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

WM. H. KNIGHT.

Los Angeles, August 28, 1894.

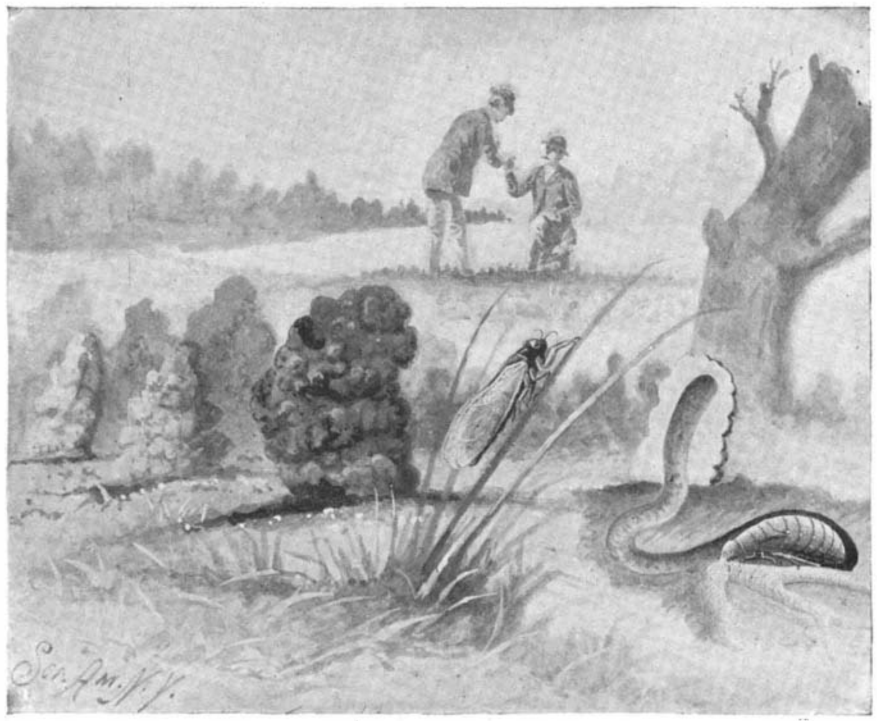
DR. LEWIS SWIFT.

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.



HUTS OF THE SEVENTEEN-YEAR CICADA.

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 clews to the solution of the three mysteries alluded to. But before stating them a more explicit allusion to the phenomenal Liliputian 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 areas after the emergence of the pupæ showed that in every instance the exit had been made at the top, and was only large enough to emit the insect. Among the many specimens collected is one unusually interesting. Its little builder had made a miscalculation, had clawed out a hole a trifle too small, but was able to get far enough out to split its shell, emerging a perfect cicada; the cast-off case remaining a fixture in the orifice. Occasionally there would be a roofless tower among the multitude of structures, but it was perfectly apparent that it had been left unfinished, as the opening at the top was in each case the exact width of the burrow; the pellets showing on the rim that it was not broken. Doubtless the little architect had been surprised and captured at his belated work by some "early bird" or other forager.

All of the large aggregations of structures observed by the writer were on high ground (a small one of importance will be alluded to later), and were not subject to overflow. They were either on the top of lofty hills or on the Palisades. All were finished, were discovered very early, and must have been built in April, considerably in advance of the open burrows of the rest of the great brood. Some were on ground that had been cleared since the 1877 swarm—quite destitute of dead leaves, or anything that would retain moisture; in every case remote from low levels.

It is well known by observers that the Cicada septendecim, ulike its congener, Cicada canicularis, or harvest fly, is extremely inert, its flight very short; and it is beyond the bounds of possibility that these high-ground builders were the progeny of low-ground builders who migrated in a body to the elevated places in order to deposit the eggs from which this year's pupæ were hatched; for unlike the grasshopper, they neither migrate nor fly collectively.

It is also well known that the Palisades and the hills on the west shore of Tappan Bay are identical in their origin, having been squeezed up in a plastic state from below by some tremendous convulsion of nature, and their tops are more or less smoothly ground by the mighty glaciers of past ages, the mould accumulated upon their highest parts varying from a few inches to three or four feet, while in many places the massive trap rock crops above the surface.

