THE WHITE-FOOTED MOUSE, OR DEER MOUSE.

There are many persons who believe that all mice found in the fields and meadows are simply "house mice which have run wild." On the contrary, they differ so widely that they can not even be admitted into the genus *mus*, to which the common mouse belongs.

The white-footed mouse is the *Hesperomys leucopus* of modern zoologists. Some have seen fit to include in it a subgenus *vesperimus*. It was first described by the eccentric French naturalist Rafinesque as the *Musculus leucopus*. The meaning of the word *Hesperomys* is evening mouse, and of *leucopus*, white foot. This species can be distinguished from the other mice of our fields and woods by the following description: Ears large; tail slender, about as long as the head and body, and thickly clothed with short hairs, no scales being visible like those of the common mouse. Color of the body above, yellowish brown to gray; feet and lower parts of body, white. Tail distinctly bicolor; that is, its upper part is the color of the back, and the lower portion white. Length of the head and body, $2\frac{1}{4}$ to $3\frac{1}{2}$ inches; length of tail generally equaling the length of the head and body.

The white-footed mouse is agile in its movements, and is an expert climber. The first nest of this species I met with in Pennsylvania was in a hollow stump, and was of a rounded form, and composed of leaves, grasses, and moss. Here they also nest under stone heaps, or logs, or in the ground. In New Jersey it generally builds its nest in thick brier bushes, several feet from the ground. These are made also of moss and leaves, but are interwoven with strips of fibrous bark, probably of the wild grape vine, to make them stronger and more secure. The hole or place of entrance to the nest is always at the bottom. These nests at a first glance may readily be mistaken for those of birds. On shaking the bush or nest you will see the little inmates come forth and rapidly descend to the ground, and conceal themselves amid the bushes and grass. Sometimes you will observe several young adhering to the abdomen of the mother. These she assists in keeping their hold by pressing her tail against them as she climbs down the stems of the briers. The female produces young two or three times during the spring and summer, having from three to six young at a birth.

It has a habit of laying up little stores of grain and grass seeds. In our State they are generally composed of wheat, but in the South, of rice. It is also fond of corn, but eating the heart only and leaving the rest untouched. This species is sometimes accused of destroying cabbage plants and other young and tender vegetables, and of gnawing the bark from young fruit trees. It is doubtless that this species is sometimes to blame, but the greater amount of this damage, I think, is caused by the meadow mouse (*Arvicola riparius*, Ord), and the so-called "pine mouse" (*Arvicola pinetorum*, Le Conte.

The white-footed mouse is of crepuscular and nocturnal habits. Many of them fall prey to the different species of owls, notably the screech owl (*Scops asio*, Linn.), as the bones and fur of this mouse found in their ejected pellets clearly show. It has a wide geographical range, being found from Nova Scotia to Florida, and west to the Mississippi River, and perhaps far beyond. C. FEW SEISS.

THE PHOTOGRAPHING OF MOTION.

The admirable method devised by Mr. Muybridge, and which consists in employing instantaneous photography for analyzing the motions of man or animals, still left to the physiologist a difficult task; for it became necessary to compare with each other successive images, each of which represented a different attitude, and to class such images in series according to the position in time and space that corresponded to each of them.

Let us admit that nothing has been neglected in the experiment; that, on the one hand, the points of reference that photography is to reproduce have been arranged along the track to be passed over by the animal, so as to permit of ascertaining at each instant the position that he occupies in space; and that, on another hand, the instant at which each image has been taken is determined, as happens with photographs taken at equal intervals. All such precautions having been taken, it is still necessary, in order to obtain from the figures the meaning hidden therein, to superpose them one over the other (either in imagination or actually), so as to cover a paper band, corresponding to the road traversed, with a series of overlapping images, each of which expresses the position that the body and limbs occupied in space at each of the moments considered.

