the attention of plumers, through whose depredations it became wholly depopulated in this single season, none breeding here in 1887 nor 1888, as I learned through a letter from Mr. Rackliff.

AN ANALCITE COPPER BOWLDER FROM THE KEWEENAW RANGE, MICHIGAN.

BY E. O. HOVEY, PH. D., NEW HAVEN.

In the Michigan exhibit in the mining building at the Columbian exposition there is a curious bowlder, or rounded mass, which deserves more than a passing glance from the visiting mineralogist. The bowlder was originally about four feet in diameter and approximately spherical in shape. It came from the Central Mine, Keweenaw County, and occurred near the contact between the ore body and the country rock. Possibly it was one of the contact phenomena of the region, and there may be other masses like it.

The bowlder is composed for the greater part of granular pink analcite with granular calcite and quartz quite evenly disseminated through it. It shows a tendency to spherical parting throughout the mass, which causes it to separate into concentric shells from one to two inches thick when broken into. Permeating the granular mass and holding it together, is an intricit net-work of arborescent native copper radiating outward from the centre of the bowlder. The action of dilute hydrochloric acid dissolves out the analcite and calcite, leaving the net-work of wire copper intact, with small grains of quartz caught here and there in it. The wires making up the arborescent growth are about 0.01 inch in diameter, but means for accurate measurement were not at hand. Under the microscope the net-work is seen to be made up of minute crystalline growths developed along axes inclined 60° to the direction of growth. The planes recognized were only the most common of those occurring on native copper; viz., the cubic, octahedral and dodecahedral. The terminations of the little branches are usually acute, and formed by the acute solid angle of the dodecahedron; but an occasional blunt point occurs made up of what seem to be cubic planes. The vertical axes of the crystals are approximately the radii of the spherical mass, and the extremities of the little branches all point outward. A low estimate places the amount of native copper in the bowlder at from 35 to 40 per cent. The crevices in the mass are stained green by the decomposition products of the copper.

The chief component of the bowlder and the one which gives it its color is pink analcite, recognized by its faint cubic cleavage, its vitreous lustre, inclining a little to pearly, and its gelatinizing with dilute HCl. The granular structure is so pronounced that the mass would crumble to pieces between the fingers, if it were not for the retaining net-work of copper. Disseminated through the analcite are small aggregations of granular white quartz, while associated with both analcite and quartz are minute particles of calcite, which occur in sufficient quantity to produce marked effervescence when the rock is placed in acid. The copper penetrates all components of the rock alike.

The peculiar structure of this mass was noted by Mr. Samuel Brady, M. E., of Detroit, superintendent of the Michigan mineral exhibit, and the bowlder secured for the display at the exposition. A more detailed account of the mass and its occurrence will appear in Mr. Brady's report on the exhibit, but he kindly gave me permission to prepare this preliminary notice for the readers of *Science*.

LOEW'S NATURAL SYSTEM OF THE ACTIONS OF POISONS.

BY J. CHRISTIAN BAY, MISSOURI BOTANICAL GARDEN, ST. LOUIS, MO.

Hitherto, the actions of poisonous substances were regarded mainly in connection with medical science or, when submitted to a general view, were mainly considered in their relation to certain physiological conditions of the mammals, or with reference to pathology. A review of poisonous actions was extended only as far as we could go with regard to the chemical composition of the matter acting, and with the pathological state of the whole organization upon which it exerted its influence. Thus, in 1862, Taylor established a classification of poisonous substances into mineral, vegetable, neurotic, spinal, and cerebro-spinal poisons. But this division did not, in the first place, cover all instances of which we had a record. Further, it was not, for logical reasons, really satisfactory.

The grand development of bacteriology, and much ingenious work in investigating the structure and physiological properties of the living matter, have extended our positive knowledge as well as our views, and special attention has been paid to the physiological unit of the cell. In this journal the writer[1] called attention to Sachs'[2] theory of the energids, in the *Botanical. Gasette*[3] he called attention to Wiesner's magnificent work[4] in similar direction, and Detmer's[5] recent contribution, which, though they go in different directions, can very well extend and be supported by each other.

