on Benson, Josh, and Dixie Creeks. The rock of this pluton is almost identical to that of the Pearse Peak pluton, both megascopically and microscopically. The minerals and their paragenesis are the same, and the percentages of six samples fall within expected limits of randomly collected samples. Secondary minerals are the same and bear the same relationship to the magmatic minerals as do those in the Pearse Peak rock.

Granite Peak pluton (8)

In hand sample the rock of the Granite Peak pluton closely resembles that of Pearse Peak. One small difference is in the color of the orthoclase, which in the rock of Granite Peak is pale pink and readily identifiable because of its contrast with the gray plagioclase. The most significant difference in the rock is the extent of hydrothermal alteration. The biotite has been almost completely converted to chlorite and epidote, and the plagioclase has been considerably sericitized, except for a thin, clear outer zone in most grains. Hornblende is generally fresh looking, but parts of some grains have altered to chlorite. The orthoclase has not been significantly changed. The rock is cut by small veinlets consisting mainly of quartz, and the presence of these veinlets offers a clue to the reason why this rock is more intensely altered than rock in other plutons of the Pearse Peak type.

Johnson Creek pluton (9)

The rock of the Johnson Creek pluton is similar to that of Pearse Peak in both texture and mineral composition, but certain variations were noted. The most significant difference is in its much higher content of hornblende -- 30 percent in the one sample examined in contrast to a maximum of 17 percent in the other samples of this rock type. It is correspondingly lower in all the other essential minerals. And, in addition, the hornblende has more of a tendency to form euhedral grains than it does in rocks of the other plutons.

Gray Butte and Lawson Creek plutons (10 and 11)

The body in upper Lawson Creek also makes up much of Saddle Mountain and is referred to by Koch (1966) by that name. The writers were unable to map the extent of the pluton, so the shape as shown on figure 1 is approximate. In hand specimen the rock of these plutons is not readily distinguishable from that of Pearse Peak. In thin section, however, certain mineral differences become apparent, the most significant of which is the absence, or near absence, of orthoclase. None was identified with certainty.

Other primary minerals in the rock of the Gray Butte and Lawson

Creek plutons are essentially the same as in the other quartz-diorite intrusions. The secondary hydrothermal minerals are the same in kind and bear the same relationship to the primary magmatic minerals as do the secondary minerals of the other plutons. Notably different is the large amount of epidote and the large size of many of its grains in the rock of both plutons. In the Lawson Creek sample, epidote makes up about 10 percent of the total rock and was derived by the alteration of both andesine and the ferromagnesian minerals. The largest grains of epidote are closely associated with the ferromagnesian minerals, but it is abundantly represented in the plagioclase.

Original biotite has been almost completely converted to secondary minerals. These are mainly chlorite and epidote, but considerable white mica is associated with the chlorite and is presumably of hydrothermal origin.

The plagioclase is badly altered, much of it almost beyond recognition, and the sericite formed from it is unusually coarse grained.

Samples from both plutons have small veinlets. In the Lawson Creek sample, the vein minerals are carbonate, epidote, and quartz; in the Gray Butte sample, the main vein mineral is the colorless mineral, believed to be prehnite, associated with biotite in the other quartz diorite samples.

Iron Mountain pluton (12)

The rock of the Iron Mountain pluton is Pearse Peak type quartz diorite. In hand specimen it resembles the Pearse Peak rock, though it is of somewhat lighter color. A sample (BAg 68-5) from the southern end of the mountain near a mining claim on a large quartz vein was examined, but a mode was not made because the rock has been considerably modified through clastic deformation. The development of mortar structure in which the mineral grains are small and the conversion of all the original ferromagnesian silicates to chlorite and epidote make a meaningful mode difficult to determine.

Most of the plagioclase has been very much altered to coarse-grained sericite, zoisite, and epidote. However, enough of it is sufficiently fresh to reveal its composition as medium andesine. Orthoclase, if present, was not identified.

Miscellaneous Plutons

Sixes River Middle Fork pluton (13)

A rock body of undetermined form and affinities on the Middle Fork of the Sixes River has textural similarity to the Pearse Peak quartz diorite but differs significantly in mineral composition.

