SCIENCE NEWS

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THE NEW TELESCOPE AT THE U. S. NAVAL OBSERVATORY

THE new telescope of the U. S. Naval Observatory, with its 40-inch diameter mirror, made by George W. Ritchey, will photograph a larger area of the sky than some telescopes that have larger mirrors. Mr. Ritchey and his assistants are now engaged in making photographic exposures to determine just how the new instrument performs. The telescope is designed especially for photographic observation.

Captain J. F. Hellweg, superintendent of the U. S. Naval Observatory, considers that the telescope is now complete and he expects that it will soon go into active service adding new knowledge to astronomy. It is the first air-cooled telescope. This most modern accessory is not for the comfort of the astronomers who will use the telescope, but to assure better observations.

The entire observatory building is built of very light metal, with double walls, so that at night the temperature will soon become the same as the surrounding air. With more massive buildings, the stone and brick absorb heat all day, and give it off long into the night, producing objectionable air currents which spoil the clearness of the telescopic images. In order to keep the telescope at its nighttime temperature, a felt canopy will be placed over it in the daytime. This is connected with air cooling equipment, so that all day the telescope will be kept at the temperature expected that night.

The entire tube of the telescope is constructed with a unique system of counterpoises, so as to prevent bending. Convenience of the observer is also remembered, as he is provided with a movable observing platform which automatically keeps him at the eyepiece as the telescope turns to compensate for the rotation of the earth. Thus he does not need to interrupt his work frequently to adjust himself.

The curves to which the mirrors are ground are novel. In a reflecting telescope the light from a star falls on a large concave mirror. It is then reflected to a smaller convex mirror above, thence back, through a hole in the large glass mirror to the eyepiece or photographic plate. With conventional reflecting telescopes, the large mirror is ground to the shape known as a paraboloid. Such a shape has the disadvantage of a very small field, that is, the star at which the telescope is directly pointed may be focussed sharply, but others near-by are fuzzy. In astronomical photography it is desirable to have stars focused sharply over a larger area, and this can be accomplished by grinding the mirrors to new curves. These have been developed by Mr. Ritchey in collaboration with Henri Chrétien, French optician, and so the new instrument is known as the Ritchey-Chrétien telescope. The Naval Observatory installation is the second to use these curves. Several years ago, while in France, Mr. Ritchey constructed one with a 20-inch mirror, which is now in the possession of the Duc de Gramont.

THE SIZE AND SHAPE OF GALAXIES

WE live in a great ball of stars and not in a watch-shaped stellar galaxy as astronomers have supposed. Dr. Harlow Shapley, director of Harvard College Observatory, in delivering the Darwin lecture in London, said that there is now increasing evidence that some types of stars are so distributed as to make the Milky Way galaxy nearly spherical.

Our neighbor galaxy, the great nebula in Andromeda, is also a great ball of stars. As in our own Milky Way, the greatest portion of Andromeda stars fall into an elongated flattened spiral form with long diameter about four times the short diameter. When Harvard astronomers made measurements along the lesser axis with an instrument sensitive to very fine differences in light, it was found to be about five times as long as previously shown on photographs made with large telescopes.

Ideas of the sizes of our own and other galaxies of stars must be revised upward, according to Dr. Shapley. The dimensions of spiral nebulae must be increased by six tenths, and for other nebulae that look like great balls the dimensions must be tripled. It is now known that it takes light at least 75,000 years to cross our Milky Way.

Some 115,000 new galaxies were discovered on photographs made at Harvard's South African Station and at the new Oak Ridge, Massachusetts, observing point of the Harvard Observatory. The most recent photographic plate taken, exposed three hours through the 16-inch Metcalf telescope, showed 1,700 galaxies, the richest region yet discovered during the extensive Harvard survey of northern skies for new "universes." Great clusterings of galaxies, each consisting of tens of thousands of galaxies and each measuring a thousand quintillion miles across, have been found.

DIAGNOSTIC TESTS FOR TUBERCULOSIS

AN improved test for tuberculosis, discovery that the disease is less prevalent in the United States than generally supposed, improvement in taking x-ray pictures of tuberculosis patients—these are the major advances in the fight against the white plague discussed at the meeting of the National Tuberculosis Association.

The improved diagnostic aid is a new kind of tuberculin used to detect the presence of tuberculosis. One difficulty with tuberculin tests in the past has been the fact that a number of different kinds of tuberculin were used. Not all of them were reliable. Tested with one product, a person might be found free from tuberculosis, whereas a test made with another tuberculin might show the presence of tubercle bacilli in his system.

The new tuberculin, prepared by Dr. Florence Seibert, of the University of Pennsylvania and the Henry Phipps Institute, Philadelphia, was described at the meeting by Dr. Esmond R. Long, of the same institution. This tuberculin is considered more accurate and otherwise superior to products previously used.

