STATE OF OREGON
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
Head Office: 1069 State Office Bldg., Portland 1, Oregon
Telephone: CApital 6-2161, Ext. 488

Field Offices

2033 First Street
Baker

239 S.E. "H" Street
Grants Pass

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FOSSIL LOCALITIES OF THE EUGENE AREA, OREGON

By
Margaret L. Steere*

Introduction

The Eugene area became known for its fossils through Dr. Thomas Condon, first Professor of Geology at the University of Oregon, who began collecting there about 80 years ago. Since that time many species of fossils have been discovered and identified, and both the University of Oregon and Oregon State College have important collections in their museums.

Typical fossils of the Eugene area are sea shells and leaf imprints. They occur in interfingering marine and terrestrial strata that were deposited from late Eocene to late Oligocene time (30 to 50 million years ago). These fossiliferous beds now crop out in the hills of the Eugene area and all dip gently eastward as the result of regional folding. In the valleys of the Willamette River and its tributaries these rocks are almost entirely buried under a horizontal blanket of Pleistocene and Recent alluvium.

Eleven localities where fossils can be found in the Eugene area are shown on the accompanying map. Localities 1 through 7 have marine fossils and localities 8 through 11 have leaf fossils. Following a review of the geologic history, these localities are described and some of the fossils listed and illustrated. A bibliography is added for persons who wish to know more about the geology and paleontology of the region.

Geologic History

During the time that the Eocene and Oligocene fossil beds were being deposited, most of northwestern Oregon lay beneath a warm shallow sea whose southeastern shoreline ran approximately through the Eugene area (Lowry, 1947). Marine invertebrate animals lived in great numbers on the sea floor, while semitropical forests grew along the coast. Because the sea level fluctuated considerably, the Eugene area was at times under water and receiving marine sediments, and at times above sea level and receiving terrestrial sediments. For this reason both fossil shells and fossil plants are found in close proximity in the rock strata.

The oldest fossil-bearing rocks in the Eugene area are brown tuffaceous marine sandstones and shales of late Eocene age, named the "Spencer formation" after typical outcrops near the mouth of Spencer Creek. The Spencer formation was laid down on the sea floor as layers of sand and mud which incorporated the shells of marine animals living there. It attained a thickness of several thousand feet. Today these fossiliferous beds are exposed in Richardson Butte and other hills along the western edge of the Eugene area (Locality 1). The formation can be traced northward along a narrow belt into the Corvallis area and southward toward Comstock; east of this outcrop belt it dips beneath younger strata.

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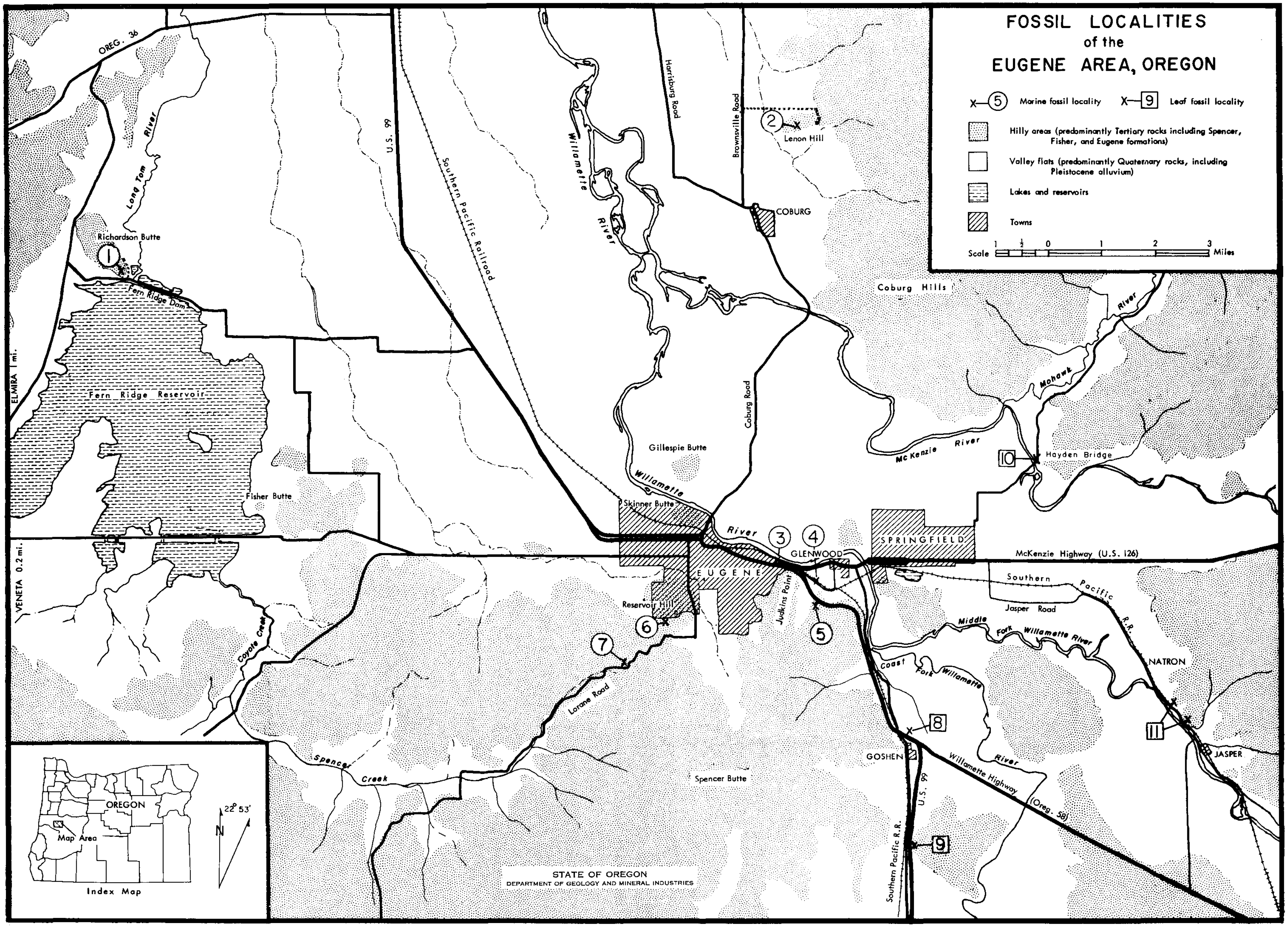
* Geologist, State of Oregon Department of Geology and Mineral Industries.