The rock, a sample (BP 67-27) of which was collected where the

Middle Fork of the Sixes River crosses an east-trending dike that bisects Salmon Mountain, is composed of 57 percent plagioclase, 18 percent orthoclase, 20 percent hornblende, and 3 percent biotite. Accessories amounting to 2 percent of the rock include quartz, abundant sphene, apatite, and very little magnetite. Accordingly, it is a hornblende syenodiorite.

The plagioclase is medium andesine in anhedral and subhedral grains and is much altered to sericite and zoisite.

Hornblende is mostly subhedral, but ranges from anhedral to euhedral. Most of the grains are more or less poikilitic, with included chlorite and epidote and some plagioclase. Closely associated with hornblende are patches of chlorite and epidote, and the texture of the chlorite indicates it is pseudomorphous after biotite. The chlorite and epidote included in the hornblende grains are believed also to be originally biotite rather than secondary minerals derived from the hornblende, which is fresh looking except for iron oxide stains from weathering.

The orthoclase is anhedral and fills interstices between hornblende and plagioclase. In places it embays plagioclase, and some grains have inclusions of plagioclase and hornblende. It is dusty appearing from kaolinization but has not been hydrothermally altered.

A very small amount of quartz crystallized late, probably at the same time as the orthoclase, and it occupies interstices between plagioclase and hornblende. The presence of essential orthoclase and the lack of essential quartz set this rock apart from the Pearse Peak and related quartz diorites, though conceivably it could be a facies variation.

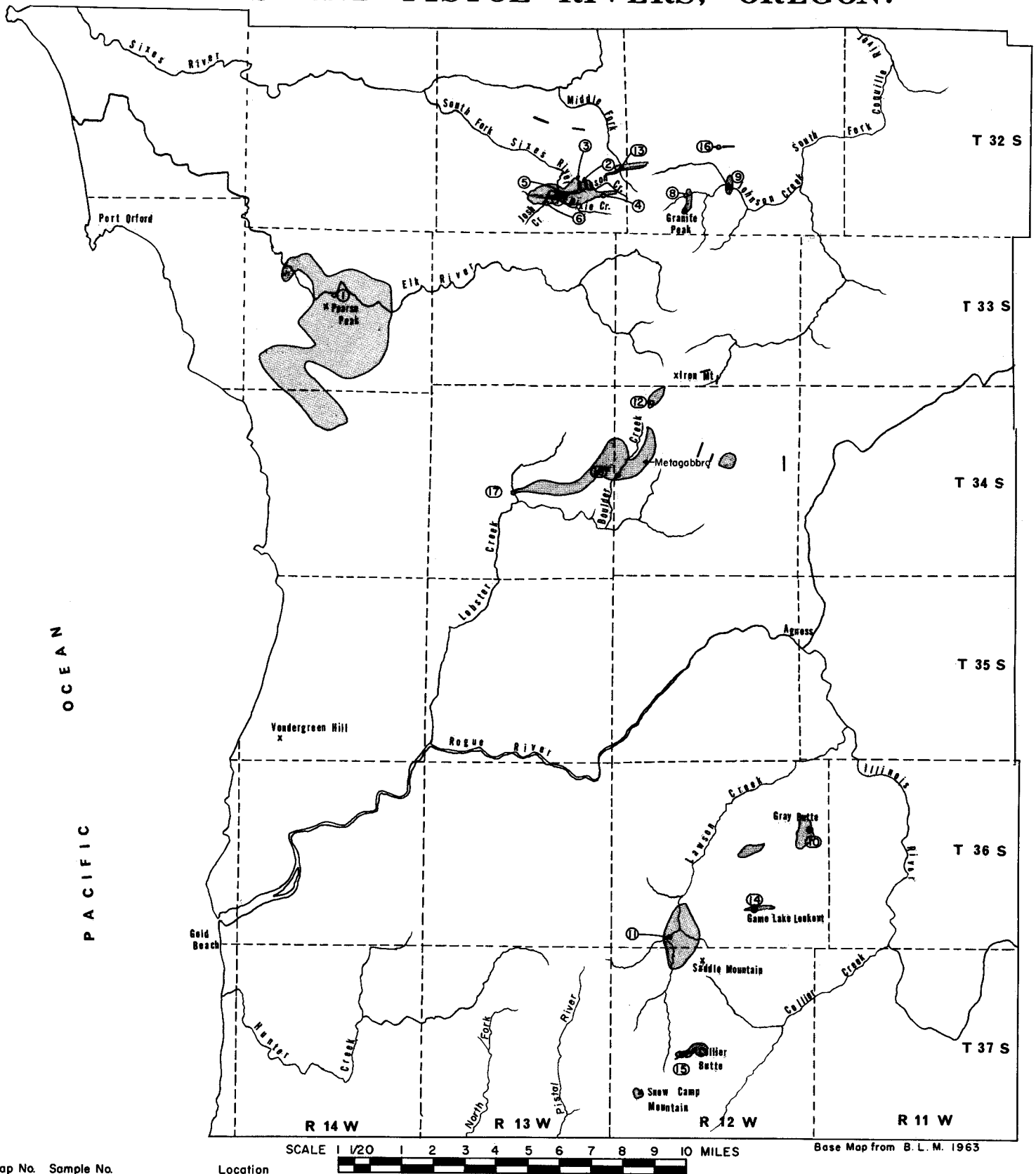
Game Lake Lookout pluton (14)

