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FOSSIL LOCALITIES OF THE SALEM-DALLAS AREA

By
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Location

The Salem-Dallas area lies in the center of the Willamette Valley in Polk and Marion counties (see accompanying map). Within this area there are a number of scattered rock outcrops where fossils may be found. The 12 localities described in this report are easily reached by paved highways or good secondary roads.

Geologic History

Thousands of feet of fossiliferous marine strata underlie the Salem-Dallas area. These rocks were deposited in seas that covered most of western Oregon during Eocene and Oligocene times. The beds have been tilted eastward; thus the older rocks (Eocene) crop out along the western side of the area in the vicinity of Dallas while to the east the overlapping younger rocks (Oligocene) crop out in the vicinity of Salem.

Eocene formations

The earliest fossil record in the area goes back about 50 million years to the time when submarine volcanoes were exceedingly active on the floor of the Eocene sea. As the sea floor subsided, a thick series of basaltic lava flows accumulated together with occasional interbeds of sediments, some of which contained shells of marine animals. Today these uplifted rocks, known as the Siletz River volcanics, form the core of the Coast Range west of Dallas. They are exposed along the far western edge of the Salem-Dallas area, and one of the interbeds of fossil-bearing sediments crops out in the Ellendale quarry (Locality 11). A rare gastropod "Pleurotomaria" has been found here, as well as oysters and other mollusks, brachiopods, bryozoa, and foraminifera.

Later in the Eocene epoch, after submarine volcanism had lessened in intensity, many hundreds of feet of thickly bedded sandstones and siltstones were laid down over the lavas in this area. These rocks now crop out in the foothills of the Coast Range west of Dallas and are known by various formation names such as Tyee, Burpee, and Yamhill. The formations are generally unfossiliferous except for plant fragments. Locally, however, they contain thick bodies of limestone in which marine fossils such as the nautilus, crabs, pelecypods, and gastropods are found. One such limestone deposit occurs near Dallas (Localities 9 and 10) and a smaller one near Buell (Locality 12). Quarry operations in both deposits continually open up fresh fossiliferous rock.