FOSSIL LOCALITIES
of the
EUGENE AREA, OREGON
Marine fossil locality
Leaf fossil locality
Hilly areas (predominantly Tertiary rocks including Spencer, Fisher, and Eugene formations)
Valley flats (predominantly Quaternary rocks, including Pleistocene alluvium)
Lakes and reservoirs
Towns
Scale
Miles
OREG. 36
Long Tom River
Richardson Butte
Fern Ridge Dam
Fern Ridge Reservoir
Fisher Butte
ELMIRA 1 mi.
VENETA 0.2 mi.
Coyote Creek
U.S. 99
Southern Pacific Railroad
Willamette River
Harrisburg Road
Brownsville Road
Lenon Hill
COBURG
Coburg Hills
Coburg Road
Gillespie Butte
Skinner Butte
Mohawk River
McKenzie River
Hayden Bridge
SPRINGFIELD
GLENWOOD
EUGENE
McKenzie Highway (U.S. 126)
Southern Pacific R.R.
Jasper Road
Judkins Point
Reservoir Hill
Middle Fork Willamette River
NATRON
Coast Fork Willamette River
Lorane Road
Spencer Creek
Spencer Butte
GOSHEN
Willamette Highway (Oreg. 58)
JASPER
Southern Pacific R.R.
OREGON
Map Area
Index Map
STATE OF OREGON
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES

Near the close of Eocene time, regional uplift caused the sea to retreat temporarily from the Eugene area. The new land surface, as the result of explosive volcanic eruptions, began to receive a thick terrestrial deposit known as the "Fisher formation" (named after Fisher Butte). This formation was composed of ash, tuff, breccia, and other volcanic material, some of which was reworked and deposited by streams. While the Fisher formation slowly accumulated, luxuriant forests, at first subtropical, grew on the slopes of the volcanoes and in the valleys between them. Fossil wood, leaves, seeds, and flowers that made up these forests are found today in rocks of the Fisher formation. They occur in lenses of fine-grained sediments that mark the sites of ancient ponds where plant remains from surrounding forests became buried in mud or ash (Localities 8, 9, 10, and 11). Several ages of forests are represented in the Eugene and adjacent areas, and two have been described in detail by paleobotanists Ralph Chaney and Ethel Sanborn (see bibliography). These are the late Eocene Comstock flora southwest of Cottage Grove (south of map area) and the Oligocene Goshen flora (Locality 9).

In middle Oligocene time, the sea again invaded the Eugene area. It filled what is now the Willamette Valley trough, and a tongue of it reached about as far south as Cottage Grove. An abundant invertebrate fauna, composed chiefly of mollusks and crabs, lived on the floor of this sea. Here the sands and muds eroded from the adjacent Fisher formation were brought in by streams and deposited to form the gray, tuffaceous and highly fossiliferous sandstones of the Eugene formation. As the sea floor subsided, the formation became extremely thick. According to Vokes, Snavely, and Meyers (1951), who mapped the Eugene area in considerable detail, the formation may be as much as 15,000 feet thick.

The fossiliferous Eugene formation is exposed today at many places in and about Eugene (Localities 2 to 7). It can be traced southward toward Cottage Grove where it interfingers with the Fisher formation. It can also be traced northward along the Coburg Hills and into the Salem area.

