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A MAGNETIC SURVEY OFF THE PACIFIC NORTHWEST COAST

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Introduction

Since 1963 the Geophysics Research Group of the Department of Oceanography, Oregon State University, has been conducting regional magnetic studies off the coasts of Washington, Oregon, and northern California. One of the purposes of these studies is to extend into the coast the data of Mason and Raff (1961) and Raff and Mason (1961) in order to determine whether their anomalous north-south lineations continue to be evident. We also desire to locate more localized magnetic anomalies and to determine their depth, bottom expression, and relationships with the continental mass and shelf.

Instrumentation and Procedure

The total intensity magnetic field was measured using a ship-towed proton precession magnetometer, of ± 5 gamma accuracy, constructed at Oregon State University in 1962.

Figure 1 shows the survey area, the ship's track lines representing 11 cruises and 10,000 miles, and the ships used. Comparison at each of the 223 cruise crossings was made and the absolute mean difference was 6.1 gammas with a standard deviation of 38.4 gammas. This is quite reasonable considering the instrument error of ± 5 gammas and the diurnal variation of 30-40 gammas for which no correction was made.

Magnetograms from Tucson were compared with our records to determine the effect of magnetic storms. No significant effect was found.

The Data

Figure 2 shows the total magnetic intensity off the coast of Washington. A main feature of this map is the north-south lineation at 126° which is consistent with the map of Raff and Mason (1961). Closed highs and lows

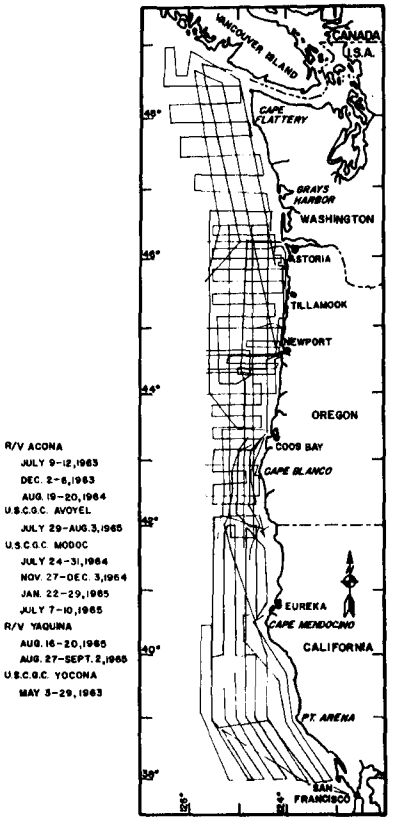

Figure 1. Ship track lines for magnetic measurements.

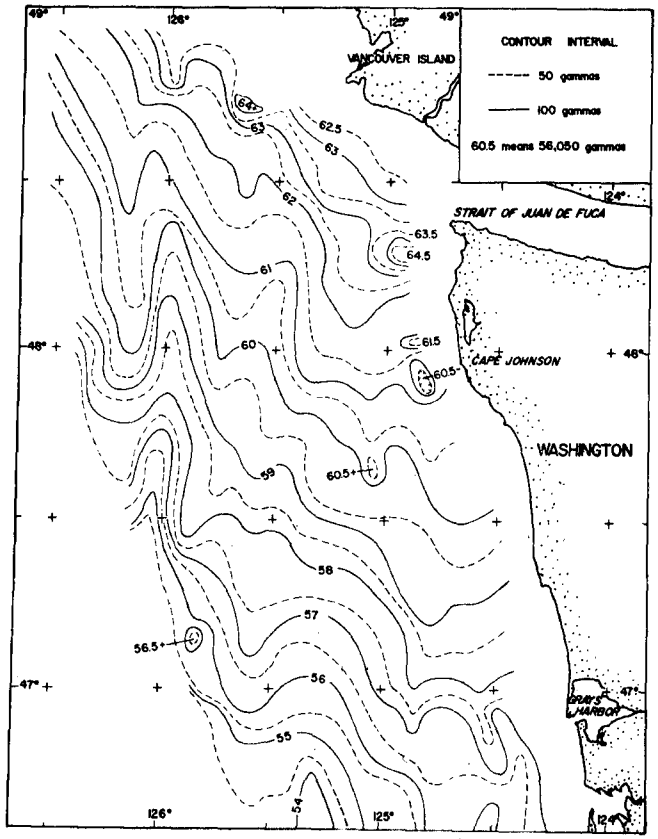

Figure 2. Total magnetic intensity off the coast of Washington.

are not as evident in this area as off Oregon and northern California. Hence, the northwest to southeast trend of the earth's dipole field is clearly seen.

