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The ORE BIN
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FOSSIL BIGHORN SHEEP FROM LAKE COUNTY, OREGON

Richard E. Thoms* and Harold Cramer Smith**

In the first week of October, 1972, Roy Collier, a bulldozer operator for the MC ranch at Adel, Oregon, bulldozed up a skull from the gravels near the mouth of Twentymile Creek. The locality is in the South Warner Valley, Lake County, Oregon, in the NW¼, sec. 19, T. 40 S., R. 24 E., W. B. & M. Subsequent examination of the skull indicated that it represents a specimen of Ovis catclawensis Hibbard and Wright, an extinct Pleistocene species of bighorn sheep known only from the Great Basin. A "battered cobble" of basalt, possibly representing human occupation of the stream bank or its vicinity, was found in association with the skull.

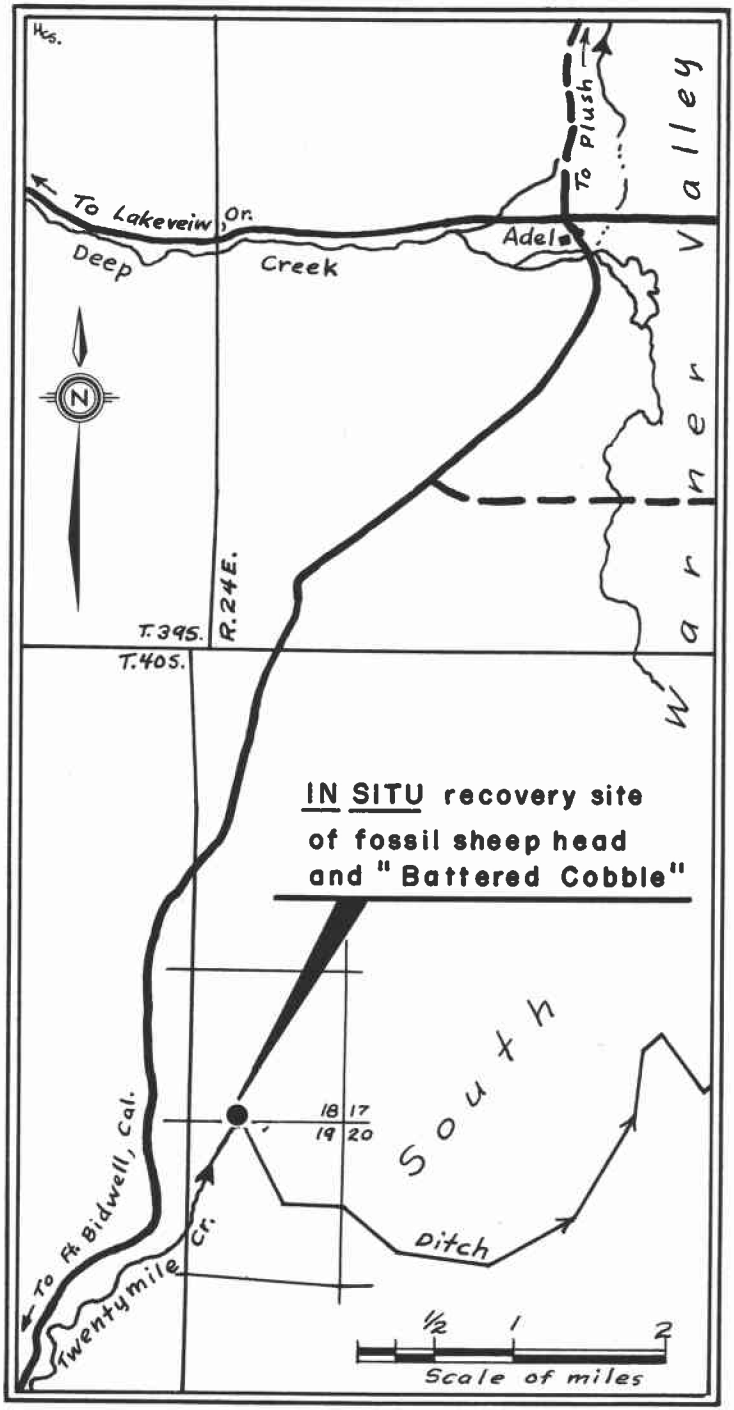
Previous Studies on Fossil and Living Bighorn Sheep From North America

