

THE LOWE OBSERVATORY.

A new astronomical observatory has been established in Southern California by Professor T. S. C. Lowe, the projector, builder, and president of the Mount Lowe Railway, an illustrated description of which was published in our issue of February 3, 1894. Its location is seven miles by rail north of Pasadena and sixteen miles northeast of Los Angeles, the rapidly growing metropolis of the Southwest.

The new observatory is well equipped with the great 16 inch Clark refractor and other instruments, which have done notable work in the Warner Observatory at Rochester, under the directorship of the eminent astronomer Dr. Lewis Swift. The buildings consist of a central tower 32 feet in diameter, surmounted by a light dome, and two unequal wings—the smaller containing a dark room for photographic work and the larger furnished with cases for the extensive astronomical library of reference gathered by Dr. Swift in the course of his professional career. A large platform in front will have ample room to manipulate the comet seeker, and to accommodate the throngs of visitors who will claim his attention on stated occasions.

The Sierra Madre Mountains, upon which the Lowe Observatory is located, have an east and west trend, and rise abruptly from the San Gabriel Valley on the south to an altitude exceeding 6,000 feet above sea level. The observatory is built upon a southern spur of these mountains, about 150 feet higher than the Echo Mountain House, reached by the Mount Lowe Railway, and half a mile west of it. Its altitude is about 3,600 feet above the sea and 2,000 feet above the foot hill mesa at the base of the mountains, which are very steep at this point. While the crest of the range rises high above the observatory and shelters it on the north, leaving, however, the north star visible, the entire southern horizon is unobstructed, extending to the rim of a large segment of the Pacific Ocean, about 100 miles distant on the south and west. Astronomically it is nearly at the intersection of 34th parallel of north latitude with the 118th meridian of longitude west of Greenwich. This very low latitude, combined with a high altitude, gives Dr. Swift a zone of the celestial sphere ten degrees wide not visible from his Rochester Observatory, and his longitude enables him to observe celestial objects three hours after they are below the horizon at the Harvard Observatory. One advantage of his new location was made manifest a few weeks ago while he was searching for comets near the southern horizon, when a star of the second magnitude whose identity was unknown to him entered the field of his telescope.

Referring to his charts, he discovered that it was the most northern star in the famous constellation of the Southern Cross.

Besides the ten degrees of south latitude at the Lowe Observatory not commanded by Dr. Swift at Rochester, he now possesses other advantages which must be fruitful of important scientific results. The large proportion of clear nights will enable him to make continuous and uninterrupted observations. When a new discovery is made, whether a comet, an asteroid, a nebula, or a new star blazing forth from the depths of space, he will be able to follow it night after night with telescope and spectroscope and camera, and catch and hold the celestial object in all its varying phases and motions.

But besides an unclouded sky, there is a peculiar clearness in the atmosphere.

Three-fourths of a mile of the densest portion of the atmosphere, with its dust, fog, haze, and other impurities, is below the observatory and Dr. Swift is able to use much higher powers on his instruments at all times than he could under the most favorable conditions at Rochester, thus vastly increasing the efficiency of their use.

Another advantage not to be overlooked is the equable temperature of Echo Mountain. As the astronomer cannot permit artificial heat in his observatory, the exposure in cold weather is very trying. At Rochester he was sometimes enveloped in three great coats, besides wrapping his lower limbs in blankets and rugs, which impeded his motions as well

as benumbed his senses. At Echo Mountain the mercury seldom descends to 40 degrees Fahrenheit, and his mental powers will always be on the alert.

Dr. Swift has been the recipient of many distinguished honors from eminent institutions in America and Europe. Three gold medals were awarded by the Imperial Academy of Science at Vienna for comet discoveries in 1877, 1878, and 1879. The Lalande prize, valued at 500 francs, and a silver medal were given by the French Academy of Sciences in recognition of the rapidity of his astronomical discoveries in 1881. The

vantage of several years' residence in South Africa, thus placing the entire southern hemisphere under his scrutiny.

Los Angeles, August 28, 1894.

HUT-BUILDING SEVENTEEN-YEAR CICADAS.

AN ATTEMPT AT AN EXPLANATION.

BY BENJAMIN LANDER.

At the recent convention of the American Association for the Advancement of Science, held in Brooklyn,

much interest was shown in the life-history of the seventeen-year cicada ("locust"). One of the most interesting papers read treated of the remarkable earthen huts which, in rare cases, are built by the pupæ on the surface of the ground, serving as a domed extension of their underground burrows. It was stated that no satisfactory explanation of the causes that occasioned their construction, their uses, or why they are so exceptional has been offered.

During the late invasion of the Hudson valley by the grand army of cicadas, the writer had unusual opportunities to study the habits of the insects; and having been so fortunate as to discover a vast "locust" city of adobe huts near his home, his observations seem to offer clues to the solution of the three mysteries alluded to. But before stating them a more explicit allusion to the phenomenal Lilliputian city might be of interest; indeed, the peculiarities of its locality bear directly upon the tentative explanation of their construction.