Such representations give rise to figures like those that the Weber brothers have introduced into use for explaining theoretically how man walks. In the works of these gentlemen we see only a series of silhouettes of men, shaded with cross-hatching of decreasing strength, and overlapping so as to represent the successive displacements of the legs, arms, trunk, and head at the different phases of one step. This mode of representation is the most striking one that has as yet been devised, and it has been adopted in the majority of classical treatises. Now, it has appeared to me (and experience has confirmed the prevision) that we might demand figures of this kind from photography; that is to say, unite on the same plate a series of successive images representing the different positions that a living being moving at any gait whatever has occupied in space at a known series of instants.

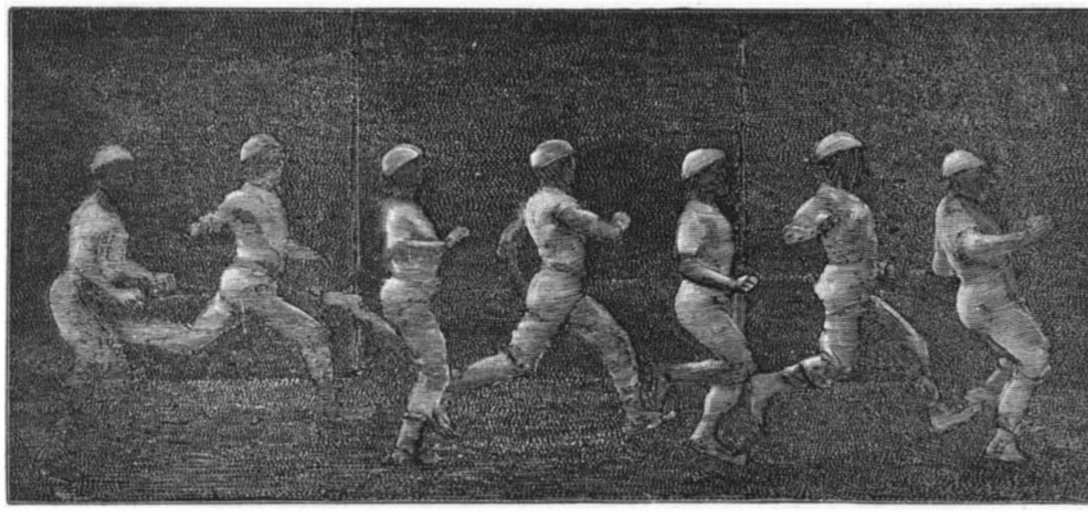
Let us suppose, in fact, that a photographic apparatus be set up on the road which is being traversed by a walker, and that we take the first image in a very short space of time. If the plate were to preserve its sensitiveness, we might, in an instant, take another image that would show the walker in another attitude in another point of space. This latter image, compared with the former, would exactly indicate all the displacements that had occurred at the second instant. By multiplying the images in this way at very short intervals, we should obtain a succession of the phases of locomotion with perfect authenticity.

THE WHITE-FOOTED MOUSE, OR DEER MOUSE.

Now, in order to keep the photographic plate as sensitive as necessary for successive impressions, it is necessary that absolute darkness shall exist in front of the apparatus, and that the man or animal that is passing shall be detached in white from a black background. But the blackest objects, when they are strongly lighted, still reflect many actinic rays; and so I have had recourse, in order to obtain an absolutely black field, to the method pointed out by Chevreul, my screen being a cavity with black sides. While a man wholly clothed in white, and brightly lighted by the sun, is walking, running, or jumping, the photographic apparatus, which is provided with a more or less rapidly revolving shutter, takes his image at more or less approximate intervals. This same method may be applied to the study of different types of locomotion; and a white horse, or a white bird, will give in the same way a series of their attitudes.

The window in the disk of my shutter may, at will, be enlarged or reduced, so as to regulate the duration of pose according to the intensity of the light, or according to the velocity with which the disk revolves. With the window reduced, and a slow rotation, we obtain images widely spaced apart. A rapid rotation gives more approximate images, but one whose time of pose might be insufficient if the window were not enlarged. Finally, a swinging shutter placed before the other serves for regulating the beginning and end of the experiment.