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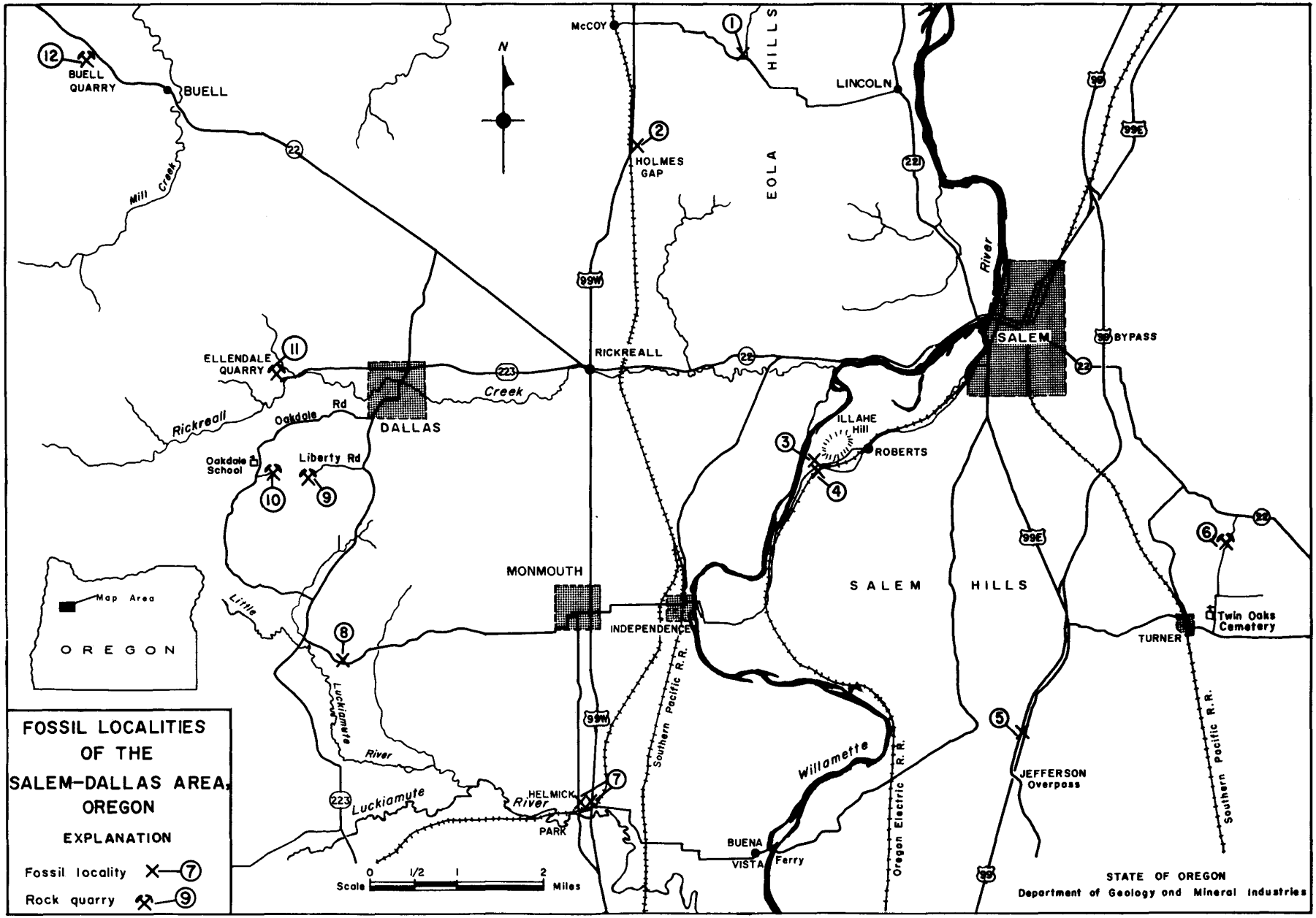
FOSSIL LOCALITIES OF THE SALEM–DALLAS AREA, OREGON
EXPLANATION
Fossil locality
Rock quarry
Map Area
OREGON
N
McCOY
LINCOLN
HILLS
EOLA
HOLMES GAP
BUELL
BUELL QUARRY
Mill Creek
ELLENDALE QUARRY
RICKREALL
DALLAS
Rickreall Creek
Oakdale Rd
Oakdale School
Liberty Rd
ILLAHE Hill
ROBERTS
SALEM
BYPASS
River
MONMOUTH
INDEPENDENCE
Little Luckiamute River
Luckiamute River
HELMICK PARK
Southern Pacific R.R.
Willamette River
Oregon Electric R.R.
BUENA VISTA Ferry
SALEM HILLS
JEFFERSON Overpass
TURNER
Twin Oaks Cemetery
Scale 0 1/2 1 2 Miles
STATE OF OREGON
Department of Geology and Mineral Industries

Between Dallas and the Willamette River is an area of later Eocene marine strata composed mainly of thin-bedded micaceous siltstones and shales containing occasional hard, massive layers. These beds are called the Nestucca formation north of Dallas and the Helmick beds south of Monmouth. Similar beds extend southward into the Corvallis and Eugene areas where they are known as the Spencer formation. In fresh outcrops these rocks are gray and contain many marine fossils, including shark teeth and mollusks. On exposure to the weather, however, the thin-bedded material turns rusty brown and disintegrates (Localities 7 and 8).

Oligocene formations

Early in Oligocene time, about 40 million years ago, the sea again invaded western Oregon. Massive beds of fossiliferous siltstones known as the Keasey formation accumulated on the sea floor. The type locality for these deposits is in the Sunset Highway area northwest of Portland where the beds contain a great variety and abundance of fossil shells. In the Willamette Valley, the extent of the Keasey formation is not well known due to scarcity of outcrops, but where found the beds contain a characteristic Keasey fauna.

By middle Oligocene time, the slowly rising Coast Range began to form a highland or row of islands to the west of the Salem-Dallas area. In the gradually subsiding basin of the Willamette Valley region, there accumulated several thousand feet of tuffaceous sandstones containing an abundance of shallow-water marine shells. Today these sandy, buff-colored beds, known as the Eugene formation, are widely distributed in the Willamette Valley. Although the name "Illahe formation," was given to beds in the Salem area by Mundorff in 1939, the name "Eugene formation," is now preferred. The Eugene formation contains a variety of pelecypods and gastropods (Localities 1 to 6).