The rock of the Game Lake pluton is very light colored and has a medium granitoid texture. It was probably originally a massive igneous rock, but cataclastic deformation has imparted to it a trace of gneissic structure. This may not be readily apparent in a freshly broken sample, but the pattern stands out on a weathered surface, especially one with small bits of moss or lichen growing on it. In thin section the cataclastic aspect is apparent in mortar structure, bent muscovite grains and twin lamellae of plagioclase, and broken plagioclase grains.

The mineral composition of the Game Lake rock (BCB 67-1), collected at the site of the former Game Lake Lookout, is 49 percent plagioclase, 38 percent quartz, 12 percent muscovite, and a trace each of orthoclase and biotite. Zircon and apatite are accessories in minute quantities.

The plagioclase is zoned, and its average composition is estimated to be medium oligoclase but on the sodic side of the mid-point in its range. According to the classification of Johannsen (1939), the rock is a tonalite (or quartz diorite). The presence of the varietal mineral muscovite, the virtual absence of ferromagnesian minerals, and the cataclastic texture

FIGURE 1. DIORITE INTRUSIONS BETWEEN SIXES AND PISTOL RIVERS, OREGON.



Map No.	Sample No.	Location
1.	BPO 67-1B	Pearse Peak plution
2.	BP 67-1	Benson Creek
3.	BP 68-16	Benson Creek
4.	BP 68-33	Benson Creek
5.	BP 67-24	Josh Creek
6.	BP 67-23	Josh Creek
7.	BP 67-3	Dixon Creek
8.	BP 68-37	Granite Peak plution
9.	BP 67-31	Johnson Creek plution
10.	BCB 67-8	Gray Butte plution
11.	BCB 69-1	Lawson Creek plution
12.	BAg 68-5	Iron Mountain plution
13.	BP 67-27	Sixes River, Middle Fork plution
14.	BCB 67-1	Game Lake plution
15.	BCB 68-2	Collier Butte extension
16.	BP 68-38	Johnson Creek quarry
17.	BAg 67-7	Lobster Creek metagabbro
18.	BAg 69-1	Boulder Creek metagabbro

LEGEND



Location of plutions
Dikes and dike like bodies

mean that the rock could be called either a gneissic muscovite leucotonalite or a muscovite tonalite gneiss. Because the clastic metamorphism has done little to destroy the igneous characteristics of the rock, the writers prefer to call it a tonalite (quartz diorite) rather than tonalite gneiss or quartz diorite gneiss. In a classification such as that of Grout (1932), in which the plagioclase series is divided into three parts and where the first division comes at An₂₀, this rock would be in the granite clan. Under this classification the rock could be called a muscovite sodic leucogranite. Because potash feldspar is the usual feldspar of granites, some readers may take exception to calling a rock that lacks essential potash feldspar a granite.