For a thorough treatment of the various studies which have been made on the descriptions, distributional patterns, and evolution of fossil and recent bighorn sheep in North America, the reader is referred to the paper by Stokes and Condie (1961). The following section, a review of the historical record of bighorn sheep in the Oregon country, is offered for the reader to better understand the rugged and limited conditions under which the modern analog of Ovis catclawensis now survives in a portion of the Great Basin.

Historical Record of Bighorn Sheep (Ovis canadensis) in the Oregon Country

The story of the decline of bighorn sheep in Oregon parallels the decline of other wilderness species that could not compete with the coming of the white man and his "civilization."

*Chairman and Associate Professor of Geology, Department of Earth Sciences, Portland State University
**Wildlife artist, Information and Education Department, State of Oregon Game Commission



Map showing location of fossil sheep skull.

The bighorn is strictly a wilderness animal, intolerant of heavy hunting and competition with domestic livestock, elk, and deer. At one time much more numerous than today, bighorn sheep were widespread over the West wherever rugged terrain provided desired habitat. As the white man turned livestock onto accessible ranges and extensively hunted the bighorns, they retreated to the most inaccessible, wildest, and highest peaks of the Rockies and to the deserts of the Southwest. All this happened quickly in the last half of the 1800's.

Distribution in North America

Two distinct species of wild mountain sheep evolved in North America since Pleistocene times, according to Cowan (1940). They are the thinhorn sheep (Ovis dalli) with three races or subspecies, and the bighorn sheep (Ovis canadensis) with five races.

Distribution in Oregon

Two types of bighorns were originally native to Oregon: the California bighorn (also called the rimrock or lava beds bighorn), and the Rocky Mountain bighorn. Bighorns generally have more massive, close, heavier horns than do the northern thinhorns, with usually blunt, broomed tips as compared to the sharper, wider spread point of the Dall and Stone sheep. The Rocky Mountain bighorn, "Emah-ki-kini" of the Blackfeet Indians, held to the relatively small area of the northeast corner of the state, including the Wallowas and part of the Blue Mountains. Old timers reported the Rocky Mountain bighorn as far south as the Strawberry Mountains in Grant County and over to the high breaks along the Snake River Canyon. U.S. Forest Service reports indicate a remnant of these sheep as late as 1933 in the high Wallowas.

The California bighorn ("Tsnoon" of the Warm Springs Indians, and "Quoipa" of the Piutes) ranged from the Cascades east through central and southeastern Oregon. Early explorers such as Peter Skene Ogden gave accounts of the lava beds sheep near the Deschutes River in the area south of The Dalles, which is still known as the "Mutton Mountains." From locales such as this, the sheep ranged eastward through Hart Mountain and the Steens Mountains to Idaho and Nevada. One authentic report places these sheep as far southwest as the Siskiyou Mountains along the California-Oregon border.

Survival

Several theories are advanced as to the cause of the extinction of this species in Oregon. Schnabel in 1916 wrote that disease in the winter of 1884-1885 killed most of the sheep in the desert country. However,

FOSSIL BIGHORN SHEEP SITES REPORTED IN WESTERN NORTH AMERICA

LEGEND FOR NUMBERED SITES

1. Two remains in Alaska-Kowak clays
2. Canada - Last Chance Creek - Yukon Territory
3. Washtucna Lake (Old Washington Lake) - Franklin County, Washington
4. Mouth Twentymile Creek, Lake County, Oregon
5. Willow Creek Canyon - near Winnemucca, Nevada
6. Danger Cave, Utah
7. Hardman Gravel Pits - Salt Lake City, Utah
8. Gypsum Cave, Nevada
9. Catclaw Cave, Mohave County, Arizona
10. River gravels near Bloomfield, New Mexico

parasites from domestic sheep appear to be the greatest decimating factor. Huge flocks of domestic sheep covering much of the high desert range near and after the turn of the century contaminated nearly all parts of both summer and winter range. The scab mite supposedly caused loss of hair and undercoat so that the wild sheep perished from exposure during the winter. This theory is questioned by some authorities. In 1914, a Mr. Tillford of Fort Klamath stated that close grazing of bighorn winter range by domestic flocks resulted in heavy winter die-off in the winter of 1879-1880. Other eastern Oregon rangers corroborated the starvation theory.