The Medical Research Committee of the National Tuberculosis Association has persuaded two drug firms to manufacture this product and hopes to have it universally adopted for tests. This would make the diagnosis of tuberculosis more certain. It would also enable health officials to determine accurately the amount of tuberculosis throughout the country.

Tuberculin tests sift out the persons who have tuberculosis from those who have not. But after the disease has been diagnosed further examinations must be made to determine the extent of the disease and the kind of treatment needed.

Most important in this respect is the x-ray picture. Here again wide variation in the way the pictures were taken made it difficult for physicians to compare pictures and judge the extent of the disease. The Medical Research Committee, under the chairmanship of Dr. William Charles White, of Washington, has sponsored research to improve x-ray picture-taking and is trying to have the improved method here also made the standard throughout the country. Tuberculin tests are already being made on a large scale, Dr. Long reported. An entirely new view of the situation in the United States has appeared as a result. Fewer persons are infected with the tubercle bacilli, with or without symptoms of actual disease, in the West than in the East. The number of persons so infected is steadily decreasing in both sections.

Contrary to general belief, very many adults are entirely free from tuberculous infection. It used to be thought that by the time a person had grown up, he had many tubercle bacilli or germs in his body, the result of picking up a few at a time from chance contact with tuberculosis patients. Because he got the germs in small, repeated doses, he developed a resistance to them which kept him from getting ill with tuberculosis. The tests now being made in schools and colleges all over the country indicate that adults generally are not infected with the tuberculosis germs.

ITEMS

VITAMIN C, the scurvy-preventing constituent of many fresh fruits and vegetables, may help the body in fighting tuberculosis, it appears from studies reported by Drs. Eugene de Savitsch and his associates, J. D. Stewart, Louise Hanson and E. N. Walsh, of Chicago, at the meeting of the National Tuberculosis Association. Guinea-pigs given about a third of an ounce of freshly prepared orange juice daily were better able to withstand the disease induced by fatal doses of tubercle bacilli or germs than pigs equally infected with tubercle bacilli but not getting orange juice. The study was undertaken in order to determine whether the peculiar resistance of rats to tuberculosis is correlated to the fact that they can manufacture their own vitamin C and need not depend on a dietary source of this vitamin.

SCIENTIFIC ingenuity has found a way to measure continuously the tiny amounts of perspiration secreted second by second. This news befitting the approach of hot weather was announced before the Midwestern Psychological Association by Dr. Chester W. Darrow, of the Behavior Research Fund and the Institute for Juvenile Research of Chicago. "We have been able to measure in milligrams per second the perspiration secreted in limited areas on different body surfaces," said Dr. Darrow, describing the apparatus and method.

A PREHISTORIC animal with a nearly flat body and head, but with tall bony processes growing out of its backbone, has just been pieced together from fossil fragments in the American Museum of Natural History by Dr. D. M. S. Watson, professor of zoology in the University of London, now visiting the American Museum of Natural History. In front view this bizarre creature would have looked like an inverted T. It is about two feet long and the "fin" along the back is nine or ten inches high. Its name is *Platyhystrix* and it belongs to a very ancient group of amphibia that crawled along the slimy pond bottoms of the southwest 220,000,000 years ago.

AVIATORS need to take along carbon dioxide gas as well as oxygen when they fly at high altitudes, it appears from studies carried on at the Eppindorfer Hospital, Hamburg, Germany, by Professor Hans Winterstein, of the University of Istanbul (Constantinople). The chief effects of high altitude are increase in the pulse rate, in the breathing rate, in the blood pressure and enlargement of the heart; a decrease in capacity for exertion; and a decrease in the carbon dioxide in the blood which causes a subdued breathing. This last effect continues for some time after the normal air pressure is reestablished. Of all these, only the high pulse rate and fast breathing are due to lack of oxygen. They alone were eliminated when the oxygen supply was increased without increasing the atmospheric pressure. Professor Winterstein therefore concludes that the lack of carbon dioxide, while not the cause of all the symptoms experienced at high altitudes, is nevertheless an important factor that should not be neglected. The studies have just been reported in *Forschungen und Fortschritte.*

A FOOTBALL bladder strapped to his chest has kept an almost completely paralyzed patient, S. Crosby Halahan, breathing continuously for the past six months, it appears from a report by Dr. Phyllis Tookey Kerridge, of the London School of Hygiene to *The Lancet.* Dr. Tookey Kerridge has designed a new apparatus to replace the football bladder. The patient is a man of 63 years. He is suffering from a progressive wasting of the muscles which started in 1927. Although almost completely paralyzed he is still mentally alert and contented. By 1931 he began to have difficulty in breathing as a result of the gradual paralysis of his muscles. From June, 1932, until September, 1933, he was kept alive by manual artificial respiration maintained continuously by relays of relatives and nurses. Then his friend, Sir William Bragg, designed a hand-operated machine for inflating a football bladder bandaged to Mr. Halahan's chest. In October, 1933, he designed hydraulic bellows for inflating the bladder, which worked successfully.