It will be remembered that the month of April was phenomenally hot. It seems no great flight of the imagination to suppose that the pupæ in the shallow earth covering the smooth, unbroken and impervious rock would be early stirred to activity by the unwonted heat, and would build their burrows to the surface in advance of those in deeper and cooler ground; obeying the same impulse that the latter would feel when the warmth of the more advanced season would reach their more remote abiding places and stir them with new life. Especially would this be so where the woods had been recently burned over, as was the case with several hut localities observed by the writer. The undeveloped state of the pupæ of these domed burrows is shown by their size, which, in those collected during the first week in May, is only about two-thirds that of those which emerged fully grown some three or four weeks later.

It does not seem unlikely that the wonderful intelligence of these marvelous creatures, apparent in so many ways to those who have carefully observed their habits, would impel them to build closed extensions to their short burrows as a protection from the premature heat; which purpose would, in some measure, be served, and possibly, to shut out injurious intruders during the incidentally lengthened period they would have to wait for full development over that of those who would later open their deeper shafts, unroofed, at the surface of the ground; the covered huts rendered more or less durable by the admixture with the fine earth composing them of a waterproof cement exuded by their builders. Equal intelligence in combating actual vicissitudes, and foresight for contingencies, in other creatures of the lower orders will present themselves to the mind of any naturalist.

The theory that the heat of the thin crust of earth covering the widely extended, smooth rock had something to do with the early appearance and hut building of the pupæ it contained is rendered well nigh conclusive by the fact that the deep gully previously referred to as crossing the large cicada city was entirely free from the buildings, for there the earth is much deeper, as in all such places, by reason of the great accumulation of alluvial detritus. Here, at a later period, the ground was honeycombed with open unhutted shafts. Could anything be more conclusive?

Only in one case was any considerable aggregation of these structures observed on low ground, and that was very early in the season and in a dry locality, but the feature that bears out the heat and shallow burrow theory is the fact that it also was on thin ground, covering a massive foundation of old red sandstone, adjacent to a quarry, where the thin earth covering was in evidence.

Indeed, all of the aggregations noticed—nine in all, varying from half an acre to sixty acres—were over extensive masses of smooth impervious rock, permitting no deep burrowing, so thinly covered with earth that in many places it could be uncovered with an ordinary garden trowel, deepening to and below the average frost line.

Thus it would happen that the same thermal conditions would act alike upon the vast numbers of pupæ within the affected area. Not an open burrow was seen in any of the hutted spaces. Indeed, among the few, even individuals, situated in like manner, the effect would be the same; and it is presumable, in view of the uniform physical features of the localities where these huts abounded, that like conditions obtain in other places whence similar discoveries of these remarkable structures have been reported.

Only twice have these huts been mentioned in the literature pertaining to the periodical cicada, and hitherto but one specimen was known to be in any museum. The cause of their phenomenal appearance this year can only be explained, it would seem, by the unusual and intense heat of April; the instinct (why not say reason?) of the hut builders being all-sufficient to meet the exigencies of exceptional environment.

Josiah Parsons Cooke.

Josiah Parsons Cooke, for many years an associate editor of the American Journal of Science, was born in Boston, October 12, 1827, and died in Newport September 3, 1894. When he was a student in Harvard College the chemical department was so thoroughly disorganized that his teaching in this branch was confined to a few disjointed lectures, and to these he added after graduation some months of study with Regnault, in Paris. With these meager exceptions, his chemical knowledge was acquired by his unaided efforts, and these had been so successful, even in his boyhood and youth, that at twenty-two he was appointed Ewing Professor of Chemistry and Mineralogy in Harvard University, a position which he held till his death.

As a teacher he has had a deep and lasting influence on the characters of a multitude of students by means of his elementary lectures given for over forty years to the whole of each class which has passed through Harvard College; and his advanced students have drawn from him the best instruction and inspiration. The chemical department of Harvard College he has raised from the state of entire collapse, in which he found it, to one of the strongest and best equipped departments in the college, established in one whole building and part of another, both of which, together with the rich mineral cabinet, were presented to the college principally through his exertions.

But his influence was not bounded by the college walls; his brilliant popular lectures have spread a taste for science and a knowledge of chemistry in the outside world, and his numerous books, ranging from abstruse college text books to popular expositions of his favorite subject and scientific essays, have reached even a wider audience.

These labors have met with recognition by his election to numerous learned societies, and especially by the degree of doctor of laws, which he received from the University of Cambridge, England, and by his selection as president of the American Academy, a position which he held at the time of his death.

The eminence of which I have tried to give an outline was due to his complete and loving devotion to his chosen science, his brilliant talents, his remarkable executive ability, and to his ceaseless and unwearied industry. He leaves a gap in Harvard University and the scientific world which it will be hard to fill.—American Journal.

Pins.

