



Science News-Letter

The Weekly Summary of Current Science

Reg. U. S. Pat. Off.

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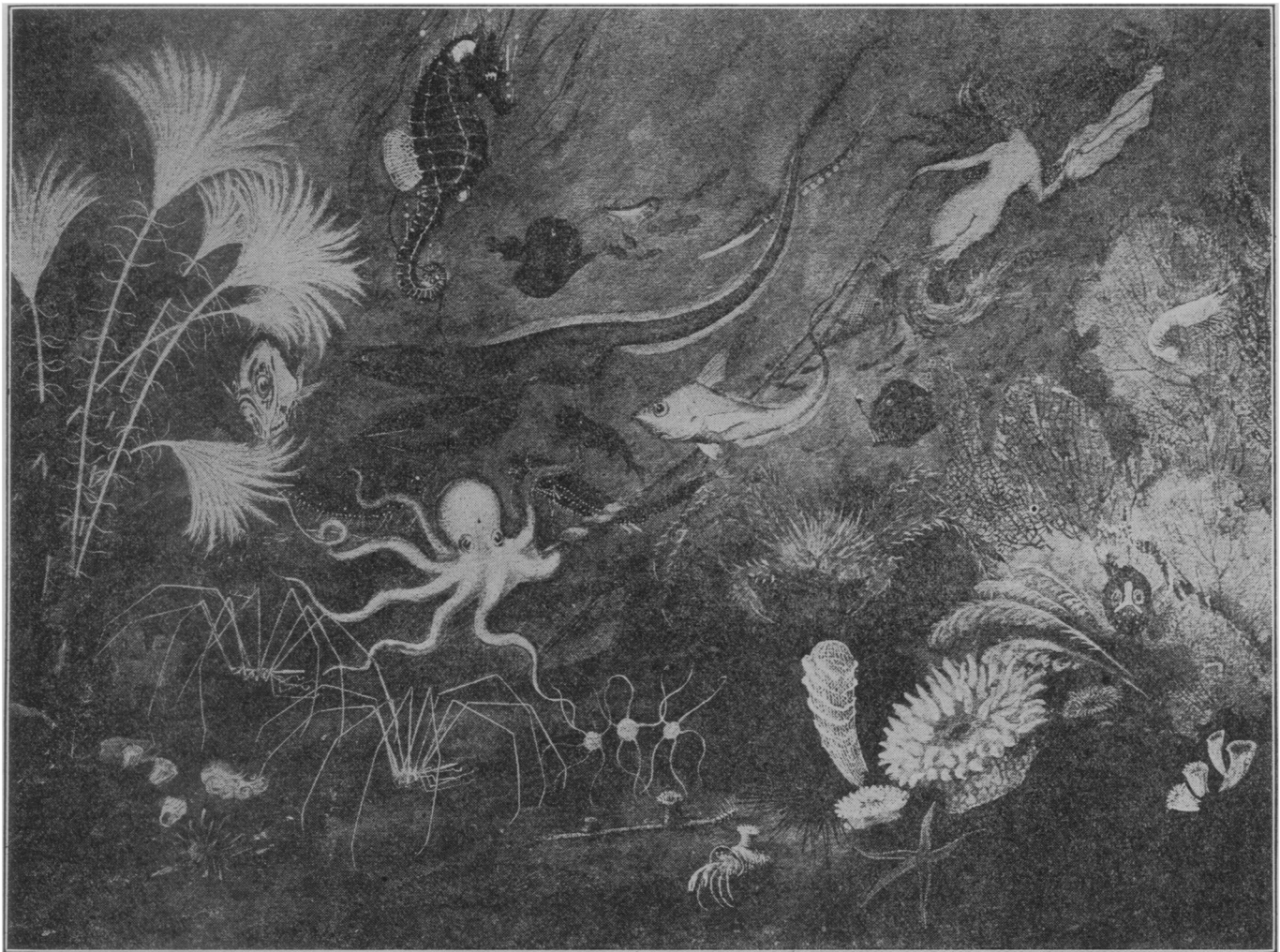
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OCEANOGRAPHY

