ASTRONOMY

1951 Astronomy Highlights

Ten top achievements include computing positions of five outer planets over 407-year period and finding neutral hydrogen radiation in space.

➤ ASTRONOMICAL HIGHLIGHTS for the past year picked by Dr. Harlow Shapley, director of Harvard College Observatory, Cambridge, Mass., are:

1. Calculation with large digital computing machines of the positions of the five outer planets for the years 1653 to 2060. This was done by Dr. W. J. Eckert of the International Business Machine's Watson Scientific Computing Laboratory, with the assistance of G. M. Clemence of the U. S. Naval Observatory and Dr. Dirk Brouwer of Yale University Observatory.

2. Measurement of velocities up to 3,300 kilometers (about 2,050 miles) per second for hydrogen nuclei (protons) in the aurora borealis. This work by A. B. Meinel of the Yerkes Observatory indicates that protons are the source of much if not all the energy for auroral displays.

3. Raising to over a hundred the number of known "radio stars," detection in the microwave region of radiation from three or four of the brighter spiral galaxies, and progress in the measurement of microwaves from the solar surface. These rapid advances in radio astronomy were made chiefly by radio engineers at Manchester and Cambridge, England; Sydney, Australia, and Leiden, Holland.

4. Putting into operation two special types of Schmidt telescopes: one, the instrument in South Africa owned jointly by Armagh Observatory of North Ireland, Dunsink Observatory of Eire and Harvard Observatory; the other, the first ever designed exclusively for tracking meteors. Both instruments were designed by Dr. James G. Baker and their operation is associated with Harvard Observatory.

5. Theoretical prediction and actual measurement of radiation from neutral hydrogen in the space between the Milky Way stars. Discovery of this invisible hydrogen gas had been predicted by Dr. I. I. Rabi and associates at Columbia University, E. M. Purcell of Harvard University and Dr. H. C. van de Hulst of Leiden Observatory, the Netherlands; Dr. Harold I. Ewen of Harvard University first detected and measured its radiation with a radio telescope.

6. Measurement by Dr. John Hall of the U. S. Naval Observatory of the polarization of light from one and only one of the stars in the Pleiades, an A-type star whose light is highly reddened as it travels from star to observer.

7. Discovery of 216 new variable stars in the so-called Sculptor cluster, wide-open spheroidal galaxy, and prediction that the total number would run over 700. This finding of Dr. A. D. Thackeray of Radcliffe Observatory, Pretoria, South Africa, is important in verifying the belief that stars making up spheroidal galaxies and globular clusters are much alike.

8. New theory of the ice ages, developed by Dr. Ernst Opik of the Armagh Observatory, North Ireland, attributes both the Paleozoic and Pleistocene glaciations to changes in the radiation of the sun resulting from temporary disturbance in production of atomic energy radiation deep in the sun.

9. Measurement of radial velocities of external galaxies more distant than any heretofore recorded. Dr. Milton Humason, working with spectra only two millimeters long (less than 0.02 of an inch) obtained with the 200-inch Palomar telescope, deduced that some galaxies are rushing away from the solar system at speeds up to 38,000 miles a second, about one-fifth the speed of light.

10. Demonstration that primary cosmic radiation, unlike that with which we are familiar at the earth's surface, is composed of the nuclei of the elements from hydrogen to iron and beyond, with hydrogen nuclei (protons) dominating. Physicists at the University of Minnesota and Rochester University made the measurements with photographic film carried by balloons to an altitude of 100,000 feet.

