

one to ten times as great. Many of them have a diameter of less than one fifty-thousandth of an inch and it is probable that there are multitudes of them so small that the highest powers of the microscope do not render them visible. Two thousand of them could swim side by side through the eye of a needle and one could hold in his single hand fifty millions of millions of them. Of the smaller ones it would take 15,625,000,000,000 to fill one cubic inch.

Now compare these with our mammoth Sequoias. The trunk of one of these trees, to say nothing about its roots and branches, contains at least 200,000,000 cubic inches. It is, therefore, 3,125,000,000,000,000,000 times as large as a single bacterium. This number is, of course, inconceivable. It may be read 3 125 millions of millions of millions. The proportion is about the same as that of an ordinary football to the earth itself.

Again, the duration of the life of many of the bacteria is only an hour. There are 8,760 hours in a year, and in 3,000 years there are 26,280,000 hours. Thus the tree has lived on while more than twenty-six millions of generations of its invisible kindred may have lived and died in the stream at its base. From the bacterium to the sequoia, what a span! Yet the rolling globe on which they live is but a speck in the universe, its diameter too small to be used as a measuring unit for interstellar spaces. As many bacteria could be laid side by side on a linear inch as earths upon the diameter of its orbit around the sun. Compared with the tree, the bacterium is almost infinitesimal; by the side of the earth, the tree is insignificant; in the solar system, the earth is but a small factor; and if the solar system were annihilated, it would be millions of years before its loss would be felt on distant stars. Magnitudes are, therefore, relative, and things are great or small according to the standpoint from which we view them.

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DESTRUCTION OF CROWS DURING THE RECENT COLD SPELL.

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WHETHER it be the result of disease or exposure, the suffering inflicted on the crows in the vicinity of Washington during the recent severe weather is of great extent, and of such a character as to excite the sympathy of any one familiar with the facts. On the 20th of January my son went rabbit hunting, and on his return told me he had found many dead crows in the pine woods, and others that were totally blind. The following day I accompanied him to the place where he had found them, and was really astonished at the sight presented. Very few crows were seen flying about, but upon entering the thick woods of scrub-pines, which was evidently the roosting-place of large numbers of these birds, they were met with on every hand. Some were lying on the snow, dead and frozen stiff; many more were perched in the trees, at various heights, in all stages of helplessness. The majority of them could fly, and on our near approach would do so; but in a moment it became apparent that they could not see, for the first thing in their line of flight, as, for example, a branch, would stop them, when they would either flutter to the ground or, changing their course, would continue their flight, to be again checked by a branch, or if they happened to miss any obstruction until clear of the woods (which rarely occurred) they continued, slowly feeling their way, over the open fields, often dropping to the snow-covered ground after flying a few hundred yards. Those which did not fly at our approach were too much weakened from starvation to do so. They were easily caught, and in every instance were found to be absolutely blind, except one individual, which had one eye but little affected. In many the eyes were closed and much swollen; in some one or both eyes had burst and frozen, this having possibly been caused by violent contact with the sharp ends of broken twigs. In all cases in which the eyes were not closed or inflamed the pupil was milky white and the iris bluish. Inability to find food on account of their blindness was evidently the immediate cause of starvation; for it was found that the dead birds were, as a rule, very much emaciated, while many of the living ones, particularly those which were most

active, and consequently difficult to capture, were in fairly good condition. It was pitiful to behold their suffering, both from the pangs of hunger as well as from the pain of their wounded eyes. Sometimes the snow beneath the trees was nearly covered by pine needles and small twigs which they had plucked off and tried to eat (they were seen doing this), while several of those which had fallen to the ground were eating snow.

The extent to which this epidemic, or whatever it may be, has affected the crow population of this locality is not easy to estimate. My first impression was that the species was nearly exterminated there, since certainly 95 out of every 100 crows seen during the day were perfectly "stone-blind," and 10 per cent of them dead. That this impression was incorrect was, however, proven by the next day's observation, the locality being visited much later in the day, when large numbers were seen coming in from the surrounding country to roost, — all these "able-bodied" crows having been abroad after food at the time of our previous visit. There seemed to be about as many of these as there were of the disabled ones, so the reduction in their numbers will probably not exceed one-half, and may not be so great.

A third visit, several days later, showed no increase among the afflicted birds. There were, however, as might have been expected, a much larger number of dead ones, while those still living were found more scattered, being encountered nearly everywhere in the open fields, where they had fallen, exhausted, during their flight from the woods.

So far as I was able to discover, after very careful examination of all specimens within reach, during both visits, only the common species, *Corvus americanus*, was affected by the malady. At any rate, neither my companions nor myself could discover a single fish crow (*C. ossifragus*), though the latter was well represented among those which were flying about.

I am at a loss to account for this scourge. Several causes have been suggested, the most plausible of which, it seems to me, is that in returning to their roosting-place one excessively cold evening they were compelled to face a freezing wind, perhaps bearing minute ice-particles, which actually froze their eyes. It may be, however, that a better explanation can be given.

REMARKS ON AMERICAN LICHENOLOGY. — III.

BY W. W. CALKINS, CHICAGO, ILL.

THE explorers for lichens in a locality so favorable as Florida will not fail to notice the abundance of brilliantly colored fungi, and, if interested, will be tempted to collect them. On some of these will perhaps occur parasitic lichens of rarity, as *Colnagonium* and *Opegrapha*. But beneath a bed of *Agaraci*, on the sandy soil of an old plantation, a close search will show another interesting lichen, known as *Heppia despreauxii* Tuck. Its character was long disputed, owing to a close resemblance to an allied genus of lichens, *Solorina*. The small cup shaped apothecia, growing single or in clusters, immersed in a green thallus, have deceived good lichenists. We owe to Dr. Tuckerman the elucidation of this elegant species. Only two were described by him in the "Synopsis." Last winter I had the good fortune to find another in the mountains of Tennessee, which, having been sent in vain around our own country, a puzzle to all, was promptly determined by Dr. Nylander of Paris to be the *Heppia virescens*, *Ach. variety rugosa* Nyl. I may remark that it is astonishing how soon afterwards we all saw the point.

In the old field as well, with a mixed second growth of *Pinus taeda*, *Plex opaca*, *Plex Cassine*, *Myrica cerifera*, *Olea americana*, etc., will be found on their foliage numerous small fungi, such as *Sphaeria* and *Cercospora*, many of which have been illustrated by Professor Ellis in his "Exsiccati" from my collections of fungi.

In close contact, lichens and fresh-water algæ and *Hepaticæ* also hold equal sway. But, towering over all, the stately *Magnolia* and the *Gordonia* (red or bull bay), with their glossy evergreen foliage, afford us the tropical lichen, *Strigula complanata* Fee., and, rarer still, *Heterothecium augustini* Tuck., though, indeed, the *Sabal serrulata*, common everywhere, abounds in elegant specimens in