Miocene to Recent formations

Uplift of the land some time in late Oligocene or early Miocene caused the sea to retreat permanently from the Salem-Dallas area. The middle Miocene epoch was a time of major volcanism. Basaltic lava flows, known as the Stayton lavas and contemporaneous with the great Columbia River basalt extrusions, blanketed the marine formations in the Salem area. Since Miocene time, the Willamette River and its tributaries have carved wide valleys in the volcanic and sedimentary rocks. Remnants of the basalt flows can be seen capping the Salem and Eola hills, while the underlying fossiliferous sandstones of the Eugene formation crop out beneath. Prolonged chemical weathering of the Stayton lavas has altered the basalt to clay and bauxite, which may be recognized by its red color.

For the past 10,000 years or more the Willamette River and its tributaries have been depositing a thick cover of sand, silt, and mud over the broad Willamette Valley. Occasionally fossil bones and teeth are found in these sediments in river banks and excavations. Because the location of such fossils is unpredictable, no localities are described in this report. Fossils which have been discovered include elephant, mastodon, ground sloth, and camel, all inhabitants of the Salem area at the close of the Ice Age, and now extinct or no longer native to this region.

Where to Look For Fossils

The places to look for fossils in the Salem-Dallas area are where sedimentary beds are either recently exposed or sufficiently well cemented to have resisted many years of weathering. Favorable localities may be man-made excavations such as quarries and road cuts, or they may be natural outcrops on hillsides and along the banks of streams. The following 12 localities are good places to find fossils:

*1. Eola Hills locality

Fossil beds of the Eugene formation crop out beneath Stayton lavas in a number of places in the Eola Hills. The locality described here is near the top of the divide on the road that crosses Eola Hills from McCoy to Lincoln. To reach the locality, start at Rickreall, go north on U.S. 99 W toward Amity for 8 miles to the Lincoln road (graded dirt road). Turn right and go east 3 miles to road junction at top of hill. A hard, fossiliferous layer of the Eugene formation crops out in a brushy pasture a short distance west of the road junction. Various other outcrops in the vicinity are reported to expose fossils.

2. Holmes Gap locality

Holmes Gap is the narrows between the hills where U.S. Highway 99 W crosses the Southern Pacific railroad 5 miles north of Rickreal. Coarse, dark-gray fossiliferous sandstone crops out in two places in a pasture on the east side of the highway about 0.2 mile northeast of the railroad crossing. One outcrop is on the bank of a shallow gully about 200 feet west of a farmhouse. The other outcrop is on the side of a small ravine in the steep bluff near the highway. This coarse sandstone contains a variety of well-preserved shells of middle Oligocene age and may represent the base of the Eugene formation. Typical fossils are the pelecypods Acila and Pitar, and the gastropods Bruclarkia and Molopophorus.

3. Illahe Hill locality

Fossils are numerous in a weathered exposure of the Eugene formation at the south end of Illahe Hill about 5 miles southwest of Salem. To reach the locality, follow South River Road to Roberts and continue 1.4 miles to driveway at farmhouse. The outcrop is behind farm buildings at the base of the hill about 500 feet north of the road. The entire hill is composed of the Eugene formation. Fossils at Illahe Hill are similar to those directly across the road at Finzer Station (Locality 4). The two localities were probably continuous strata before being separated by erosion.

4. Finzer Station locality

Fossils are abundant at Finzer Station on the Oregon Electric railroad 5 miles southwest of Salem. This locality is directly across the road (South River Road) from the Illahe Hill locality (Locality 3). To reach it climb up to the tracks at the railroad overpass and walk along railroad for about 100 feet to a deep cut through the hill. Here the Eugene sandstone of Oligocene age forms the vertical walls on each side of the tracks. Fossil casts, particularly pelecypods, are exceedingly abundant. The sandstone weathers rapidly and fossils are well preserved only when freshly exposed. Some of the typical genera are: the pelecypods Solen, Spisula, Yoldia, and Nuculana, and the gastropod Bruclarkia.

5. Frontage Road locality

Chalky-white mollusks in gray sandstone and siltstone are abundant in a recent road cut on Frontage Road about 10 miles south of Salem. To reach the locality from Salem, start at City Center and drive south on U.S. Highway 99 for 11 miles to the Jefferson overpass. Turn right (west) onto Frontage Road and drive back toward the north (parallel to the main highway) for 1 mile to road cut. The Eugene formation of Oligocene age is exposed here dipping northeastward under the Stayton lavas. Although the original shells are still preserved, they quickly disintegrate on exposure to the air leaving internal casts in the rock. The locality is about 3.5 miles south of the junction of U.S. 99 through Salem and the By-pass.

