SCIENCE NEWS

Science Service, Washington, D. C.

THE WORLD'S LARGEST TELESCOPE

THE world's largest telescope, with a concave mirror two hundred inches in diameter, twice that of the greatest existing instrument, will be under construction within a few months at the California Institute of Technology. The funds will be provided by the International Education Board of New York, which administers some of the Rockefeller benefactions.

"The interest of the board is based chiefly upon the successful cooperation of the Mount Wilson Observatory and the California Institute, and their belief that the provision of additional means of furthering this joint work may lead to many new advances in astronomy, physics and chemistry. The full cooperation of the Carnegie Institution of Washington, of which the Mt. Wilson Observatory is a branch, has been assured by the unanimous action of President John C. Merriam and the executive committee of the institution, and by that of Director Walter S. Adams and other members of the Mt. Wilson staff. The research policy of the new Astrophysical Observatory of the California Institute, which will be designed to supplement and not duplicate the Mt. Wilson Observatory, will be determined by a joint committee representing the two institutions, aided by other leading investigators."

Dr. George Ellery Hale, honorary director of the Mt. Wilson Observatory, and chairman of the Observatory Council of the Institute, spoke of the plans in an exclusive interview to *Science Service*.

"In designing this instrument," he said, "we shall have the collaboration of leading physicists and engineers as well as of astronomers and instrument makers. When the telescope is completed it will be used to extend our present researches in various directions, as in spectrum photography of the stars, direct photography of very faint celestial objects, investigation of the nature of the spiral nebulae or 'island universes' beyond the Milky Way, and in radiometry, or the measurement of the heat from the stars. By making a special study of the various instruments and methods to be used in conjunction with the new telescope for these and other purposes, and by securing the cooperation of the ablest authorities, we expect greatly to increase the efficiency of the telescope.

"The equatorial mounting of the telescope will be designed by a group of experts, including Dr. J. A. Anderson, Dr. Francis G. Pease and other members of the staff of the Mt. Wilson Observatory, working in conjunction with several eminent engineers, opticians and physicists. It is the great mirror, nearly seventeen feet in diameter, double that of the largest that has yet been made, that will offer the most difficulty. We expect to make it out of fused quartz, and are much pleased by the cordial and generous offer of cooperation received from President Gerard Swope, of the General Electric Company, and Dr. Elihu Thomson, director of the Thomson Research Laboratory of this company at West Lynn, Mass. Dr. Thomson is deeply interested in the problem, and has already succeeded in making quartz discs of considerable size. His method is to cast a quartz disc full of fine bubbles and to fuse a layer of very pure quartz, free from bubbles, on the surface, in which to grind the proper dish-shaped figure. Such a mirror behaves as well as a perfectly solid one, and has the advantage of being lighter.

"The great advantage of quartz is that it changes its form so slightly with temperature. With the 100-inch telescope now at Mt. Wilson, we must always be careful to avoid exposing the glass mirror to the heat of the day, and some changes occur due to differences in temperature at night. With a quartz mirror the effect of temperature is too slight to give any trouble. We feel confident that, by the time we are ready for the mirror, Dr. Thomson will have succeeded in making a quartz disc of the requisite size. Pyrex glass, which is much better than ordinary glass, but not equal to quartz, might be used as a substitute if necessary."

Just how long it will be before the new telescope is in operation, it is at present impossible to tell, but it will doubtless be several years. The plans for this telescope have no connection with the project of Professor George W. Ritchey for a large telescope at the Grand Canyon, in Arizona. Professor Ritchey has been working in Paris for several years on a method of constructing large telescope mirrors in a cellular fashion, but it is not planned to employ his method in the 200-inch telescope.

The exact location of the new telescope also remains to be decided. Perhaps it will be placed on Mt. Wilson, 5,900 feet altitude, where there would be the advantage of proximity to the other observatory facilities. However, it is possible that the smoke, dust and glare of electric light from Los Angeles in the future, with the city's increased growth, may prove a disadvantage, especially because of the comparatively short focus of the instrument. Several other sites are therefore being tested in comparison with Mt. Wilson.

