ucts Exhibits, Inc., has assembled an exhibit which shows the metallic elements present in the earth's crust, their availability, the locations of commercial sources and the flow of metals and minerals in world trade. Genuine ores, metals and typical fabricated metal products, including specimens and displays supplied by state and federal agencies as well as the major metal producing companies, are included. The exposition opened on August 17 and will close on October 17 at the Metal Products Exhibits in the International Building at Rockefeller Center. It is open every weekday from 10 A. M. to 6 P. M. except Saturday, when the closing hour is 3 P. M. Admission is free.

DISCUSSION

THE EIGHTIETH ANNIVERSARY OF PROFESSOR S. N. WINOGRADSKY

PROFESSOR SERGEI NIKOLAEVITCH WINOGRADSKY, who will reach the venerable age of eighty on September 1, 1936, may be considered by common consent as the dean of soil microbiologists. In the words of his prominent student, Omeliansky, whom he has survived, Russia produced two outstanding bacteriologists, I. Metchnikov in the medical field and S. N. Winogradsky in the non-medical.

Born of a rich and aristocratic family in the region of the Ukraine, Winogradsky was educated in the Universities of Kiev and St. Petersburg. His first scientific interests were directed to the morphology and physiology of bacteria. Finding that the Russian institutions offered only limited facilities for conducting investigations in this field, he left for western Europe, but he did not become expatriated, as was the case of Metchnikov. Winogradsky spent several years in the laboratory of De Bary in Strasbourg and, when the latter died, he settled at the University of Zürich. At these two institutions, he made his epoch-making contributions to the knowledge of autotrophic bacteria. First, the sulfur-oxidizing organisms, the iron bacteria and finally the nitrifying bacteria. The principles laid down by Winogradsky concerning the metabolism of these highly interesting and important groups of microorganisms served as the foundation for the numerous investigations that were to follow. Winogradsky not only developed but discovered this field of microbiology.

In 1891, Winogradsky, while still in Zürich, received a tempting invitation from Pasteur to come to Paris and organize a division of soil microbiology at the Pasteur Institute. He refused, in order to accept another invitation extended to him simultaneously from his home land, to organize a division of general microbiology at the newly established Institute of Experimental Medicine in St. Petersburg. He soon became the first editor of the *Archives of Biological Sciences* and was later made director of the institute. His scientific interest was now turned to the study of the nature and physiology of non-symbiotic nitrogen-fixing bacteria, and later of pectin-decomposing bacteria. Executive duties soon interrupted his scientific work, leading to his final retirement both from active research and from his executive position at the institute, in 1905. Some of his investigations were continued by his capable assistant, Omeliansky, who later took his place at the institute.

Winogradsky retired to his estate in the Podol to engage in practical agriculture. Here, surrounded by his family, he would have spent the remaining years in the manner of a Russian landlord, so well described by the novelists Turgeniev and Tolstoi. However, fate willed it otherwise. The Russian revolution resulted in the complete economic destruction of the class of landowners. Winogradsky, among many others, was forced to leave his native country and seek refuge in foreign lands. In 1921 he found himself in Yugoslavia, without any means of support. Although he was immediately appointed professor at the University of Belgrade, he had little opportunity for pursuing scientific work. Upon learning of his fate, the Pasteur Institute renewed again the invitation extended to him 30 years previously, which he now accepted. In 1922 he established a division of soil microbiology at the Pasteur Institute. A small estate, located at Brie-Comte-Robert, some 40 kilometers outside of Paris, was placed at his disposal.

In his new laboratory, Winogradsky devoted himself primarily to the study of the microbiological population of the soil. In rapid succession, he carried out a series of brilliant investigations on methods of studying microorganisms in the soil, on the nature of cellulose decomposing bacteria, nitrogen-fixing bacteria and nitrifying bacteria. His annual critical reviews dealing with the subject of soil microbiology in the *Bulletin* of the Pasteur Institute and a series of 8 memoirs published in the *Annals* of the institute and dealing with his own investigations, attracted considerable attention and aroused new interest in the science.