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*Numbers refer to localities on index map.

6. Turner quarry locality

From center of Turner (about 9 miles southeast of Salem), go east on county road ½ mile to Oaks Cemetery road (graded dirt road). Turn left (north) and go north on Oaks Cemetery road toward Witzel for 2.3 miles to old, shallow quarry and dump on west side of road. The quarry exposes well-cemented brown tuffaceous sandstone of the Eugene formation of Oligocene age in which casts and molds of Spisula and other pelecypods are well preserved. An upper quarry a short distance to the west exposes the overlying Stayton lavas of Miocene age.

7. Helmick Hill locality

A new section of U.S. Highway 99 W makes a long deep cut through the north bank of the Luckiamute River 4.5 miles south of Monmouth. The cut exposes northward-dipping Helmick beds of upper Eocene age. This exposure is similar to the cut through Helmick Hill on old Highway 99W a third of a mile due west. The new highway cut is not as deeply weathered as the old one and fossils can still be found in the more indurated layers. Among the fossils that have been collected from these cuts in the past are the pelecypods Spisula, Tellina, and Volsella, and the gastropods Ampullina and Acrilla. Shark teeth have also been found.

8. Cooper Hollow road locality

A road cut in a low bank on the Cooper Hollow road exposes upper Eocene sediments that are presumably a continuation of the Helmick beds. The outcrop is on the north side of the highway where the highway rises up out of the Luckiamute Valley. It is 6.5 miles west of U.S. Highway 99W in Monmouth and 1.2 miles east of State Highway 223 (Kings Valley road). When the Cooper Hollow road was under construction, a number of kinds of fossil mollusks similar to those at Helmick Hill were collected from the freshly exposed dark-gray shale. Weathering has since obscured much of the outcrop, but a few fossils can still be found. These are generally hard and fairly well preserved and can be combed out of the soft shale.

9. Polk County Lime quarry

The Polk County Lime quarry is about 1 mile east of the Oregon Portland Cement quarry in an extension of the same limestone deposit. It may be reached from the Dallas Court House by following State Highway 223 south for a distance of 2.2 miles to Liberty Road and continuing west on Liberty Road 1.5 miles to the quarry. Fossils of middle Eocene age, particularly Ostrea, are numerous in certain horizons of the Tyee formation.

10. Oregon Portland Cement quarry

The Oregon Portland Cement Company has a large quarry in a deposit of massive gray limestone southwest of Dallas. The quarry may be reached from the Dallas Court House by following State Highway 223 for 1.0 mile south to the intersection with Oakdale Road. Turn west on Oakdale Road and go 3.7 miles to quarry sign and private road. The quarry is in the bottom of a valley 0.3 mile east of Oakdale Road. Permission to hunt for fossils may be obtained at the quarry. Fossils are of Eocene age and are fairly numerous in certain horizons of the Tyee formation at this locality. Among those found are the crab Raninoides, pelecypods, a large species of nautilus, shark teeth, sea urchins, and foraminifera.

11. Ellendale quarry

Fossils of Eocene age may be found in the Ellendale basalt quarry. The quarry is on Ellendale road, 3.0 miles west of the junction in north Dallas with State Highway 223. Basaltic rock of the Siletz River volcanic series comprises most of the material in the quarry, but a sedimentary bed of grit containing many broken fossil shells is exposed over a fairly wide area near the top of the quarry and is easily accessible from the south side of the hill into which the quarry is dug. Among the fossils that have been found are the gastropods Calyptraea, Turritella, and the rare Pleurotomaria; the pelecypods Barbatia, Ostrea, and Pecten; several kinds of brachiopods; and bryozoa.

12. Buell Limestone Quarry locality

Fossils are abundant in the Buell limestone quarry 2 miles west of Buell on State Highway 22. The entrance to the quarry is marked by a sign at a gate on the south side of the highway. The quarry (not operating at present) is plainly visible about 1/8 mile to the southwest in the bottom of a valley. Limestone of the Yamhill formation (Eocene) is exposed in the quarry. A layer of coquina composed of shells and shell fragments contains Ostrea, Lima, and other mollusks. Overlying this layer is a bed of black basaltic grit containing large round foraminifera (easily seen without a hand lens) and brachiopods.

