WILLIAM T. MAGRUDER, M. E., adjunct professor of mechanical engineering in Vanderbilt University has resigned and has been elected professor of mechanical engineering in the Ohio State University.

SCIENTIFIC LITERATURE.

The Jack Rabbits of the United States. By T. S. PALMER, M. D., Assistant Chief of Division. Bulletin No. 8, U. S. Department of Agriculture, Division of Ornithology and Mammalogy, Washington. Government Printing Office. 1896. 8vo., pp. 84, 6 pll. and frontispiece and 2 text figures.

No jack rabbits are found in the United States east of about the 95th meridian; west of this line they are of almost universal distribution, sometimes several species occurring over the same area. They extend northward over the plains of the Saskatchewan, and southward into Mexico far beyond our southern border. The extent of their abundance and the amount of injury they are capable of doing to growing crops is little known to the general public, outside of the jack rabbit area. In Bulletin No. 8, of the Division of Ornithology and Mammalogy of the U. S. Department of Agriculture, a vast amount of information is given on both these points, both statistically and pictorially, Dr. Palmer having treated his subject with great thoroughness, and in a way at once interesting to the naturalist and the general reader. The matter is non-technical and relates to the habits and distribution of the five or six species (no attempt is made to discriminate the subspecies) found in the United States, including their abundance and rapidity of increase; their injury to crops and the means of protection against them, and the methods of destruction employed to reduce their numbers. There is also a chapter on 'Rabbit Drives and Hunts,' and another on the value of jack rabbits as game.

In respect to the abundance of these animals over certain areas, Dr. Palmer gives some striking statistics. For instance, he states that in Modoc county, California, 'nearly 25,000 jack rabbits were said to have been killed in three months on a tract of land only six by eight miles in extent.' "A still more remarkable case has been recorded in the San Joaquin Valley. Some of the early drives near Bakersfield took place on a ranch less than one square mile in extent. In the first drive, on the afternoon of January 2, 1888, 1,126 rabbits were killed; as soon as the animals were dispatched, the same field was passed over again and 796 more killed. A week later, on January 10th, there were two drives on the same ground, the first resulting in the destruction of 2,000 rabbits, the second in more than 3,000; in the latter an adjoining field was also driven over. It was estimated that altogether about 8,000 rabbits were killed on this ranch in nine days. The 'Kern County Echo' of March (8?) 1888, stated that a total of about 40,000 rabbits had been killed in the drives about Bakersfield from January 1, 1888, up to that date, and referred to an estimate that two-thirds of the rabbits killed in the drives were females and the average number of young of each of these was 3½. On this basis it was computed that had these 40,000 rabbits lived two months they would have increased to 135,000. When it is considered how much injury a single rabbit can do, the damage which such an army of rabbits is capable of inflicting would hardly be less than that caused by a grasshopper plague." In another place Dr. Palmer states that "it has been estimated that five jack rabbits consume as much as one sheep."

As means of protection rabbit-proof wire fences are sometimes resorted to, and poisons are occasionally used to reduce the number of rabbits; many are also shot, but the chief dependence is wholesale destruction by drives. These are described at length, and illustrated by cuts and some striking reproductions of photographs of some of the remarkably effective drives made about Fresno, in California, where in one instance 20,000 rabbits were killed in a single drive. In the larger drives hundreds of men and boys participate, some on foot but many on horses. It is said that in one drive near Fresno, resulting in the death of 15,000 rabbits, 2,000 horsemen took part. A list of 155 rabbit drives in California is given, with a map showing their location. These drives resulted in the destruction of nearly 400,000 rabbits during a period of about eight years. Lists of drives made in Oregon, Utah, Idaho and Colorado are also given.

The jack rabbits have at present little commercial value; their skins are used to some extent for furs, and many of the animals are sent to the markets of the larger cities and sold as food. It is estimated that some 600,000 are annually consumed in the United States, the greater part being sent to the larger Eastern cities. It is believed that "commercial utilization is the most promising and least expensive method of keeping these pests in check in localities where they are unusually abundant; but returns from this source will only partially offset the losses sustained on account of injuries to crops."

"In America," says Dr. Palmer, "the rabbit question never has, and probably never will assume the proportions it has assumed in Australia. The jack rabbits of the United States are all indigenous species and ordinarily are held in check by natural enemies and by disease. Although local conditions may sometimes favor their temporary increase, yet natural agencies aided by the persistent and constantly increasing war of extermination are gradually, but none the less surely, diminishing their numbers."

Incidentally some account is given of the rabbit pest in Australia, New Zealand and Tasmania, due to the introduction of the common rabbit of Europe (*Lepis cuniculus*), about thirty years ago, for purposes of sport. As is well known, they multiplied so rapidly as to become soon a very serious pest. Dr. Palmer cites statistics showing that about $5,500,000 had been expended prior to 1888 for their destruction, and in building several thousand miles of rabbit-proof fences for the protection of crops.

J. A. A.

Catalogue of Fossil Fishes of the British Museum. Vol. III. By Arthur Smith Woodward, F. C. S., F. Z. S.

Since the publication of the first volume of this series the student of vertebrate morphology, not less than the specialist, has felt that he was to be indebted to Mr. Arthur Smith Woodward for an admirable text-book on the entire subject of Fishes. Critics have universally commended the catalogue, from its general plan down to the details of its text figures and plates, a work which only could have been written by one who has had the long experience, the broad judgment, to say nothing of the industry, of its author.

The volume which has recently appeared deals with those groups of fishes popularly known as Mesozoic Ganoids, and reviews this subject in such a way that the fourth volume of the series, beginning with the 'Teleosts,' may complete the catalogue. It is understood that a supplememtary volume will thereafter be published to supply omissions and to bring the entire subject up to date. Those only who know the confusion which has existed in our knowledge of extinct Ganoids—confusion due to a large and scattered literature, faulty nomenclature, imperfect and partial study—can appreciate the degree of order which has been infused into the entire subject by the present work. Indeed, one may well believe that this volume could not be possible had its author not felt it necessary to visit every noteworthy collection, at home and abroad, for the purpose of making comparison of his material.

The present volume begins with a review of the structural relations of the following groups: the Palæoniscoids of the Trias, *Catopterus* and *Dictyopyge;* the Protospondyli, *Semionotids, Macrosemiids, Pycnodonts, Eugnathids, Amiids, Pachycormids;* the Aetheospondyli, *Aspidorhynchids, Lepidosteids;* the Isospondyli, *Pholidophorids, Leptolepids.* Then follows the catalogue proper, a careful review of the systematic side of the subject, with complete reference lists and descriptions, illustrated by numerous text figures. Among these are a number of new and admirable restorations, including those of *Dapedius, Cleithrolepis, Eugnathus, Caturus, Hypsocormus, Aspidorhynchus* and *Leptolepis.* There are also eighteen plates illustrating those specimens in the Museum which prove of especial interest. A careful review of the book brings out clearly that the treatment of the subject is a purely morphological one, and that the most recent studies on the modes of evolution have been brought into good use. General conclusions have, in the majority of cases, been drawn from the study of progressive series, as, for example, where the author shows that "the most advanced stage of the endoskeleton (of *Neor-*