Figure 3 shows the total intensity off the coast of Oregon. The most interesting areas of this map lie just off shore where many strong highs and lows are evident. One of these areas in particular, just south of Newport, was studied by Whitcomb (1965). Combining magnetic data with that from gravity and sparker work, Whitcomb concluded that the coastal geologic structures probably do continue to the west, although this may not always be evident from the sea-floor geology and topography. We feel this to be representative of the other near-shore anomalous areas off northern Oregon.

Figure 4 shows the total intensity off the coast of northern California. Much magnetic character is evident here, with the main points of interest being opposite Cape Mendocino and Point Arena. Off Cape Mendocino indications are that the Mendocino Anomaly continues to the continent. This is an excellent extension of the maps of Mason and Raff (1961) and a confirmation of their later findings based on two magnetometer lines run in this area. Off Point Arena there is what very well could be an extension coastward of the subtle Pioneer Anomaly of Mason and Raff. This anomaly vanishes as it approaches the coast.

Work Being Done

Anomaly maps have just been completed and calculations of depths to anomaly sources are being made using the methods of Peters (1949), Vacquier and others (1951), Henderson and Zietz (1948), and Smellie (1956).

Acknowledgments

We would like to thank Happy T. Holden, Jeremy R. Hutt, Timothy Long, William R. McKnight, and William A. Rinehart for assisting with the field work and data reduction. The U.S. Coast Guard provided ship time on the U.S.C.G. cutters AVOYEL, MODOC, AND YOCONA. The National Science Foundation and Office of Naval Research sponsored this work under grants GP 2186, GP-5581 and Nonr 1286(10) NR 083-102.

References

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Peters, L. V., 1949, The direct approach to magnetic interpretation and its practical applications: Geophysics, vol. 14, p. 290-320.

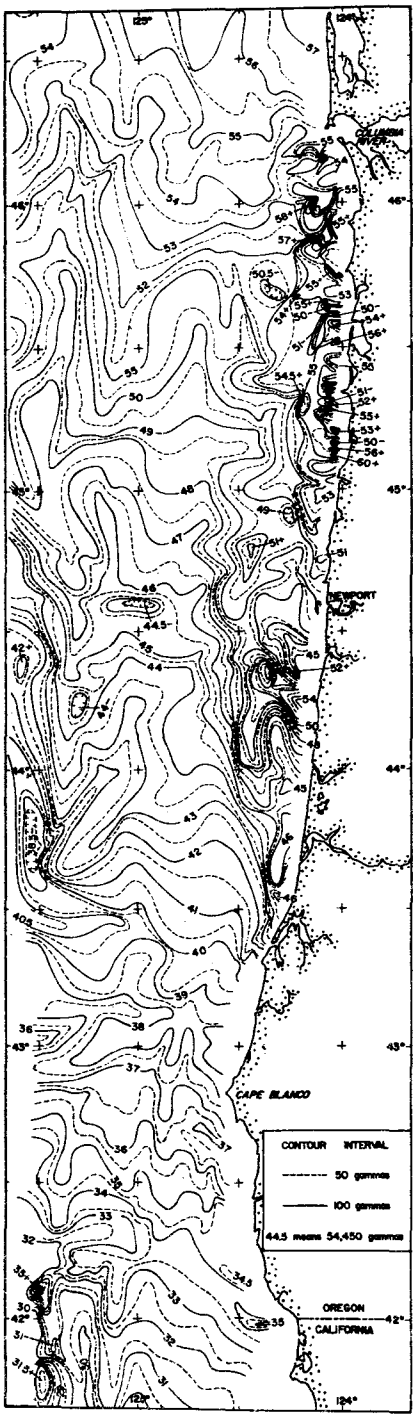

Figure 3. Total magnetic intensity off the coast of Oregon.

