

ASTRONOMY—GENERAL SCIENCE

# Completion of 200-Inch Telescope Is in Sight

## One of Its Uses Will Be in Study of Radiation From Planets, Including Invisible Infra-Red Rays

COMPLETION of the great 200-inch telescope to be erected on Mt. Palomar as part of the Department of Astrophysics of the California Institute of Technology is at last in sight, thirteen years after the late Dr. George Ellery Hale convinced the Rockefeller Boards of the feasibility of such an instrument, and obtained funds for its construction.

This was announced by Dr. Max Mason, chairman of the Institute's Observatory Council, to the Pacific Division of the American Association for the Advancement of Science. He revealed

that a major headache, a sagging of the great disk of glass for the big mirror which will collect and concentrate the light of distant stars, had been overcome.

The disk, which is 17 feet in diameter and originally weighed 21 tons before some four tons of glass were removed in grinding, is solid in front, but the back is ribbed, mainly to lighten it. By a system of 36 levers, the mirror is held in the holes formed between these ribs. Both the method of support and the structure of the mirror are new in this instrument.

"The supporting system must operate

so perfectly that no bending of the reflecting surface beyond one or two millionths of an inch will occur as the telescope moves," said Dr. Mason.

"As the surface of the mirror was brought by polishing close to a spherical form it became clear that the disk, when tipped from the grinding table to a vertical position for optical test, sagged slightly under gravity," he confessed. "After months of study, as the polishing continued, this sag was eliminated by installing a system of twenty-four squeeze levers, operated by counter weights, distributed around the rim of the glass, and thus another major '200-inch headache' was cured."

*Science News Letter, June 28, 1941*

## To Study Radiations

WHEN the 200-inch telescope finally does swing into use, one of its employments will be in the study of radiations from the planets, Dr. John Strong, also of the California Institute of Technology, said. Planets not only reflect visible light which they receive from the sun; they absorb and then re-radiate considerable quantities of solar energy, largely in the form of the invisible infra-red rays. These will be caught by the great mirror, and analyzed in a number of specially constructed instruments.

These instruments, Dr. Strong informed his audience, are now being constructed, and the special techniques necessary for their operation are being developed by members of the Institute staff. Much of the information necessary for comparison of conditions on the planets with those on the earth can be obtained only by a more careful and exact study of physical processes taking place on our own planet's surface and in its atmosphere. Determinations, on an entirely new order of exactness, of what happens to earth radiations when they pass through water vapor, carbon dioxide, ozone and the major atmospheric gases, are on the program of research at the Institute.

Incidentally, Dr. Strong pointed out, data obtained in these researches will probably have considerable value to meteorologists as well as to astronomers.

*Science News Letter, June 28, 1941*

## Big, Cool, Red Stars

THE bright star Arcturus, which passes almost directly overhead these



### FOR PRECISION

*A new white, plastic finish, which will resist the combined attacks of heat, corrosive fumes and humidity, has been developed to protect dials on industrial and military instruments. In a series of tests with the "world's worst weather," created artificially, the new dials remained pure white under the most grueling conditions, while dials of the old type developed yellow splotches and other defects. Accuracy required in electrical instruments makes it necessary to print the marks on the dials with a variance of less than 1/200th of an inch. The young woman worker is mounting the dials at the Westinghouse plant.*

June evenings, "is representative of a class of fairly numerous stars, known as K giants, which differ in many ways from the normal, or dwarf stars, like the sun," said Dr. Gustaf Stromberg of the Mt. Wilson Observatory. "They are rather large, having diameters from 10 to 50 times that of the sun and their intrinsic brightnesses are equivalent to from 50 to 500 suns. They are much redder than the sun and therefore have considerably cooler atmospheres.

"The mechanism by which they generate heat must be quite different from that activating the sun and other normal stars, and their evolution may well have followed different lines. They are not in general found in star clusters in or outside the galactic system and seem to be peculiar to our own system, or even perhaps to that part of the system in which we are at the present time. They are quite distinct from the so-called supergiants, which are found in star clusters."

*Science News Letter, June 28, 1941*

## Instrument Shows 'Flames'

**R**ESULTS obtained with a new type of instrument for observing the fiery clouds of prominences in the sun's atmosphere were announced by Dr. Edison Pettit of the Mt. Wilson Observatory. When attached to a motion picture camera prominences have been photographed moving with velocities exceeding 180,000 miles per hour.