Withdrawal of the Oligocene sea from the Willamette Valley some 30 million years ago marked the end of marine deposition in the Eugene area. In Miocene time, the Spencer, Fisher, and Eugene formations were intruded by lavas which in places spread out over the strata as extensive flows. The prominent topographic features such as Skinner Butte, Spencer Butte, and Judkins Point are erosional remnants of these resistant volcanic rocks. During more recent geologic epochs, the Willamette River and its tributaries have carved wide valleys in the older rocks and have developed extensive flood plains underlain by thick deposits of alluvium. Occasionally an excavation in this alluvial material reveals bones and teeth of now extinct mammals that lived in this region at the close of the Ice Age.

Where to Find Fossils

*1. Fern Ridge dam

Marine fossils are abundant and well preserved in buff-colored sandstone of the Spencer formation which crops out on Richardson Butte at the west end of Fern Ridge dam. The locality is on the barren hillside at the extreme southeast end of the Butte and above a dirt road leading north from the west end of the dam. The fossils occur at various elevations on the side of the hill. As many as 25 different species of mollusks of Eocene age have been reported from this locality.

2. Lenon Hill

Many marine fossils have been collected from outcrops of the Eugene formation on Lenon Hill northeast of Coburg. To reach the locality from Coburg, go west on the Harrisburg road a short distance to the junction of the Brownsville road. Follow the Brownsville road north 1.9 miles

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* Numbers refer to localities on index map.

to a dirt road running east toward the Coburg Hills. Go east on this road 1½ miles to the farmhouse at the end of the road. Here, permission may be obtained to use the lane leading west from the farmyard toward Lenon Hill. The hill is composed of sandstone of the Eugene formation. Beds rich in Crepidulas, Spisulas, and other Oligocene mollusks crop out about halfway up the hill on the steep south slope and also on the west slope.

3. Smith quarry

Oligocene marine fossils are numerous in the old abandoned Smith quarry at the eastern edge of Eugene. The quarry is situated on the north side of U.S. 99, between the Highway and the mill race, at the junction of the west-bound lane of the McKenzie River Highway (US 126). Tuffaceous sandstone of the Eugene formation crops out in the quarry walls and contains layers packed with large white pelecypods.

4. Railroad cut near Sears Warehouse

Marine fossils occur in the steep bluff along the Southern Pacific railroad near the Sears warehouse between Eugene and Glenwood. To reach the locality from Glenwood, follow Henderson Road south from the McKenzie River Highway ½ mile. Cross Southern Pacific tracks and turn west on Judkins Road. Go about ½ mile to the Sears warehouse. The railroad tracks lie immediately to the north. Walk back along railroad grade for about ¼ mile to the steep bluff where sandstone of the Eugene formation crops out above the tracks. Although somewhat weathered now, this locality has yielded a large fauna in the past.

5. U.S. Highway 99

Oligocene marine fossils are varied and abundant in a prominent road cut east of Eugene on U.S. Highway 99. The locality is 0.7 mile southeast of the junction of U.S. Highway 99 and the McKenzie River Highway. The hill into which the cut was made is composed of soft, gray sandstone of the Eugene formation. Although the material in the cut is disintegrating rapidly and grass is gradually covering it, sandstone beds containing layers of fossils are still partially exposed. Numerous small ball-like concretions containing beautifully preserved crab claws are characteristic of this locality and are scattered along the roadside at the base of the cut.

6. Reservoir Hill

Marine fossils are reported from recent road cuts and basement excavations along Jefferson and Washington streets in the vicinity of 26th and 28th avenues high up on the west slope of Reservoir Hill. The fossils are in the form of casts and molds in weathered Eugene sandstone.

7. Lorane Road

Fossiliferous sandstone of the Eugene formation crops out at the top of the high hill on the Lorane Road near the south edge of Eugene. The locality is 2.3 miles southwest of the corner of Willamette Street and 29th Avenue. Marine fossils can be found in weathered sandstone in the shallow road cut and in outcrops above the road on the crest of the hill. Fresh rock containing fossils is temporarily exposed in some of the nearby basement excavations.

8. North Goshen leaf locality

Many fossil leaves of late Oligocene age occur in dark gray shale in the upper part of the Fisher formation at the north edge of Goshen. The locality is a road cut in a small hill on the north side of the junction of U.S. Highway 99 and State Highway 58. The fossils are in the form of black carbonaceous films and impressions beautifully preserved on thin layers of shale. This flora has been described by R. E. Brown (see Vokes and others, 1951, in bibliography). It is younger than the true "Goshen flora." Several fossil salamanders have been discovered on slabs of shale along with the leaves at this locality.