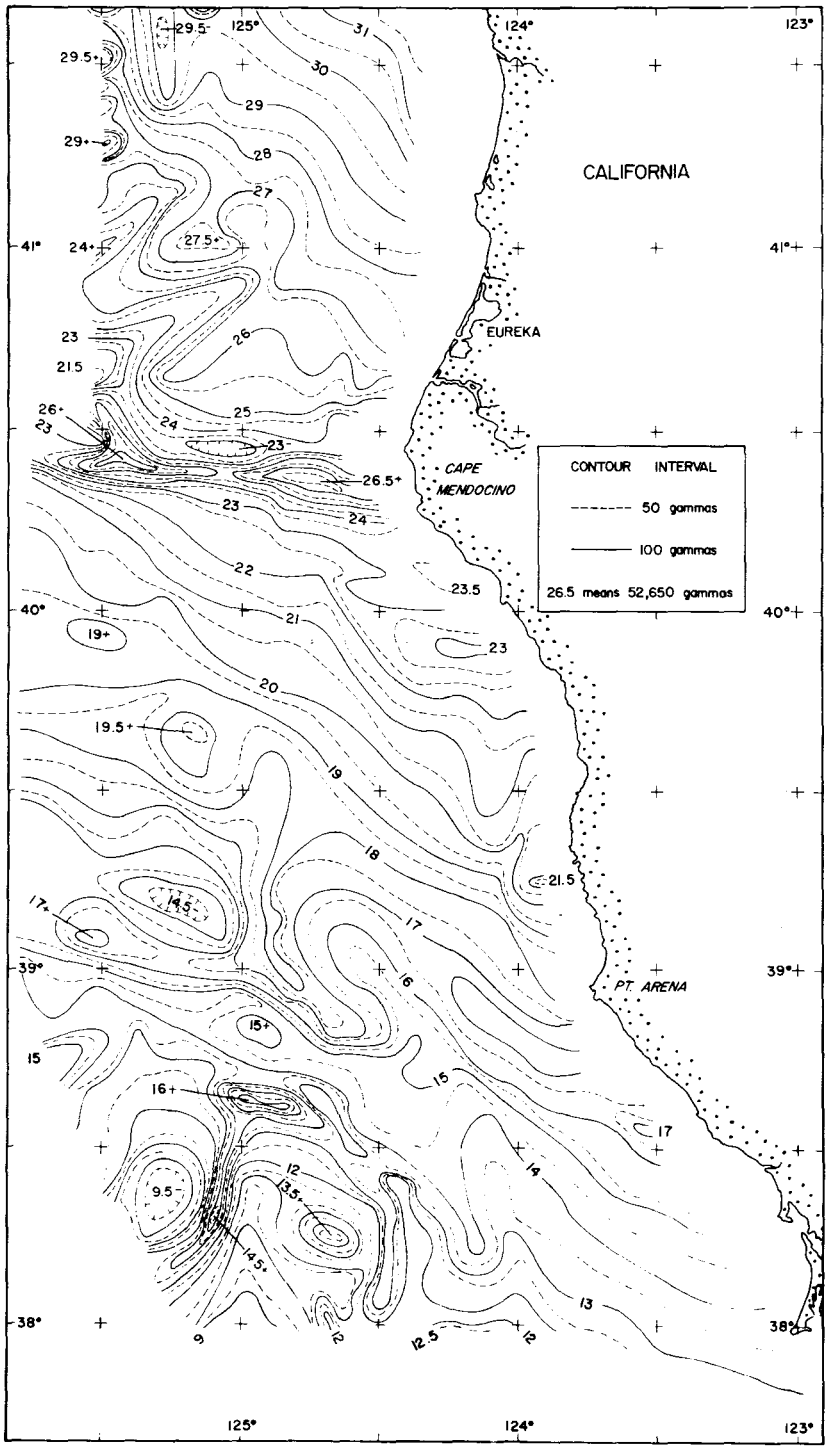

Figure 4. Total magnetic intensity off the coast of northern California.

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Vacquier, V., and others, 1951, Interpretation of aeromagnetic maps: Baltimore, Maryland, Geol. Soc. America Memoir 47, 151 p.
Whitcomb, J. H., 1965, Marine geophysical studies offshore - Newport, Oregon: Master's thesis, Oregon State University.

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FOSSIL LEAVES FROM CENTRAL OREGON EXHIBITED

A fossil leaf collection from the Dick Ranch near Post southeast of Prineville in Crook County, Oregon, is on display at the Department's Portland office. The fossils occur in the John Day Formation of late Oligocene to early Miocene age. Leaves and seeds are numerous, varied, and beautifully preserved. They represent more than 30 different kinds of trees and shrubs growing today in moist temperate climates. The flora has been described in a Carnegie Institution publication by noted paleobotanist Ralph Chaney, who considers it to be identical to the Bridge Creek flora at Painted Hills State Park. Associated with the plant remains at Dick Ranch are skeletons of tiny fish. The Dick Ranch leaves were collected and loaned by Lee Jenkins of Portland. The Department also has fossil leaves from this site that were collected and donated by Leonard Wilkinson of Prineville. The Jenkins collection will be on display through January, 1967.

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OREGON ACADEMY OF SCIENCE ELECTS OFFICERS

The Oregon Academy of Science has elected the following officers for 1966-67. President: Dr. Wendell Slabaugh, Department of Chemistry, Oregon State University; Secretary, Dr. Keith Oles, Department of Geology, Oregon State University; Treasurer, Dr. Alan Kays, Department of Geology, University of Oregon. The next annual meeting will be held on February 25, 1967. The meeting place will be announced in the near future.

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THE ARMSTRONG NUGGET

By N. S. Wagner*

On Thursday, June 19, 1913, George Armstrong and his partner recovered the gold nugget pictured in figure 1 from the gravels of their placer mine located approximately three miles from Susanville, Grant County, Oregon.

