Astronomy

Dietrick E. Thomsen reports from Santa Cruz, Calif., at the meeting of the Astronomical Society of the Pacific

Eclipses don't know there's a war on

In the summer of 1945, World War II was rolling to its end in the Pacific. Troops crowded trains in the United States and stations greeted civilians with signs reading: "Is this trip necessary?"

On July 9, 1945, North America experienced a total eclipse of the sun. As Katherine Bracher of Whitman College in Walla Walla, Wash., relates, astronomers thought a trip necessary, and several expeditions from various parts of the continent set up in several of the little towns along the path of totality, which ran from central Idaho across Montana, Saskatchewan and Manitoba.

To get equipment from Los Angeles to Malta, Montana, Bracher relates, special arrangements had to be made with gasoline rationing boards along the way. Long motor trips were discouraged and even forbidden in wartime. In Canada the Canadian army provided transport.

The people of the little prairie towns took the astronomers into their homes and feted them with barbecues and picnics. They also helped set up equipment. In one town the local watchmaker worked all night to repair a broken mainspring in a telescope drive. In some locations the weather was cloudy, but in others the sun broke through in time. The usual sort of observations were made, including pictures and spectrograms of the corona, and pictures of solar prominences and Bailey's beads. Two firsts were recorded: Observations from high-flying airplanes chasing the eclipse and photographs of the moon's shadow moving through the atmosphere on its way to the earth's surface. A Canadian group got the first pictures and spectra of the corona from altitudes above 30,000 feet, and many amateur astronomers got the moon's shadow coming through the atmosphere.

In all nothing spectacular, Bracher says, but it shows that it could be done, even in the middle of a war.

World's first high-altitude observatory?

Astronomical observatories are today so routinely placed on mountaintops that it may be surprising to realize that it is a fairly recent practice. The earliest modern observatories were in or near big cities. Astronomers had to discover that seeing is better from mountaintops, and technology had to develop the means of building on them.

According to W.R. Beardsley of the University of Pittsburgh, possibly the first group of astronomers to appreciate the value of a mountaintop was a U.S. Navy expedition to the Pacific Ocean commanded by Lt. Charles Wilkes. They built an observatory on Mauna Loa on the island of Hawaii that Beardsley believes was the world's first high-altitude example.

The Wilkes expedition sailed from Norfolk, Va., in 1838 with the mission of determining accurate latitudes and longitudes of islands in the Pacific. Latitude and longitude have always been difficult — and longitude for centuries impossible — to determine from the deck of a moving, heaving ship. For accurate navigation, therefore, a set of accurately determined points on fixed islands was desirable as a base for reckoning, corrections and cartography.

Wilkes landed at Hilo on Hawaii in 1840 and proceeded to try observations near the shore. The party found that the surf throws a saltwater spray into the air that hinders observations, so they decided to climb the mountain. It was December; there was lots of snow. The Hawaiian bearers they had hired disliked the snow and deserted, but after many difficulties they built a small observatory and did what they had come for, including some observations of occultations of Jupiter's satellites, which were important to the planetary astronomy quite popular in those days.

Today another mountain on Hawaii, Mauna Kea, is becoming something of an astronomical ghetto as everybody with a new telescope to build seems to want to put it there. A questioner asked why Wilkes didn't use Mauna Kea, as Mauna Loa is an active volcano, and Mauna Kea is not. Beardsley replied that Mauna Loa was not active then, and it is closer to the town and therefore better for logistic reasons.

The results of the Wilkes expedition so stimulated interest in astronomy in the United States, Beardsley says, that they led to the founding of two famous observatories, Harvard College Observatory and the U.S. Naval Observatory (neither of which was built on a mountain), and the Smithsonian Institution to house and classify the specimens brought back.

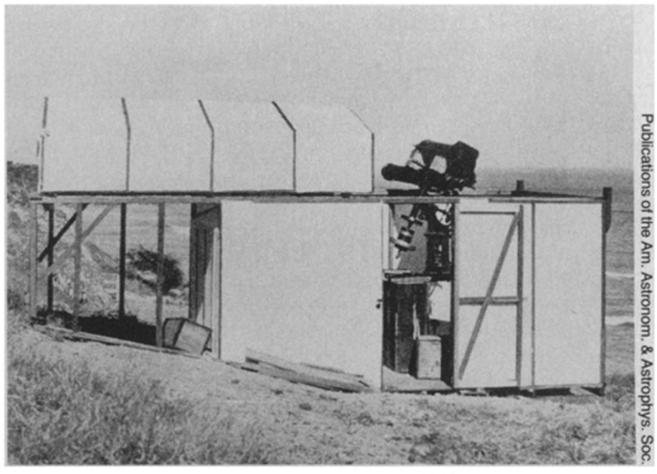
Tailing Halley's comet

Comet Halley is probably everybody's epitome of a comet. It has fascinated people from the embroiderers of the Bayeux Tapestry through Mark Twain to the latest engineers of space probes. Its next perihelion passage, in 1986, will be observed by just about everything astronomers can point at it.

In the midst of the great public brouhaha over Halley's last return, in 1910, the American Astronomical and Astrophysical Society resolved to send a scientific expedition to observe the comet from Hawaii, where the angle of view would be particularly favorable.

As John Lankford of the University of Missouri at Columbia relates the story, the Society had great trouble getting money and personnel. Finally the National Academy of Sciences gave funds and Ferdinand Ellerman, recruited by George Ellery Hale, then director of Mt. Wilson Observatory, agreed to lead the expedition.

The expedition went to Oahu and set up on the beach near the south slope of Diamond Head. Emphasis was on wide angle photographs of the comet's tail. Even though the weather was "abominable," they got 70 photos between April 14 and June 10, 1910, and later published a selection. But astronomers were little interested, and the expedition was judged a scientific failure.



On the beach at Waikiki the expedition of 1910 set up to photograph Halley's comet.

Lankford feels that the expedition failed because astronomers then did not have good ideas about what to study in comets. The intervening years have yielded theories of the composition and chemical and physical evolution of comets, and Jan Oort's theory of where comets come from — a cloud of cosmic debris orbiting the sun at a distance 100,000 times as far as the earth. These developments have shifted attention from the tail to the head. Knowing more specifically what to look for, Lankford suggests, astronomers should derive far more profit from coming observations of Halley than they did in 1910.