Science News Letter, November 3, 1951

MARINE BIOLOGY

Largest Rock Fished From 3-Mile Pacific Deep

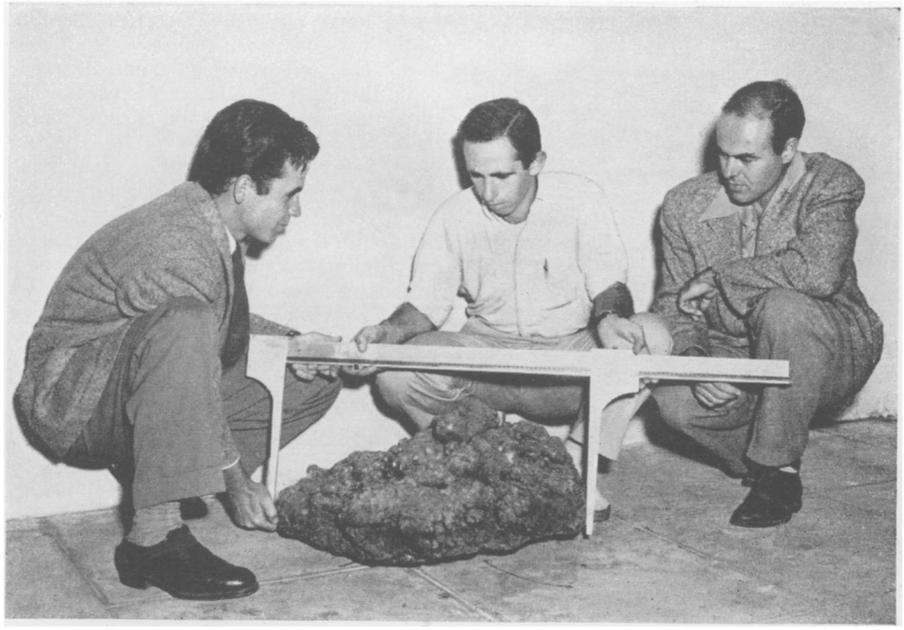
➤ A NEW deep-sea fishing record has been set by scientists just returned to La Jolla, Calif. Their prize came from the ocean floor, three miles down.

The find—probably the largest rock ever dragged up from a three-mile depth—is now being examined at the University of California's Scripps Institution of Oceanography.

Like many other objects—rocks, whale bones and sharks' teeth—dredged up from the ocean's floor, this 100-pound mass is covered with manganese dioxide. Manganese, a metal used in hardening steel, is known to exist on the bottom of all oceans, and in the dioxide form it coats ocean objects.

By finding out what lies underneath the chemical coating, scientists may get new information on the age of the Pacific, for manganese dioxide does not accumulate on rocks on land.

The prize find was brought up only by chance. Oceanographers on the research vessel *Horizon* had been using a new, more



FISHING FIND—Accidentally dredged up from three-mile deep ocean floor, this manganese concretion is being examined by Jose Barandiaran, Harris B. Stewart, Jr., and John D. Cochrane of the Scripps Institution of Oceanography.

efficient way of telling when their hydrographic wire had reached bottom. The method—breaking a glass ball at the end of the wire, then picking up the sound waves it sets up on the ship's hydrophones—promises to become standard for scientific cruises. One time when it did not work, extra cable was paid out and when this was hauled in, there was the rock, covered with manganese dioxide.

Science News Letter, November 3, 1951

PHYSICS

Heating of Lead Used To Measure X-Ray Energy

➤ A "HOT LEAD" technique can now be used to measure X-ray energy in terms of standard heat measurements of energy instead of by indirect measurements through secondary phenomena.

The method, worked out by University of Illinois physicists in Urbana, Ill., measures the rays' heating effects on a block of lead. The method gives very precise measurements and can be used on X-rays of energies from the 400,000 used in conventional medical X-ray treatments, to the 340,000,000 volts from the University's betatron.

Though the physicists term the new method a "hot lead" technique, the actual temperature rise is no more than one-tenth of a degree. The small temperature increases are measured by a thermistor, a new type of heat-measuring device 10 times as sensitive as older resistance thermometers. It is embedded in the lead.

Physicists at the University of Illinois and at the medical campus in Chicago worked together on the new development. P. D. Edwards in the betatron laboratory worked in the 300,000,000-volt range, and J. S. Laughlin at the College of Medicine at the 25,000,000 and 400,000-volt levels.

Science News Letter, November 3, 1951

ENGINEERING

Find Cure for Dancing Conductors—on Wires

➤ A CURE for "dancing conductors" was reported in Cleveland. Dancing conductors are not related to band or orchestra leaders. They are transmission lines for electricity, such as those seen along a highway, that have been set in a rhythmic rise-and-fall motion by the wind. This can happen when they are covered with a light glaze of ice. When one wire swings up even with or quite close to another wire, the current jumps across, causing a short circuit.