In Oregon, the Steens and Hart Mountains appeared to be the last stronghold of the California bighorns. The last records of wild sheep in these areas was an account, by Goldman, of one or two rams seen on Hart Mountain in 1912. By 1916 the California bighorn had disappeared from the state.

In 1939, a group of Lakeview sportsmen, with the aid of the U. S. Biological Survey, released 23 Rocky Mountain bighorns on Hart Mountain. This transplant was unsuccessful.

In 1954, the Oregon Game Commission, in cooperation with the British Columbia Game Department, trapped 20 sheep in British Columbia and released them in Oregon. Again the Hart Mountain area was chosen as a good site. They were released into a 34-acre pen and held there while a 600-acre holding pen was constructed on the west face of Hart Mountain. The large pen was started in March, 1955, and completed in July of that year. It consisted of over $4\frac{1}{2}$ miles of fence constructed under adverse conditions and on very difficult terrain.

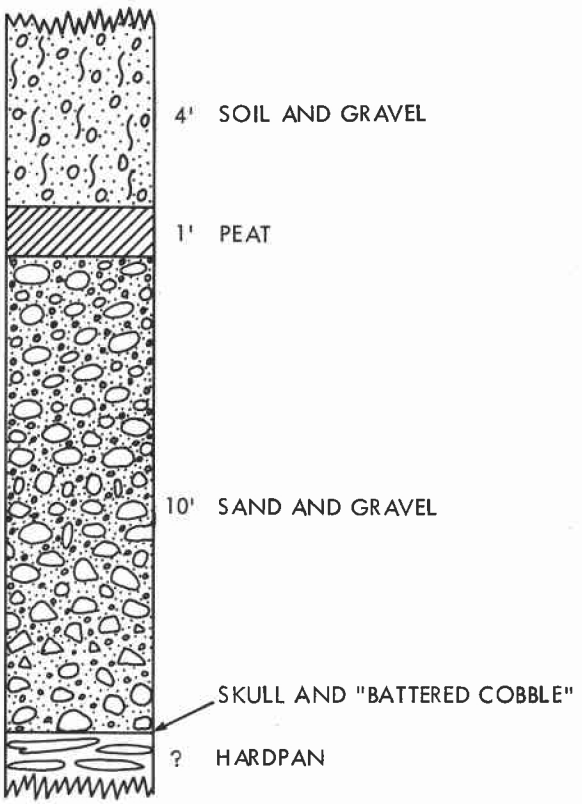
The sheep quickly adapted to life in the 600-acre pen. The first release from the pen was made in June, 1957, when 18 sheep were allowed to escape from the pen at the west face of the mountain. Since that time a few sheep have liberated themselves by breaking through the fence. An attempt has been made each year to tally as many sheep as possible both inside and outside of the pen. By 1960, the known population was over 64 animals, including animals both in and out of the enclosure. In 1960 four sheep were caught and moved to Steens Mountain, a distance of about 70 airline miles, and in 1961 an additional seven sheep were moved to that site.

In November of 1965, 17 sheep were transplanted from the Hart Mountain herd to the Owyhee Canyon country. In 1971, 21 Hart Mountain sheep were released in the Strawberry Mountains area south and east of John Day and Prairie City. Also in 1971, 40 sheep from Jasper National Park were released on two different sites in the Snake River country, 20 head below Hells Canyon Dam, and 20 head on the lower Lostine River. To date, some of the transplants have been sufficiently successful to allow limited permit hunting.

