

The specimens are smaller than those measured by Wilson (1900), as were those studied by Kepner and Edwards (1917), but the environmental conditions of the material I am collecting are almost identical with those described by Wilson.

ISABELLE P. MCGUIRE.

Shepparton, Milngavie.

The Whale Shark, *Rhineodon typus*, among the Seychelles Islands

THE publication in a recent number of *Science* of notes¹ on the occurrence of the whale shark in Bornean waters and on the Florida coast has led me to look over my notes and to put on record its occurrence and abundance in the Seychelles.

About six hundred miles north-east of Madagascar and four degrees south of the equator is found the Seychelles archipelago, formerly a French dependency, but now a British colony. To these islands, in 1868, came an Irish naturalist, E. Perceval Wright, for a six months' stay. To him we owe our first knowledge (and only published accounts) of the occurrence of the whale shark in this locality, where it is called the 'Chagrin'. He took photographs of two specimens (male and female), dissected two fish, and saw a number of others in the waters around the islands. It is greatly to be deplored that Wright made so little use of his opportunities to study this great fish. He wrote no article on it, nor did he publish his photographs (presumably the first ever made of the whale shark). Brief accounts, however, are given incidentally in four of his publications, in none of the titles of which does the name of the shark occur. There is nothing to form a guide, and only by running down obscure clues did I find accounts of the whale shark in the works listed below.²

The whale shark is as abundant around the Seychelles to-day as it was in 1868. In 1914 Dr. A. G. Mayor, director of the marine biological work of the Carnegie Institution of Washington, planned to send me to the Seychelles to study *Rhineodon*. Seeking information, I got in touch with Mr. P. R. Dupont, curator of the botanic station on Mahé, who informed me then, in 1919, and again in 1925, that the fish was comparatively common in the Seychelles. He had this information from many fishermen, and the managing director of the St. Abbs Whaling Company, situated on Mahé Island, also told him that the whale shark was abundant on the Seychelles Bank. Moreover, Mr. Dupont himself had at various times seen specimens, to the number of five or six. He further ascertained from an old fisherman that about 1865 there had been carried on by a family, of whom he was the only living member, a fishery for the 'Chagrin' to obtain oil from its liver. This man named eleven "grounds" where the fishing had been carried on, and said that when he was a boy of fifteen at Frigate Island the 'Chagrin' could be found all the year round. Mr. Dupont adds that to-day it is almost always to be found there in calm weather.

The War made the trip to the Seychelles impossible, so it was October 1919 when I again heard from Mr. Dupont. He reported that whale sharks were comparatively plentiful around the south end of Mahé Island, where a number had been seen a few days previously. As a result of this information, tentative plans were again made to go to the Seychelles, but the untimely death of Dr. Mayor in 1922 put an end to these.

In the meantime Mr. Dupont, who had been severely wounded in the War, was transferred to Mauritius, but returned to the Seychelles in 1924. Under date

of July 27, 1925, he wrote me that *Rhineodon* was still not uncommon, and added:

"According to our local fishermen, *Rhineodon* comes over to the Seychelles when *Caranx gymnostooides* appears in enormous shoals from May to August, during the trades which blow heavily from the S. of Java toward the N. end of Madagascar, bringing on their way a good deal of fish to our archipelago. Advantage no doubt is taken by migratory fish of the currents which run in the same direction at this time."

Here then we have a suggestion as to how the whale shark has reached the Seychelles. This will become more apparent when one learns that *Rhineodon* is found in numbers in the East Indies and especially around Java. The abundance of the whale shark at the time of the schooling of the *Caranx* is not because the former feeds on the latter, but because both feed on a certain small sardine called 'tauve' and upon a little octopus called 'vauve', which abound in vast schools. In fact, the fishermen are guided by the presence of the 'Chagrin' to indicate good fishing grounds for *Caranx*. As to the breeding of *Rhineodon* in the Seychelles, the fishermen were in doubt, but Mr. Dupont definitely says that "The breeding season occurs in June". From this and from the statement that the fish is found all the year round, we may judge that, while it may have originally come from the East Indies long ago, it is now native to the Seychelles.

In my last letter to Mr. Dupont (September 1925), I asked him for any data that might have recently come to hand, and stated that I would like to bring together and publish that which he had sent me. Having had no answer, I fear that he has succumbed to his wounds. So the data about *Rhineodon* in the Seychelles have been collected and are now published in order to put the facts on record and to give Mr. Dupont credit for the information which he so kindly gathered and communicated.

E. W. GUDGER.

American Museum of Natural History,
New York City, June 17.

¹ Herre, A. W., "The Whale Shark on the Coast of Borneo", *Science*, 75, 413; 1932.

² Gudger, E. W., "The Fifth Florida Whale Shark—1932", *Science*, 75, 412-413; 1932.

³ (1) "Six Months at the Seychelles." Dublin, 1868, 16 pp. (Privately published and later included as one of the component parts of the next number—of which only 75 copies were published.)

(2) "Spicilegia Biologia." Dublin, 1870, pt. i., pp. 64-65.

(3) "On a New Genus and Species of the Family Pandarina [Found Parasitic on the Whale Shark]", *Proc. Roy. Dublin Soc.*, 2 ser., 2, 583-584; 1877.

(4) "Animal Life, or the Concise Natural History." London, 1879, p. 463.

Light and Sexual Periodicity in Indian Buffaloes

DR. MARSHALL has stated¹ that "in tropical countries where environmental conditions are similar throughout the year, such as the Cameroons, the native birds have no restricted breeding season but breed at any time". The data I collected in 1929 with regard to the buffaloes is of interest in this connexion.

The Government of Madras has stationed two buffalo bulls for stud purposes at the Agricultural Research Station, Kovilpatti (lat. 9° N.). During 1926-29 I noticed that a greater number of buffalo cows were brought to service in particular weeks of the months, which suggested that there was some periodicity in these animals coming on heat. The prevailing opinion amongst cattlemen was that more animals came on heat during periods of dark nights. With the aid of Tamil almanacs, I worked out a frequency curve of the services by these bulls during the previous ten years with respect to the new moon and full moon days occurring in each month. It was interesting to note (Fig. 1) two modes in the curve,