By early the next morning news of the discovery was made public and spread like wildfire. First a Susanville correspondent interviewed Armstrong in Susanville and telephoned his account to the Baker Herald, Baker, Oregon. A few hours later another correspondent interviewed Armstrong and his associates in Austin and telephoned in a report to the Baker Herald. In some way news of the discovery reached Ed Hendryx, editor of the Blue Mountain American, Sumpter, in time for him to meet the train and interview Armstrong and his entourage in the Sumpter Valley Railroad depot in Sumpter that same afternoon.

The reports submitted by the Susanville and Austin correspondents were printed in the Baker Herald, Friday, June 20, the same day the correspondents interviewed Armstrong and submitted their stories. Hendryx missed out on a scoop, however, because his Blue Mountain American was a weekly paper published each Thursday; hence, his article did not appear in print until June 26, even though his interview with Armstrong took place on the same day as the other interviews.

Because these published reports were based on first-hand interviews with Armstrong at a time when the novelty of the discovery was still fresh and uppermost in his mind, they probably chronicle the circumstance of the discovery accurately. In addition, they provide an interesting side light into the manner in which each reporter handled the story. For these reasons the full text of each of these articles is reproduced. First, however, there is another thought that it might be best to mention. This is that in evaluating these reports, the reader should remember that the Susanville and Austin reporters were faced with the cost of long-distance tolls and the urgency of meeting a press deadline. Their stories are, therefore, probably shorter and less detailed in their coverage than they would have been had they had more time for preparation. Hendryx, on the other hand, was faced with the fact that the news was already old by the time he could publish his article; hence, he did not elaborate on the subject to the extent that he might have done had he not been scooped by the Baker newspapers.

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Undoubtedly each of the reporters deplored the circumstances which prevented him from writing a detailed, blow-by-blow account of the discovery, but perhaps this was for the best, because what we now have in these particular articles conceivably comes closer to being a straight recitation of essential fact than might otherwise have been the case. In any event, and in the order in which the interviews were held, these articles are as follows:

Baker Herald, Friday, June 20, 1913

$1500 NUGGET IS PICKED UP AT SUSANVILLE

"Largest find of the kind in eastern Oregon was made yesterday
"Three men bring it to this city
"George Armstrong and Dick Stuart make discovery while working in their placer mine in Dutch Gulch
"May be the largest found in the Northwest"

"Susanville, June 20: To find a $1500 nugget, after picking up three pieces of gold worth $10 to $11 each, was the good fortune which befell George Armstrong and Dick Stuart in their Dutch Gulch placer claim three miles from Susanville yesterday.

"The nugget is solid gold, no quartz being mixed with it, and weighs about six and three-quarters pounds. The gold is worth about $17.50 an ounce.

"The men have been working the claim irregularly the past four years but have found it paying a handsome profit for the little time spent on the property. While mining by hydraulic pressure yesterday the big find was unearthed.

"The nugget is the largest ever found in Eastern Oregon and perhaps in the entire Northwest, being of solid gold. A few years ago a specimen was found in that same district worth $728, and about two years ago, one was found in the Humboldt placers worth $720.

"The two men and a companion left this morning for Austin to take the Sumpter Valley train for Baker."

* * *

Baker Herald, Friday, June 20, 1913

"Special to Herald

"Austin, June 20: On their way to Baker with the $1500 nugget the three men stopped in Austin today. When asked about the find, Armstrong said: 'It was almost unbelievable yesterday when we washed that chunk out, we were so surprised. We have been working on the claim only at intervals, but we have been well repaid for our work. Three of us comprise a party, guarding the metal, and will reach Baker this evening on the Sumpter Valley. There has been a number of people to see the find, several being

Figure 1. The famous Armstrong nugget found in placer gravels near Susanville, Grant County, Oregon, in 1913.

Figure 2. Medal won in 1915 at the Panama Pacific Exposition in San Francisco for being the largest quartz-free nugget exhibited.

from Susanville and Austin. All are of the same accord that it is one of the greatest finds in Eastern Oregon'."

* * *

Blue Mountain American, June 26, 1913

"A NEAR RECORD GOLD NUGGET

"A gold nugget worth $1408.75, weighing a fraction over 80 ounces, is some piece of gold, a sight for sore eyes. Those at the S. V. depot last Friday afternoon were treated to a sight of this kind. The nugget was the property of D. I. Stewart and George Armstrong, and was found by them in their placer mine near Susanville. They were taking it through to Baker to place it in the First National Bank of that place.

"The nugget takes its place among the large pieces of native gold that have been found in Eastern Oregon, and calls to mind other big chunks of the yellow stuff that have been found. These range in value from a few hundred dollars to up in the thousands. One story we remember is of the finding of a chunk worth $10,000.00 by a Chinaman, in the Greenhorn mountains many years ago. This, if authentic, was doubtless the largest nugget ever found in the state."