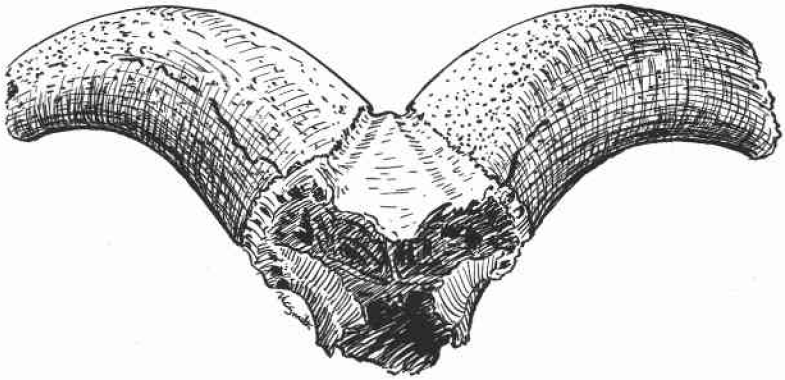
Stratigraphy

The skull and "battered cobble" were found about 5 feet apart on the south side of the creek bed, lying on the hardpan layer beneath the oldest deposit of sand and gravel exposed in the bed of Twentymile Creek. The sand and gravel was previously about 8 to 10 feet thick, but was partially cleared away about 10 years ago. The bed of Twentymile Creek is artificially altered by continual construction of revetments and digging in the channel for agricultural purposes. Thus, the specimens were covered by only about 4 feet of the deposit. They were obviously associated with the sand and gravel and not with the hardpan. A layer of peat, about 1 foot thick, overlies the sand and gravel, and this in turn is covered by about 4 feet of mixed soil and gravel.

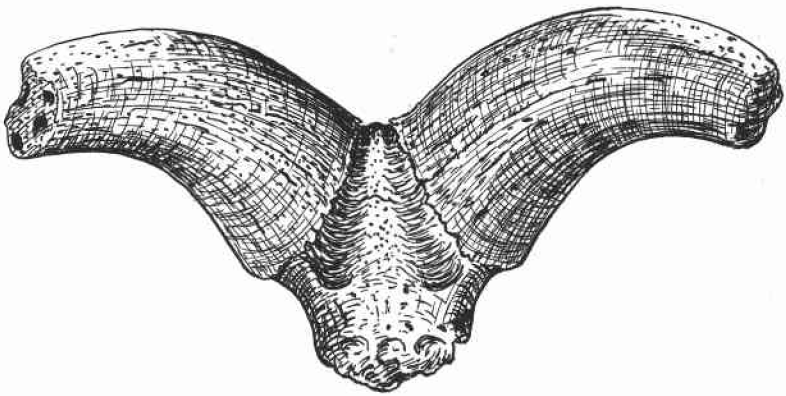
Across the channel on the north side, about 5 to 10 yards from the bank, is a promontory where the wind has blown away the soil in places, exposing numerous artifacts. This may represent an old campsite, and thus a human origin for the "battered cobble" is made more probable.



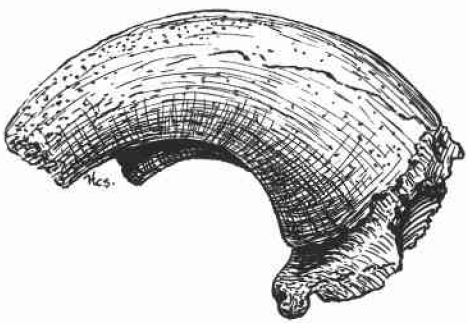
Stratigraphic column at discovery site (Adel, Oregon)



Front View



Rear View



Side View

Three views of partial skull and attached horns of Ovis catclawensis from Adel, Oregon.