9. South Goshen leaf locality

This leaf locality is one of the sites of the "Goshen flora," a large suite of fossil plant remains of lower to middle Oligocene age occurring in lenses of whitish tuff within the Fisher formation. The Goshen flora is described by Chaney and Sanborn (see bibliography). This locality is at a road cut through a small hill on old Highway 99 beneath an overpass 1.75 miles south of Goshen. The outcrop has been partly destroyed by recent highway construction, but fossil leaves can still be found in the bed of whitish tuff at road level.

10. Hayden Bridge leaf locality

Fossil leaves reported by R. W. Brown to be of late Oligocene age are found in a road cut near Hayden Bridge. To reach the locality from Springfield, go about 3 miles northeast on Marcola Road, cross McKenzie River on Hayden Bridge, and continue 0.2 mile to road cut through small hill. The cut exposes beds of black carbonaceous shale of the Fisher formation or equivalent dipping gently eastward. Fossil leaves occur in thin layers at several levels. The shale is poorly cemented and breaks easily so that specimens must be handled with extreme care.

11. Jasper leaf locality

Fossil leaves and wood reported by R. W. Brown to be of late Eocene to early Oligocene age occur at three outcrops along the Southern Pacific railroad near Jasper. The outcrops are between 5 and 7 miles southeast of Springfield via the Jasper road. Measured from the bridge across the Middle Fork of the Willamette River at Jasper, the first outcrop 3/4 mile north, the second 1/4 mile north and the third about 1 mile south. All outcrops are prominent exposures of massively bedded sandstone in vertical cuts along the railroad tracks immediately east of the Jasper road. Carbonized wood, including some large logs, is scattered through the sandstone, while leaf impressions occur in streaks of cream-colored ashy shale.

Fossils to Look For

Plant fossils: Fossil leaves, wood, and occasionally flowers, fruits, and seeds, occur locally in the Fisher formation in the Eugene area. The fossil plants so far recognized in the map area include two ages of Oligocene floras. The older flora (Goshen flora) contains meliosma, magnolia, fig, and other semitropical plants. The younger flora contains plants characteristic of a more temperate climate such as pine, oak, maple, and sassafras. Some of these fossil plants are listed below. Fossils marked with an asterisk are illustrated.

Plant Fossils

Fisher formation (Oligocene)

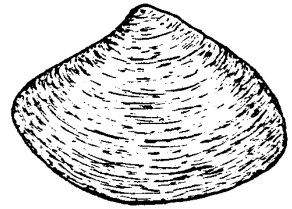
South Goshen flora (Early Oligocene)	North Goshen flora (Late Oligocene)
Ocotea eocernua Chaney and Sanborn	*Pinus latahensis Berry
*Meliosma goshenensis Chaney and Sanborn	*Quercus consimilis Newberry
Ilex oregona Chaney and Sanborn	*Hydrangea bendirei (Ward) Knowlton
Magnolia reticulata Chaney and Sanborn	Acer glabroides Brown
Cupania packardi Chaney and Sanborn	Platanus dissecta Lesqueureux
*Ficus goshenensis Chaney and Sanborn	*Cinnamomum dilleri Knowlton
Tetracera oregona Chaney and Sanborn	Sassafras sp.

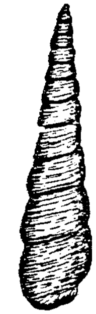
*Illustrated on page 57.

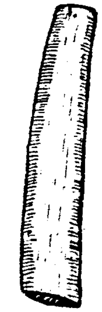
EOCENE FOSSILS FROM THE SPENCER FORMATION


Venericardia hornii

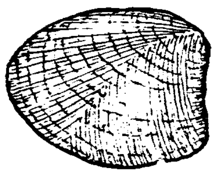

Pitar eocenica

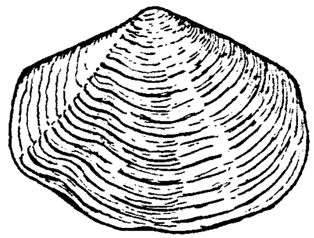

Spisula packardi

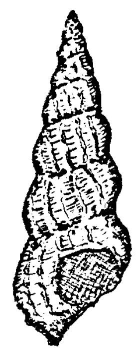

Turritella uvasana

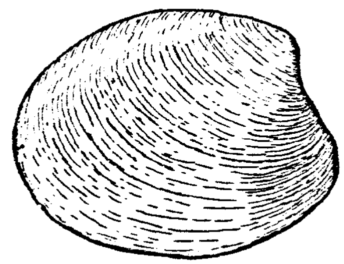

Dentalium

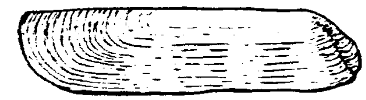
OLIGOCENE FOSSILS FROM THE EUGENE FORMATION

