more about airplane control by flying miniature planes freely in a special wind tunnel; creating artificial wind gusts and testing planes in them; improving the famous N.A.C.A cowling to reduce wind resistance of new giant air-cooled engines; bettering seaplanes; experimenting with rotorplanes, etc.

The great international research race in aeronautics is getting closer. America has been way out in the lead. But our research, which always pays magnificent dividends, must be continued and expanded to keep up with the world procession.

Science News Letter, May 29, 1937

ASTRONOMY

New Equipment To Be Used On June Eclipse Expedition

Wide-Aperture Camera and Device for Distributing Light on Plates May Disclose New Facts on Corona

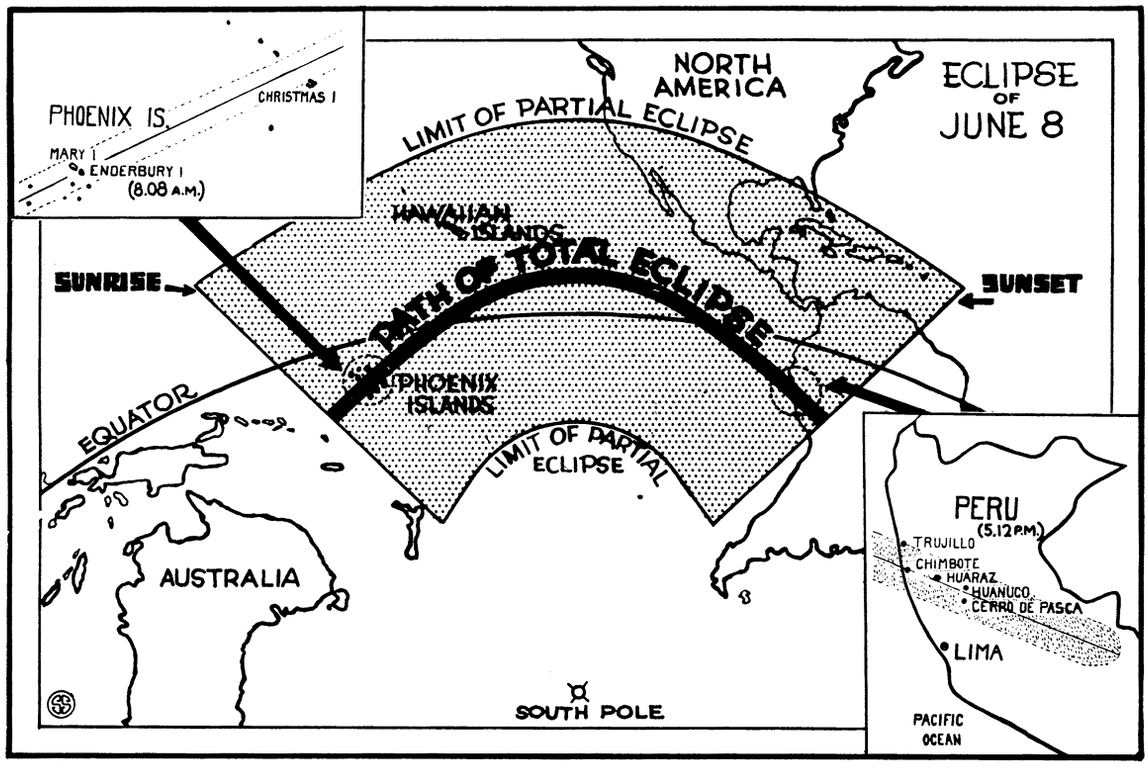
WHILE, in the main, scientific observations on the sun's corona have not changed markedly in the last twenty years, each new eclipse brings refinement of technique and some really new observing equipment. The eclipse of June 8 is no exception.

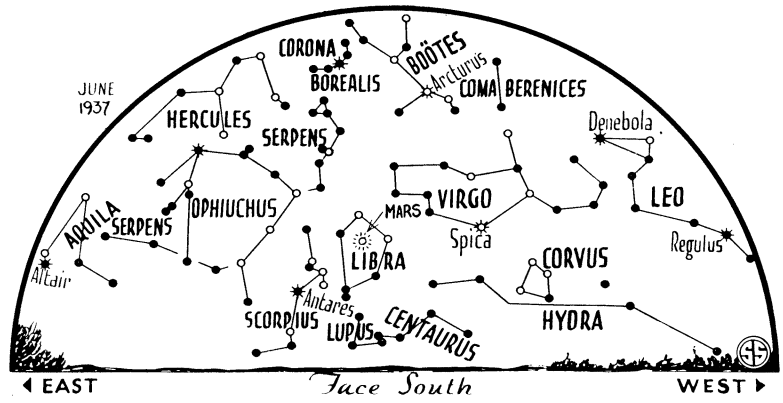
On the Peruvian coast, north of Chimbote, at an altitude of 3,000 feet a new device will be used for the first time in a total eclipse of the sun—the fast Schmidt type camera operated by Prof. Charles H. Smiley, director of Ladd Observatory of Brown University. This small camera will have an optical aperture of f/1, which means that the diameter of the light-collecting mirror of the instrument is equal to its focal length. The best of candid cameras, one can recall, are f/2 or f/1.5, while most telescope cameras are f/10 or more. The lower the aperture the greater the light-gathering power of the instrument and the shorter may be the exposure time. Prof. Smiley's Schmidt camera can scan the sky through 20 astronomical degrees, while the ordinary reflector camera can picture only about one degree. The fast light-gathering camera should be useful in recording the relatively poor lighting conditions that will prevail in Peru.