Description and Comparison of the Adel Specimen

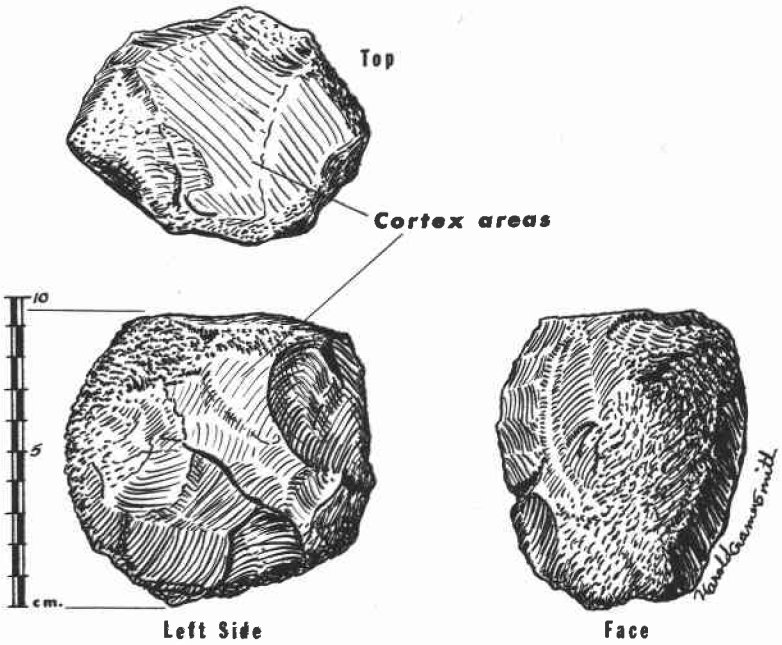
The accompanying table summarizes the measurements which could be made on the specimen, a partial skull with attached horn cores. These measurements compare favorably with those made by Stokes and Condie (1961) on fourteen specimens of Ovis catclawensis from several localities in the Great Basin. However, the partial nature of the Adel specimen permitted only one of Stokes and Condie's "most significant measurements" -- the maximum core circumference -- to be compared. Comparison of illustrations from Stokes and Condie with the specimen shows many similar features. In addition, comparison of the Adel specimen with specimens and measurements of the modern Ovis canadensis canadensis and Ovis canadensis californiana do not warrant inclusion in either of these subspecies. The Adel specimen possesses the robust features of a mature male, with the fused condition of cranial sutures characteristic of an individual of 10 years or more in age.

Horn core and skull measurements of the Adel specimen

Maximum diameter at base of horn cores:	left	116 mm
	right	115 mm
Minimum length of horn cores:	left	179 mm
	right	179 mm
Circumference of horn cores at base:	left	336 mm
	right	337 mm
Minimum angle between horn cores:		90°

Conclusions

The discovery of the Adel specimen extends the known range of Ovis catclawensis into the northwestern-most part of the Great Basin. Although a precise date for the locality has not yet been established, all heretofore known occurrences of this species are Pleistocene, and the majority of these are from the Alpine Formation of the Bonneville Lake basin. The association of skull and "battered cobble" in proximity to a living site suggests that Ovis catclawensis was contemporaneous with early man in at least part of its stratigraphic range. This association, as well as the geographic distance of the find from those of the Bonneville basin, should spur interest in this fascinating part of Oregon's Pleistocene record.



"BATTERED COBBLE"

Possible artifact from mouth of Twentymile Creek in South Warner Valley. (Found in association with sheep skull.)

Description: Approximately cobble size, some cortex* (20%) remains, both areas of cortex on opposite ends of object.

Appears to have been battered over 60% of surface, quite a number of hinge-flake scars visible in one area. Spalls and other flake scars over much of remainder of surface. Little indication of mechanical transportation subsequent to manufacture is present. It was apparently deposited at site of find or nearby. An in situ circumstance is indicated.

Conclusion: Quite high probability that this object represents human (cultural?) modification, but it is not a standard artifact form. Other associations and data needed to confirm. I would call it a "battered cobble."

Dr. Tom Newman
Department of Anthropology
Portland State University

*Natural, unflaked surface of the basalt cobble

Acknowledgments

The assistance of several persons who have aided in the preparation of this report is hereby acknowledged. First of all, Roy Collier, of Adel, Oregon, whose sharp eye and steady hand first brought the specimen to light and whose generous loan of the specimen made its careful study possible. Next, Dr. Tom Newman of the Department of Anthropology, Portland State University, who analysed the "battered cobble;" and finally, David Taylor, who made the measurements of the skull in the Earth Sciences Museum, Portland State University.