Science to Explore Ocean Canyons



FANTASTIC DENIZENS OF THE DEEP with whom scientists may soon have more than a nodding acquaintance. From a painting by Albertus H. Baldwin

Miles beneath the ocean's surface are regions which scientists, since the dawn of history, have tried in vain to penetrate. Far down in the inky vastness of these undersea canyons or "deeps" may be the solution of many perplexing earthquakes. Perhaps, too, the ocean's mysterious labyrinths bear secrets which, if revealed, would explain vastly important data on the origin of volcanic disturbances.

These matters considered, imagine how scientists are regarding the news from that notable scientific body, the International Geodetic and Geophysical Union, that the organization has proposed an international co-operative scheme whereby it is hoped to combine vast technical and money resources for extensive study of the ocean's canyons. Meeting recently at Prague, Czechoslovakia, scientists of 25 leading nations pledged their

support to the possible epoch-making venture.

According to Commander N. H. Heck, of the U. S. Coast and Geodetic Survey, who attended the conference, if the proposal takes its hoped-for course in practice, three main methods of procedure will be under serious consideration: widespread depth sounding; gravity observations on the surface, dealing

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Science To Explore Ocean

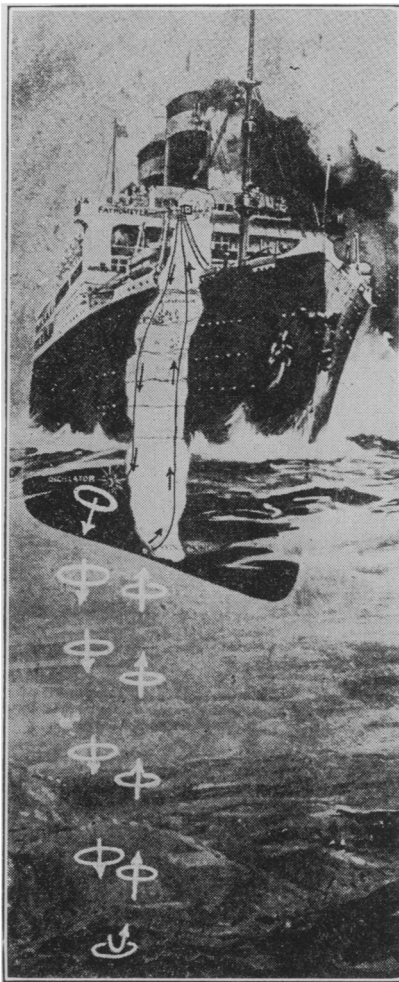
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with structural considerations such as recently were probed with remarkable results by the eminent Dr. J. Vening Meinesz of the Dutch Geodetic Commission; and the spread of seismological stations for earthquake study.

Human imagination can hardly picture the vastness of the submarine troughs. Scientists have dubbed them "the earth's last frontier" because, until very recently, man has been unable to devise instruments capable of plumbing them with any degree of accuracy. Gigantic indeed is the Grand Canyon of the Colorado, but even its breath-taking bigness fades into insignificance when compared with the ocean canyons. The Grand Canyon drops downward for a mile, while the sea canyons are from three to four times deeper. Sometimes they extend thousands of miles in length, making the 217-mile stretch of the Grand Canyon seem puny indeed.

Perhaps the most accessible deep for scientific research is the Aleutian, roughly 1,500 miles long and over 4,000 fathoms, or about five miles deep, and having an indeterminate width. Starting off the coast of Alaska, it parallels the Aleutian island chain, extends over towards Kamtchatka, there joining another great canyon which reaches down past the Japanese islands, thence east to the Philippines; then for the first time breaking into smaller deeps upon reaching the South Sea islands.