* * *

Today there are several stories about how the nugget was found at the instant of discovery. One is that a large chunk of mud stuck to the heel of Armstrong's son's boot when they started back to the cabin for lunch. This revealed the nugget which the father, walking behind, picked up. Whether it is true, or just fanciful, this version of the actual discovery is mentioned in print in a Democrat Herald article as early as October 25, 1934 and is credited to one of the old First National Bank officials who presumably knew the story from first-hand acquaintanceship with the principals.

Another version of the discovery is given by O.H.P. McCord of Baker, who was bookkeeper at the First National Bank at the time Armstrong brought the nugget in. McCord's version of the discovery is that Armstrong left the giant trickling at reduced pressure against the face while the crew went to lunch. When they returned to the pit, the nugget lay there on the pit floor as a result of having been washed out during the lunch hour.

Despite the fact that this aspect of the discovery is not mentioned in any of the foregoing articles, either of these stories can represent a true account of the actual circumstance which took place at the instant of discovery. For example, a nugget of this size would not likely be washed to the sluice boxes by ordinary hydraulic means. Instead, it would hang back nested in the mud in the bottom of the pit near the face from which it had been washed. Thus it would be available to be stepped on and tripped over and there is no real reason to disbelieve the mud-on-the-son's-heel story. On the other hand, McCord's story is equally sound as leaving the giant in

operation at reduced pressure, temporarily, was a common practice at all hydraulic operations.

The articles disagree on the name of Armstrong's partner, which is spelled "Stuart" in the report datelined Susanville, and "Stewart" in the Hendryx article. What the correct spelling of the partner's name is we don't know and haven't taken the trouble to investigate. Of more importance, Armstrong's placer is described in the Susanville article as being located in "Dutch Gulch." However, the location is universally accepted as having been in Buck Gulch and this is a situation that can be attested to by numerous individuals, still living, who resided in Susanville and knew Armstrong at the time the nugget was discovered. This discrepancy was investigated and it can be stated that the location of the Armstrong placer is given as being on Buck Gulch in a report published by the Oregon Bureau of Mines and Geology in 1914, to wit -- "Buck Gulch, below Deep creek, years ago had one $800 (nugget), but on June 19, 1913, George Armstrong found another on Buck gulch weighing 80.4 ounces."

Why the Susanville article cites the location as "Dutch gulch" is difficult to explain. One possibility is that the gulch may have been known locally by two names in 1913. Another more likely explanation is that during the course of relaying the story between the reporter in Susanville and the Herald editor in Baker, the name became garbled due to poor connections. After all, long-distance communication by telephone during 1913 often left much to be desired in terms of today's standards, so that, conceivably, the word "Buck" could have come through as "Dutch" to the ears of the listener.

How contagious "gold fever" can be is amply illustrated by the editorial the editor of the Baker Herald saw fit to publish on June 21, 1913. This was the day after Armstrong arrived in Baker with the nugget and whereas the editor does not say so explicitly, we can be virtually certain that before composing his editorial he had visited the bank, talked with Armstrong, drooled over the nugget, and probably also hoisted a few convivial drinks with the assembled throng in line with the general spirit of "celebration" which is rumored to have taken place. In any event, the editorial which followed the original discovery articles is as follows:

Baker Herald, Saturday, June 21, 1913

"PICKING UP $1400

"How would you like to pick up a house and lot? Or a small store? Or a four-passenger automobile? Maybe a trip around the world? A nice little farm? A college education? A team of find horses? A band of sheep? A bunch of cattle? Or a little library?

"That is just what George Armstrong and Richard Stuart did when they found a nugget worth $1,408.75 near Susanville. Any of these things they could buy with the find and many more.

"While placer mining, the big piece of gold was picked up and when brought to Baker last night safely deposited in a bank after being weighed.

"This probably gives Baker County the added distinction of producing another largest nugget in the Northwest. It makes the strides of placer mining in this county even greater than before -- and placer mining here has given indications before that it would take the lead in the state in every way.

"In making this find and advertising Baker County as a mining community these two men have paid themselves for much work they have done in the past. It is their reward for perseverance. While it may seem easy to pick up $1,400 there is always the unrewarded work of the years gone by that evens the so-called 'luck.' So they are receiving their just reward.

"However, wouldn't it be a happy little party if each of us could go out and do the same?"

