likening them to human pirates, and berating Deer Run for what it has done, let us look at the affair from the point of view that a well-disposed river would take.

When this district was lifted from its former lowly estate, the streams found a new task set before them. They at once set to work at it with the best disposition in the world. But, in their immaturity, they accepted without question such guidance as the faint relief of the surface afforded, only to discover later on that the primitive division of territory was unadvisable as a permanency, because it was not adapted to the best accomplishment of the work assigned to them. It is found that a re-adjustment of boundaries, in certain cases, will allow a more economical transportation of land-waste to the sea by better-arranged channels; and, when this becomes apparent to a stream, it at once obeys its new opportunity, whatever force of habit it may theretofore have had. If the ideal of a stream's life were always to persevere in the channel that it at first selects, this readiness to change its course would be called fickleness; but when we perceive that the true ideal of a stream's life is to carry towards the sea its full share of the waste of the land that its river system drains, then we may recognize a virtuous willingness to the performance of duty in this immediate forsaking of an old course, and adoption of a new one, where its work can be done better and quicker. It is the unwisdom of youth that is thus corrected by the better choice of maturity, and many a river has thus improved its early ways. It is undoubtedly true that Deer Run has taken something of what once belonged to the Perkiomen, but it was not seriously that the name of a river-pirate was given to it. W. M. D.

A POPULAR OBSERVATORY.

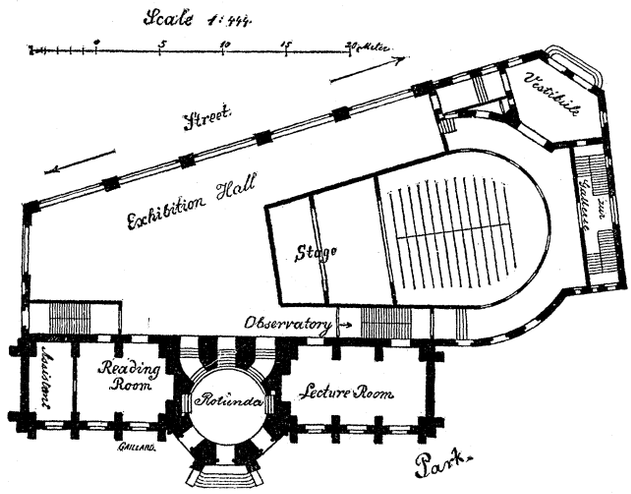
A FEW months ago a company was formed in Berlin, the aims and purposes of which are well worth being widely known. The company is named "Urania," and it was established for the purpose of diffusing the interest in the phenomena of nature. Some of the most prominent German scientists are the promoters of this enterprise, the plan of which originated with the distinguished astronomer Professor W. Foerster, who explains the objects of the company as follows: The object of the society is to promote knowledge. In order to inculcate knowledge, it is necessary to educate man to use his mental powers. Therefore institutions for the diffusion of knowledge can only be successful when they try to teach how to use one's mental powers. The society has limited its work principally to astronomical, geographical, and physical phenomena, and for reaching its object has established a great popular observatory, which will be a model for all similar institutions, and publishes a journal, *Himmel und Erde* (Berlin, H. Paetel), which is beautifully printed and illustrated, and gives, in a popular form, reports on astronomical and geographical phenomena and questions.

The popular observatory, of which we reproduce the plan, is divided into three sections, — the rotunda, which forms the foundation of the observatory proper; the large hall, in which instruments and microscopes are exhibited; and the scientific theatre. It is the plan of the founders of this institute to benefit the general public, which embraces uneducated as well as educated persons. Therefore the methods of instruction are varied according to the intelligence and education of the various classes. The scientific theatre forms the lowest stage, on which the results of exact investigations are presented in as attractive a form as possible, in order to give a stimulus to intelligent observation. Solar and lunar eclipses, comets, and meteors are shown to the spectator; the scenery representing beautiful and characteristic landscapes of the parts of the globe in which these phenomena were seen. Thus the desire is aroused to understand the origin of these phenomena, which, only a few centuries ago, were considered as forebodings of evil. These views are accompanied by lectures calling attention to the peculiarities of the phenomena observed on the scene. Among others, a series of astronomical panoramas has been prepared for the purpose of explaining the phenomena of solar eclipses.