The well known Tonga Deep near Samoa likewise seems important for immediate research work, for extensive seismological investigations are being conducted in the vicinity, notably at Apia, Samoa, and at the stations in New Zealand and Australia. Moreover, Pago-Pago, at the Isle of Tutuila, is an American port. So American scientists may well have an active interest in the region.



HOW SOUND TRAVELS from a ship's bottom to sea bottom, "bounces" back, and is timed on the bounce to measure the sea depth

In general, the Pacific deeps are by far the greatest to be found anywhere. The reason, as pointed out by Commander Heck, is unquestionably tied up with the fact that the Pacific is the source of most of the world's severe earthquakes. However, were the United States to enter the world-wide deep investigation picture, American scientists might do well to begin by probing the Atlantic. The

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Finds Naked Eye Comet

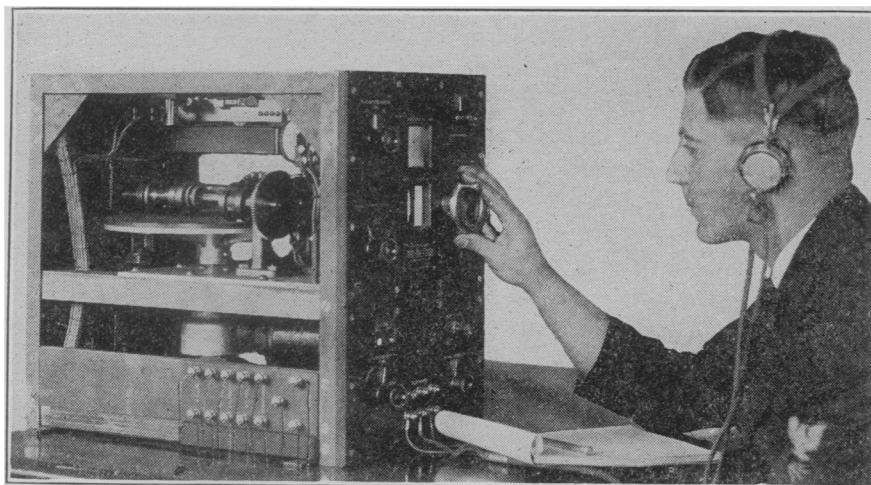
The first bright naked eye comet of recent years has been found by an amateur astronomer in Australia, according to communications received by the Harvard College Observatory, American clearing house for astronomical discoveries. The discoverer was not a professional astronomer, but an amateur star-gazer, J. F. Skjellerup, who once lived in South Africa, where he made previous cometary discoveries. Not only is the Skjellerup comet the brightest that has been seen recently, but it brings this year within one comet of the record of 1926, when eleven were observed, more than ever before. The new visitor is this year's tenth, so that it will be recorded in astronomical annals as comet j1927.

When he picked it up on Saturday, December 3, the comet was in the constellation of Norma Euclidus, or "Euclid's Rule." This is a star group that is not visible to inhabitants of north temperate countries, but at Melbourne it is nearly overhead at certain times of the year. This month, an Australian would see it low in the eastern sky shortly before sunrise, so that its poor position, even for southern countries, probably accounts for the fact that the comet reached third magnitude before it was found. On a clear dark night the keen eye can see objects about as faint as the sixth magnitude.

The comet's exact position when found, expressed in the astronomical equivalents of latitude and longitude, was 16 hours, 12 minutes and 12 seconds right ascension, and $53^{\circ} 57'$ south declination. It had a tail three degrees long, or about six times the apparent diameter of the full moon. However, as it was moving towards the sun, it will soon be invisible even in southern countries, as the glare of that brilliant body blots out even bright comets.