On the fourth of May, while passing over a burnt section of the woods on South Mountain, near Nyack-on-the-Hudson, great quantities of small,

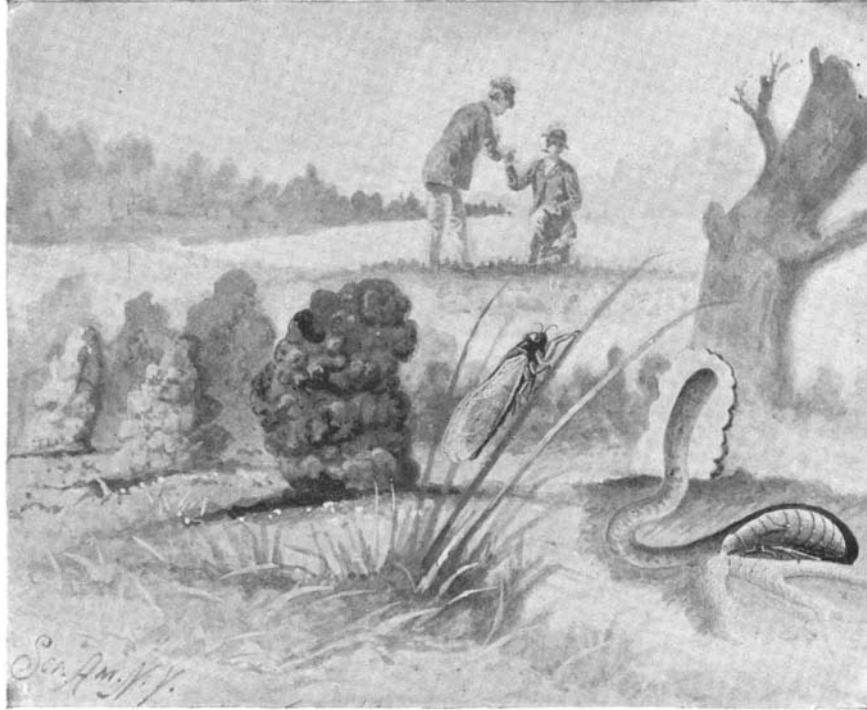
irregular earthen protuberances were observed on the surface of the ground, extending in every direction. To one acquainted with the literature pertaining to seventeen-year cicadas, their origin was manifest: they were the wonderful huts of those insects.

There was no exit, and on breaking them off they were found to be built in continuation of the burrows of the pupæ. In height, they varied from one to four inches. Some were very symmetrical, even beautiful, especially when built of clay impregnated with a rich red iron oxide.

The area of the original discovery extended over about two acres, the huts gradually disappearing as the ground dipped to a deep gully—a miniature valley, three or four hundred feet wide, an important fact in the attempt to explain their cause. Subsequent explorations beyond the gully revealed a wide extension of the mysterious structures, a conservative estimate making the aggregate area where they abounded at least sixty acres. Almost every square yard had more or less of them; frequently eight or ten to the foot. In one case twenty-three were counted in this small space, many of them joined externally; the separating walls of the chambers in some cases not more than an eighth of an inch thick. So populous was this marvelous city that in August the writer collected and preserved in balsam over sixty thousand larvæ, hatched from eggs deposited in the twigs of four or five trees.

Professor C. V. Riley, late government entomologist, in a recently published article, attempts to explain the mysteries of the huts on the supposition that they are built (when on low ground) to protect the burrows from the inflow of water, but admits an objection in the fact that they are also found on high and dry ground, and suggests that in the latter case they are constructed by the progeny of cicadas which had built in low, damp places, the inherited building instinct remaining through the lapse of years—a theory which, in the light of observations made during the recent appearance of the insects, seems quite untenable. In the same article it is stated that "the tubes are generally closed at the top, with an orifice at the surface of the ground"—a statement which seems inexplicable, save on the ground that it was based on the word of some superficial observer.

Out of countless thousands of these buildings seen by the writer, not one had an orifice at the surface of the ground at any time; repeated visits to the hut



HUTS OF THE SEVENTEEN-YEAR CICADA.

bronze medal of the Astronomical Society of the Pacific was awarded for the discovery of the famous many-tailed comet of 1892.

But brilliant as are his achievements in the discovery of comets, they are almost insignificant when compared with the work accomplished in an entirely different field of investigation. Dr. Swift has discovered and catalogued more nebulae than any other living astronomer. The number of these faint, elusive, tantalizing, and highly interesting objects first detected and accurately described by him now reaches the surprising total of 960. Only the two Herschels, father and son, surpass this record. Sir William began his researches more than a century ago, and Sir John had the ad-



DR. LEWIS SWIFT.