At the commencement of the lecture the stage represents a landscape near Berlin, at the beginning of the total eclipse of Aug. 19, 1887. At that time unfavorable weather prevented the remarkable phenomena from being seen, to which attention had been called in newspapers and journals. In the theatre all phenomena of the eclipse will be shown as they would have happened in clear weather. First the landscape will be seen in the light of the early dawn; then the sun will slowly rise on the horizon in the shape of a crescent between purple clouds. The crescent grows narrower rapidly until the dark shadows of the eclipse appear. After two minutes the character of the illumination changes again, and soon the landscape is seen lighted by the clear sun.

While the lecturer explains this phenomenon, the scene changes, and the spectator is transported to a place at some distance from the earth. The huge globe rotates in front of the zodiac, whose signs form the background. The moon, moving through the sunlight, throws its shadow upon the planet, and it is seen crossing the continent of Europe. It is at once understood how the eclipse originated. We continue our journey and reach the moon. We see its desolate mountain ranges. There is deep night in the valleys, while the summits of the mountains are lighted by the rising sun. On the starry sky the earth is seen, giving some light to the parts of the moon over which the sun has not yet risen. On the earth a small dark dot is seen, the point of the shadow of the moon, and its track shows the region where the eclipse is visible. Our journey is continued toward the sun and the planets, the surfaces of which are shown according to the result of the most recent investigations.

A higher stage of instruction is given in the exhibition hall, in which instruments, apparatus, and arrangements of various kinds,



PLAN OF THE POPULAR OBSERVATORY IN BERLIN.

are exhibited, for the purpose of explaining physical phenomena. The composition of sounds, particularly those of speech, are exhibited. The wonderful phenomena of light; its enormous velocity; its composition of numerous colors, which makes nature appear so beautiful; the wonders of the spectroscope, which betrayed the chemical composition of the celestial bodies, and is at present used in many industries, for instance, in the Bessemer process, and in the examination of wines and other liquids regarding their adulteration; the phenomena of polarization and their application in the manufacture of sugar, — all these will be shown and explained to the visitor. In another section of the hall the phenomena of heat will be explained. Models of machines will be exhibited here in great numbers. In still another part of the hall electricity and magnetism, and their extensive applications in manufactures and as a means of rapid communication between distant places, will be shown. Furthermore, fifty microscopes will be placed in this hall, in which the use of this powerful help to scientific investigation will be explained.

Instruments of precision will be exhibited in the same hall. From the latter a staircase leads to the observatory, passing the lecture-room. Here astronomical and microscopical objects will be shown by means of the lantern, and a lecturer will call attention to the characteristic features of each object before it is seen through the telescopes and microscopes.

The observatory of the Urania will be furnished with a number of small instruments; but, in addition to these, it will have the most powerful telescope of Berlin. The lens of the great refractor will be twelve inches in diameter, while the length of the telescope is to be five metres. The dome is eight metres in diameter.

The establishment of this grand institute marks a new departure in the methods of popularizing the natural sciences, and its influence cannot fail to be wholesome. It will educate the masses to an intelligent observation of natural phenomena.

SCIENTIFIC NEWS IN WASHINGTON.

Irrigation in California. — The Nucleus of a "Zoo." — Mounds of Ohio. — Triple Births in the Human Race. — The Talking-Machine in Use. — Where Will It Go Next?

Irrigation in California.

MR. WILLIAM HAMMOND HALL, State engineer of California, addressed the National Geographic Society on Friday evening last, on irrigation, particularly irrigation operations in California. It appears that the first work of this kind within the State, subsequent to that of the early mission fathers, was undertaken by a band of Mormons in the San Bernardino valley, in 1852.

Of the total area of California perhaps one-third is susceptible of sufficient cultivation to sustain a moderately dense population without the aid of irrigation, while one-third will not sustain a sparse population without the aid of irrigation. The principal regions of irrigation in the State are the great interior valley, the southern valley, and the coast plain of the south. By a comparison of the relative amount of rainfall in the older countries of Europe with that of California, and from the peculiar character of the soil, Mr. Hall showed that the relative necessity for the artificial application of water is far greater in California than in these countries, the annual rainfall being much less, and the character of the soil and rate of evaporation quite as unfavorable.

There are in California about 750,000 to 800,000 acres actually irrigated each year, representing what would ordinarily be called an irrigation area of 1,200,000 acres, and there are reasonably within reach of existing canals 2,500,000 acres. The methods of applying water differ very widely with the differing conditions in the various irrigable areas. Much has been done by individual effort in regions where the problem of diverting water from the streams is comparatively easy; but there remain a large number of streams presenting difficult problems, the waters of which can only be utilized by the expenditure of immense capital and the operation of extensive works. Land values in the valley have increased from $1.25 per acre, prior to the introduction of irrigation, up to $250 and even higher values, merely by having water rights attached. Much is expected from the investigations on this subject which Congress has recently authorized to be prosecuted.