Just what may happen to the comet is problematical. To determine its orbit, at least three separate observations of its position must be made. If not, the object may be lost, as has happened in the past. In the summer of 1921, Dr. W. W. Campbell, director of the Lick Observatory of the University of California, was sitting in front of his house with some friends watching the sunset over the mountains. One of the party noticed a strange bright object in the gathering dusk just after the sun had descended below the horizon. As no known object of such brightness,

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THE NAVY'S NEW SONIC DEPTH FINDER. The operator is listening for the echo which will tell him how deep is down

SCIENCE TO EXPLORE OCEAN

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U. S. Coast and Geodetic Survey is considering the installation at an early date of ultra-modern equipment at its seismological stations near San Juan, Porto Rico, and near Sitka, Alaska. San Juan is near the great Nares deep, stretching about 300 miles east and west and 100 miles north and south. It is 4,662 fathoms deep—the Atlantic's deepest point. Sitka is in the general region of the Aleutian deep, greatest in the Pacific. Rather a good scientific tie-up for America.

Other well-known ocean canyons are: One off the west coast of Mexico and Central America stretching some 400 miles long, 40 miles wide and about 3,000 fathoms deep; and one off the coast of Java, recently explored by Dr. Meinesz.

Ocean canyons align themselves close to the earth's peculiar structural formations with amazing regularity. They are found in the regions of the world's greatest and most numerous earthquakes. Undoubtedly they are connected in a definite way with mountain building. In many places near the coast they parallel steep mountains or island chains, which in reality are submerged mountains and probably are related to the formation of land mountains. Consequently seismologist and geologist alike find them of vital interest. The seismologist wants to know just how earthquakes are related to the deeps: that is, whether they are born on the inshore edge, the outside edge or in the deep's middle. Likewise, he wants to know where the slipping of rock formation—the cause of earthquakes—originally occurs, whether at the surface or far beneath. It is not im-

possible that these deep troughs are surface indications of lines of weakness in the earth's crust, reaching down even ten miles or more.

In their efforts to explore the ocean's great sub-strata scientists have labored under terrific handicaps. It has been impossible, and surely would be suicidal, to send submarines into the greater depths. Divers have penetrated only to depths of less than 200 feet.

But if man with all his intelligence has done little towards penetrating the far-flung depths of the sea, how about fish life down there? Can fish withstand the icy coldness, the inky blackness, the terrific pressure? It seems that they can.

Deep sea anglers claim that down as far as five miles they have found hardy members of the finny tribe. Black seems to be their unchanging color though many are characterized by luminous spots or secretions. Black bodied fellows, more than a hundred species of them, their bodies marked with round, luminous spots, are believed to be abundant. Sailor folk call them lantern fish.

And there are other luminous deep sea divers. A species known as the grenadier may be found in the deep vastness off the Continental rim between Ireland and Morocco, "where the submerged edge of the continent begins to plunge rapidly down to the depths of the Atlantic Ocean." Then there is a West Indian deep sea maneuverer whose eyes and forehead are united in a single plate. Such are a few of the many fish that swim in the depth of the seas far below the thousand foot level to which daylight penetrates.

Mention has been made of the three main methods of procedure under

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Comet Found by Australian

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which must have been first magnitude or more, was in such a position, it is believed to have been a comet. The next night, however, it had vanished in the sun's rays, and was never seen again.

However, if all goes well with the Skjellerup comet, it should go around behind the sun, and then reappear on the other side. If that is the case, it should turn up some place in the neighborhood of Aquila, the eagle, which is now seen in the western sky shortly after sunset, though without exact data on its orbit, any prediction of its behavior is most uncertain. After that it may mount still higher in the night sky, and so perhaps the coming months will be enlivened by the presence of a brilliant comet.

If this happens it will be the first bright comet in many years. Last June the Pons-Winnecke comet became just barely visible to the unaided eye, but that was a small comet, bright only because it happened to approach very close to the earth.

Not since 1910 has there been a really brilliant comet. During that year Halley's comet came back on one of its regular visits, and then also another comet bright enough to be easily seen without a telescope appeared without warning earlier in the year. During the last century there were several bright comets, the more recent of which are still remembered by the older generation.

The first bright comet of the 19th century was that of 1811.