The proofs from the negatives that I have obtained, and a sample of which is shown in the engraving, were made at the physiological station of the Parc des Princes, where I worked with the aid of Mr. G. Demeny.—*E. J. Marey, in La Nature.*



THE SUCCESSIVE PHASES IN THE MOTION OF A MAN RUNNING.

Strontia in Sugar Refining.

Dr. Bittmann delivered an address at Magdeburg, in which he gave the following description of the use of strontia for the recovery of sugar from molasses.

As early as 1849, Dubrunfaut and Leplay received a French patent on a strontian process, but it does not seem ever to have been put into practice. At all events, it was totally unknown to Max Fleischer, who was experimenting on it ten years ago, and who perfected his process to such an extent that he offered it to a sugar manufacturer, Hermann Kuecken. This was the origin of the Dessau Sugar Refining Stock Company, which has been using the process for ten years, and, after overcoming many difficulties, they have, within the last four or five years, brought it to such a state of technical perfection that it has outstripped every other process for removing sugar from molasses. At first, the chief difficulty lay in securing enough of the material. Recently, the Dessauer factory has obtained the greater part of its supply from the large mines of strontianite in Westphalia, and besides that a large chemical factory has been erected at Rosslau, for working celestine, which can be had in inexhaustible quantity in Sicily, so that hereafter there will be no difficulty in getting material, and the principal objection to the process is removed.

The operation is conducted as follows: Caustic strontia in substance, or in solution, is added to the heated molasses, and at boiling heat the sucrate of strontium separates from a tolerably concentrated solution in the form of an insoluble bisaccharate which is almost completely insoluble. In order to precipitate as nearly as possible all of the sugar, enough strontium must be added to leave a ten per cent solution of caustic strontia, in which is suspended the sugar compound of strontium; this is very easily accomplished. The separation of the precipitate from the mother-liquor takes place in an apparatus where a vacuum can be obtained for sucking the liquid out of the saccharate. The latter is in the form of a plastic, granular paste, the consistence of which makes it easier to remove the mother-liquor. After draining, it is washed repeatedly with a concentrated solution of caustic strontia, and the latter is then sucked out. In this manner a saccharate of extraordinary purity is obtained. The loss of sugar, when these conditions are closely observed, is inconsiderable. On the average the water that runs off contains $1\frac{1}{4}$ per cent of sugar.

The saccharate could be decomposed directly with carbonic acid, and carbonate of strontia would be formed, which could be used again, while the solution would contain sugar, and would only need to be filtered through bone black and then refined. But the saccharate possesses one remarkable property, that it decomposes spontaneously. It splits up in such a manner that, from a saccharate containing two molecules of strontium and one of sugar, at least one molecule of caustic strontia crystallizes out, while all the sugar remains in the solution, which also holds a portion of the strontia in solution. This property of the saccharate is of considerable practical interest, since it is not necessary to use carbonic acid for precipitating all the strontia that is used, and consequently not more than half of the material has to be put through the tiresome process of regeneration. If the decomposition is performed in an intelligent manner, it can be made to yield considerably more than one molecule of strontium hydrate by spontaneous separation. For this purpose the saccharate is mixed with water and then left to itself: crystals of caustic strontia are formed, which can be utilized at once for a fresh operation, and a solution of sugar, from which the strontia is precipitated by carbonic acid. The solution is then passed over bone-coal, and from this moment it is refinery sirup, which can be used immediately in the refinery, and at Dessau it is evaporated and converted at once into cube sugar by Langen's process. Or the crystalline mass can be put in Fesca's centrifugal, and a fine marketable product obtained.

The regeneration of the strontium requires a good deal of room, and owing to its difficulty it is by far the largest half of the process. For a long time Dessau has been fighting the problem of finding out the right way to convert the precipitated carbonate of strontium into caustic strontia, and in the course of the past year has arrived at a complete system of doing so. The slimy mass of carbonate left in the filter presses is mixed with saw dust and pressed in bricks, which are burned in a gas furnace. The ignited mass consists of anhydrous oxide of strontium, or strontia.

The mass is leached out, and put in crystallizing vessels to crystallize. The lye, which is made on a large scale, contains while hot about thirty per cent of hydrate of stron-