Fossils To Look For

Pelecypods and gastropods are the most abundant and the most varied fossils in the marine formations of the Salem-Dallas area. Other marine animals reported from these formations are scaphopods, brachiopods, cephalopods, echinoids, corals, bryozoa, foraminifera, crabs, and shark teeth. Fragments of poorly preserved leaves and wood are abundant in the Eocene strata. Once in a while bones and teeth of fossil mammals, particularly mastodons, are found in the Pleistocene and Recent sediments of the Willamette Valley.

The names of some of the characteristic fossils of the Eocene and Oligocene marine formations in the Salem-Dallas area are listed below, and many additional fossils are listed in publications cited at the end of this report.

Eocene fossils:

Siletz River Volcanic Series

Pelecypods:
- Barbatia cf. B. cowlitzensis (Weaver and Palmer)
- Lima sp.
- Ostrea n. sp.
- Pecten cf. P. interradiatus Gabb
- Spondylus carlosensis Anderson

Gastropods:
- Acmaea n. sp.
- Calyptraea sp. indet.
- Turritella andersoni cf. subsp. susanae Merriam
- Pleurotomaria sp. indet.

Brachiopods:
- Terebratulina (several species)

Bryozoa

Foraminifera
- Discocyclina sp. (large disk-shaped foram)

Tyee Formation

Pelecypods:
- Crassatellites dalli Weaver
- Pitar cf. P. dalli (Weaver)
- Ostrea sp.

Crustacea:
- Raninoides oregonensis Rathbun

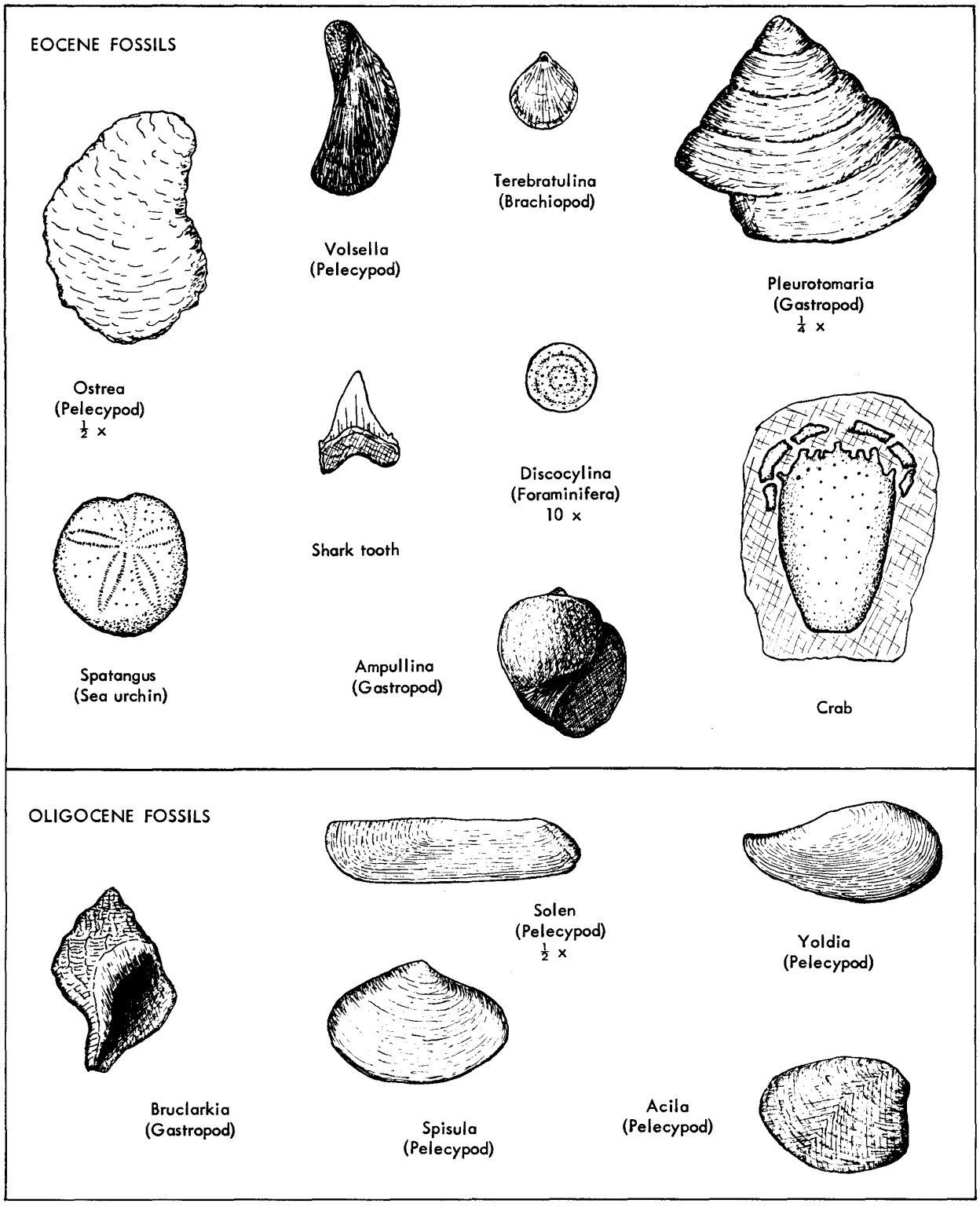
Cephalopods:
- Nautilus (several species)