* * *

The Herald editor was carried away by his own enthusiasm, forgetting that Susanville is located in GRANT COUNTY -- many miles from the Baker County border. Thus his remarks about how the find advertises "Baker County as a mining community" and gives Baker County the added distinction of producing "another largest nugget in the Northwest" must be recognized as editorial exuberance, if not, indeed, too much celebrating. Just the same it is interesting to note the list of everyday items he saw fit to equate with the value of the nugget -- a four-passenger car, a team of fine horses, a band of sheep, a farm or a small store, a college education, the cost of a trip around the world, and so forth. The importance of the find is thus well illustrated in terms of the economy of the period. In this connection the reader must remember that gold was priced at only $20.67 per fine ounce in 1913. However, at today's price of $35 an ounce the nugget is worth approximately $2,500 in terms of its gold content. Its value as a specimen is many times greater.

Perhaps on Thursday, June 26, the Oregon Daily Journal was motivated by a case of sour grapes when it came to news of eastern Oregon (a not-unprecedented situation). Or perhaps it correctly interpreted this eastern Oregon editorial about the nugget as being due to "gold fever." In any event, the only coverage they gave to the nugget story (that we found) was a short four-line comment on an obscure, back page and without a headline. This reads:

Oregon Daily Journal, Portland, Thursday Evening, June 26, 1913

"That $1,500 Baker County nugget will probably have the usual result in stimulating a toilsome and expensive search for other big nuggets that aren't there."

* * *

No bull could have been more enraged by a red flag than was the Baker Herald editor by the Journal's comment. As a result we have one final editorial with which to conclude this presentation of news articles inspired by the discovery of the Armstrong nugget. Even yet the editor still disdains to give Grant County credit for being the county in which the nugget was found, to wit --

Baker Herald, Saturday, June 28, 1913, Editorial column

> "How does the Portland Journal know that there are no more big nuggets? Large nuggets, some worth nearly $3,000, some worth $700, have been found in Baker County before. Why cannot there be more? Many men have searched for gold and have failed but their efforts made them better men -- better at least than those who do not try but instead scoff at those that do. The men who found the $1,500 nugget got it by systemmatic and persistent work. Others will do the same.
>
> "Were the Portland Journal, usually fair and often flippant, to investigate it would find that mining in Eastern Oregon, great as it is, is only on the threshold of its possibilities. Today the figures that once startled the world are commonplace in comparison with what is being accomplished now. Baker County mines this year are to make the state greater than ever before. Baker County mines this year will make the nation wealthier.
>
> "There are plenty of nuggets in Baker County for the man who wants them enough to work for them."

* * *

Now that 53 years have passed, we can look back on history and make an independent judgment of our own. One thing we find is that placer mining did continue in both Grant and Baker Counties. Furthermore, it expanded appreciably as is shown by records covering an output since 1912 of nearly 640,000 fine ounces of gold and 126,000 fine ounces of silver from placer sources in the two counties.

At the current price of $35 per fine ounce for gold and $1.29 per fine ounce for silver, this amounts to a combined value of approximately $32,500,000 for the gold and silver output recorded since 1912. If the value of gold and silver produced from lode sources during the same period is added to that of the placer output, the total value of the gold and silver produced from these two counties since 1912 then amounts to nearly $56,500,000 even though precious metal mining has been at a virtual standstill in both counties since 1942, at which time gold mines were shut down by governmental decree for the duration of World War II -- a set-back from which the industry has never recovered because of continued governmental maintenance of the pre-war price of gold despite the ever-inflating trend of post-war operating costs.

The bulk of the afore-mentioned production was achieved during the 30-year period immediately following 1912 rather than between 1912 and

Figure 3. Gold collection owned by the United States National Bank of Oregon and displayed at its branch bank in Baker includes the Armstrong nugget.

1966. Thus, in all fairness, and as we see it, the Baker Herald editor's optimism concerning the gold-silver potential of Baker and Grant Counties cannot be regarded as altogether unfounded, even though he did commit a major sin by not giving Grant County recognition as the parent county in which Susanville is located.

As for the Armstrong nugget -- in 1915 it won a medal at the Panama Pacific Exposition in San Francisco for being the largest essentially quartz-free nugget of its type exhibited. Insofar as is known, this record still stands. The medal that was won is pictured in figure 2. It is owned, along with the nugget itself, by the United States National Bank of Oregon, and both items are part of the bank's famous gold collection on exhibit at its branch bank in Baker, Oregon (figure 3).

Acknowledgments and References

Except for the Blue Mountain American article of June 26, 1913, and the Democrat Herald article of October 25, 1934, both of which are in this Department's files, all press quotations originate from microfilm files in the archives of the Oregon Historical Society, Portland.

Data confirming early use of the name "Buck" gulch originated from A. M. Swartley's report entitled "Ore Deposits of Northeastern Oregon," published by the Oregon Bureau of Mines and Geology, Mineral Resources of Oregon, Volume 1, Number 8, 1914.

Production statistics (ounces) originate from U.S. Bureau of Mines records tabulated in the date range used here by Howard Brooks, geologist with the Department.

