

done his work with much painstaking care, and that both the theoretical and the practical part are set forth in a manner which cannot fail to give students an excellent foundation in the science of the elasticity and strength of materials.

MANSFIELD MERRIMAN.

LEHIGH UNIVERSITY.

The Pocket Gophers of the United States. Bulletin No. 5, U. S. Department of Agriculture, Division of Ornithology and Mammalogy. Prepared under the direction of DR. C. HART MERRIAM, Chief of division, by VERNON BAILEY, Chief Field Agent, Central Park, New York. Published by authority of the Secretary of Agriculture. Washington, Government Printing Office. 1895. 8vo., pp. 47. Frontispiece, 6 cuts in the text, and colored map.

In a former number of SCIENCE (N. S. Vol. I., No. 9, March 1, 1895) attention was called to a monograph by Dr. Merriam on the Pocket Gophers (family Geomyidæ), in which was presented the scientific results of his extended and detailed studies of the group. The present 'Bulletin' is a fitting sequel to the technical monograph already noticed, dealing, as it does, with the economic relations to agriculture of these destructive rodents. This paper was prepared by Mr. Vernon Bailey, under the direction of Dr. Merriam, Chief of the Division of Ornithology and Mammalogy of the U. S. Department of Agriculture. Mr. Bailey is one of the most experienced and expert of the many expert field naturalists now connected with this branch of government service, and is therefore eminently fitted by personal experience in the field for the preparation of a report like the one under notice.

The first ten pages relate to the general habits of these animals, which live almost wholly under ground, and make known their presence chiefly by the mounds of earth

thrown out from their burrows, or by their troublesome depredations upon farm and garden products. Even where so numerous as to be exceedingly troublesome they are rarely seen, and little is known of their life habits by even the people who suffer from their depredations. Hence the detailed account of their habits and methods of working here given is a welcome contribution toward a fuller knowledge of their life histories. Although deficient in vision, their senses of taste, touch and smell seem to be compensatingly acute, and their ample external cheek-pouches serve an important function in the transportation of food, for which they seem exclusively used. The Gophers, says Mr. Bailey, "are industrious workers, and whatever food is found and not needed at once is carried to chambers in some part of the tunnel and stored. * * * Sometimes a peck of small potatoes, roots of coco grass, wild parsnip, wild sunflower and other fleshy or bulbous roots are found in a single chamber." They are especially fond of potatoes, turnips, carrots, beets, onions, parsnips, corn, barley, rye and alfalfa, and even squashes and melons do not escape their ravages. They are also very destructive to fruit and ornamental trees by eating off their roots, which are sometimes so thoroughly cut away that the trees fall from lack of support. Their burrows are also often a source of injury over comparatively large areas, through the large amount of earth thrown up as mounds, thus burying crops, and sometimes they cause breaks in irrigating ditches and induce serious washing of hillside lands.

The Gophers have few natural enemies, and seem to flourish and increase through the fruits of man's industry. Hence the question of artificial means of destruction becomes a matter for careful consideration. They can be trapped readily by those who know how to do it, but generally the art is unknown, and it is a widespread belief

among farmers subject to their inroads that they cannot be caught in traps. Mr. Bailey especially commends the use of bisulphide of carbon for their destruction, which is readily accomplished by placing an ounce or two of this volatile fluid on cotton or rags in their burrows. Instructions are also given for the use of poison and traps. In consequence of the harm done by Gophers, bounties have been offered in many parts of the West, but the system is condemned as a means of depleting the county treasuries without effecting the extirpation of the Gophers. Thus it is stated that Benton county, Iowa, paid out \$18,000 in three years in Gopher bounties, "but the Gophers, though greatly reduced in numbers, were not exterminated."

Gophers of one species or another occupy practically the whole of the United States west of the Mississippi River, and also the greater parts of the States of Illinois, Georgia, Alabama and Florida. Detailed accounts are given of the habits of the various species found east of the Rocky Mountains. Aside from its important economic bearings, the Gopher Bulletin is a most interesting contribution to the life history of a group of animals hitherto little known. Four of the six illustrations in the text are from Dr. Merriam's monograph, as are the frontispiece (Georgia Gopher), and the colored map of the distribution of the species of the genera *Geomys* and *Craterogeomys*. The two colored plates (of the Prairie Gopher and Gray Gopher), called for in the list of illustrations, and prepared especially for this Bulletin, are lacking, in consequence, as we are privately informed, of their having been 'misaid' at the Government Printing Office after their production and delivery by the Department of Agriculture.

J. A. ALLEN.

[*The Norway Lemming*] *Myodes lemmus*, its *Habits and Migrations in Norway*, by R. Collett. Christiania. 1895. 8°. pp. 62.

The distinguished naturalist of Christiania, Dr. R. Collett, has just published a treatise on the Norwegian Lemming that at once becomes a classic on the subject. He tells us that, in a manuscript believed to have been written in the latter half of the 13th century, the Lemmings are supposed to have been the same as the 'locusts' mentioned in the Bible in connection with the plagues in Egypt. In a book published by Jacob Ziegler in 1532 the theory of their descent from the clouds is proposed, based on statements of two bishops from Trondhjem. In 1555 Olaus Magnus, Archbishop of Upsala, published a figure showing the Lemmings (with tails like house mice) falling from the clouds and being preyed upon by Ermines.

Dr. Collet states that normally the Lemming inhabits all of the mountain plateaus of Norway above the zone of coniferous trees, descending in Finmark to sea level, thus occupying about one-third of the total land area. Besides the mainland they inhabit the large rocky islands off the coast, especially to the northward.

In normal years they are rarely seen, even by explorers. In prolific years they suddenly increase and overflow vast areas. In such years according to Dr. Collet, "The litters produced during the course of the summer follow so closely one upon the other that the one set is barely allowed time to leave the nest ere the next lot arrives. Furthermore, the litters are unusually large, as they constantly contain up to 10 younglings in each set (although possibly 6 or 7 on the whole is the rule); and all these young ones appear to be possessed of greater powers of attaining maturity than those produced during a normal year."

This excessive reproduction results in overcrowding the breeding grounds, from which vast numbers move away in different directions. Descending the mountains and following the valleys they continue blindly