Echinoderms (sea urchins):
- Spatangus tapinus Schenck

Foraminifera

Shark teeth

Fossil plants:
- Cinnamomum
- Ferns



Approximately natural size except where indicated.

SOME TYPICAL FOSSILS OF THE SALEM-DALLAS AREA, OREGON

Eocene fossils (cont.)

Helmick Beds

Pelecypods:
- Spisula (several species)
- Tellina (several species)
- Nuculana gabbi (Gabb)
- Volsella cowlitzensis (Weaver and Palmer)
- Acila decisa (Conrad)

Gastropods:
- Ampullina andersoni (Dickerson)
- Acrilla aragoensis (Turner)
- Ficopsis cowlitzensis (Weaver)
- Exilia cf. E. dickersoni (Weaver)

Foraminifera

Scaphopods:
- Dentalium sp.

Shark teeth

Plant fragments

Oligocene fossils:

Eugene (Illahe) Formation

Pelecypods:
- Acila shumardi (Dall)
- Solen sp.
- Pitar oregonensis (Conrad)
- Nuculana washingtonensis (Weaver)
- Spisula pittsburgensis Clark
- Yoldia oregona (Shumard)
- Tellina eugenia Dall

Gastropods:
- Polinices cf. P. washingtonensis (Weaver)
- Perse sp. indet.
- Crepidula sp. indet.
- Molopophorus dalli Anderson and Martin
- Bruclarkia columbiana (Anderson and Martin)

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GRANITE MINING DISTRICT BULLETIN PUBLISHED

"Lode Mines of the Central Part of the Granite Mining District, Grant County, Oregon," has just been published by the State of Oregon Department of Geology and Mineral Industries as a contribution to the knowledge of the State's mineral resources. The publication is designated as Bulletin 49. George S. Koch, Jr., Assistant Professor of Geology at Oregon State College is the author.

Since its discovery in 1861, the Granite mining district has been one of the State's leading producers of gold and silver from lode mines. The Buffalo mine, largest producer in the district, is one of the few gold mines in the United States that was able to reopen after Government closure in 1942 and continue to operate to the present day. In Bulletin 49, Dr. Koch has described the operation of the Buffalo mine and has presented the available information on the underground workings of eight other mines in the district. Included in the Bulletin are descriptions of the mineral deposits and the geology of the area. A discussion on rock alteration at the Buffalo mine by S. H. Pilcher is appended.

Bulletin 49 is paper bound, has 49 pages, numerous mine maps and sections, photographs, and a geologic map. It may be obtained from the Department offices in Portland, Baker, and Grants Pass. The price is $1.00.

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MINING ADVISORY COUNCIL TO MEET

The Western Governors Mining Advisory Council will meet July 8 and 9 at Sun Valley, Idaho. The meeting was called by Governor Robert Smylie of Idaho, Chairman of the Western Governors Conference, because of the serious situation facing the nonferrous and strategic metal mining industries of the western states, including Alaska. Governor Mark Hatfield, Oregon, was an advocate of this meeting and early in the year urged Governor Smylie to call the Council into session.