At the age of 80, Winogradsky is still engaged in research work. He has few assistants, his daughter, Helene, being his only collaborator. His mind is as active, vigorous and critical as ever. He is anxious

to devote all his available time to his investigations, since he fully recognizes how much of the field will still be left untouched after he is gone. Among the quiet surroundings of the country estate, outside of Paris, enclosed by the traditional stone fence, there lives the sage of soil microbiology, where pilgrims from many countries come to pay their respects.

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A WHALE SHARK OFF BIMINI, BAHAMAS

IN January, 1935, I published in the *Proceedings of the Zoological Society of London* an extensive paper on "The Distribution of the Whale Shark, *Rhineodon typus*." In this I listed 76 recorded specimens as of December 31, 1934. On page 882 of this I wrote:

> For some time newspaper accounts have been sent in to me purporting to relate encounters with the whale shark in the Gulf Stream between Miami, Florida, and the Bahamas. Efforts have been made to get definite facts about these reputed occurrences, but so far in vain. There is no reason why the shark should not be found there.

I have spent much time and effort in the fruitless endeavor to verify these accounts, and while persuaded of their validity, I have not been able to get any photographs nor have I been able to get in touch with any man of scientific training who had seen one of these great sharks in this region. Some of these reports spoke of large spotted sharks, but the identification from this angle is complicated by the presence in these waters of the spotted tiger or leopard shark, which grows to a considerable size. They are said to reach 18 feet, and, while my largest (taken at Key West) only reached 12.5 feet, I have no doubt that an occasional one does reach 16 or 18 feet.

Such then was the situation when on July 9, 1936, I had a call from Dr. G. W. Phelps, a practicing physician of New York City and member of the American Museum. Dr. Phelps has long known of the whale shark and of my interest in it. So he took the trouble to come to my office and to communicate the data which form the basis of this note.

On June 15, 1936, while leaving Bimini, Bahamas, a very large shark was seen swimming over the white coral sand not far away. When the boat came closer, Dr. Phelps at once recognized it as a whale shark, pictures of which he had seen in my articles in *Natural History*. It was described to me as having a square blunt head with a terminal mouth. On the back there were visible at least three longitudinal ridges, and running vertically across these were faint light buff vertical bars. The ridges and bars crossing at right angles gave the side of the fish a checker-board-like appearance, with large buff-colored spots in the squares.

This description surely makes out this fish as *Rhineodon typus*. It was a large specimen. The boat followed it around for about an hour, but the fish showed no fear of it whatever. The boat was 36 feet long and by getting it as nearly alongside the shark as possible, the length of the fish was estimated as fully as great as that of the boat.

The whale shark has long been known from Florida waters. In 1902, B. A. Bean recorded one which came ashore that year at Ormond Beach. Others have been recorded by the writer: one in 1913 at Knight's Key; another in 1919 from near Cape Sable in the Bay of Florida; the third in 1923 at Marathon; the fourth near Miami in 1932. Then I have an unverified account that two or three years ago a small school of whale sharks had been seen by a bridge tender on the Florida East Coast Railway, making a passage in the deep channel under his bridge between two keys.

From the Cuba side of the Straits of Florida, Gudger and Hoffmann in 1928 and in 1930 recorded two specimens; one from each side of the mouth of Havana harbor. Then in 1936, I made known the capture of a third fish from the very mouth of Havana harbor. Furthermore, Dr. Hoffmann has heard of a spotted shark, off Cójimar Village, five miles east of Havana, so well known and so huge that it was locally known as "El Elephante." But it has remained for the Cuban ichthyologist, Luis Howell Rivero, to record in February, 1936, the presence of a small unmounted skin (6 feet long—the smallest known specimen) in the Instituto of Havana. Rivero also reveals that Poey in 1876 listed as *Chetorhinus maximus* a large shark in Cuban waters. But his mention that the fish had white spots on a dark background like a "checker-board" identified it beyond doubt as *Rhineodon typus*.

From these records it is seen that in what may be properly called the Straits of Florida, four whale sharks have been recorded from Florida waters, one from Bahamas, and five from Cuba—a total of 10 specimens. As this great fish becomes better known and better differentiated from the tiger shark, it may be expected that other specimens will be definitely reported from these waters.

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AMERICAN MUSEUM OF NATURAL HISTORY

MEAT DIET: BLOOD AS AN ANTI-SCORBUTIC FACTOR

WITH relation to the prevention and cure of scurvy, there are well-known discrepancies between the results