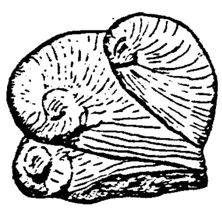

Acila shumardi

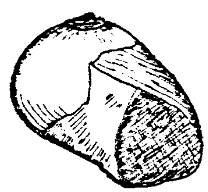

Thracia condoni


Epitonium condoni

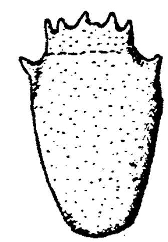

Pitar dalli


Solen eugenensis


Crepidula ungana

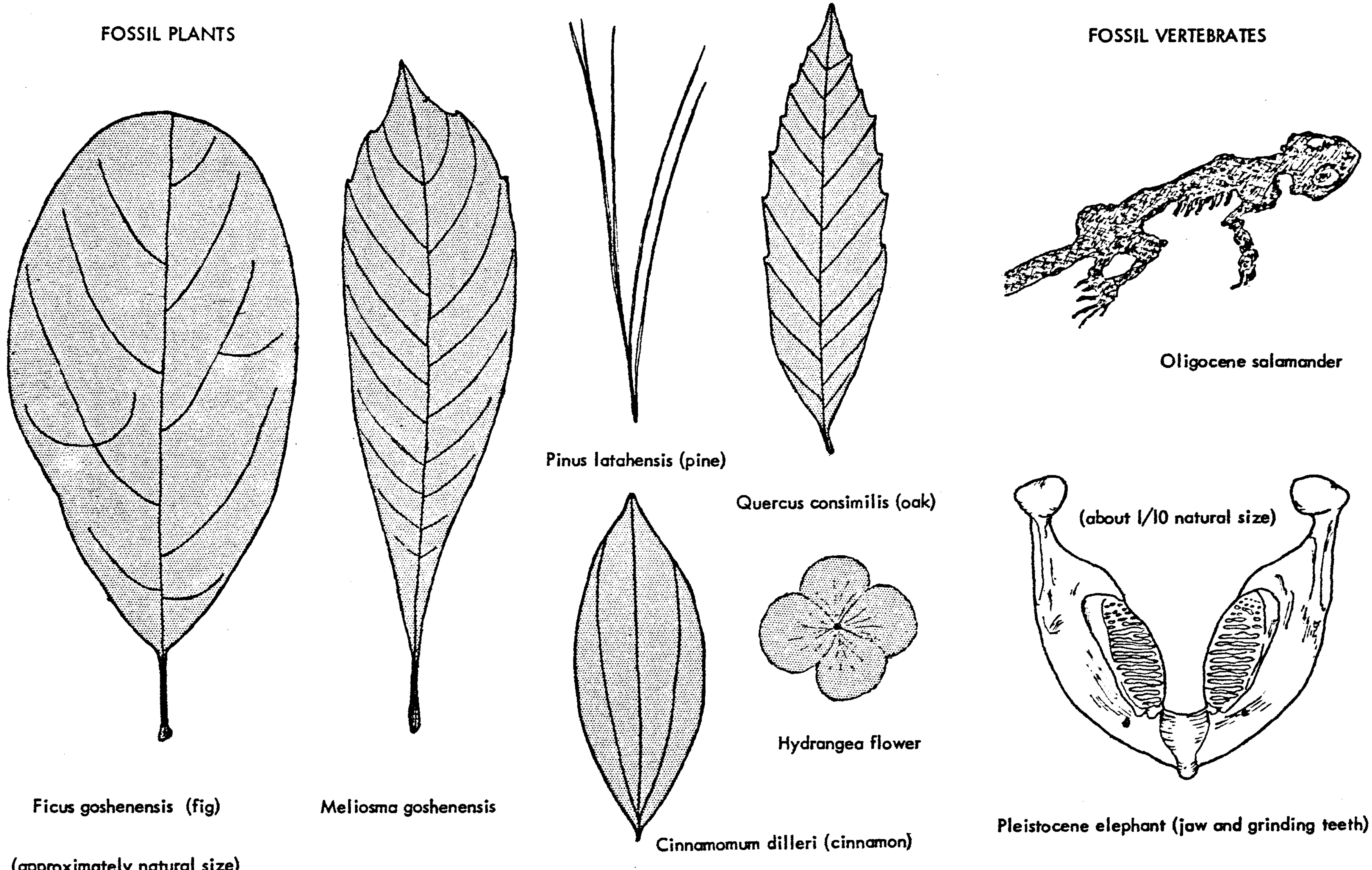

Polinices secta


Raninoides eugenensis (crab claw)


Callianasa oregonensis (crab shell)

(approximately natural size)

MARINE FOSSILS OF THE EUGENE AREA, OREGON



LAND FOSSILS OF THE EUGENE AREA, OREGON

Marine fossils: Mollusks are by far the most abundant of the invertebrate marine fossils of the Eugene area. They include pelecypods (clam-like shells), gastropods (snail-like shells), and scaphopods (tooth shells). The Spencer and Eugene formations each carry a distinctive assemblage of mollusks, with more than 20 species of pelecypods and nearly as many species of gastropods. Fossil barnacles, sea worms, echinoids, and crabs, although not as numerous as the mollusks, are not uncommon in the Eugene formation. Some of the characteristic marine fossils of the Eugene area are listed below, and those marked with an asterisk are illustrated.