The Council will study the problems and make recommendations for presentation to the board of directors of the Advisory Council. These recommendations will then be submitted to the various governors for their information and guidance prior to the meeting of the Conference of Western Governors September 24 to 27.

The Western Governors Mining Advisory Council is composed of delegates appointed by the various governors. Oregon members named by Governor Mark Hatfield are: Hollis M.Dole, Portland; Lester R. Child, Grants Pass; William Kennedy, Portland; Harold Banta, Baker; Rep. Fayette Bristol, Grants Pass; William Gardner, Canyon City; Earl S. Mollard, Riddle; Dr. Garth Thornburg, Lakeview; Pierre R. Hines, Portland; Rep. Clinton P. Haight, Jr., Baker; and Bruce J. Manley, Medford.

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OIL RECORDS RELEASED FROM CONFIDENTIAL FILES

Records on Miriam Oil Company's "Bliven No. 1" (Permit No. 24) were released from the confidential files on June 1, 1959. The hole was drilled in the $SW\frac{1}{4}$ sec. 11, T. 8 S., R. 5 W., Polk County. Total depth was 1300 feet.

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GUIDEBOOK TO GEOLOGY ALONG OREGON HIGHWAYS PUBLISHED

"Guidebook to Geology along Oregon Highways" has just been published as Bulletin 50 by the State of Oregon Department of Geology and Mineral Industries. This publication was designed to serve a dual purpose. Its immediate use is for the College Teachers of Geology Conference, sponsored by the National Science Foundation, held in Corvallis June 15 to 27, 1959. Its more permanent use is for the interested layman or geologist who wishes to drive over the Oregon highways to see the geology described.

The Guidebook contains the logs of seven field trips to areas in the State where geologic formations of special interest are exposed along the highways. The first two trips pass over Tertiary marine formations of the Willamette Valley, Coast Range, and coastal region. The third trip crosses the volcanic rocks of the Cascade Range and takes in the Bend area. The fourth and fifth trips visit Cretaceous and Tertiary formations in central Oregon between Prineville and John Day. The fifth and sixth trips go through areas of Paleozoic, Triassic, and Jurassic rocks between Canyon City and Suplee. The seventh trip crosses the northern part of central Oregon and follows the Columbia River Gorge to Portland.

Accompanying the trip logs are numerous strip maps showing the geology along the route. Four correlation charts show the stratigraphic relationships of the geologic formations in Oregon, many of which are described in detail. The publication contains a number of scenic photographs, four of which are in color. An extensive bibliography accompanies the text.

Although many persons contributed to the text and illustrations in the Guidebook, W. D. Wilkinson, Professor of Geology at Oregon State College and Director of the Geology Conference, was responsible for compiling and organizing the material.

Bulletin 50 has 152 pages and is paper bound. It may be obtained from the Department's offices in Portland, Baker, and Grants Pass. The price is $1.50.

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GEOLOGY CONFERENCE DRAWS COLLEGE PROFESSORS

A total of twenty-nine college geology professors selected from schools all over the United States attended the Summer Conference in Geology sponsored by the National Science Foundation at Oregon State College June 15 through June 27. Dr. W. D. Wilkinson, professor of geology at the College, secured the grant from the Foundation, arranged the various symposiums and field trips, and compiled a field guidebook covering seven trips through areas of particular geologic interest in the State.

Symposium discussions were led by Dr. Siemon Muller, Stanford University; Dr. Ralph Imlay, U.S. Geological Survey; Dr. E. L. Packard, Oregon State College (Emeritus); Dr. H. L. Popenoe, Jr., Shell Oil Company; Dr. A. J. Eardley, University of Utah; and Dr. Harry Wheeler, University of Washington. Following the symposiums the group went by bus to Newport and Depoe Bay, then across the Cascades to Bend, Newberry Crater, the Ochoco Mountains, John Day and Bear valleys, Picture Gorge, Fossil, Arlington, and down the Columbia River Gorge to Portland.

One of the objectives of the Symposium, aside from providing those attending with an opportunity to discuss new trends in geologic instruction, was to acquaint them with some of the State's geological provinces which are largely unpublished. The Department of Geology and Mineral Industries assisted the Conference by publishing the field guidebook used on the firld trips. The guidebook is described elsewhere in this issue.

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