The Nucleus of a "Zoo."

The Department of Living Animals at the National Museum attracts greater crowds of visitors than can find comfortable standing-room in the animal building, and furnishes one of the strongest arguments that could be made on the necessity of a great national zoölogical garden. Gifts and deposits have been coming in in such number, that the museum authorities have found it necessary to decline a number of valuable objects, such as a lioness, aoudad, black leopard, camel, and ostrich, because the institution is positively unable to provide for their accommodation. The total number of live animals, birds, and reptiles received up to date is 281. One of the latest arrivals is a great rarity, a Rocky Mountain sheep from north-western Montana, the gift of Mr. George Bird Grinnell, editor of *Forest and Stream*. It has attracted thousands of visitors, and is at present in fine condition. So far as known, it is the only specimen of the species now alive in captivity.

Mounds of Ohio.

At the instance of Dr. Cyrus Thomas, Mr. Reynolds of the Bureau of Ethnology has recently conducted an exploration of one of the most interesting mounds in Ohio; namely, the truncated pyramid associated with the system of enclosures opposite Bourneville, in the Point Creek valley. These enclosures belong to the type comprising true circles and equilateral squares. It proved to be a burial-mound in which two series of circular upright palings, thirty-six feet in diameter, constituted a pre-eminent feature. These indicated successive erection and use, as the mound was from time to time enlarged. The skeletons found were all interred systematically within these wooden palings upon the different sand-seams at different depths. The burials were evidently successive or periodical. None of them could have been intrusive, since the stratification above them was not disturbed. Many interesting specimens, comprising pottery, stone pipes, shell beads, and grooved bone implements, were found deposited with the various skeletons. These and other features that were observed, will, it is said, prove eminently helpful in the solution of the questions relative to the age and builders of these interesting works.

Triple Births in the Human Race.

Some interesting data respecting the frequency of triplets in the the human race are being collected and elaborated by Dr. B. Ornstein, late surgeon-general of the Greek army. While on an inspection tour through western Greece, he discovered the fact that triplets are more frequently found there than in any other portion of that kingdom. Great difficulty is experienced, however, respecting information as to the age reached by either or all of the children.

It is desirable therefore, for the purpose of careful study of this subject, to gather information based upon the following: viz., (1) all well-authenticated instances of triple births, and in how many of them the three children reached the age of two (or more) years; (2) the number of cases in which two of the triplets survive one year, or longer, or in which one of them reached the age of one year or more.

Any information pertaining to this subject will be gratefully received by Dr. Ornstein, Athens, Greece; or communications will be forwarded if sent to Dr. W. J. Hoffman, Bureau of Ethnology, Washington, D.C.

The Talking-Machine in Use.

The Geological Survey is the first of the government offices to adopt the graphophone for service. Major Powell is supplied with one of these wonderful little listening and talking machines, and he takes it home with him, and talks to it as the necessity arises or an idea strikes him. In his absence an intelligent boy or girl can evoke a repetition of his monologue, and commit it to paper.

Where Will It Go Next?

The apparatus of the Life-Saving Service which has attracted such deep interest in the Cincinnati Exposition is home again, and safely under shelter. Mr. S. I. Kimball, in charge of the bureau, does not wish to return it to the bare and distant loft of the Treasury Department, where for many years it has been an object of curiosity to visitors, but will await the assignment to it of convenient quarters, where the property can be properly protected.

BOOK-REVIEWS.

The Teachers' Psychology. By A. S. WELCH. New York, E. L. Kellogg & Co. 12°. $1.25.

THIS work consists of two distinct parts, the first being a treatise on the intellectual faculties, and the second an essay on the proper method of educating them. The author begins with a general view of the mind as a whole, with its three functions of thought, feeling, and action, but afterwards confines himself to the operations of the intellect. This psychological part of the book cannot be pronounced very successful. Mr. Welch's philosophical standpoint seems to be that of the Scottish school; but he cannot be compared with the standard authors of that school in his method of treatment. He takes a surface view of his subject, and, besides, is often lacking in accuracy. Thus, the term "concept," which has always been used to denote a general idea, is employed in this work for both general and particular ideas. Mr. Welch's view of memory is also peculiar, for he includes in it the act of acquiring knowledge as well as the acts of retaining and recalling it. The second part of the work is of a better character, and lays down