

to those of a skate (*Raia*), almost immovable, in many transverse rows, and with acute backward-directed points and bulging heel-like bases. It has a straining apparatus, somewhat like that of the basking shark (*Cetorhinus maximus*) and its food is analogous to that of its northern relative. It consists of the minute copepod and other crustaceans as well as mollusks which live about the surface of the ocean. These flourish in such abundance as to compensate by their number for their small size. In fact, like those other giants of the sea, some of the whale-bone whales, it finds enough for growth and the enjoyment of life among the smallest of animals.

Nothing is known of its reproductive habits but it has been assumed that, like its nearest relatives, it is ovoviviparous.

According to E. Perceval Wright, 'it is quite a harmless fish, with a mouth of immense width, furnished with small teeth,' really very minute. "It now and then rubs itself against a large pirogue, as a consequence upsetting it, but under these circumstances, it never attacks or molests the men, and while it reigns as a monster among the sharks, is not, despite its size, as formidable as the common dog-fish"—save in the line of upsetting!

Dr. Buist, as early as 1850, referred to it as the 'mhor or great basking shark' and stated that it was frequently captured at Kur-rachee (not far from the mouth of the Indus). "It is found floating or asleep near the surface of the water; it is then struck with a harpoon." The stricken fish is "allowed to run till tired; it is then pulled in, and beaten with clubs till stunned. A large hook is now hooked into its eyes or nostrils, or wherever it can be got most easily attached, and by this the shark is towed on shore; several boats are requisite for towing. The mhor is often forty, sometimes sixty, feet in length; the mouth is occasionally four feet wide."

The later literature respecting the species has been already summarized in SCIENCE (1902, N. S., XV., 824-826).

THEO. GILL.

A FAUNAL SURVEY OF THE FOREST RESERVES IN
THE SANDHILL REGION OF NEBRASKA AND OF
THE LAKES IN THAT REGION.

NEBRASKA is, from a faunal standpoint, one of the most interesting states in the Union. Owing to its geographical location, to a range in altitude of from 810 to 5,300 feet, to variations in soil, climate and vegetation, the state contains a fauna rich in species and in great variety. Along the Missouri River, which forms the eastern boundary of the state, and following westward out the tributary streams into the prairie region, is a growth of purely deciduous timber representing species of trees derived from the south and east and including oaks, hickories, walnut, butternut, honey locust, Kentucky coffee-tree, wild cherry, etc.; while spreading into the state from the north and west and following down the Niobrara River nearly to its mouth is a growth of pine, together with quaking aspen, balsam poplar, mountain maple and black birch.

Midway across the state and at an average altitude of 3,000 feet lies a region of extreme interest, one of sandhills, varying in height up to 250 feet, so thickly scattered as to make a surface as rough as can well be imagined. The region is sharply defined. Streams flow out of it toward the east and south which have carried away sand to deposit it as sandbars lower down their courses, making in that way valleys running back into the hills and up which extend fringes of low trees and shrubbery, the advance guard of the tree growth from the southeast. To the north and west of this region are plains cut into by pine-clad canyons. In the sandhill region proper, however, no native trees of any kind are found, although there are here and there patches of stunted bushes—sand cherry, plum, rose, *Ceanothus* and June berry. Throughout this area, which in extent equals one fifth the total area of the state, or about 11,000 square miles, forest conditions are quite absent and forest animals absolutely lacking.

In this region the government has recently set aside two tracts of land as forest reserves. One, known as the Dismal River Reserve, in Thomas County, has an area of 86,000 acres, the other, the Niobrara Reserve, in northern

Cherry County, an area of about 126,000 acres. It is the intention to plant pines upon the hills and deciduous trees in the valleys, hoping thus to prove the possibility of foresting the sandhills and to induce private parties following its lead to aid the government in the work of reclaiming this region. The writer believes that here is a unique opportunity to study the development of a forest fauna from the beginning. These planted forests are by far greater in area than any forests ever planted before, and in them will be seen the gradual evolution of forest conditions, and, it may be assumed, the gradual development of a forest fauna, where absolutely no trace of such a fauna is to be found at the present time. The question suggests itself at once as to the possible origin of this fauna. Will it be derived from the pine-clad canyons of the north and west or will it come from the deciduous timber of the south and east? Will the pine growth receive its fauna from one direction and the deciduous forest in the valleys its from the other? If so, what will be the ultimate result? What will be the order of appearance of these forms and what will be the possible succession of dominant types which may exist one after the other in the evolution of this fauna from year to year? These are only a part of the problems that present themselves, the working out of which will be the labor of many years. During the past three years the author has been studying all of the conditions as they now exist in order to thoroughly familiarize himself with the ground, that the investigation may be followed through intelligently from the very beginning. How soon results may be attained and how important they will be the future must disclose.

Bound up in the study of the sandhill region and its fauna, though not directly connected with the investigation above outlined, is another problem which the author is also studying at the same time. In this region are many bodies of water differing in size, from mere pools to lakes even four or five miles in length, most of them fed from subterranean streams and with no outlet, lying in pockets between the hills. These vary from those containing the most beautifully clear, limpid,

sweet water, full of animal and vegetable life, to those so strongly alkaline as to be incapable of supporting more than a limited fauna and flora and that made up of a very few species. The study of the distribution of life in lakes so widely different in chemical composition of the water, but in every other respect absolutely similar, promises extremely interesting results, not the least important of which will be the possible variation of the same species under these varying degrees of alkalinity.

It is three years since these investigations were begun. The first of these years was spent in a general survey of the region and in mapping the largest group of lakes, the second and third in a more critical study of lake conditions, the collecting of material, and the securing of a series of photographs. The work is to be continued during the present summer by the taking of water samples from as many lakes as possible for chemical analysis, by further study of the conditions in the lakes themselves and of the biological conditions in the region as a whole, and in the securing of additional photographs to illustrate them. The investigation is being carried on very largely at private expense, since there is no fund available in the state for the purpose; but the intention is to spend as much time as possible each year in the field, results being published from time to time as they may become complete so far as any given problem is concerned, or whenever the progress of investigation makes it possible to present definite results.

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THE MAILED CATFISHES OF SOUTH AMERICA.

IN the *Transactions* of the Zoological Society of London, Volume XVII, Part III., October, 1904, C. Tate Regan publishes a 'Monograph of the Fishes of the Family Loricariidæ.' The Loricariidæ are one of the families of Ostariophysi. They are found only in the rivers of South America, ranging from Panama to Montevideo. As understood by Regan the Loricariidæ are equivalent to the Loricariidæ and Argiidæ of Eigenmann.