An article in a recent number of Machinery, by Mr. Fred H. Colvin, contains some interesting particulars.

The manufacture of pins was one of the first mechanical industries which engaged the attention of our forefathers, for as early as 1775 the colony of Carolina offered prizes for native-made pins, and a factory was started in 1812, but failed. Twelve years later Mr. Lemuel W. Wright, a native of Massachusetts, was granted a patent in England for a pin-making machine, but this, for some reason, was not introduced into the United States; and in 1842 Dr. John T. Howe, a New York physician in charge of an hospital, whose convalescents occupied their time by making pins by hand, determined to introduce into America the manufacture by machinery of these small articles. After a period of careful study, during which time he acquired knowledge of their manufacture, he returned to this country, bringing with him the necessary machinery for a factory, and founded what is now the Howe Manufacturing Co., of Birmingham, Conn.

The ingots, or bars from which the pins are finally made, are cast in iron moulds, and are about 1½ by 3 inches and 6 feet long, being a mixture of two parts copper to one part zinc. By continuous rolling and frequent annealing these bars are reduced to sheets about one-eighth of an inch thick, and then passed between rollers which slit them into small square strips ready for drawing. The process of drawing is well known, dies of different sizes being provided, and by continuous drawings and annealing the wire assumes the right diameter for pins.

When it reaches the pin department proper the wire must first be straightened, as on the small reels it takes a permanent set, which is not allowable in the pin machines. From the small reels it is wound to the standard pin machine reel, 22 inches in diameter, at the rate of over 1,000 feet per minute, passing through a combination of horizontal and vertical straightening rolls, which effectually take out the kink and leave it ready for the pin machine. The reel is now placed on the rack beside the pin machine, and rollers draw the wire into the machine, where it is first cut off, then headed by three distinct blows, given by a cam and toggle.

The headed blanks are carried down on the surface of a vertical wheel, to horizontal disks below. Here they pass between the two disks and are revolved by one running much faster than the other, at the same time being moved to the left over revolving steel files, four in number, which make the points, finishing with an emery belt. These machines are speeded to make 160 pins per minute, and fifty machines work in one room. As these machines require practically no attention, they are run about fourteen hours a day, and the number of pins made, allowing for stoppages, will exceed 5,000,000 per diem, the aggregate weight being from 1,200 to 1,500 pounds, according to size; the different sizes varying in weight from 1,100 to 18,000 to the pound.

The pins then travel to the tinning room, where they are tumbled with sawdust for ten minutes to remove all oil and dirt, boiled for four hours with pure Banca tin, in a prepared solution, and after a bath of strong soapsuds to give them a smooth surface, a final tumbling with sawdust makes them ready for the sticking room. Once there, they are dumped into the hoppers of the sticking machines and thence pushed out by revolving fingers to an inclined bed with radial slots, or "runs," into which large numbers of the pins fall, some being caught by the head, others escaping through openings to a pan below to be replaced in the hopper at leisure. The pins feed down these slots and drop in the "cutting-off" plate as it is moved slightly across the row, and when full the movement of a lever drives the small hammers down, forcing them into the paper, which is crimped at the same time and held for the sticking. These power sticking machines were designed by Mr. Naramore in 1884, and have as many runs as there are pins in the row, the ones for cut sheets having 30 pins to the row and 12 rows to the paper being used in this machine, the attendant sticking about 2,400 sheets per hour.

Some of the sticking machines similar to the ones shown are adapted for the cheaper pins, which are stuck into continuous rolls at the rate of 100 rows a minute and cut up into the required lengths after they leave the machine. These machines need very little attention, filling the hopper and renewing the rolls being all that is required. About the only feature of the business which has not [illegible]nged is the style of putting up the pins, the old numbers of 14 rows of 20 each for cheaper pins and 12 rows of 30 each for the better grades still being used.

Fifty years ago when Mr. Joseph Naramore was a boy in the pin factory at Birmingham, Conn., the pins were put into the paper by hand, the creases being rolled in by a machine, and the pins and paper were taken home by the farmers to do evenings, being paid at the rate of six cents per dozen papers. Next came the hand machines shown, having a single slot or "run," in place of 20 or 30, as are now used, and having a "cutting-off" plate and hammers much as in the latest machine, being operated by the levers at the side of the machine.

The first pins were made with wrapped or spun heads, the solid or "upset" head not being satisfactorily accomplished until it was discovered that two or more blows were necessary, and three has now become universally the practice. The firm of Wallace & Sons had its origin in 1848, and has grown so that the pin department is a small portion of the whole, the electrical industries having created an immense demand for copper wire in various forms, and this forms probably their largest department.