Collier Butte (extension) (15)

A rock sample (BCB 68-2) from the quarry a mile west of Collier Butte on Game Lake road is a light gray porphyry with plagioclase and quartz phenocrysts in an aphanitic groundmass of plagioclase, quartz, and muscovite. The rock has been sheared, and surfaces with slickensides are common. In thin section some plagioclase grains are seen to be bent and broken, and there is some mortar structure; however, it is not easy to distinguish minerals in the mortar structure from the groundmass minerals.

The plagioclase phenocrysts are of medium andesine composition. The euhedral and subhedral shapes of many grains are still discernable, but the borders of the grains have been encroached upon by groundmass minerals so that boundaries are not distinct planes. The mineral has been sericitized, and much of the sericite is in comparatively large grains.

The quartz phenocrysts show effects of resorption in their much-rounded shapes, and boundaries are irregular because of encroachment of groundmass minerals. The highly undulatory extinction of the quartz probably is another reflection of the stress to which this rock was subjected.

Muscovite is a matrix mineral and occurs in aggregates of small grains rather than in single discrete grains. Much of it has intimately associated chlorite, suggesting original biotite, but none of the biotite remains.

In addition to the sericite and chlorite, zoisite and epidote are secondary minerals present in small amount. Zircon and apatite are accessories in minute quantities.

The composition of the groundmass plagioclase was not determined because of its small grain and altered condition, so an estimate of its anorthite content was not attempted. Based on the composition of the phenocrysts, the rock is classified as porphyritic muscovite dacite. This rock, which may be in an offshoot of the rock body at Collier Butte, is similar to that near Game Lake in its muscovite content and very low content of iron minerals and could well be genetically related, in spite of the textural difference.

Rock in quarry on Johnson Creek road (16)

This rock (BP 68-38), sampled at a small roofing granule quarry at the head of Ragsdale Creek, a short tributary of Johnson Creek, is a light-colored, fine-grained porphyry with plagioclase and some quartz phenocrysts in a groundmass of quartz, plagioclase, and the secondary minerals epidote, zoisite, chlorite, and white mica. Only a trace of original biotite remains, and no hornblende is present. A modal analysis was not made, but the rock is clearly a dacite porphyry.

The plagioclase in the phenocrysts is medium andesine, mostly in subhedral grains but ranging in shape from anhedral to euhedral. Though the general shapes of the grains are still retained, the boundaries are irregular because of encroachment by groundmass minerals. Grains have been altered in varying amounts to sericite, zoisite, and epidote. Some are affected very little, and others are largely destroyed by alteration.

Quartz is not as abundant as plagioclase in the phenocrysts but nearly equal to it in the groundmass. Phenocryst grains are corroded and embayed by the groundmass minerals.

The secondary minerals chlorite, epidote, zoisite, and white mica occur together in aggregates. A cluster may be predominantly one mineral, but generally two or three minerals are together. These minerals, except where clearly embodied in plagioclase grains, are secondary after original ferromagnesian silicates. Some clusters have a trace of biotite, which is a clue to their parent material. These clusters are mainly white mica with lesser amounts of chlorite and other secondary minerals. Aggregates of this combination embody most of the secondary mineral matter outside the plagioclase. A few large clusters composed mostly of epidote may have been derived from hornblende.

Lobster Creek-Boulder Creek metagabbro (17 & 18)

Lying in the drainage area of the North Fork of Lobster Creek and Boulder Creek is a body of rock of mafic composition. The rock (BAg 67-7 collected on the North Fork of Lobster Creek a short distance above the main forks, and BAg 69-1 collected on Boulder Creek, a prominent tributary of the South Fork of Lobster Creek, where road survey line reaches Boulder Creek) in hand specimen has a texture that appears igneous, though its general appearance gives the impression of its having been altered. Olive-green crystals of medium grain size are surrounded by a milky white, granular groundmass.

In thin section the rock is seen to consist largely of secondary minerals. Original monoclinic pyroxene is still present, but much of it has been altered to tremolite. Many grains have been completely converted to tremolite pseudomorphs, and others have been altered in varying amounts. Shapes of tremolite pseudomorphs and partly altered pyroxene grains suggest

that the original pyroxene was in euhedral and subhedral grains.