For Corona Pictures

The U. S. Navy-National Geographic Society expedition — perhaps the most pretentious of all American parties which will take the field—will employ a new device developed by Dr. Irvine Gardner of the National Bureau of Standards in Washington that should obtain better pictures of the far-flung, but faint, streamers which blaze out hundreds of thousands of miles into space from the shining corona of the sun.

Dr. Gardner's device is a rotating disk with four sections cut out of it like pieces of pie. This disk spins 100 times a minute in front of his telescopic camera. The amount of light reaching the photographic plates depends on the openings in the disk. Out near the rim the openings are large and nearly all the light will come through. Nearer the center, more and more light is cut off. The object of the device is to secure about equal light from the brilliantly bright part of the corona near the sun's surface and from the very faint outer portions of the corona. Photographs of the corona, in the past, have sometimes been overexposed by the brilliant inner corona before sufficient light from the outer co- (*Turn to page* 342)





MARS SHINES IN SOUTH

ditions are much worse. There the total eclipse happens at 5:25 p. m. Eastern Standard Time. This is also, approximately, the Peruvian local time, because the western coast of South America is directly south of the eastern United States. At the time of the eclipse it is about 45 minutes before sunset, the sun is only 8 degrees above the western horizon, and totality lasts 3 minutes and 20 seconds.

Peru will be the scene of at least two parties. One is Japanese, from the Kwasan Observatory at Kyoto. The other will represent the Hayden Planetarium, New York City. The University of San Marcos, the oldest in the western hemisphere, is cooperating with the visitors.

At both locations the observations will be of the same sort.

Though the eclipse overshadows other astronomical events of the month, there is another that is welcome. This happens on June 21. On that date, at 3:12 p. m. Eastern Standard Time, the sun reaches its farthest north position in the sky, and this is the summer solstice, the beginning of summer. This day is the longest of the year.

Vega Brightest

On the evenings of June the brightest star visible appears high in the east. This is Vega, of Lyra, the lyre. But this June it is not the brightest sky object. The moon and two planets, now visible, exceed it in splendor. One, shown on the accompanying maps (in which the skies are depicted for 10:00 p. m., standard time, at the beginning of the month, 9:00 p. m. in the middle, and 8 p. m. at the end) is Mars, in the group of Libra, the scales, in the south. Just to the left is Scorpius, the scorpion, with the red star Antares.

The name, by the way, means "rival of Mars," applied no doubt because of its color. This month we have a good chance to compare them and we find that it is a rather feeble rival, as far as brilliance is concerned.

The other planet of the June evenings is Jupiter, which appears to the southeast about 10:30 p. m., standard time, and is even brighter than Mars. It is in the constellation of Sagittarius, the archer, to the left of the scorpion, and it is not shown on the maps.

Look for Pointers

To locate other bright stars of the June sky, one might start with the great dipper, high in the north. The two lower stars in the bowl are the famous pointers, indicating the direction of the pole-star. The curved handle is also a guide post. If we follow its curve to the south, we come first to Arcturus, in Bootes, the bear driver, and then to Spica, in Virgo, the Virgin.

Descending in the west is Leo, the lion, with the star Regulus at the end of the handle (to the south) of a subgroup called the sickle. Near the horizon, in the northwest, are Castor and Pollux, of Gemini, the twins, and still lower, and farther north, is Capella, in Auriga, the charioteer. However, this is so near the horizon, that it is very difficult to see during the month.

Below Vega, to the east, is the northern cross, of Cygnus, the swan. Deneb is the brighest star, at the top of the cross, which is on its side. Altair, in Aquila, the eagle, is a neighbor, to the right.

Phases of the Moon

		E. S. T.
Last Quarter..... June	2	12:24 a. m.
New Moon	8	3:43 p. m.
First Quarter	15	2:03 p. m.
Full Moon	23	6.00 p. m.

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rona was obtained. As a result scientists exposed for the bright light and let the faint part fade out into nothingness. Naturally they have always wondered about the knowledge that might be gained from the faint, lost part.

Also on the coast hills and mountains of Peru will be the Hayden Planetarium Grace Expedition from the American Museum of Natural History in New York City. Members of this party include: Dr. Clyde Fisher of the Planetarium as leader; Charles H. Coles, Dorothy A. Bennett; Prof. William H. Barton, Jr., Capt. A. W. Stevens, Dr. S. A. Korff, and Hans Christian Adamson.

