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.