Dr. H. C. Delsman was on board, saw the fish and made the first record in 1934. Later I secured further data and published them, and for the general paper I secured a splendid photograph of this rammed *Rhineodon.*

A TIGER SHARK RAMMED OFF PERIM ISLAND, RED SEA

In 1936, Major Stanley Flower sent me a clipping from a London paper which read as follows: "Finding her speed reduced by a 25-foot tiger shark impaled on her bow, the 10,786-ton Union-Castle liner *Landaff Castle* had to stop off Perim, the coaling station in the [mouth of the] Red Sea, to remove the shark." In the light of the experience of the *Johan van Oldenbarnevelt* off this very island and of another steamer off Socotra Island nearby in ramming whale sharks, I naturally thought this a whale shark and not a tiger. However, through the help of the U. S. Hydrographic Office, I got in touch with Captain G. H. Gogden, master of the *Landaff Castle,* who kindly gave me full data about this interesting matter.

Where and when the fish was impaled is uncertain, but it was first noticed when close to Perim Island. The shark was rammed just behind the right pectoral fin. The head on one side the bow was turned so that the mouth and white under parts could be seen. The hinder part of the body on the other side of the stem showed the stripes. The exact position of the head and tail on the bow plates was carefully noted and, when the ship docked at Mombasa, these were measured and it was shown that the shark must have been from 35 to 37 feet long. An attempt was made to photograph the fish, but the bow waves prevented this. The ship was stopped and backed, whereupon the shark sank, accompanied by a flock of other sharks which attacked it as it went out of sight.

Captain Gogden knows both the whale shark and the tiger. His shark had a pointed snout with the mouth underneath and having "the form of a curve or half-moon." The body was dark brown, particularly in the region of the stripes. These stripes were wide and extended diagonally from top or left to bottom or right. There are in the Indian Ocean and Red Sea two striped sharks—*Rhineodon,* with terminal mouth and vertical narrow stripes, and *Stegostoma tigrinum,* with mouth and coloration as noted. From this it seems that Captain Gogden's shark was surely the Indian Ocean tiger shark, *Stegostoma tigrinum.* As to the size it attains, I can find little. It is recorded up to 15 feet but must grow longer, since in Ceylon it has been confused with the whale shark (well known there) which grows to 30 or 40 feet.

THE BASKING SHARK, *Cetorhinus maximus*

Whale and tiger sharks are warm-water dwellers, but the basking shark is a cold-water fish. However, *Cetorhinus* grows large—30, 40 or 50 feet—rivalling *Rhineodon* in length. But *Cetorhinus* has a pointed snout and is small forward, whereas *Rhineodon* has a broad blunt head and is tadpole-shaped. *Cetorhinus* is rather sluggish in movements, and here follows an account of an individual rammed by a steamer. This is contained in a clipping from a Norwegian newspaper (dated Oslo, August 6, 1935) kindly sent to me in 1935 by Dr. C. H. Townsend, then director of the New York Aquarium.

On a return trip from the North Cape, the Norwegian ship *Stavangerfjord* is reported to have rammed a giant shark [Brugde, the Norwegian name for the basking shark]. The shark hung fast to the bow and the vessel had to be slowed down in the endeavor to set it free. The crew attempted to get the fish aboard, but failed through lack of proper tackle. The shark eventually got free from the stem while the ship was moving at slow speed. The head of the fish was badly damaged. The shark was estimated to be 25 feet long.

Here then in addition to the 12 whale sharks recorded as rammed by ocean vessels, we have two others, the Indian Ocean tropical tiger shark and the North Atlantic cold-water basking shark. I am unable to ascertain anything about the habits of *Stegostoma,* but all the figures seen show it to be long and lanky, and hence we may presume that it is sluggish in movements. *Cetorhinus* is known to be a slow and deliberate swimmer. This was admirably portrayed on the screen some years ago in the interesting picture "Men of Arran." Hence we must conclude that both these presumed sluggish sharks contributed to their destruction by blundering into the paths of the ocean steamers.