Around the pyroxene and tremolite is zoisite, much of which is in well-developed crystals of the variety with anomalous blue interference color. Associated with the zoisite is a little epidote and probably other secondary minerals not identified. It is very likely that these minerals are secondary after original plagioclase, though none of this mineral remains.

Shear stress, if present during the time the rock was undergoing alteration, did little to impart a planar structure, and in hand specimen there is only a suggestion of mineral grain alignment.

Recrystallization has changed the texture and mineral composition of this rock to such a degree that it should be considered metamorphic. Assuming that zoisite and related minerals represent original plagioclase of calcic composition, the rock is classed as a metagabbro.

Summary and Conclusions

Petrology

Diorite and dacite intrusions lying in the drainage area of the Rogue River and the southern part of the drainage area of the Sixes River in Coos and Curry Counties are of two general types. The most numerous are small diorite plutons that range in size from a few hundred yards to several miles across and are roughly oval to irregular in shape. Dikes or dike-like bodies of dacite are the other type, and they may be apophyses of the larger plutons. The position and age of the intrusions with respect to intruded formations suggest they are epizonal. Textures of the two types are different; the texture of the rock of the plutons is medium granitoid and equigranular, and that of the dikes is porphyritic. Mineralogic similarity between dikes and nearby plutons suggests a genetic relationship between the two types.

The rock of most of the plutons is quartz diorite, and textural and mineralogic similarity between a number of them indicates a common origin. The largest is the Pearse Peak pluton. It was the first to be named and described, and for this reason, and for the reason that its rock is representative of the rock in the several plutons, it is designated as the "type" quartz diorite of this group of related intrusive bodies.

The rocks of three plutons studied differ somewhat from the Pearse Peak type in mineral composition but are like it in texture and general field appearance. One of these is in a pluton on Lawson Creek, and another is at Gray Butte. The rocks of both lack potash feldspar, but otherwise are like the Pearse Peak in mineral paragenesis and texture and are not readily distinguishable from it in the field.

The rock in a small pluton on the Middle Fork of the Sixes River differs significantly from the Pearse Peak in its lack of essential quartz. The other minerals and their paragenesis are the same as the Pearse Peak and the textures are similar. Its affinities are uncertain, but it may be a differentiate

of the magma from which the Pearse Peak quartz diorite crystallized. This idea is supported by the proximity of this intrusion to intrusions of the Pearse Peak type.

The rock in the intrusion at Game Lake Lookout is either a quartz diorite or a granite, depending on which classification is used. The sodic oligoclase and the varietal mineral muscovite set this rock apart from the Pearse Peak quartz diorite. A porphyritic rock in a dike-like body west of Collier Butte is similar mineralogically and is probably genetically related to that in the Game Lake Lookout pluton.

An elongate rock body that lies along the drainage divide between the North and South Forks of Lobster Creek and in the drainage area of Boulder Creek is a highly altered gabbro. Some original pyroxene remains, but most of it has been converted to tremolite, and original plagioclase has been completely altered, principally to zoisite. This rock is classified as a metagabbro.

Age and correlation

The intrusive bodies of southwestern Oregon seem to fall into two general groups by rock type: 1) the dioritic intrusions discussed in this paper, and 2) gabbroic intrusions that appear to be associated with the Galice greenstone and the Colebrooke Schist. Diller (1903) included areas of greenstone and sedimentary rocks with gabbro and diorite.

In most instances the two rock types may be distinguished megascopically in the field. However, there are several that need closer inspection. The altered pluton between the North Fork of Lobster Creek and Boulder Creek, although initially mapped with the younger intrusions, appears to be related to the older gabbros. There is a small intrusive body surrounded by serpentine under the Snow Camp Mountain Lookout. This is sheared and somewhat altered and is of questionable age. There is always the possibility that some of the plutonic rock was brought in with the encompassing serpentine. According to Koch (1966, p. 52) several severely deformed quartz diorite bodies are present along the coast near Otter Point and Vondergreen Hill. He concludes that the pluton on the southwestern side of Vondergreen Hill was perhaps dragged upward during intrusion of the ultramafic body. Cataclastic structure in the Game Lake body points to post-intrusive deformation of the body. Diorite float occurs in the North Fork of Rock Creek on the east flank of Iron Mountain. It is similar to that at the south end of the mountain. Small masses are shown on figure 1 that are not discussed.