New Signaling Apparatus.

A new signaling apparatus, the joint invention of Prince Louis of Battenberg and Captain Percy Scott, of the ordnance committee, has been fitted for trial on board the Insolent at Portsmouth, England. The advantages claimed for it are clearness, certainty, and rapidity in the transmission of orders by the Morse system of telegraphy. It consists of a collapsible canvas sphere constructed with ribs somewhat like an umbrella, and is made to open and close by means of movable collars attached to the mast. The collars are connected with rods which pass through the interior of the mast to the lower deck and are actuated by levers worked within the protection of the side armor in battleships or beneath the protection decks of cruisers.

Peary in Greenland.

Lieutenant Peary has heroically remained in Greenland to carry on the work of exploration for another year. To any one familiar with Arctic exploration the situation is perfectly clear. As has happened often enough in the past, the weather and conditions of one season have proved no criterion of the weather in a succeeding season. Kane pushed the Advance north into Smith Sound with little difficulty. For the next two years the ice was solid about the vessel. His second summer he was able to leave the vessel in boats. The first summer his exploring party was stopped, its members frostbitten, and the Advance turned into a hospital by a storm which was precisely like that which overwhelmed Lieutenant Peary on his trip to Independence Bay on a track which he crossed with no danger whatever two years before. The vessel which took up the Greely party went the length of Smith Sound and beyond as easily as a vessel goes up the St. Lawrence in summer. The vessel which went to Greely's relief was crushed before it entered Smith Sound.

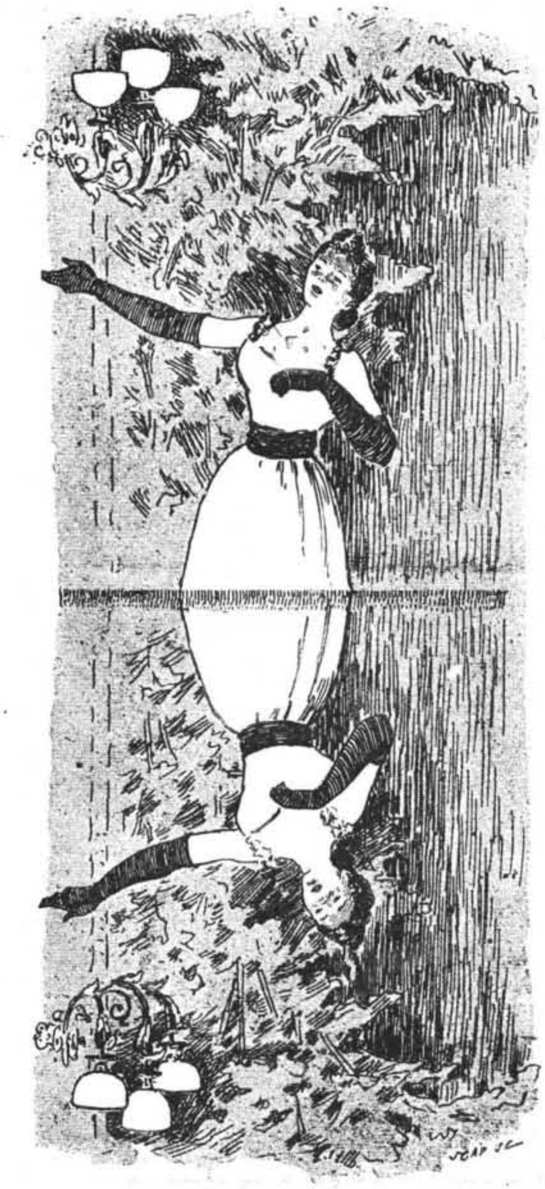
These are the constant risks and hazards of Arctic exploration. In a year of general disaster Lieutenant Peary has faced them all with success. His theory that northern exploration is safer on the ice cap than elsewhere is demonstrated by his safe return after the most terrible storm recorded in Arctic annals as much as it was proved by his success in crossing Greenland in 1892. In a good season, on this route, extended exploration is possible and in a bad season a safe retreat. With the daring, energy, and perfect self-command he has always shown, he has used his advance this year to cache supplies for his advance next summer. In the interval between his return to the coast and the appearance of the Falcon he was accumulating supplies with an energy which suggests what might have been done by other Arctic parties in the same region. No previous explorer has recorded a tidal wave such as destroyed part of his stock of fuel, the tides being unusually stable on the Greenland coast. Even with this disaster the expedition endured nothing not familiar in all Arctic expeditions. In short, Lieutenant Peary has shown the same ability in the face of untoward conditions which he has displayed under more favorable circumstances.—Philadelphia Press.