Finally, credit is due the United States National Bank of Oregon, and especially John R. Hilsenteger, Press Relations Officer, Portland, and to F. W. Johnson, Thomas Hunt, and Jyme Stoner of the Baker Branch, for assorted data relating to the nugget and medal, and for permission to photograph them; to Lester Hansen, former manager of the Baker Branch of the same bank, and to O. H. P. McCord, former bookkeeper at the old First National Bank of Baker, for supporting data; and to Oscar Nygord for photographs of the nugget and medal.

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IGNIMBRITE IN JOHN DAY FORMATION DESCRIBED

Pyroclastic ignimbrites, sometimes referred to as welded tuffs or ash-flow tuffs, are extensively displayed throughout large areas of central and eastern Oregon. The state has come to be considered a classic region for the study of these interesting volcanic rocks, because of the wide diversity of petrologic types and the areal extent.

Richard V. Fisher describes the mineralogy and petrology of a distinctive rhyolitic to dacitic ignimbrite sequence which occurs in the middle part of the John Day Formation of eastern Oregon. Field evidence indicates that the flow probably had its source somewhere west of the John Day basin, and poured out over 1200 square miles of the land surface before coming to rest.

The report, entitled "Geology of a Miocene ignimbrite layer, John Day Formation, eastern Oregon," is published by the University of California Press as University of California Publications in Geological Sciences, volume 67. Copies of this report may be obtained from the University of California Press for $2.50.

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REPORTS ON OREGON GEOLOGY RECEIVED IN 1966

The following published and unpublished reports on Oregon geology and mineral resources were added to the Department's library during 1966. The list does not include papers appearing in technical journals or trade magazines.

United States Geological Survey

Geologic maps

Brown, C. E., and Thayer, T. P., 1966, Geologic map of the Canyon City quadrangle, northeastern Oregon: USGS Map I-447.

Brown, C. E., and Thayer, T. P., 1966, Geologic map of the Mount Vernon quadrangle, Grant County, Oregon: USGS Map GQ-548.

Thayer, T. P., and Brown, C. E., 1966, Geologic map of the Aldrich Mountain quadrangle, Grant County, Oregon: USGS Map GQ-438.

Walker, G. W., and Repenning, C. A., 1966, Reconnaissance geologic map of the west half of the Jordan Valley quadrangle, Malheur County, Oregon: USGS Map I-457.

Wilcox, R. E., and Fisher, R. V., 1966, Geologic map of the Monument quadrangle, Grant County, Oregon: USGS Map GQ-541.

Mineral resources

Cornwall, H. R., 1966, Nickel deposits of North America: USGS Bulletin 1223.

Walker, G. W., and Greene, R. C., 1966, Mineral resources of the Mount Jefferson Primitive Area, Oregon: USGS Bull. 1230-D.

White, D. E., 1965, Geothermal energy: USGS Circular 519.

Young, L. L., and Colbert, J. L., Gaskill, D. L., and Piper, A. M., 1965, Water power resources in Nehalem River basin, Oregon, with sections on geology of sites: USGS Water-Supply Paper 1610-C.

Stratigraphy and paleontology

Addicott, W. O., 1966, Late Pleistocene marine paleoecology and zoogeography in central California: USGS Prof. Paper 523-C (includes Bandon, Oregon area).

Bingham, J. W., and Grolier, M. J., 1966, The Yakima Basalt and Ellensburg Formation of south-central Washington: USGS Bulletin 1224-G (correlates with Oregon).

Jones, D. L., Murphy, M. A., and Packard, Earl L., 1965, The Lower Cretaceous (Albian) ammonite genera Leconteites and Brewericeras: USGS Prof. Paper 503-F (central Oregon).

United States Bureau of Mines

Peterson, E. C., 1966, Titanium resources of the United States: USBM Inf. Circ. 8290.

Walker, F. E., and Hartner, F. E., 1966, Forms of sulfur in U.S. coals: USBM Inf. Circ. 8301.

United States Air Force

Skehan, J. W., 1965, A continental-oceanic crustal boundary in the Pacific Northwest: Air Force Cambridge Research Lab. Scientific Rpt. No. 3.

University of California

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Oregon State Engineer

Price, Don, and Johnson, Nyra A., 1965, Selected ground-water data in the Eola-Amity Hills area, northern Willamette Valley, Oregon: Oregon State Engineer, Ground-Water Rept. 7.

Sceva, Jack E., 1966, A reconnaissance of the ground-water resources of the Hood River Valley and Cascade Locks area, Hood River County, Oregon: Oregon State Engineer, Ground-Water Rept. 10.

Sceva, Jack E., 1966, A brief description of the ground-water conditions in the Ordnance area, Morrow and Umatilla Counties, Oregon: Oregon State Engineer, Ground-Water Rept. 11.

