ASTRONOMY

Star Study Program Will Not Be Finished Until 2019

Special Star Camera Will Take Milky Way Pictures Now, Others for Comparison in Period 75 Years Hence

PHOTOGRAPHS made over a four-year period beginning in the year 2015 will be required to complete a research program to measure the rotation of the Milky Way, which will start soon at the Lick Observatory of the University of California, on Mount Hamilton.

A new $65,000 star camera, making exposures on plates 17 inches square, will be used, says Dr. W. H. Wright, director of the Observatory. The 16-ton mounting for the camera, arranged to turn as exposures are made, thus compensating for the earth's movement, is now in place. Eventually it will have two lenses, one to photograph in blue and ultraviolet light, the other in yellow light.

However, the European war will delay indefinitely the completion of the former, since the glass discs of which it is ground were ordered from abroad. The glass for the latter arrived just before hostilities began, and is now being ground to the right curvature. For the present, says Dr. Wright, this one will do double duty.

Every clear night, after the lens is in place, photographs will be made, overlapping pictures of the northern part of the heavens. Four years, it is estimated, will be required to complete the work. Seventy-five years from now, the series will be repeated, and comparison of the two sets of plates will show the rotation of the Milky Way.

The sun, as well as all the stars we see, is part of the Milky Way system, or Galaxy, and partakes of this rotation. These stars are arranged in a great cluster the shape of a grindstone. We are inside, and when we look to the edge of the grindstone we see a much greater concentration of stars than when we look to the side. This concentration is the Milky Way. The grindstone is about 100,000 light years (600,000,000,000,000,000 miles) in diameter.

Stars nearest the center turn fastest. We are about two-thirds of the way out from the center, and at that distance take about 220,000,000 years to make one circuit. Long though this is, the distance is so great that we are traveling at a speed of approximately 170 miles per second to make it. These figures will be known much more accurately in 2019, when the Lick Observatory program is completed.

Incidentally, the new star camera has many other uses, and will not be placed in retirement in the 75-year interval.

Science News Letter, August 10, 1940

GOD MEETS GODDESS

A feature of the Field Museum's new hall of Babylonian archaeology is a frieze composed of enlargements of ancient seals. This one shows a god and a goddess in conversation, flanked by the same cuneiform inscription, repeated on each side. Between the pair are representations of a monkey, a fish, and a winged sun-disk.

Science News Letter, August 10, 1940

ARCHAEOLOGY

Ancient Gateway of Kish Reconstructed in Museum

See Front Cover

A LITERAL gateway into the past is the outstanding feature of the Field Museum's new hall of Babylonian archaeology, which was recently opened to the public. It is a reconstructed gateway of the ancient city of Kish, on the Euphrates, rebuilt with the original stucco pieces taken from the ruins as far as possible, and with the gaps supplied by Museum artizans.

The gateway comes from the later days of Kish, when a Persian dynasty ruled over the Tigris-Euphrates valley. It dates from the reign of King Shapur II (310-370 A.D.) But Kish had days of glory far earlier than that. The city stood through changing fortunes for some 4000 years before it was finally abandoned in the seventh century A.D. At times it rivaled and even outshone its better known neighbor, Babylon, which stood only about ten miles away.

In the new hall dominated by the gateway are the fruits of ten years of intensive excavation of the ruins of Kish, including such interesting objects as one of the first wheels ever used on a chariot, building bricks which are almost exact duplicates of bricks made in modern kilns, bones of fresh-water fish that were left when a post-Noachian deluge swept over the city site, and even gambling devices from some proto-historic den of sin.

Science News Letter, August 10, 1940

ASTRONOMY

Rocket Journey to Moon Shown at Fels Planetarium

JOURNEYING by rocket to the moon, to see the earth eclipse the sun on April 15, 2033, will be the experience of visitors to the Fels Planetarium in Philadelphia, during August, F. Wagner Schlesinger, director of the Planetarium, has announced.

The Planetarium chamber, he said,

will seemingly be transformed into a rocket ship, and, as the trip is made, the moon will be seen growing larger and larger. Arriving there, visitors will disembark, and see the earth hanging in the sky above the lunar mountains. It will change in phase, as the moon does as seen from the earth. Then, at new earth, the sun will pass behind our planet. The moon will be illuminated with a strange red glow, from a ring of ruddy light around the earth.

After a three-week period on the moon, compressed into 45 minutes, the voyagers will be safely returned to earth.

Science News Letter, August 10, 1940

NAVIGATION

Navy's Chronometer Shortage Not Serious; Radio Helps

SHORTAGE of chronometers—accurate marine timekeepers—which has led the U. S. Navy to reduce the number on battleships from the usual three to two, is not as serious as it might have been at the time of the last war.