Through many special papers and occasional notes, our knowledge of the actions of poisons has been extended, since the old school of physiologists saw other systems of knowledge come forth. In this connection, attention should be called to the work of Pereira and Buchheim[6]. Now, however, the facts are arranged in a totally new, very logical and natural way, by Dr. O. Loew,[7] of Munich, who has established a natural system of the actions of poisons, corresponding with our present knowledge and views of the elementary units of the animal and vegetable body.

Loew arranges poisonous actions according to their way of action upon the organization, thus establishing a physiological system. This is to be preferred to any other, because many of these actions open views into the chemical and physiological properties of the protoplasm and its constituents. The support of this system is Pflüger's theory from 1875[8] that the properties of living and dead matter (or matter in the living and dead state) are intimately connected with the properties of the organic proteid combinations in the protoplasm. This question was, in 1882 and later, subject to exceedingly careful and important experimental studies by Loew and Bokorny,[9] the result of which being that the albuminoid matter of the protoplasm of plant cells in the living state differs greatly from that in the dead state. Much opposition against the conclusions from the many important facts herewith connected results mainly from lack of understanding of these questions, while, on the other hand, there are good reasons for opposing. The *facts*, however, cannot be rejected.

1 Science, XXI., p. 162, 1892.
2 Flora, Regensburg, 1892, pp. 57-64.
3 Bot. Gaz., XVII., 1892.
4 Die Elementarstruktur und das Wachsthum der lebenden Substanz. Wien, 1892.
5 Berichte der Deutschen Bot. Gesellschaft, X., p. 433-441, 1892.
6 Pereira: Handbuch der Heilmittellehre, übersetzt von R. Buchheim. Vol. I-II.
7 Loew, Dr. Oscar: Ein naturliches System der Giftwirkungen, Munchen, 1893. The work is dedicated to Professor von Pettenkofer on his 50 years' doctor-jubilee.
8 Pfluger's Archiv f. d. ges. Physiol. des Menschen und der Thiere, Vol. X., 1875, p. 300. See also Detmer: Pringsh. Jahrb. XII., and his Pflanzenphysiologie, 1883, p. 149-153.
9 Die chemische Kraftquelle des lebenden Protoplasmas, 1882. See also Biol. Centralbl.

The structure of the active albumen is highly labile, it is easily altered, and transformed into an inert mass. The protoplasm, being equally labile, *possesses its vital force in consequence of the balance between the attractive and repulsive forces of the proteid molecule.* When this balance is disturbed by an excess of the attractive power over the repulsive, we have a disturbance of the vital power. It must be confessed that this theory explains well the death of the living matter.

From this foundation Loew builds up his theory. With wonderful patience he has collected the notes from the literature, and succeeded in bringing together a reference-work of high rank, while, at the same time, original observations are frequently broadening out the scope and giving numerous suggestions for further investigation. As the work is altogether a work of facts, only a general view will find its place here.

The system is the following:

A. General Poisons.
1. Oxidizing poisons.
2. Catalytic poisons.
3. Poisons operating through the formation of a salt.
4. Substituting poisons.

B. Special Poisons.

1. Poisons which affect solely such acting albumen as has a special configuration and lability: toxical proteids.

2. Poisons which have a destructive effect on the structure of the cells, in consequence of their association with the active albumen of the protoplasm.

3. Poisons which have an indirect effect;
(*a*) checking the breathing power,
(*b*) acting by their own decomposition,
(*c*) altering the swelling up of organic bodies.

The toxical proteids (chapter V) are treated in full. "The discovery by Hammerschlag in Nencki's laboratory (1888) that a poisonous proteid could be isolated from the *Bacillus tuberculosis*, was succeeded by the important observation by H. Buchner (1889) that certain proteids are present in the blood of certain animals and have a poisonous effect on bacteria. Emmerich had already, in 1887, shown the destruction of bacteria in the circulation; then he succeeded in showing that the bacteria-killing properties of the blood rested in the albuminoid substances contained therein."