Most of the dioritic plutons intrude pre-Nevadan formations but nowhere are they definitely known to intrude post-Nevadan formations. Koch (1966) found abundant clasts of Pearse Peak diorite in the basal early Cretaceous Humbug Mountain conglomerate along Elk River. This evidence plus K-Ar dates ranging between 140 and 150 m.y. place the time of

intrusion of Pearse Peak and allied plutons within the span of the Nevadan orogeny. K-Ar dates, based on hornblende, of more than 200 million years do not seem tenable, for neither the Pearse Peak nor the Lawson Creek-Saddle Mountain pluton is as internally deformed as one might expect with thrusting, a probable condition for a pre-Mesozoic age. Both are petrographically similar. Although the plutons on the north end of Iron Mountain and on Gray Butte are entirely surrounded by serpentine, and may have been brought in with the ultramafic rock, it is the authors' opinion that these plutons were intruded after emplacement of the serpentine.

References

- Baldwin, E. M., 1968, Geology of the Horse Sign Butte blacksand deposit and vicinity, Curry County, Oregon: The ORE BIN, v. 30, no. 3, p. 45-54.
- Baldwin, E. M., and Sam Boggs, Jr., 1969, Study of heavy metals and heavy minerals on the southern Oregon coast: U.S. Geol. Survey Rept. no. 2, submitted to Office of Marine Geology and Hydrology, Contract No. 14-08-001-11058, p. 1.
- Burt, W. D., 1963, Geology of the Collier Butte area, southwest Oregon: Univ. Wisconsin master's thesis, 93 p., unpub.
- Diller, J.S., 1903, Description of the Port Orford quadrangle: U.S. Geol. Survey Geologic Atlas, Port Orford Folio, No. 89.
- Dott, R. H., Jr., 1966, Late Jurassic unconformity exposed in southwestern Oregon: The ORE BIN, v. 28, no. 5, p. 85-97.
- Grout, F. F., 1932, Petrography and petrology: New York, McGraw-Hill Book Co., 522 p.
- Koch, J. G., 1966, Late Mesozoic stratigraphy and tectonic history, Port Orford-Gold Beach area, southwestern Oregon coast: American Assoc. Petroleum Geologists Bull., v. 50, no. 1, p. 25-71.
- Johannsen, A. J., 1939, A descriptive petrography of the igneous rocks, Vol. I: Chicago, Univ. Chicago Press, 318 p.

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INTERIOR SUPPORTS MINING LAW OF 1872

Secretary of Interior Walter J. Hickel recently gave full support to the existing Mining Law of 1872. This will necessarily be the stand of the Department of the Interior (which includes the Bureau of Land Management) in the nation-wide controversy over whether the present claim location system should be replaced by a leasing system. This stand completely reverses the position taken by the former Secretary, Mr. Udall.

In a letter to the Public Land Law Review Commission, Secretary Hickel recommended "... a workable revision of the mining law of 1872 which will enable it to meet our present and future needs. This can be accomplished without sacrificing the best qualities of the old law and stifling needed exploration and development while still insuring appropriate consideration for necessary conservation and multiple use management."

He further recommended "... that a careful study be made of revenues resulting from minerals claims to determine whether the Federal Government should receive any compensation from the minerals extracted from such claims. However, consideration should not be given to revisions which would deter exploration for and development of our mineral resources nor which would render unfeasible or uneconomical the removal of vitally needed minerals from public lands."

His letter then went on to make the following suggestions for improving the Mining Law of 1872:

"1. Revision of the patenting procedures to grant claimants only a patent to subsurface mineral resources with a right to use so much of the surface as is necessary for mining and related activities. Preference should be given to the patentee in any sale of the remaining surface rights.

"2. Provision for realistic increases in the purchase price per acre for mining claims upon patenting. Such increases should adequately reimburse the Federal Government for expenses incurred in issuing the patents. Prices established in 1872 are far from in line with prices of today.