Marine Fossils

Spencer formation (Eocene)

Pelecypods:
- Acila decisa Conrad
- Ostrea idriaensis Gabb
- Brachidontes cowlitzensis (Weaver and Palmer)
- Macrocallista conradiana (Gabb)
- Tellina cowlitzensis Weaver
- *Spisula packardi Dickerson
- *Venericardia hornii Weaver and Palmer
- *Pitar eocenica (Weaver and Palmer)

Gastropods:
- Polinices nuciformis (Gabb)
- Siphonalia sopenahensis (Weaver)
- Perse sinuata (Gabb)
- *Turritella uvasana Conrad

Scaphopod:
- *Dentalium stramineum Gabb

Eugene formation (Oligocene)

Pelecypods:
- *Acila shumardi (Dall)
- *Thracia condoni Dall
- Loxocardium eugenense (Clark)
- *Pitar dalli (Weaver)
- Tellina eugenia Dall
- Spisula eugenense (Clark)
- *Solen eugenensis Clark

Gastropods:
- *Epitonium condoni Dall
- *Polinices secta (Gabb)
- *Crepidula ungana Dall
- Bruclarkia fulleri Durham
- Molopophorus dalli Anderson and Martin

Scaphopod:
- *Dentalium

Echinoid

Barnacle:
- Balanus

Sea worm:
- Teredo

Crabs:
- *Raninoides eugenensis Rathbun
- Zanthopsis (several species)
- *Callianasa oregonensis Dana

* Illustrated on page 56.

Vertebrates

Pleistocene elephant:
- *Elephas columbi (jaw and grinding teeth)

Oligocene salamander:
- *Palaeotaricha oligocenica

Oligocene shark tooth:
- Odontaspis sp.

* Illustrated on page 57.

Vertebrates: Occasionally teeth and fragments of elephant tusks are found in the Pleistocene silts in outcrops along Spencer Creek and in the Willamette Valley. Such finds are rare and new locations are unpredictable, consequently no localities are described in this report. Several fossil salamanders have been discovered at the north Goshen leaf locality (Locality 8) in black shales of the upper Fisher formation of late Oligocene age. A few shark teeth have been collected from Oligocene marine sandstones of the Eugene formation. Fossils marked with an asterisk are illustrated.

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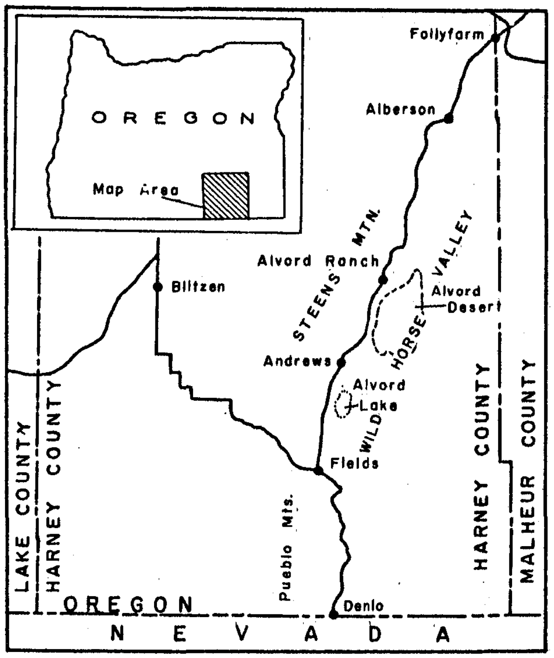
ALVORD LAKE AREA LEASED FOR BORAX

After more than half a century the sodium borate deposits of southern Harney County are again receiving attention. Approximately 50,000 acres are involved in prospecting applications covering the Alvord Lake area (see map). The wave of interest in the area apparently stems from the recent publicity over the use of boron in high-energy fuels. Borax was first produced at the turn of the century from the playa immediately south of Alvord Lake by the Rose Valley Borax Company. The Company scooped up borax-rich crusts from the playa surface, dissolved them in boiling water, and collected the pure crystals upon cooling. Approximately 400 tons were shipped annually for several years to Winnemucca, Nevada. The discovery of the borate mineral colemanite in 1882 resulted in the decline of the use of playa crusts as a source of borax, and by 1907 had completely replaced them.