In 1835 Halley's comet appeared on one of its regular visits.

In 1843 a very famous comet appeared that probably belonged to the same family as comets which appeared in 1880, 1882 and 1887, all of which almost grazed the surface of the sun.

The year 1858 brought Donati's comet. In 1861 a comet appeared with a long tail through which the earth actually passed.

The years 1880, 1882 and 1887 also brought bright naked eye comets, in the same "sun-grazing" family as the one of 1843. Like that one, all were brilliant enough to be seen in daytime. These came within 400,000 miles of the surface of the sun.

The year 1892 brought Holme's comet, which was also bright. This returned again in 1899 and 1906, but then it was much fainter, so that it was only visible in a telescope. In 1919, when it was expected, it failed to appear at all.

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Science to Explore Ocean

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consideration by the International Geodetic and Geophysical Union in its proposed plan. In respect to probing the deep sea troughs, the usual method has been to take soundings by means of lead weights attached to heavy piano wire. To let out some six miles of wire and pull it to the surface hundreds of times, as must be done to get an idea of the deep's configuration, is costly and time-taking.

Fortunately, echo sounding methods have been developed recently which permit depths to be determined in a few seconds. A number of repetitions can be made in a few minutes so as to make sure no error has been made. Powerful sound transmitters are needed for this and it is also necessary to employ some form of sound receiver, preferably one which determines direction accurately. This device, known as the sonic depth finder, was developed by Dr. Harvey C. Hayes, expert of the U. S. Naval Research Laboratory at Anacostia, D. C. The apparatus has been used by naval vessels in obtaining soundings in the various oceans to depths of more than three thousand fathoms.

The operation of the sonic sounder depends upon the measurement of the time that it takes a sound to travel to the ocean's floor and back again. In practice, sound impulses are sent out at various intervals until one of them agrees with the lapse of time necessary for the sound to travel to the bottom and back to the receiver.

Suppose that the vessel is passing over a bottom 400 fathoms deep. The operator sets the machine in motion so that an impulse is sent out every one and a half seconds. The first impulse will be heard in one phone of the head set while the key is closing the transmitter circuit and again in the same phone when the key closes the circuit one and one-half seconds later. Meanwhile the first impulse has traveled to the bottom and back, a total distance of 800 fathoms.

As the velocity of sound is 800 fathoms per second, the impulse is heard in the other phone of the head set one second after it was transmitted. Immediately the operator will know that the time interval to which the device is adjusted is too great and will reduce it. As the adjustment is varying continuously, the time interval can be reduced until it coincides with the lapse of time between the making of the impulse and the reception of its echo, which in this case, will be one second.

It has been proved by the U. S. Coast and Geodetic Survey, using the apparatus with special precautions, that the depth of 4,600 fathoms, or five and one-half miles, the greatest in the Atlantic ocean, could be measured readily. In a recent experiment the vast depth of the Nares deep, north of Porto Rico, was actually sounded, leaving no more doubt in the minds of scientists that the greatest ocean "deeps" can be probed with the echo sounding device.

The suggestion of the International Geodetic and Geophysical Union, that new seismograph stations be established for studying the ocean deeps, or at least that the old ones be greatly improved, should have an important bearing on future earthquake investigations. After soundings have helped determine the exact configuration of a given deep, science one day will know exactly in what part of it the earthquake occurs.

Science News-Letter, December 10, 1927

Fresh eggs sink when placed in water, and stale eggs float, because the fresh eggs contain more water.

"Parasol" ants cut large pieces out of leaves for making nests, and march along carrying the pieces over their heads like umbrellas.

Army airplanes are now equipped with smoke candles which give forth a dense gray smoke, easily distinguished from ordinary fire smoke, so that they may signal for aid in mountainous country.

A statuette of a "golden calf" coated with pure sheet gold was found in a royal tomb in Palestine, and is believed to be some 500 years older than the calf made by the Children of Israel in Moses' time.

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