

of Brown University, to which Mr. Olney gave his botanical collection by will, to complete the distribution so far as the plants received and determined by the testator will allow. Mr. Bennett, in assisting me with his great experience, has had sole charge of *Carex* and brought neatness and order out of much that was chaotic. He will be prompt to respond to any and all inquiries.—W. W. BAILEY, *Curator, Brown University Herbarium.*

RECENT PUBLICATIONS.—*Check-List of North American Gamopetalæ after Compositæ*—This is a very neatly printed pamphlet of 12 pages, published by Harry N. Patterson, Oquawka, Ill. Mr. Patterson's printing is well enough known to be its own recommendation and the list given will be of very great use. We very much need a new and complete check-list of all our North American Phænogams and Vascular Cryptogams, with every species numbered as in Mann's Catalogue. It is vastly more convenient to write out a list of numbers than of long botanical names. For price see the advertisement.

Practical Uses of the Microscope—This is included in the Inaugural Address of Dr. R. H. Ward to the American Society of Microscopists. No one could be much better fitted for speaking upon such a subject than Dr. Ward. The practical use most largely spoken of is what may be called the legal use, such as the examination of signatures, etc. With considerable curiosity we looked through the pamphlet to see the opinion of such high authority concerning the practical importance of the binocular arrangement. This is what we found: "The binocular arrangement has grown from an experiment of disputed value to a priceless luxury if not a literal necessity." We would like very much to know from our working histologists how much they use the binocular arrangement, and if they use it at all, with what powers.

On the Microscopic Crystals Contained in Plants.—Mr. W. K. Higley, of Ann Arbor, has been examining a great many plants with reference to their crystals and the results are brought together in this paper, a reprint from the *American Naturalist*. The crystals are considered under the three heads of Raphides, Sphæraphides and Crystal prisms. These names have already been defined in a previous no ice, but it may be said further that Mr. Higley's observations seem to show that the raphides are composed of phosphate of lime, the acicular or crystal prisms of oxalate of lime, the cubical crystals of carbonate of lime, the sphæraphides of the same base combined with different acids according to locality. The author thinks that their great abundance would point to some use to the plant itself. Two uses to man are suggested, first, that the phosphates these crystals contain may strengthen bones, and second, through decaying leaves and stems they act as a fertilizer. A list of 71 phænogamous families is given, known to contain crystals, 46 being exogens and 25 endogens.

Useful and Noxious Plants.—This is the first annual report upon this subject by Prof. T. J. Burrill, Botanist of the Illinois State Board

of Agriculture. It makes a pamphlet of 9 pages, two being devoted to "Trees," one to "Noxious Plants" and six to "Fungi on Living Plants," which, of course, shows the direction of the writer's principal observations. The Catalpas are noticed, and also White and Green Ash and Spanish Oak. Under the head of Noxious Plants are included what we loosely call "weeds." Some of the most pestiferous are mentioned and especial attention called to the fact of their wonderful fecundity. The part on Parasitic Fungi is by far the most important as it gives some account of a group of organisms very important to farmers and very little understood.

On the Development of Lemna minor.—This is a four-page pamphlet with plate, reprinted from the Proc. Acad. Nat. Sci. of Phila. The author, Mr. Wm Barbeck, had his attention called to the so called "bulblets" and after careful investigation has come to the conclusion that they are in reality regular *seeds*, from which, however, the fronds are propagated in a peculiar and interesting manner. The figures given are taken from sections which he has mounted and hence may be compared at any time. The closing sentence gives the author's conclusions. "My investigation has been made only on the *Lemna minor*, but there is no reason to doubt that in the development of the whole family of *Lemnaceæ* (analogous to our species) we have an interesting instance of parthenogenesis, there being seeds (produced in autumn by a sexual process) from which, during the course of the summer, generation after generation is propagated without any further fertilization."

On the Timber Line of High Mountains.—Mr. Thos. Meehan in a paper before the Acad. Sci. of Phil. upon this subject, came to the following conclusion :

In view of the facts detailed we may conclude that at the elevation of these mountain chains, the lowland vegetation was carried up at the same time. The summits, covered by luxuriant forests would present a cooler surface to the moist clouds, and there would be less condensation than on bare sun warmed rocks, and deep snows would be less frequent, and not sufficient to interfere much with arboreal growth. But the rain would of necessity carry down the earth and disintegrated rock to lower levels; and the melting snows, such as there were, would make this downward progress of the soil continuous. In some mountains where the rock was easily broken by frost, as in Colorado and the White Mountains, it would be very difficult for the soil to hold its own against these forces of gravitation; but on more solid rock the mass of tree roots protecting the rock, and retaining the earthy matter would longer hold its own. In the former case with the gradual washing away of the earth the larger trees will have to find a lower level; the summit condensing more moisture, and having a cooler atmosphere, would form heavier masses of longer enduring snow, and thus keep down from tall growth the younger trees left as the older and larger ones retired. They would have to be low bushes by the absence of earth for vigorous growth, and remain

trailing bushes, through the superincumbent and long continued mass of snow.

We thus see that though a long continued mass of snow has much to do in marking a timber line, that line is precedent to the snowy mass. The primary cause is the gravitation of disintegrated rock—the movement of the hill top towards the sea. From the moment the mountain reaches its highest point it commences its downward march. The entire reduction of the highest to a level with the plain is but a question of time. The frost and rain and melting snow will do it all, and this reduction, bringing down not only the earth, but cold-loving plants to warmer levels, must continually change the aspects of vegetation, as well as perpetually vary the timber line.

In low hills as well as in high mountains the forces of gravitation are also at work. But the sides are seldom so steep as in the loftier hills—the rains do not gather with such force nor are the melting snows of near the same duration. There are sudden washes, but not the continuous roll of the earth to the bottom. In time they may exhibit the same phenomena of the disappearance of species from their summits as their loftier brethren; but the centuries here will gather much more slowly to produce a similar effect.

In conclusion we would say briefly that the “timber line” of high mountain tops results from the washing down of the earth from the higher elevations.

NOTES FROM UTAH.—*Corydalis Cascadea*, Gray.—I have added two stations more to that of last year for this plant. One station is in American Fork Canon, 7,500 feet altitude; the other, above Silver Lake, at 11,000 feet altitude. It is difficult to secure good seed, because an insect infests the pods and destroys the seeds; but I have secured a small quantity. The bursting of the pods is interesting. They split at the end, and the segments coil up with such rapidity that the seeds are thrown three feet or more. I believe this plant has never been discovered north of Arizona before, and is rare there.

A remarkable monstrosity of *Ranunculus Cymbalaria* occurs here. The flowers (ten or twenty) are united in a half circle, making one large flower with ovaries arranged in a half moon and surrounded by from one to two hundred petals.

Dicentra uniflora, Kellog. — This is not uncommon in City Creek Canon; but, unlike Coulter, I found leaves only with the exception of a single faded flower.

Streptanthus cordatus.—The petals are twice the sepals, and stems are often branched.

Vesicaria montana.—This occurs as far south as St. George.

I have a variety of *Arabis arcuata* with pods much wider at tip than at base. The siliques of *Lepidium Wrightii* are frequently hairy on the edge. The leaves of *Arabis Lyallii* are as often auricled as sagittate. *Capsella divaricata* has the appearance of an introduced plant at St. George, where it is very common.



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