Prominences are visible to the naked eye only for a few minutes during a total eclipse of the sun. Otherwise they are visible only with expensive apparatus or simpler devices used at high altitudes. The new instrument, which makes use of polaroid and has no moving parts, can be used with a small telescope at any elevation.

Dr. Pettit stated that "with the new instrument scarlet flames stood out in the atmosphere of the sun with remarkable sharpness, resembling a prairie fire."

*Science News Letter, June 28, 1941*

## Vitamin B<sub>1</sub> Fails

**T**HE STORY of a vitamin experiment that backfired was told to plant pathologists attending the meeting, by Dr. Dean E. Pryor of the U. S. Department of Agriculture. He undertook to test a theory that if cantaloup vines were given doses of vitamin B<sub>1</sub> they would acquire extra vigor and thus become resistant

to the troublesome fungus disease known as powdery mildew. Under both greenhouse and field conditions, the vitamin seemed, if anything, to impart more vigor to the fungus than it did to the vines. From these preliminary results, he concluded, it would seem that the vitamin "offers little possibility for control of cantaloup powdery mildew."

More hope would seem to be found in breeding and selection of strains resistant to the disease, for in experiments which Dr. Pryor carried on jointly with Dr. Thomas E. Whitaker, also of the Department of Agriculture, a number of plants were found that showed no gross signs of the mildew, even in the midst of plantings that were heavily infested. Further search for resistant strains is still going on.

*Science News Letter, June 28, 1941*

## Sea Level Not Level

**S**EA LEVEL isn't level in the equatorial region of the Pacific ocean. It is two feet higher on the Australasian side than it is on the American, Dr. H. U. Sverdrup, director of the Scripps Institution of Oceanography, declared in his address as president of the Pacific division of the American Association for the Advancement of Science.

As a result of this difference in elevation, there is a narrow, relatively swift current flowing eastward along the equator. If it were not for the friction of water against water, it would move at a rate of about seven knots, said Dr. Sverdrup. Its actual rate is one or two

knots. This, however, is as rapid as the current in a great many inland rivers.

The pile-up of water against the Pacific's western shore results from the action of the trade winds, the speaker stated. Steady winds blowing across the water from the northeast in the northern hemisphere's lower latitudes, and corresponding winds from the southeast in the southern hemisphere, keep two great currents moving steadily westward in the tropical Pacific. Separating them, in the equatorial belt of calms, is the narrow return current, flowing like a river.

This narrow west-to-east equatorial current, however, accounts for only a small part of the water returned across the Pacific. Much larger streams flow away from the equator, to make the return trip at higher latitudes. In the northern hemisphere, the principal returning mass is borne in the Kuroshio or Japan current, which sweeps along the Aleutian chain and turns southward along the North American coast. It is estimated that this current carries more than 5,000 times as much water as the Mississippi.

As described by Dr. Sverdrup, the Pacific is a cold monster with a relatively thin, warm skin. Surface temperatures are quite high, reaching as much as 75 degrees Fahrenheit. But this warm surface layer extends downward only a few hundred feet at most. The great bulk of Pacific ocean water, in the depths, is always cold, most of it only a few degrees above freezing-point.

*Science News Letter, June 28, 1941*

RADIO

# Airplane Locator Probably Uses Altimeter Principle

**A**DMISSION by Lord Beaverbrook and other British aviation officials that they have a secret radio device for locating enemy planes confirms suggestions that have been made in the United States for some time. Though the nature of the device is not revealed, it is probably some apparatus that uses, in reverse, principles of the radio altimeter.

The ordinary aneroid barometer, commonly used as an altimeter, measures altitude above sea level by showing air pressure, which decreases with height. However, especially when travelling over

mountains, what is more important is the height of the plane above the ground. The radio altimeter sends out a high frequency radio wave, which is reflected from the ground. A receiver on the plane picks up this echo and the time, though a small fraction of a second, is measured. This gives the height.

In the British device, it is believed, the radio beam is sent out, the metal shell of the airplane reflects it, and the receiver detects it on the rebound. Details of one possible way of doing this were revealed last February by the U. S. Patent Office,