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THE BALANCED ROCKS OF THE METOLIUS

Phil Brogan
Bend, Oregon

John Strong Newberry, physician, naturalist, and geologist, was nearing the end of an historic exploration of the upper Deschutes country in the late summer of 1855 when he discovered a strange formation in the Metolius River canyon.

His observation concerned a group of balanced rocks visible today on the north-facing slope of the Metolius River canyon where the rocky wall of the Metolius sharply slopes to the man-made lake behind the Round Butte Reservoir. This reservoir is Lake Billy Chinook, named for an Indian Scout of pioneer days.

In 1855, Dr. Newberry, for whom Mount Newberry was named years later, was physician for the Williamson Railroad Survey party, which was assigned the task of locating a possible route for a railroad between the Sacramento Valley of California and the Columbia River basin.

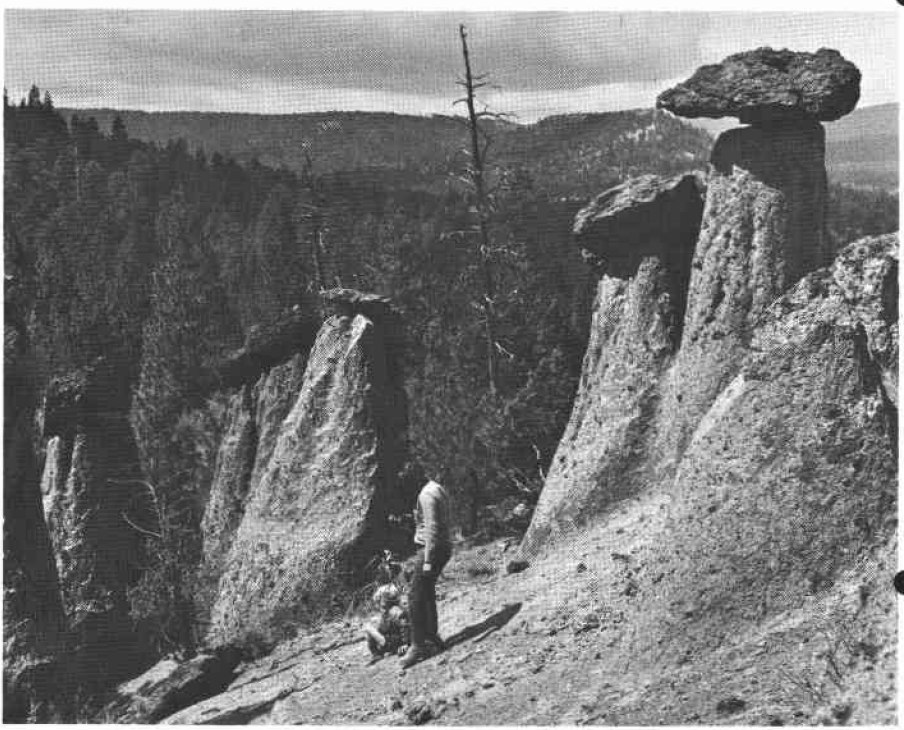
Members of the railroad survey party, headed by Lt. R. S. Williamson, moved northward from Klamath Basin toward Fort Dalles; their route eventually took them into the grand gorges of the Metolius, Crooked, and Deschutes Rivers. Apparently Dr. Newberry made profuse notes of the region traversed. His observations are recorded in "Explorations for Routes for Pacific Railroad," vol. 6, pt. 2, 1855.

After leaving the party's base camp near the present site of Sisters, Dr. Newberry and his group rode toward Mount Jefferson. He noted, "On the side of Mount Jefferson was plainly discernible a stream of black and rugged lava which had descended nearly to the Metolius River."

From this point of observation, the explorers followed the Metolius River downstream some 20 miles. Newberry wrote, "The canyon walls on either side continued as high as where we struck it until we emerged from the hills which form the eastern base of Mount Jefferson." There the party came to the plateau of the Deschutes.