Radio time signals in recent years have increased both in accuracy and number to such an extent that a navigator could now operate satisfactorily with no timepiece but a dollar watch. Twenty times a day, on a number of different frequencies, signals are broadcast from the powerful Navy radio stations at Arlington, Virginia, Mare Island, California, and other locations. Thus, even a relatively poor clock or watch can be checked frequently and its error determined.

These time signals originate here at the Naval Observatory, whose superintendent, Capt. J. F. Hellweg, invented the transmitting clock which has made possible such accurate time signals, usually precise to within a hundredth of a second or less. This clock can be very rapidly checked and set by comparison with the standard clocks, kept in an underground vault at constant temperature and pressure. The actual transmission is controlled by a vibrating quartz crystal, similar to those used to keep radio stations operating on the proper wave lengths. Similar clocks, adjusted by the signals from Arlington, are used at distant stations.

Though many chronometers have been imported from England, Switzerland and Germany, good ones are also made in the United States. There are many in private hands, and, if the shortage became serious, these could doubtless be obtained by the government.

The chronometer is needed to find a ship's longitude. Latitude can be found by observing with a sextant the sun's height when it has its greatest altitude—that is, at "high noon." But to get the longitude, the navigator must find his local time, and compare this with the time at some fixed point, usually Greenwich, the British national observatory. If he is west of Greenwich, his time is earlier, if east, it is later. The difference tells him the distance he is east or west.

Chronometers carry Greenwich time, and the local time can be found by astronomical observations in one of several ways. Most ships in the past have carried three chronometers. If there were only one, it might stop. With two, an awkward situation might arise if they differed, for no one could tell which was correct. But with three there is greater safety, for not more than one is likely to be seriously in error at a time.

Science News Letter, August 10, 1940

TECHNOLOGY

Technical School Merger Announced in Chicago

A NEW technical school, the Illinois Institute of Technology, has been formed in Chicago by the consolidation of the Armour Institute of Technology and Lewis Institute, each with nearly a half century behind it. With a total of about 7000 students in day and evening classes, the new Institute will be one of the country's largest.

In order to perpetuate the old names, the Illinois Institute of Technology will have three departments: Armour College of Engineering, Lewis Institute of Arts and Sciences, and Armour Research Foundation. Henry T. Heald, Armour president for the past two years, is president of the new school.

Science News Letter, August 10, 1940

Fifty thousand airplanes, which the United States is called on to produce for defense, are about 2,000 more than this country has built in all the years since the Wright brothers' experiments.

ASTRONOMY

Saturn-Jupiter Triple Pass To Begin on August 15

BEGINNING of a rare and complicated set of steps in the dance of the planets, during which Jupiter will pass Saturn three times in six months, will occur on Aug. 15. The last time such a maneuver was seen was in 1682 and 1683.

Astronomers call this a "triple conjunction." It is an effect of the motion of the earth around the sun, at a speed of 18.5 miles per second. Jupiter, farther out from the sun, travels more slowly, only eight miles per second, while Saturn plods along at about six miles per second. Once a year, as we overtake these planets, they seem to go backwards, or "retrograde," in the same way that a slow freight train seems to be going backwards when you pass it in a fast express.

At the present time, both Jupiter and Saturn, which rise soon after midnight, are traveling in their direct motion, from west to east. Now Jupiter, brighter of the pair, is to the west, but on Aug. 15, at 8:00 a.m., Eastern Standard Time, he will pass his fainter brother. They will be separated by about two and a half times the apparent diameter of the full moon.

On Aug. 27, as the earth catches up to Jupiter, he will seem to stop, after that will retrograde, moving to the west. On Sept. 4, Saturn likewise will stop, and turn back. Then, on Oct. 11, Jupiter will again pass Saturn.

By Dec. 31, we shall have moved far enough along that Jupiter will again seem to stand still, and then start moving east once more. After Jan. 10, Saturn will resume his direct motion. On Feb. 20 the third, and final, conjunction of the series will take place. In the fall of 1941, the two planets will again move to the west, but this time Jupiter will not reach Saturn.

About 19 years from now, Jupiter will again pass Saturn, but then only once. While the planets will retrograde at that time, as they do every year, this backward motion will not occur at the right time to cause a triple conjunction.

A very famous triple conjunction occurred in the years 7 and 6 B.C., about the time of the birth of Christ. It has been suggested that this was one of the strange happenings in the sky observed by the Wise Men, which have come down to us as the "Star of Bethlehem."

Science News Letter, August 10, 1940