In the South Seas expedition to the islands of the Phoenix group will be: Dr. S. A. Mitchell, director of Leander McCormick Observatory, University of Virginia, as leader; Capt. J. F. Hellweg, superintendent of the U. S. Naval Observatory; Dr. Paul A. McNally, director of Georgetown College Observatory; Dr. Floyd K. Richtmyer of Cornell University; Dr. Irvine C. Gardner, National Bureau of Standards; Dr. Theodore Dunham, Mt. Wilson Observatory; John W. Willis, U. S. Naval Observatory; Richard H. Stewart, National Geographic Society, Charles G. Thompson, Foundation for Astrophysical Research, and Charles Bittinger, Washington artist.

Broadcast

A world-wide broadcast will be made from the scene of the eclipse with George Hicks as announcer and Walter R. Brown and Marvin S. Adams, field engineers for the National Broadcasting Company. The Columbia Broadcasting System has prepared facilities to cover the event from Peru where Capt. Albert S. Stevens will describe his plans to make photographs from an airplane.

Because of the rarity of eclipses, and their brief duration, an astronomer who observed all the eclipses of his lifetime would see the corona for less than an hour, so even a few minutes more will add materially to the time during which it has been observed. Full knowledge of the sun is desirable not only because of its importance to us, but also because the sun is the only star which we can see in detail. What we learn of it helps us better to understand the more distant celestial bodies.

The coronal observations are by direct photography, with large cameras, and with the spectroscope, which analyzes its light. Other spectroscopic observations are of the chromosphere, the

outer layer of the sun's globe. Just before, and just after, the moon covers the solar disc, the chromosphere shines by its own light, unmixed with that from the interior, and then important observations can be made of the distribution of gases in the sun's atmosphere.

Motion Pictures

At both of the eclipse locations motion pictures will be made to record the changing effects as the partial phases, and the total eclipse, take place. Also, at each, an artist will paint a portrait of the eclipse during the fleeting moments of totality. Charles Bittinger, painter of scientific subjects, of Washington, D. C., is with the South Seas party, while D. Owen Stephens, of Swarthmore, Pa., is in Peru.

Even though shipboard observations are very much restricted it was felt by many that some astronomers should be as close to the middle of the path as possible. Early efforts to charter a ship, on which to take an eclipse cruise with passengers who wanted to see the spectacle, were unsuccessful because of the expense. However, there are some freighters, plying between Hawaii and Panama, which could go through the center of the eclipse track by taking an alternative southern route.

One of these will carry Dr. John Q. Stewart, of Princeton University, and James Stokley, representing The Franklin Institute and the Cook Observatory, of Wynnewood, Pa. They expect to make visual observations of the corona, measurements of its brightness and also photographs. The latter, however, will have to be of short exposure, because of the motion of the ship. Should the expeditions in Peru and the Phoenix Islands be unsuccessful these might be the only records of the appearance of this eclipse.

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The Eclipse on the Radio

May 29, 5:45 p. m., E.S.T., Dr. Clyde Fisher, Hayden Planetarium, speaking on the ancient superstitions of the sun-worshiping Peruvians. (Columbia Broadcasting System).

May 30, 9:00 p. m., E.S.T., Broadcast from Canton Island. (National Broadcasting Company Blue Network).

June 1, 9:00 p. m., E.S.T., Entertainment from New York and Washington for expeditions (NBC Blue).

June 3, 5:00 p. m., E.S.T., Capt. Albert Stevens outlines plans for photographing the eclipse from airplane at 30,000 feet altitude. (Peru, CBS)

June 7, 5:00 p. m., E.S.T., Preview of last-minute technical preparations. (Peru, CBS)

June 7, 6:45 p. m., E.S.T., Description of last-minute preparations from Canton Island. (NBC Blue).

June 8, 12 noon, E.S.T., Early stages of eclipse from Canton Island. (NBC Blue).

June 8, 5:00 p. m., E.S.T., Description of eclipse. (Peru, CBS)

June 8, 2:00 p. m., E.S.T., Totality described from Canton Island. (NBC Blue).

June 8, 9:45 p. m., E.S.T., Scientists at Canton Island will speak of results of observations. (NBC Red).

MAKING SCHMIDT CAMERA

Prof. Charles H. Smiley, of Brown University's Ladd Observatory, is here directing the grinding of the f/1 lens for the Schmidt type camera with which he hopes to obtain eclipse photographs of new usefulness to science. With him is shown his assistant, Donald S. Reed.

ENGINEERING

New Turbine Pumps Rescue Water-Flooded Coal Mines

BITUMINOUS coal mines that have long been flooded with water are being rescued by the use of deep well turbine pumps.

A. B. Kelly of Greenburg, Pa., reported to the American Mining Congress the first successful freeing of an abandoned coal field by this method. In 46 days, the turbines caused 2,500,000 tons of water to gush out of Westmoreland County, Pa., flooded mines. This was 53,800 tons a day or 37.5 tons per minute. Similar pumps are about to raise 4,000,000,000 gallons (some 16,000,000 tons) of water from a maximum depth of 450 feet in a Fayette County, Pa., submerged field.

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The London Zoo has a new feature—a studio of animal art, where about 25 art students can sketch wild animals brought to "pose" in a special cage before them.