ARTIFICIAL MIRAGES.

Midsummer is the season that in our climate most readily permits of the observation of mirages. As well known, what we designate by this name are symmetrical and inverted images of objects that are seen, under certain atmospheric conditions, as if reflected from sheets of water. The phenomenon is frequent upon the plains of Egypt. It gives rise to the most startling illusions, and we well know the cruel deceptions that, during the campaign in Egypt, were experienced by our soldiers when, in the extreme heat of the day, they ran exhausted by thirst and fatigue toward the villages that they saw emerging from large chimerical lakes. Such distresses were good for some thing at least, for we are indebted to them for the first scientific explanation of the phenomenon, which was given by Gaspard Monge. Struck by the rays of the sun, the sand becomes exceedingly hot, and the heat is communicated to one after the other of the different strata of air, but it is those that are nearest the earth that are the hottest and lightest. The heat and lightness of the strata continually diminish in ascending.

If a luminous ray, such, for example, as that which is emitted by the top of the palm tree of our figure, traverses them from top to bottom, it will be more and more deflected from the vertical by the lighter and lighter strata. Its behavior will be just the reverse that of the ray that is sent to us by the sun, and which, traversing heavier and heavier strata of air in measure as it draws near us, tends every time to approach the vertical and makes the orb appear to us further above the horizon than it really is. In short, our luminous ray, through the curved route traced in the figure, will finally meet the surface of separation of two strata, and, as it will meet this almost in grazing it, it will not traverse it, but will be reflected, and thus, in rising, reach the eye of the observer, who will see the image of the object upon the prolongation of the ray (that is to say, inverted and symmetrical upon a white background due to the brightness of the sky), and having the appearance of a beautiful lake. Our figure represents an experiment that has recently been made with a view to reproducing a mirage by photography.

A very even plate of sheet iron is taken and placed horizontally upon two supports. The plate is heated very uniformly and sprinkled with sand. Then a small Egyptian landscape is arranged at one end of the plate and the eye or the photographic instrument is so placed that the visual ray shall properly graze the



A MIRAGE IN A CONCERT HALL.

plate. A mirage can be obtained still more easily, when the air is very calm, by lying flat upon the stomach upon a road or well heated sandy lane. In placing the eye very near the ground one can obtain an inverted and symmetrical image of sprigs of grass, pebbles, etc. This is a diversion that may agreeably break the monotony of long hours of revery in the country.

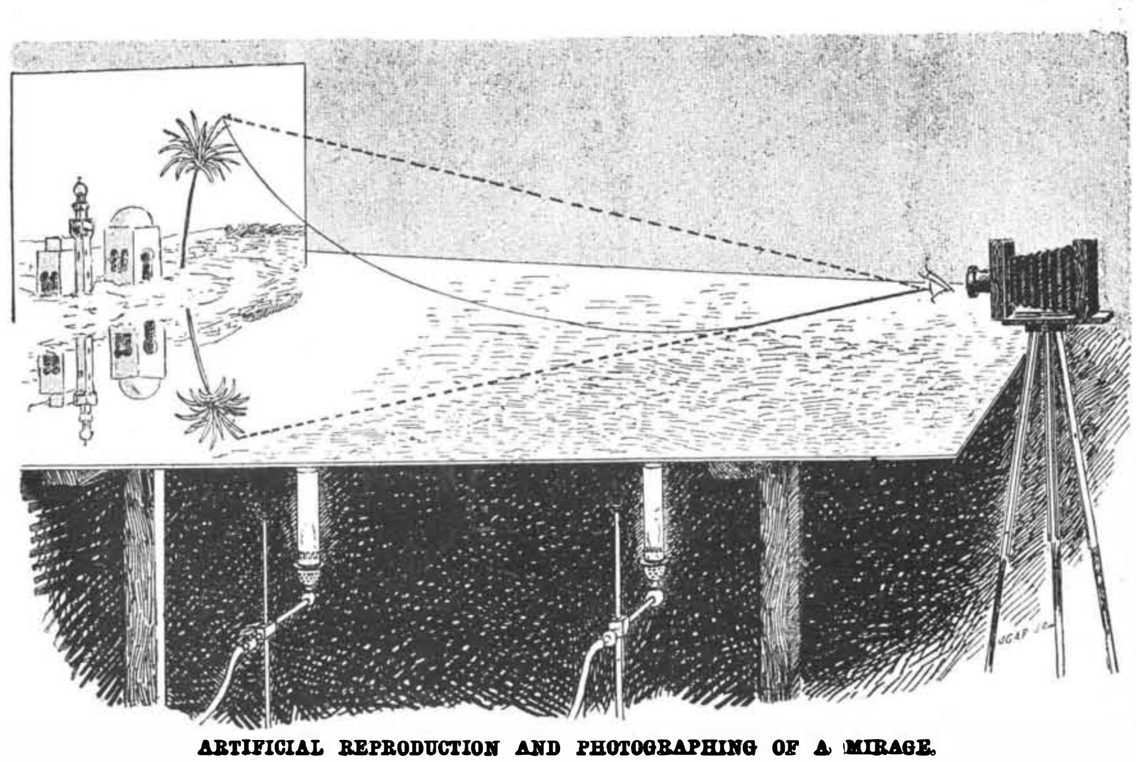
In a music hall and in well-lighted places, in the evening, it is thus possible to vary an often monotonous show and create new surprises for one's self. With the greatest care, and without mixing them, superpose in a glass two liquids that are capable of gradually uniting at their surface of separation, such, for example, as water and lemon sirup. Now look at the diva through the stratum of the liquids that have just mixed, and the spectacle will be fantastic. Our figure is capable of giving but a very incomplete idea of it. This experiment, like the one first described, is a practical demonstration of Monge's principle and of the value of his explanation.—Le Monde Illustre.