The multitude of facts makes it possible to give only the main features of Loew's theory here. Everybody who is interested in physiology and its progress knows that we must have views as well as facts in order to secure a constant progress. The importance of the new theory will be felt by all who are interested in medical science; it is one of the steps that show us that the time has come for establishing a special general physiology of animals and plants. All this made it a pleasure to the writer to turn the attention of fellow-workers towards it.

SOME OHIO MOUNDS.

BY HAROLD HEATH, DELAWARE, OHIO.

DURING the last few years several mounds in central Ohio have been entered and some of the data obtained has proved to be of considerable interest. Mounds similar to these have long been described under the title of Funeral Tumuli and Sacrificial Mounds, yet their true function seems to be doubtful even in the present day. They were about of equal size, varying from 40 to 50 feet in diameter and 15 to 20 feet in height, and without exception were situated upon some water course. In the cases where the land was still undisturbed a layer of vegetable mould covered the surface to a depth of between two and three feet. Beneath this covering came a layer of fine sand and gravel similar to that found in the sand bars of streams or rivers. This layer was always four or five feet thick. In making shafts extending perpendicularly through the centre of the mound, after passing through this gravelly layer, a rough altar was reached in four cases out of six, and in the other two ashes and charcoal were found. These altars were constructed of unhewn, waterworn bowlders piled in a rude fashion to form a mass having the average dimensions of 5.3 feet in length; 4.1 feet in width, and 2.4 feet in height. In two other cases, which have come to my notice, skeletons, evidently Indian, were found in this gravelly superficial layer above the altar. One skeleton was especially remarkable for its height, measuring when put up a trifle less than six feet. About and upon the altars were scattered ashes and charcoal, and dark masses of vegetable mould indicated decayed bits of wood. Portions of human skeletons and in one case that of some carnivorous animal were found, many pieces in a charred condition, indicating either human sacrifice or cremation. These altars were built before a rude pavement of stones similar to those composing the altar and were of about the same size, viz., about a foot in diameter. Beneath this lay a mixture of blue and yellow clay and gravel making up the greater portion of the mound. In one case layers of gravel stones about the size of a cricket ball were encountered lying in strata separated by about a foot of this clay-gravel mixture. These layers extended through a depth of nine feet. This "cement" was so compact and hard as to withstand almost like stone the most persistent attacks with pick and shovel. In most cases the work was abandoned after sinking the shaft to a depth corresponding to the height of the mound, although the clayey cement indicated that the lower surface of the structure had not been reached. In only one case when a depth of nineteen feet had been reached by means of excavations and blastings was a skeleton found. This was the skeleton of a man 5 feet 1 inch in height and it was so fragile in the damp tenacious clay that only portions of the bones could be extracted. The body lay partially upon the right side, one hand lying across the breast, the other extended along the side. The left leg was considerably flexed, while the right was extended. Lying at the side of the skeleton were two stone beads, a perforated bit of unio shell and two flakes of mica. A further excavation of six feet, and also large tunnellings at the foot of the shaft, failed to bring to light any more bones or implements.

In two other mounds implements were found in this thick cement—an axe in one and two fleshers and several rough spear heads in the other. In other localities a few cases have been reported where a kind of vault was found a short distance beneath the altar, containing one or more skeletons and generally some implements or ornaments, but so far as I can determine no such report has been made for this section of the country.

AN EYE PROTECTOR TO BE USED WITH THE MONOCULAR MICROSCOPE.

BY L. BREWER HALL, M. D., PHILADELPHIA.

How often have we heard persons exclaim, upon looking into a binocular microscope for the first time: "Oh, how much easier it is to see with this instrument, and how much plainer everything appears;" and this *with one field quite dark*, which provokes a smile from the amateur. I am fully convinced, however, that we cannot ascribe such expressions wholly to dissimulation or flattery, or even self-deception, and for the following reasons:—

When one eye is looking through an instrument like the microscope, and the other, being open, is regarding the objects outside the tube, an image is formed upon each retina, and the normal action of the mind is to blend them into a single picture. This being impossible from