Much of the land in the vicinity of Alvord Lake and Alvord Desert is federally owned. In the past six months the Land Office of the U.S. Bureau of Land Management has received 30 applications for prospecting permits from individuals. Eight of these applications, totaling 15,000 acres, have been processed by the Bureau, but due to a conflict of overlapping claims in the southern portion of the area, it will be some time before the remainder can be acted upon. There is a small amount of State land in the area but no applications have been received by the State Land Board. Federal prospecting permits are granted for a 2-year period for areas where deposits of mineral are not known to occur. Other than the $10 filing fee which must accompany the application, and which is not returnable, there is no charge for the prospecting permit. A letter in duplicate, addressed to the Land Office of the U.S. Bureau of Land Management, 809 N.E. 6th Avenue, Portland, together with the filing fee, giving the legal description of the land and indicating whether the applicant is a native born or naturalized citizen, is all that is required. Naturalized citizens must give their citizenship certificate number and the date and place it was granted. A limit of 2,560 acres is placed on each application, with a total maximum of 5,120 acres per applicant. Under the terms of the permit a holder can examine the ground, make such explorations as are necessary to determine the extent and quality of the deposit, but may not develop or remove any mineral prior to obtaining a lease and royalty agreement. An application for a Preferential Right Lease must be accompanied by a $10 filing fee. The application is examined by the mining branch of the U.S. Geological Survey.

In recent years California has produced all of the borax used in the United States and supplied nine-tenths of the world's requirements. A comprehensive article on borax minerals has been published by the California Division of Mines in their Bulletin 176, Mineral Commodities of California, 1957.

R.S.M.

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NO NEW DMEA CONTRACTS AFTER JUNE 30, 1958

The Defense Minerals Exploration Administration has announced that funds will not be available to finance new mineral and metal exploration contracts after June 30. Exploration project contracts in effect on June 30 will be continued until terminated, but no new contracts will be approved after that date.

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OUR IN-AND-OUT POLICY ON MINERALS COULD HAMPER AMERICA'S DEFENSES*

By

Edmund Christopherson

Today the minerals segment of our economy is in trouble. World prices of copper, zinc, lead, tungsten and other metals essential to our industries have toppled to the point where U.S. producers, who pay miners from five to twenty times what foreign miners receive, just can't compete.

In Butte, long famed as the "richest hill on earth," 5300 men were working in the mines in January of 1957. Today fewer than 2000 are employed, with more lay-offs expected. It's a sort of chain reaction. With a smaller ore output, the smelter in Anaconda needs fewer men and the refinery in Great Falls lays off workers too.

This current crisis in the feast-and-famine minerals industry is a result of the patch, mend, and improvise Government policy on U.S. mining. During World War II, when enemy submarines were sinking a shockingly high percentage of the ships bringing strategic minerals from Africa and South America, we depended on our ability to produce these minerals at home. The industry's response was a decisive contribution to winning the war.

After the war, in 1946, Congress passed a Strategic and Critical Materials Stockpiling Act, but failed to implement it with necessary appropriations. Since then, Government agencies have spent some billion dollars to aid and develop minerals production abroad while doing little for domestic producers.

The Korean crisis again put metals mining on a crash basis, and U.S. producers came to the rescue. After Korea, in 1953, Congress passed measures and appropriations to continue buying strategic minerals, and the General Services Administration operated this program. Congress voted in 1956 to continue the program, but was slow about putting up the money. In the absence of immediate appropriations, minerals producers were encouraged to continue production on the assumption that deficiency appropriations would be forthcoming. They ended up holding the sack.

Tungsten is the key component of heat-resistant alloys vital in jets and missiles. With unlimited use of tungsten for aircraft engines, Russian designers turned out a hotter-burning jet, which gave their MIG-15 better climbing and altitude capabilities than our F-86's showed over Korea. It was only because of other design faults in the MIG that we came out ahead. Our designers were handicapped by limitations on the use of tungsten because the Defense Department rated it short. At the same time another Government agency was trying to shut down domestic tungsten production because there was too much! It wasn't until December 1956 that our aircraft engineers were told to use all the tungsten they wanted in engine design. This delay may have played a part in putting us behind the U.S.S.R. in the missile race.

When the Korean crisis caught us unprepared, tungsten prices soared from $25 a unit to $100. The current price on the world market is $13. While this low price has shut down even our most efficient domestic producers and put miners and processors out of work, the Government continues with contracts to buy another $60,000,000 worth of this product abroad at $55.

We need a long-range minerals program which will enable the industry to operate with reasonable continuity and stability.

This does not mean that we should shut off all minerals imports, nor should we bail out obviously inefficient producers. We should determine realistic price and volume levels which will keep efficient U.S. mines in operation and encourage needed exploration. We should then set import bases that will permit the importation of needed mineral products without forcing our producers to shut down.