Oregon State University

Allison, Ira S., 1966, Fossil Lake, Oregon -- its geology and fossil faunas: Oregon State Monograph, Studies in Geology No. 9.

University of Oregon Museum of Natural History

Emlong, Douglas, 1966, A new archaic cetacean from the Oligocene of northwest Oregon: Univ. Oregon Museum of Natural History Bulletin 3.

Hutchison, J. H., 1966, Notes on some upper Miocene shrews from Oregon: Univ. Oregon Museum of Natural History Bulletin 2.

Kittleman, L. R., and others, 1965, Cenozoic stratigraphy of the Owyhee region, southeastern Oregon: Univ. Oregon Museum of Natural History Bulletin 1.

Kansas Geological Survey and University of Kansas

Merriam, D. F., Ed., 1964, Symposium on cyclic sedimentation: Kansas Geol. Survey Bull. 196, vols. 1 and 2. (Vol. 1 contains paper on Coast Range by Snavely, Wagner, and MacLeod; Vol. 2 contains paper on southwestern Oregon by Dott).

Skinner, J. W., and Wilder, G. L., 1966, Permian fusulinids from Pacific Northwest and Alaska (Part 2 - Permian fusulinids from Suplee area, east-central Oregon): Univ. Kansas Paleontological Contributions, Paper 4.

Unpublished Theses

Dodds, R. Kenneth, 1963, Geology of the western half of the Svensen quadrangle, Oregon: Univ. Oregon master's thesis.

Engelhardt, Claus L., 1966, The Paleozoic-Triassic contact in the Klamath Mountains, Jackson County, southwest Oregon: Univ. Oregon master's thesis.

Fairchild, R. W., 1966, Geology of T. 29 S., R. 11 W., in the Sitkum and Coquille quadrangles, Coos County, Oregon: Univ. Oregon master's thesis.

Heinrich, M. A., 1966, Geology of the Applegate Group, Kinney Mountain area, southwest Jackson County, Oregon: Univ. Oregon master's thesis.

Helming, Bob Hager, 1966, Petrology of the Rogue Formation, southwest Oregon, Univ. Oregon master's thesis.

Magoon, L. B., 1966, Geology of T. 28 S., R. 11 W. of the Coquille and Sitkum quadrangles, Oregon: Univ. Oregon master's thesis.

Morrison, R. F., 1963, Pre-Tertiary geology of the Snake River Canyon between Cache Creek and Dug Bar, Oregon - Idaho boundary: Univ. Oregon doctoral dissertation.

Trigger, J. K., 1966, Geology of south-central part of the Sitkum quadrangle, Coos County, Oregon: Univ. Oregon master's thesis.

Wolff, E. N., 1965, Geology of the northern half of the Caviness quadrangle, Oregon: Univ. Oregon doctoral dissertation.

OLD MINING PROPERTIES PROVIDE RECREATION SITES

Two more withdrawals of federal lands from mineral entry have been announced by the U.S. Bureau of Land Management. Both actions stem from requests made by the U.S. Forest Service. One 52.5 acre withdrawal, located in southern Umatilla County along the banks of the North Fork of the John Day River, is scheduled for development into a recreational site. The second area is in central Josephine County, where 60 acres will also be developed for recreational purposes.

The Umatilla withdrawal site occupies old dredged ground which produced a large quantity of placer gold many years ago. The Josephine County area was once occupied by a brick and tile quarry and plant. The two withdrawals serve to point up the often-overlooked fact that old and abandoned mining properties can be rehabilitated and restored to an additional period of usefulness.

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REYNOLDS ALUMINUM ENLARGES TROUTDALE PLANT

The Reynolds Metals Co., which recently celebrated the 20th anniversary of the establishment of its reduction works at Troutdale, has embarked on an expansion program which will ultimately provide for a yearly total production of 140,000 tons of primary aluminum. Reynolds began operating the Troutdale plant in 1946 and acquired ownership from the federal government in 1949. The increased capacity at the plant will require the construction of one new potline plus additional furnaces, casting units, and ancillary equipment and buildings.

The economic impact of the Reynolds Troutdale plant on the local economy can best be gauged by the $88 million payroll and $200 million in taxes, supplies, utilities, freight, and other expenses incurred during the past 20 years. The Troutdale plant currently employs an average of 800 employees on a year-around basis.

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JOHN DAY MAMMALS EXHIBITED

Some exceptionally fine specimens of fossil mammal skulls, jaws, and a foot are on display at the Department's Portland office. The fossils include two oreodons, two sabre-tooth cats, a rhino, a peccary, and a coyote (skull and foot). All are from the John Day Formation and were collected and prepared by David Taylor of Portland. The specimens are on indefinite loan while Taylor is in the service.

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