"3. Retention by the United States of surface rights should be accompanied by a provision enabling the Federal Government to exercise a reasonable degree of control over the impact upon the surface and environment as a result of mining and related operations." [State of Alaska Mines Bulletin, vol. 17, no. 10, October 1969, p. 2]

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GRANT COUNTY TO PURCHASE FOSSIL COLLECTION

Fossils collected years ago from geologic formations in the area of Dayville by the late Mr. Weatherford, long-time resident of that district, will be enjoyed by visitors to the Grant County Chamber of Commerce. Directors of the organization have voted to purchase the collection. (From the Blue Mountain Eagle, Sept. 11, 1969.)

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COPPER BELT RE-EXAMINED

The geological consulting firm of E. P. Sheppard and Associates, Ltd. of Vancouver, B.C., is currently mapping the belt of copper prospects owned by the Oregon Copper Co. in the Lower Powder River and Sparta mining districts of Baker County. An extensive, close-interval geochemical sampling survey is now in progress and a follow-up airborne magnetometer survey is contemplated. The examination is being made for the Baker Mountain Copper, Ltd. (NPL) (formerly Dennis Holding Co.) of Vancouver, B.C. The area under investigation embraces more than 100 claims and includes most of the prospects held under option by the Cyprus Mining Co. during 1967 and 1968. Whether the present examination will include a continuation of the core-drilling program started by Cyprus will be governed by the outcome of the sampling and mapping program now under way.

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HEAVY METALS, GOLD PUBLICATIONS ISSUED

"Principal gold-producing districts of the United States," by A.H. Koschmann and M. H. Bergendahl, is a recent Professional Paper (No. 610) of the U.S. Geological Survey. Information on U.S. gold deposits is presented alphabetically by state; 15 pages of the 283-page book are devoted to a discussion of Oregon's gold-producing districts. The book is for sale by the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Price per copy (cloth bound) is \$4.75.

The Survey is also issuing progress reports on its Heavy Metals Program, which began in 1966 in cooperation with the U.S. Bureau of Mines. Field work and topical studies performed in 1968 are summarized in Circulars 621 and 622 respectively. Both circulars are available free of charge from the U.S. Geological Survey, Washington, D.C. 20242.

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MOLLUSKS OF THE EUGENE FORMATION DESCRIBED

"The Oligocene marine molluscan fauna of the Eugene Formation in Oregon," by Carole Jean Hickman, has been published as Bulletin 16 by the University of Oregon's Museum of Natural History. A total of 67 species of mollusks are described and figured. In addition, the stratigraphy, paleoecology, and other aspects of the Eugene Formation are discussed. The 112-page bulletin can be obtained from the Museum of Natural History, the University of Oregon, Eugene, Oregon 97403. The price is \$2.50.

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AVAILABLE PUBLICATIONS

(Please include remittance with order. Postage free. All sales are final and no material is returnable. Upon request, a complete list of the Department's publications, including those no longer in print, will be mailed.)

BULLETINS

2.	Progress report on Coos Bay coal field, 1938: Libbey	\$ 0.15
8.	Feasibility of steel plant in lower Columbia River area, rev. 1940: Miller	0.40
26.	Soil: Its origin, destruction, preservation, 1944: Twenhofel	0.45
27.	Geology and coal resources of Coos Bay quad., 1944: Allen and Baldwin	1.00
33.	Bibliography (1st supplement) of geology and mineral resources of Oregon, 1947: Allen	1.00
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	Vol. 2. Two papers on foraminifera by Cushman, Stewart, and Stewart, and one paper on mollusca and microfauna by Stewart and Stewart, 1949	1.25
37.	Geology of the Albany quadrangle, Oregon, 1953: Allison	0.75
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56.	Fourteenth biennial report of the State Geologist, 1963-64	Free
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58.	Geology of the Suplee-Izee area, Oregon, 1965: Dickinson and Vigrass	5.00
60.	Engineering geology of the Tualatin Valley region, Oregon, 1967: Schlicker and Deacon	5.00
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63.	Sixteenth Biennial Report of the State Geologist, 1966-68	Free
64.	Mineral and water resources of Oregon, 1969	1.50
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Geologic map of Oregon west of 121st meridian: (over the counter)	2.00
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Gravity maps of Oregon, onshore and offshore, 1967: [Sold only in set]: flat	2.00
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