Near the head of a dry canyon, Dr. Newberry suddenly came on a spectacular group of perched rocks. He wrote, "This canyon, where it cuts through the hills, exposes nothing but volcanic rock, generally dark, vesicular trap [basalt], with sometimes volcanic conglomerate.

"In some places where this formed the north wall of the canyon, the fragments which it included were of large size, cemented by a tufaceous [tuffaceous] base which was readily eroded by the action of the weather. The portions of this material which here underlie these larger masses of enclosed trap were protected by them from the erosion which wore away the surrounding rock, and they were left perched on pinnacles 20 or 30 feet in height, and having a less diameter at the summit than the rock they sustain."



Dr. Newberry also noted a marked change in walls of the Metolius River canyon as he moved downstream. He wrote:

"The precipices, composed of trap and volcanic conglomerate which with a height of nearly 2,000 feet had enclosed it for twenty miles, were here succeeded by strata of tufas [probably tuffs]. These formed walls perhaps 2,000 feet in height, capped by a thick layer of columnar trap [basalt]."

It is apparent that at this point Dr. Newberry was referring to The Dalles Formation, also known as the Deschutes or Madras strata, which is composed of layers of water-laid tuffaceous siltstone, sandstone, and conglomerate interbedded with basaltic lava flows and ash-flow tuffs.

Although Dr. Newberry obviously was intrigued by the giant, perched rocks, flat and slightly tilted, he did not show these in the big 1855 railroad survey volume, which holds a number of sketches of prominent landmarks.

Not far from the balancing slabs of volcanic debris is another "garden" of balancing rocks. These are not as massive, nor as high as the familiar balancing rocks. The second group has been named Button Head Rocks.

The balanced rocks illustrated in the accompanying photographs are at the head of a small canyon south of the Metolius River about 9 miles north of the Fly Lake Guard Station. Information relative to reaching the site can be obtained at Lake Chinook Village. This service area is near the top of the west grade out of the Crooked River Canyon in Cove Palisades State Park.

For more information about the geology and history of the region, see the references listed below:

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* * * * *

LAND USE PLANNING

A. J. Teske, executive secretary of the Idaho Mining Association, said recently that any land use planning approach which fails to take into consideration subsurface mineral potential will severely reduce the nation's capability to meet future mineral requirements.

Speaking at the Inland Empire Chapter of the Society of American Foresters' annual meeting in Spokane, Teske said most of the land use policy proposals presented to date seem to discard the multiple use management principle in favor of identifying lands for their dominant use.

He said that more often than not superficial appraisals and personal value judgments are the determining factors, not actual resource values.

Teske noted that only a fraction of western public land has been seriously explored and evaluated for mineral potential.

"If at this time, a land use plan is adopted preventing mineral exploration and development because the land is committed to specific surface uses, the importance for mineral purposes will never be known," he said.

"The mining industry recognizes that there are certain land areas of unusual and unique value which may justify preservation," Teske said. "But, as a general policy, lands valuable for a particular surface use should not be closed to the evaluation of their importance for mineral purposes."

Citing substantial projected increases for mineral demand in the years ahead, Teske said the domestic mining industry must continue to have reasonable access to the public lands under land use policies which recognize certain basic facts about the needs of the industry.

Among those facts: (a) Most of the mineral deposits for future requirements are still undiscovered, (b) it will require extensive and expensive exploration to find these deposits, and (c) minerals can be mined only where they exist - not where they are environmentally acceptable.

(Amer. Gold. News., v. 4, no. 6, p. 7, 1973)

* * * * *

BERKLUND NAMED DIRECTOR OF BUREAU OF LAND MANAGEMENT

Curtis J. (Curt) Berklund, 43, of Cottonwood, Idaho, has been appointed Director of the Bureau of Land Management. Berklund succeeds Burt Silcock, who is now Federal Co-Chairman of the Joint Federal-State Land Use Planning Commission for Alaska. Berklund has held several jobs in the Department of the Interior prior to his appointment as Director. Before entering government he was an executive with resource industries, basically lumbering and ranching in Idaho.