Dancing conductors can be cured by mechanical dampers and other means, J. E. Sproule and F. L. Code of the Hydro Electric Power Commission of Ontario reported to the American Institute of Electrical Engineers in Cleveland.

Science News Letter, November 3, 1951

DENTISTRY

Fight Tooth Decay

Very few of nation's public water supplies are being treated with the tiny amount of fluorine that could keep youngsters' teeth more free from decay.

➤ ONLY ABOUT three-quarters of one percent of America's public water supplies are now adding the tiny amount of fluorine that promises to make the coming generation's teeth more nearly free from decay.

But the dentists, water works engineers and public health experts who are urging fluoridation of water we drink are not discouraged by this fact that only 120 out of the more than 15,000 public water supplies of the nation are fluoridated.

The one big hope of preventing dental caries—decayed teeth in simple words—is treating growing teeth with amounts of fluorine so small that they produce no other effect on human health. This is the biggest dental discovery in recent years, in the opinion of many experts. It produces about a two-thirds reduction in the dental decay rate of children. Too much fluorine occurring naturally in drinking water causes unsightly mottled enamel of teeth. Surprisingly, mottled teeth were more free from decay than prettier teeth. It was found that adding the chemical to teeth, in drinking water or by swabbing it on in the dentist's office, protected teeth from decay in later years.

The U. S. Public Health Service and several other investigators developed the methods. Guinea pig cities, one with fluorine added to its water matched with another left alone, proved that children's teeth could be protected. The rush began to add fluorine to water so children could drink away future toothaches.

Wisconsin is the most fluoridated state. Sixty out of the 120 treated water supplies are in that state.

But the fluorine rush for better teeth is on. Almost every state's health department is helping communities prepare for fluoridating their water, much as a number of years ago chlorination was introduced to clean up polluted water supplies that were spreading water-borne diseases.

Civic clubs, women's organizations and newspapers in various localities, as well as dental and health associations, are campaigning for fluoridation of water supplies so that children can literally drink away their future toothaches.

So difficulties arise in the program:

As often happens with new methods, some misinformed individuals are contending that addition of the minute amounts of fluorine to water is dangerous. There is no good evidence to support such ideas.

State and local health departments, and water works, are limited by facilities and personnel in the speed with which the fluoridation program can be put into operation. One typical state can extend the method to only one city each month. There is also a limit to the amount of the necessary chemicals that can be produced industrially in the forthcoming months. Money is also necessary to operate the program and install the method, although this amounts to only a few cents each year for each person benefited. Federal funds to aid states have been limited severely by Congress.

Not all the population can be reached with the fluorine chemicals in public water supplies. The millions in very small towns and in rural areas, who drink spring and well water, will need to have their children go to dentists to have the chemicals swabbed on their teeth by a process called topical fluoride applications.

There are a few favored areas where there is enough fluorine naturally in the water to protect future teeth, but there are less than 1,500 of these cities with natural fluoridation. Some areas of excess fluorine content in their water may actually have to remove some of it to prevent mottled enamel.

Science News Letter, November 3, 1951

ASTRONOMY

Our Milky Way Galaxy Is a Giant Starry Universe

➤ OUR MILKY WAY galaxy of millions of stars is a giant among the starry universes, Dr. Thornton Page of Yerkes Observatory has just reported to the Smithsonian Institution.

The galaxy of which our solar system forms a tiny part weighs about as much as 200 billion suns, Dr. Page estimates. The Andromeda nebula, nearest object in space beyond the Milky Way galaxy, appears to weigh as much as 100 billion suns. But other nebulae sufficiently close to be seen with the world's largest telescopes weigh only as much as one to ten billion suns, the Yerkes astronomer calculates.

About half the weight of each "island universe" is believed due to the gases and cosmic dust between the stars rather than to the stars themselves.

Latest sampling counts indicate that about 2,000 such starry universes of different shapes and sizes are near enough to our solar system for their light, traveling 186,000 miles a second, to reach us within 13,000,000 years. There are approximately 9,000,000 such stellar universes near enough