The trustees of the California Institute have placed the entire project in the hands of a committee of the executive council of the institute, consisting of Dr. Hale; Dr. Robert A. Millikan, director of the Norman Bridge Laboratory of Physics; Dr. Arthur A. Noyes, director of the Gates Laboratory of Chemistry, and Henry M. Robinson, well known for his work as a member of the Dawes Commission and in other international undertakings. Dr. John A. Anderson, physicist and astronomer of the Mt. Wilson Observatory, will serve as executive officer of the Observatory Council, in direct charge of design and construction. They will be assisted by an advisory committee including Dr. Walter S. Adams, director of the Mt. Wilson Observatory; Professor Fred-

erick H. Seares, assistant director; Dr. A. A. Michelson, of the University of Chicago; Dr. Charles G. Abbot, secretary of the Smithsonian Institution; Professor Henry Norris Russell, of Princeton University, and Professors Richard C. Tolman, Paul S. Epstein and Ira S. Bowen, of the California Institute. George Eastman, and Dr. C. E. K. Mees, director of his research laboratory, have offered fullest cooperation in the study of special photographic problems. Ambrose Swasey, chairman of the Warner and Swasey Co.; Dr. Gano Dunn, president of the J. G. White Engineering Co., and recently chairman of the National Research Council; Dr. Frank E. Ross, of the Yerkes Observatory, and others equally well known, will aid in the work of design, and many other scientists especially qualified will contribute useful suggestions.

ATOMIC LAYERS

LAYERS of metallic rubidium, only one atom deep, so thin that several million would be required to equal the thickness of the paper this is printed on, have been measured at the Bell Telephone Laboratories. Thin films of rubidium, a metal similar to the sodium of common salt, are important because of their use in photoelectric cells.

As the magic lamp of modern physics, the photoelectric cell, transmuter of light variations into sound, is the very heart of the revolutions in industry that have been plotted in the physics laboratories. Talking motion pictures, radiovision, television, telephoned photographs would all be impossible without the photoelectric cell.

In the course of researches on how to make the photoelectric cell most efficient, A. L. Johnsrud measured the thin films. When the thin film of metal inside the glass cell was very thin it operated better than when thicker. Rubidium can be made into thin films more easily than its relative metals, because at rather low temperatures and without loss of time it can be made to evaporate and the vapor deposited, in a vacuum, to form such a film.

A large photoelectric cell was made and so arranged that rubidium could gradually be deposited on the glass, or else, after a thick deposit had been made, it could gradually be removed. While the film was thus getting thicker or thinner, the photoelectric response, the current given off when light fell on it, could be measured. Since the maximum response was obtained at the same point, whether the film was growing thicker or thinner, it was necessary exactly to record the film's depth.

Ordinary measuring methods proved inadequate and polarized light was used. When polarized light passes through any film, such as the one of rubidium, the direction in which it vibrates is twisted. The thicker the film, the more it is twisted. By means of another prism similar to that which polarizes the light the extent of the twisting, and also the thickness of the film, is measured. The most current was obtained when the film was but one atom thick.

INDIANA MOUND SURVEY

BURIAL and ceremonial mounds of earth and stone, which are the only monuments left by the prehistoric and early historic inhabitants of this continent, have been the objects of a survey conducted during the past summer by the Indiana Historical Society and Historical Bureau, under the direction of Dr. C. B. Coleman. Many of these artificial hillocks have been destroyed by cultivation, and it is desired to obtain a complete record of the rest before they meet a like fate.

The valley of the Whitewater River, near the Ohio border, was chosen as the best place to begin, in part because of the possibility of finding here culture remains related to those of the famous mounds of Ohio. Two counties in this valley have been surveyed, and several mounds explored. The archeological remains in them were not rich, but may be taken as good promise of valuable data to be expected when the explorations can be made more general.

One mound near Brookville was entered because it was being cut away by the river on one side and by the highway on the other. In the remaining portion a great mass of incised pottery fragments was unearthed, and evidences of fire were widespread. Two skulls and a number of other human bones were found, bearing some signs of having been deposited by cremation burial. With them were margrinda beads, slate ornaments, tools of bone and a single arrow-point, probably left as funeral gifts.

The survey will be continued this fall as long as weather permits, and will be taken up on a larger scale next spring.

EARTHQUAKE IN THE NICARAGUA AREA

THAT troubled Central American republic, Nicaragua, now being controlled by U. S. Marines, was shaken by the earthquake that was recorded on seismographs of this country Thursday morning, October 25.

The disturbance itself sent the news by its world-shaking waves to the earthquake observatories and their reports wired to *Science Service* and interpreted by the U. S. Coast and Geodetic Survey allowed the quake to be located at approximately 12 degrees north latitude and 86 degrees west longitude. The exact time of the shock was 7:32.8 A. M. eastern standard time.

It is considered possible that some damage was caused by the earth disturbance, although the U. S. Marine headquarters at Washington has not yet received any report.

Earthquakes in Nicaragua interest American authorities not alone because of the marine occupation but because the United States acquired by purchase twelve years ago the right to build in the country a ship canal between the Atlantic and Pacific. Earth disturbances would be likely to damage such a canal.

Seismograph observatories throughout the world recorded the quake. Those reporting to *Science Service* were located at Georgetown University, Washington; the Dominion Observatory, Ottawa, Canada; observatory at Harvard University, Cambridge, Mass.; station of the U. S. Coast and Geodetic Survey at Tucson, Ariz.; Fordham University, New York City; St. Louis University, St. Louis, and the Meteorological Observatory, at Victoria, B. C.