* * * * *

Book Reveiw: GEOTHERMAL ENERGY, Resources, Production, Stimulation
Edited by Paul Kruger and Carel Otte

This book, released by Stanford Press in July of this year, is recommended to any serious student of geothermal energy, and because of its broad treatment of the entire field, would make an excellent textbook.

Papers presented at the special symposium held by the American Nuclear Society in June of 1972 have been enlarged and thoroughly edited for technical content by the original symposium participants. Individual papers discuss available and potential resources throughout the world, methods of exploration and evaluation, geological and geochemical character of the resource, problems in developing the several types of resources, the current status of geothermal energy production in the United States and elsewhere, potential methods for more efficient production, the impact on the environment, and possible uses as a water resource. Six papers are devoted to the possibilities of stimulating resources by underground explosion or other fracturing methods, either to generate steam or to release existing fluids from otherwise sealed aquifers.

Of special benefit to students are the extensive bibliographies that accompany most of the articles.

The book is available from Stanford University Press, Stanford, California, 94305, for $17.50.

* * * * *

MORE NATURAL GAS TO BE FOUND IN U.S.

Undiscovered gas resources in the United States are estimated by the Potential Gas Committee to be 50 times the present annual use. In other words, these supplies, plus existing reserves, could meet the nation's gas needs for the next 60 years. Future gas supplies will cost more to find and develop than the earlier supplies since they will come from offshore wells, wells located in the Artic, or from wells onshore at depths of 15,000 feet or more below the earth's surface. The future potential supply of natural gas in the United States, according to the committee, is 1,146 trillion cubic feet. Current proved reserves in the United States total 266 trillion cubic feet and present annual use is 22.5 trillion cubic feet.

The Potential Gas Committee consists of 150 scientists and engineers from industry, universities, and governmental agencies under the direction of the Colorado School of Mines. The School of Mines has endeavored to establish the independence and absolute freedom of the Committee from industry or political influence. The Oregon Department of Geology and Mineral Industries has contributed data to the study for the past six years.

* * * * *

PENDLETON QUADRANGLE MAP PUBLISHED

"Reconnaissance geologic map of the Pendleton quadrangle, Oregon and Washington," has been published by the U.S. Geological Survey as Miscellaneous Geologic Investigations Map I-727. The map and accompanying text are by George W. Walker. The Pendleton quadrangle map, at a scale of 1:250,000, covers a large region of northeastern Oregon between 118° and 120° lat. and 45° and 46° long. It includes a large part of the Columbia River Plateau and the northern edge of the Blue Mountains. The region is occupied mainly by basalts of the Columbia River Group, but includes in its southern part rocks as old as Paleozoic. Map I-727 is on one sheet, together with explanation of units, a brief text, a tectonic map, and a list of references. The map is for sale by the U.S. Geological Survey for 75 cents.

* * * * *

GOLD AND SILVER ASSAY CHARGE RAISED

The Governing Board of the Department of Geology and Mineral Industries, at its August 10 meeting, determined that increased costs of laboratory materials and supplies make it necessary to raise the charge for combined gold and silver assays from $4.00 to $5.00. Assays for either gold or silver alone will remain at $3.00.

* * * * *

WASHINGTON MINES AND GEOLOGY DIVISION RENAMED

Geology and Earth Resources Division is the new name recently given the Mines and Geology Division of Washington's Department of Natural Resources. It was announced that the new title is more consistent with the Division's objectives and services in relation to present-day technology. No staff changes will be made, and V. E. (Ted) Livingston, Jr., who supervises the Division, continues as the State Geologist. The Division remains at the same location. Mail address is: Department of Natural Resources, Geology and Earth Resources Division, Olympia, Washington 98504.

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8. Feasibility of steel plant in lower Columbia River area, rev. 1940: Miller . . . $0.40
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71. Geology of selected lava tubes in the Bend area, 1971: Greeley. 2.50
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GEOLOGIC MAPS

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Geologic map of Oregon (12" x 9"), 1969: Walker and King 0.25
Geologic map of Albany quadrangle, Oregon, 1953: Allison (also in Bulletin 37) . . 0.50
Geologic map of Galice quadrangle, Oregon, 1953: Wells and Walker 1.00
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