Hibernating mammals.

An article on hibernating mammals, by Dr. C. C. Abbott, in *Science*, No. 65, contains several statements the correctness of which I am inclined to challenge. For example: Dr. Abbott says, "Of the thirty or more mammals found here [central New Jersey], thirteen species are supposed to be hibernating animals. These are four species of bats, two of moles, three squirrels, one ground squirrel, one marmot, one jumping-mouse, and one Hesperomys."

If it is true that the red squirrel, 'two moles,' and 'one Hesperomys' hibernate in the latitude of central New Jersey, the fact is sufficiently interesting and important to merit a detailed account of the evidence upon which an announcement seemingly so extraordinary and improbable is based.

Further on, the doctor states that the common star-nosed moles "form commodious nests, placing a good deal of fine grass in them. Here, indifferent to freshets, they remain all winter, and, as they can lay up no food, sleep, I suppose, through the entire season. The fact that these moles are unaffected by being submerged during the spring freshets is an interesting fact." Here, it will be observed, the author not only asserts that the star-nosed moles 'remain all winter' in their nests; but, without adducing a single fact in proof, he even goes so far as to assume that they are 'submerged during the spring freshets,' and goes on to say, "I think that the animals must have been thoroughly soaked for from forty-eight to seventy-two hours, the ordinary duration of the high water." Now, it is a very easy matter for these semi-aquatic animals to betake themselves to higher ground when driven from their usual haunts by freshets; and this is exactly what usually takes place, as I have ascertained by personal observation.

In the Adirondack region, where snow covers the ground for five or six months of the year, the star-nosed mole does not hibernate. At the approach of winter, it sinks its galleries below the depth to which frost penetrates, and still finds an abundance of earthworms, which at all seasons constitute a large share of its food. When the snow has attained the depth of a metre or a metre and a half, as it commonly does here during January and February, the frost gradually leaves the ground, and both moles and earthworms again approach the surface. The moles sometimes burrow up through the snow; and I have captured them while running about on a stiff crust, through which they were unable to bore in time to make good their escape.

The red squirrel is well known to be the hardiest of his family. Disdaining to hibernate, he remains active throughout the continuance of excessive cold. When fierce storms sweep over the land, he retires to his nest, to re-appear with the first lull in the wind, be the temperature never so low. I have frequently observed him when the thermometer ranged from 30° to 40° below zero, Centigrade, but could never see that he was troubled by the cold. While running on the snow, he often plunges down out of sight, tunnels a little distance, and, re-appearing, shakes the snow from his head and body, whisks his tail, and skips along as lightly, and with as much apparent pleasure, as if returning from a bath in some rippling brook during the heat of a summer's afternoon.

Dr. Abbott, after commenting upon the fact that the jumping-mouse (Zapus Hudsonius) lays up no store of provision for winter, while the white-footed mouse (Hesperomys leucopus) invariably hoards, says, "However this may be, the fact remains that both these rodents are quite sensitive to cold, and hibernate as soon as winter sets in; yet how very differently is this faculty exercised!"

The white-footed mouse is the last animal of which I should say, 'sensitive to cold.' Like the red squirrel, it is one of the hardiest of rodents, and in our northern forests it remains active throughout the long and severe winters. It is not known to hibernate; and, except during very stormy weather, its footprints can always be seen, dotting the snow in various directions.

If animals that are active in winter throughout the north-eastern part of the United States and much of British North America should be found hibernating in a mild climate like that of central New Jersey, the fact would be of unusual interest; but, since its acceptance must upset the well-known laws that govern the physiological process of hibernation, it becomes expedient to sift well the evidence upon which such statements rest. C. HART MERRIAM.

Experiments with reflections.

The accompanying figures, though not perfectly accurate copies of photographs I have made, are at least truthful representations of reflections obtained from, 1°, rectilinear striations upon a polished plane; 2°, circular striations upon a disk; 3°, circular striations upon a sphere.

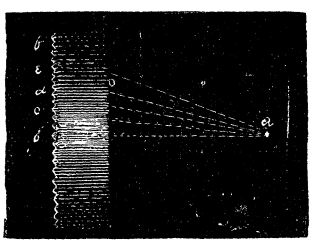

FIG. 1.

In fig. 1 the direct rays from a luminous point, *a*, touching the rectilinear striations at *b*, return to the eye a brilliant reflection of the luminous point; the divergent rays at *c*, *d*, *e*, *f*, returning the same with decreasing brilliancy as the remoter striations are reached. Thus a band of light is reflected perpendicular to the striations, of uniform transverse diameter, and with an intenser luminosity at the central point. If the striations are upon a finely polished surface, the outline of the luminous point is preserved in the reflection quite sharply, whether circular or otherwise.

If the striations are circular and concentric from circumference of a disk, — the centre of the disk, the light, and the eye occupying the same plane, and the face of the disk perpendicular to it, — the reflection is two equal sectors, with their luminous apices united at the centre of the disk, as in fig. 2. The diameters of the intercepted arcs depend upon the angle formed by the incident and reflective rays. Variations of the light, disk, or eye, in position, produce every degree of difference between the two sectors.

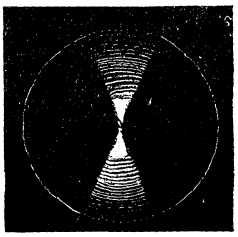

FIG. 2.

If the striations are upon a polished sphere, and