The Japanese Victory.

The first serious engagement between the Chinese and the Japanese forces in Corea has resulted, as competent judges have foreseen all along, in the complete victory of the latter. The strong position of Ping-Yang, lying north of the Tatong River, on the road from Seoul to Mukden and Pekin, was carried by assault in the small hours of Sunday morning, September 16, 1894. The Chinese troops who held it, to the number, it is reported, of 20,000 men, were routed with a loss in killed, wounded, and prisoners estimated at four-fifths of their entire force. The residue are said to be scattered in all directions, and the victors are stated already to have dispatched a flying column to seize and occupy the passes between Corea and China to the north. There never was much question that, if the Japanese could manage to get to close quarters with their opponents before the winter set in, they would succeed in inflicting upon them a severe defeat. It has long been known, on the authority of military experts, that their infantry and artillery at any rate are in a high state of efficiency. The men themselves are hardy, active, brave, and intelligent. Their drill and discipline have been carefully adapted from the best European models. Their arms are of the latest and most destructive patterns that science has devised, and every detail in their equipment and accouterments has been thoroughly thought out and carefully provided. The officers who have had the skill and the energy to create such a force are, it need hardly be said, worthy to lead it. All of them have made a scientific study of their profession, and some among them have devoted themselves to a close investigation of the more famous European military systems, under the guidance of distinguished strategists. But, while it was evident that such an army, so led, would have an easy task in defeating and dispersing any force which the Chinese were likely to assemble against it at short notice in Corea, it was by no means certain that the Japanese could force on an engagement before the Corean winter made serious operations impracticable. The Japanese commander has shown that he has mastered the great secret of modern warfare. He has known how to move his troops with rapidity and with precision, and by doing so he has succeeded in dealing what is undoubtedly a heavy blow to China with trifling loss to himself.—London Times.

Velvo-Carbon Batteries.

By invitation of the Battery and Motor Company, a number of scientific experts were present lately at the company's works, on Petersham Island, Richmond, to witness the application of the velvo-carbon principle to launch propulsion. The Velvoca, which has been specially built, is a 35 ft. open boat, and has a beam of 6 ft. 6 in. The batteries, weighing 14 cwt., are placed in the center, and have a cover which can be utilized for a seat, so that no space is wasted. Velvo-carbon, it should be stated, is a special class of negative electrode for electric batteries, consisting of ordinary carbon with a surface of carbonized cotton velvet. Batteries employing these carbons were shown to be both light and powerful, and may be used with a weak solution of sulphuric acid only as an excitant. The patent incorrodible connections are made of pure silver or platinum, and owing to their form, are cheaper than the connections used hitherto, both in first cost and in maintenance. Trial was made of the Velvoca at full speed and at half speed, and it was stated that she could be charged to run for a few hours at half speed if so desired. It is claimed that velvo-carbon for electric launches possesses many advantages over the existing system.



ARTIFICIAL REPRODUCTION AND PHOTOGRAPHING OF A MIRAGE.