E. W. GUDGER
AMERICAN MUSEUM OF NATURAL HISTORY

APPARENT SPLITTING OF LIGHT FROM FLUORESCENT LAMPS INTO COMPONENT PARTS BY MOVING OBJECTS

MOVING objects illuminated by fluorescent lamps show not only the usually noted stroboscopic effects associated with intermittent flashing light, *viz.,* the appearance of multiple images from moving objects or apparently stationary positions of rotating or vibrating objects, but show in addition an apparent splitting of the incident light into separate colors, depending upon the color characteristics of the lamp. A series of multi-colored images appears when a rod or opaque object is passed across the path of the light. An iron wire or a thin strip of steel made to vibrate in a magnetic field produced by a 60 cycle A.C. current appears as if consisting of two parts. In light from a "daylight" lamp the outer image appears red, the inner image—blue. The same phenomenon is readily observable when such light is viewed through slits in

revolving discs, after the method of Plateau. The relative position of the red and blue bands varies with the direction of rotation. Splitting of light also appears when a triangular faced mirror is made to rotate in the path of the light.

Separation of the incident light varies with the source. A wide degree of separation has been observed when a light divider, consisting of a disc 60 cm in diameter, perforated at the periphery with 60 narrow radia slits, is rotated at a constant speed. Under these conditions "blue" light from the lamp appears to be broken up into a comparatively wide pale blue band and a narrow dark band either dark brown or maroon. Light from the "green" lamp is divided into yellow-green and pale blue bands of nearly equal width. Light from the "daylight" lamp is clearly divisible into orange red and greenish-blue bands, which spread further into merging bands discernible as purple-blue-green-yellow-orange and red.

There are several conceivable explanations for the apparent separation of light into its component parts. These possibilities include accounts based either upon subjective or psychological factors or upon objective physical phenomena. In the former instance the apparent splitting might be attributed to a variation in the threshold of stimulation of the end organs of the eye by alternating light as in Benham top wherein alternate black and white stimuli give rise to the sensation of color. Obviously this possibility might be tested by color photography. Since a color pattern comparable to the one described has been reproduced on a Dufa film by exposure for 30 minutes to light reflected from the rotating wheel of an electric clock the phenomena can not be explained upon a subjective basis and it is necessary to consider objective physical factors.

These chromogenic phenomena do not appear when moving objects are illuminated by light from ordinary incandescent lamps or in sunlight.

This leaves the nature of the light produced by the fluorescent lamps as a possible basis for the phenomena. The mechanism of operation of the lamp suggests the possibility that there are differences in the time intervals of emission of light of various wave-lengths. It may be assumed that the mercury discharge appears first, and this in turn stimulates or activates the fluorescent coating. Characteristic wave-lengths of the latter are then emitted. This cycle of color emission is repeated for each electrical cycle. Moving objects merely provide an optical means of separating these alternate flashes. Under ordinary conditions the rapidity of the flashes obscures the presence of the rapidly alternating production of colors. High-speed color photography synchronized to the various parts of the cycle could definitely determine the correctness or incorrectness of this view. In the absence of facilities for making this direct test an alternative trial mimicing the postulated conditions was carried out. A disc with alternate red and blue segments was rotated while illuminated by light from an incandescent lamp. When viewed through a slit in a second stationary disc a composite of the red and blue appeared. When the "analyzing" disc was rotated alternate flashes of red and blue were evident. While lacking a crucial test, the foregoing considerations make it appear that alternate flashes of light of various wave-lengths is the most probable explanation for the apparent splitting of the light of fluorescent lamps into component colors by moving objects.

C. WESLER SCULL
CHARLES G. GROSSCUP
E. G. WITTING

ABINGTON MEMORIAL HOSPITAL,
ABINGTON, PA.

BIOGRAPHY OF DR. WILLIAM H. PARK

I AM at work upon a biography of Dr. William Hallock Park, the late director of the New York City Board of Health Laboratories. Any assistance rendered, in the form of the loan of letters, anecdotes or other memorabilia, will be gratefully received, and due acknowledgment given. Reasonably prompt return of letters, etc., is insured.

WADE W. OLIVER

THE WILLIAM HALLOCK PARK LABORATORY,
BUREAU OF LABORATORIES,
NEW YORK, N. Y.

QUOTATIONS

THE END OF "DISCOVERY"

WITH this issue *Discovery* has to end. It began at the end of the last war, and endured with some vicissitudes until April, 1938, when it was renovated by the Syndics of the Cambridge University Press. Now, after two years in its new form and six months of another war, they have reluctantly decided that it must end.

It seems a pity. To any of us who have been concerned with the editorial side of *Discovery*, it is a personal loss to see it go; and we believe that will be true of a good many readers. But it is no use repining. Perhaps, after this war, *Discovery* will be started again, or something like it will. The only service which we can perform, while the end of *Discovery* is fresh in our minds, is to put down one or two reflections for the benefit of our possible successors.