A WEATHER STATION IN ALASKA

RADIO weather reports of observations taken by a young woman at the coldest and most inaccessible weather station in United States territory at Point Barrow, Alaska, will enable warnings of cold waves affecting the North Central states to be sent out this winter several days earlier than has previously been possible.

Mrs. Beverly A. Morgan, wife of the Army Signal Corps radio operator at the trading post, has recently been appointed observer at Point Barrow. She is one of the six white inhabitants of the town. Arrangements have been made for the first time to radio observations from this station twice daily to Weather Bureau headquarters in the United States.

The recent opening of daily communication with this station makes forecasting data on weather conditions on the Arctic Ocean available for the first time. Most of the cold waves and other atmospheric disturbances affecting the northwestern states originate in that region of the Arctic. Observations previously taken at this station were sent by mail to the United States, reaching the forecaster's office months after they were made. They were, of course, useless in making the weekly and daily weather forecasts and valuable only as a matter of record. The Point Barrow is over 450 miles north of the other weather outposts sending in wire or radio reports.

Charles L. Mitchell, chief forecaster of the Weather Bureau, places great stress on the value of these new data. He states that "this daily contact with the most northern settlement on United States territory will give us data which will enable us to trace the origin, force, extent, probable duration and intensity of each disturbance near the point of its origin, so that we will be able to predict its probable effect on crops, shipping and household arrangements many days before it will arrive."

It is thought that the observations from Point Barrow will have a vital effect on making the weekly weather forecast for the various sections of the United States more complete, and will allow the predictions of cold waves to be felt six or seven days after the report is issued. This is not always possible now.

Mrs. Morgan and her husband will live in the most primitive surroundings with only a few score people within hundreds of miles. Their only communication with the outside world, with the exception of their radio, will be a steamer once and sometimes twice a year. Sometimes even this powerful icebreaker is unable to penetrate to the post for months after her scheduled arrival. Shortage of food and other supplies has often caused serious hardship at the station, necessitating rationing of food. The temperature averages 19 degrees below zero during the coldest winter months and has been known to reach 55 degrees below zero.

Despite these hardships Mrs. Morgan has pledged herself to make the routine observations twice a day regardless of weather, storms, sickness or other conditions. Many of the instruments require considerable mechanical attention and Mrs. Morgan will perform these duties in addition to her work as observer.

The linking of the Point Barrow station into the twice daily observation scheme completes the chain of eleven Alaskan stations distributed at strategic points throughout the territory, each sending by radio or wire the required data.

Bureau officials are now considering some means of extending the observation system into Siberia and islands in the Arctic Ocean, so that reports will be available even closer to the origin of every disturbance which would affect the United States.

ITEMS

A NEW astronomical observatory, equipped with two large telescopes, as well as smaller instruments, will soon be under construction at Saltsjoebaden, just south of Stockholm, under the auspices of the Royal Academy of Sciences. The new observatory is made possible by the sale of the old observatory of the academy for one million crowns (about $270,000) and the donation of a like amount by the former secretary of state for foreign affairs, K. A. Wallenberg. A 36-inch reflecting telescope and a 20-inch refractor for photography will be the chief instruments. Professor Bertil Lindblad will be the director.

A NEW X-ray laboratory, for use in plant breeding experimentation, has been installed at the University of California, and will be available for cooperative researches by workers in other parts of the country. The plan is to have projected experiments submitted in outline to a special Committee on X-ray Experimentation at the university, and when this committee has given its approval, the pollen or other plant material to be X-rayed will be sent in to the laboratory, treated and returned to the experimenter, who will observe and report the results obtained. In this way it is hoped to develop new varieties of fruits, crop plants and ornamentals which might never have come into existence. At the same time, results of value from the purely scientific viewpoint are expected.

THE health-giving ultra-violet rays of sunlight, which everybody wants nowadays, pass through cotton, linen and rayon fabrics about equally well when these are of equal weight and closeness of weave. Fresh, white, natural silk is almost as transparent toward the rays as bleached cotton, while wool is only about half as transparent. These are some of the results obtained in a study of the transmission of ultra-violet radiation through various fabrics, conducted at the U. S. Bureau of Standards by Dr. W. W. Coblentz, Dr. R. Stair and Dr. C. W. Schoffstall, and reported in the bureau's new *Journal of Research*. "In all cases when the fabric is dyed, or slightly yellowed with age, the ultra-violet transmission through the thread is greatly decreased. Hence, as is to be expected in comparing various kinds of dyed fabrics, the one having the largest openings between the threads transmits the most ultra-violet."