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URANIUM MILL CONSTRUCTION STARTS

Lakeview Mining Company, acting as its own general contractor, is well under way with the construction of the uranium reduction plant located at the north edge of Lakeview. The $2,600,000 mill will process ore from the White King and Lucky Lass properties a few miles northwest of Lakeview. At the White King Mine, work has been started on a new three-compartment shaft which will cost more than $500,000 and reach a depth of 700 feet below the surface. The shaft is located 600 feet east of the original two-compartment shaft which was sunk 312 feet deep to explore the deposit. A total of 116 men are presently employed, with 70 at the mill site and 46 at the White King Mine. Announced completion date of the mill, which will supply "yellow cake" to the Atomic Energy Commission, is early in 1959. (From Lake County Examiner.)

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SECRETARY OF INTERIOR SEATON MODIFIES PROPOSAL FOR CHROME

Secretary of Interior Fred A. Seaton appeared before the Senate Interior and Insular Affairs Committee June 19, 1958, to modify his Stabilization Plan of 1958 and his Long-Range Minerals Program submitted to the Senate last year as Senate Bill 2375. Of particular interest to Oregon miners are his remarks on production bonuses, especially as they apply to chromite. It will be noted from the Secretary's statement, which appears below, that the experts within the Department of Interior still believe it unnecessary to consult with industry regarding the needs to keep the mines open and that they prefer to operate under a stopgap proposal. Industry representatives testifying before the Senate Committee have repeatedly stated that bonuses for production are not the answer to the problem of continued mining, and they have shown that the domestic chrome miner must compete with United States costs at the finished product level rather than with cheap labor of foreign mines at the raw-ore level. Industry representatives have suggested that, in lieu of giving a production bonus for domestic raw ore, the government underwrite a domestic chrome-miners cooperative ferrochrome plant by purchase of a guaranteed portion of the production over a 6-year period and thereby establish mining on a permanent basis. The text of the Secretary's statement as it applies to chrome follows:

The Administration's proposal of last year for production bonuses for beryl, chromite, and columbium-tantalum, apparently has not been completely understood. . . . The production bonus program is not a support program. It is, rather, a program undertaken as an adjunct to the on-going programs of research in the Government and it is justified by the present and potential importance to the Nation of the commodities included in the proposal and by the foreseeable technological advances that will affect their production and use.

The Administration originally proposed specific production bonuses for limited quantities of domestically produced beryl, chromite, and columbium-tantalum. Following hearings before this Committee, the chairman and several members suggested that the Department take another look at the over-all situation with respect to these commodities. This has been done. Accordingly, we are modifying our original proposals. . . .

Chromite: Our initial proposal for chromite called for a production bonus of $21 per long dry ton for not to exceed 50,000 long dry tons annually. It is now recommended that this production bonus be fixed at $35 per long dry ton, but that there be no change in the annual or company limitations (10,000 l.d.t.) as contained in the Administration's original bill. In view of the fact that there has been a great deal of discussion of the chromite proposal, I should like to provide the Committee some of the background as to the method through which our original price was arrived at and outline to you the reasons for increasing the bonus from $21 to $35 per long dry ton.

The prevailing quotation from imported metallurgical grade chromite, f.o.b. United States ports, is approximately $55 per long dry ton. Freight and other charges involved in moving this material into the primary marketing area, the Ohio Valley, would add another $10 to this price, bringing the total price to consumers in the major marketing area to approximately $65 per long dry ton. This is the price that would prevail for material of comparable grade produced from our own Western States if sold under existing conditions. Chromite from Oregon and California moving into the Ohio Valley would have to bear freight and handling and other charges approximating $25. Deducting this figure from the market price of $65 leaves a gross return of approximately $40 to the mine to cover all mining and, where applicable, milling costs. On the basis of our original proposal this $40 figure would be increased to approximately $60 upon payment of the production bonus of $21. Information contained in the Department indicates that this level of income would be sufficient for the bulk of the mining operations conducted in the western chromite-producing area. We acknowledge, however, that much of the affected production would be sold at a somewhat lower price than that commanded by the imported material, particularly when account is taken of the penalities which would apply to producers on sales of material that cannot meet the highest commercial specifications, therefore we are proposing that this bonus be increased to $35 per ton.

One further point with respect to the chromite proposal needs clarification. The production bonus will be paid on the basis of 46% material. Premiums over this amount will apply to higher-grade chromite and penalties to chromite of lower-grade. A schedule of premiums and penalties will be contained in the regulations which will also apply to the chrome-iron ratio of the concentrates and fix the basic specifications on which the bonus will be computed.

The success of the chromite production bonus program is largely up to the domestic industry. As indicated, I am advised that the quantities and magnitude of the bonus are such as to maintain a substantial production of chrome in the United States. Until now the domestic producers have enjoyed a guaranteed market and guaranteed price for their product. They have not established commercial relationships with consumers in the United States. Under the terms of the proposed bonus program, such relationships must be established inasmuch as there must be evidence of a sale before the bonus can be paid. In this way a commercial domestic industry can be established and maintained.

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