Two Shark Incidents at Eniwetok Atoll, Marshall Islands[1]

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THE TWO SHARK INCIDENTS described in this paper can be be considered as unprovoked shark attacks (Gilbert *et al.* 1960: 324). The importance of documenting these incidents is that they were observed by persons with some experience in the study of animal behavior. The great need of precise and detailed observational information on shark attacks has been stressed in recent reports on the subject (Coppleson, 1958: ix; Gilbert *et al.,* 1960: 323; Tester, 1960: 181). It is the belief of the authors that well-documented reports of shark incidents will contribute significantly to a clearer understanding of the stimulus situations in which shark attacks on man can be expected.

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FIRST INCIDENT

At noon on September 1, 1960, Hobson, Mautin, and Reese were engaged in spear fishing activities on a reef about 25 ft. below the surface and approximately 200 yd. from shore on the lagoon side of Parry Island, Eniwetok Atoll, Marshall Islands. Dr. Richard A. Booloo-tian of the University of California was in a 16-ft. skiff powered by a 35-hp. outboard motor which was idling nearby. The sea was calm, there was very little wind, and the sky was clear. Underwater visibility was in excess of 100 ft. Table 1 indicates the nature of the equipment that was being used. The spatial relationship of the divers to one another and to the skiff above the reef at the start and the end of the encounter is shown in Figure 1.

Hobson speared a 25-lb. grouper (*Plectropomus* sp.), which swam, trailing the spear, beneath a large coral boulder (rock 1, Fig. 1). Almost immediately three grey sharks (*Carcharhinus menisorrah,* Fig. 2), approximately 5–7 ft. in length, appeared from the deep water of the lagoon and began to circle the rock. Hobson observed (1) the sharks were swimming in an excited manner, and (2) they paid no attention to him floating quietly on the surface. Suddenly the grouper broke cover and dashed to a second large coral boulder (rock 2, Fig. 1). The three sharks immediately followed and began to circle the second rock.

Reese, who was directly above rock 2, noticed the sharks and was also impressed with the excited appearance of their swimming. Meanwhile, Hobson swam towards rock 2 to inform Mautin and Reese of the speared fish and the excited sharks in the area. At about this time Mautin observed the sharks and noted their excited state. All three began to swim toward the skiff, making a conscious effort not to produce an undue amount of commotion on the surface. There were now four or five sharks swimming in an excited manner on the reef below. Mautin, who was unarmed and farthest from the boat, was swimming strongly in an effort to join the others. Both Hobson and Reese observed that Mautin's swim-fins were breaking the surface of the water resulting in clouds of bubbles being carried beneath the surface at each down stroke.

The following sequence of events was very rapid. Almost simultaneously with the above observation, Mautin had reached a position almost above rock 2 (see Fig. 1). Suddenly one of the sharks rose from the bottom and swam very fast in a direct line towards Mautin. Mautin saw the approaching shark and rolled on his right side

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TABLE 1

PHYSICAL CHARACTERISTICS OF DIVERS AND NATURE OF EQUIPMENT USED AT TIME OF FIRST INCIDENT

	HOBSON[1]	MAUTIN	REESE
Weight	180	195	175
Height	5′ 10″	6′ 3″	5′ 9″
Skin color	brown	brown	brown
Bathing suit	khaki	none	gray & white
Swim fins	light blue	yellow	black
Mask	dark blue	white	dark blue
Snorkel	green	white	black
Spear	Hawaiian sling with 6-ft. free shaft	none	Hawaiian sling with 6-ft. free shaft

[1] Same equipment in second incident.

in order to face the onrushing shark. When the shark was very close he kicked it violently on the snout with his swim-fins. The shark veered away, circled once or twice behind Mautin and, upon the approach of Hobson and Reese, swam away. All three swimmers were now quiet in the water.

Immediately after the first shark left the bottom, a second shark began to swim toward the surface on the same course as the first shark. However, after approaching approximately halfway, it returned to the reef floor. It is suggested that the cessation of commotion on the surface

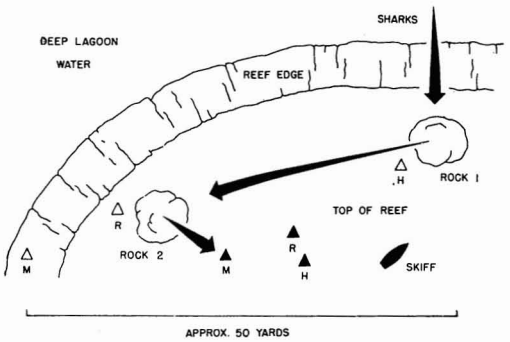

FIG. 1. Spatial relationship of divers to one another and to skiff above the coral reef at start of incident (white triangles) and at time of shark attack (black triangles). Letters beside triangles refer to diver which they represent, H = Hobson, M = Mautin, and R = Reese. Arrows indicate direction of movement of sharks.

and the presence of three swimmers resulted in the first shark swimming away and the second shark returning to the bottom.

Both Hobson and Reese were approximately 20–30 ft. from Mautin at the time the first shark attacked; however, there was no indication that the shark directed any attention toward them. It appeared that the shark was orienting to the agitation at the water's surface caused by Mautin's strong swimming. This observation supports the suggestion by Tester (1960: 183) and others that sharks are attracted by unusual commotion. A second possibility is that the shark was attracted to the bright yellow swim-fins which Mautin was wearing, but Hobson, on the basis of unpublished data, feels that this is unlikely.

Mautin gained the impression that the shark came for him believing he was the wounded fish, and that competition from the other sharks resulted in the direct and swift attack not prefaced by the usual cautious investigation.

The four to five sharks were still swimming in the same excited manner in the vicinity of rock 2 when the divers left the water.

SECOND INCIDENT

A second incident occurred the following day, September 2. Again the time was approximately noon, the sky was clear, and the surface of the lagoon was calm with underwater visibility in excess of 100 ft. Fish were being speared in shallow water along the beach at Sand Island adjacent to the deep water channel leading into the lagoon from the east. Hobson was in the water, and John C. Kay, a graduate student at the University of Hawaii, was standing off the beach in a 16-ft. skiff with the outboard motor idling. Hobson speared a 10-lb. parrot fish (Scaridae) which carried the spear shaft toward deeper water. About 35 yd. from the beach, at the edge of the reef, the bottom drops abruptly from approximately 15 ft. to over 100 ft. Grey sharks are common along this drop off. Hobson pursued the fish along the bottom, thus avoiding the surface commotion which had apparently attracted the attention of the sharks the day before. He overtook the injured fish on the bottom at a depth of approximately 15 ft. on the edge of the drop off. When the trailing spear

shaft was grasped, the fish struggled free. At the same instant a 6-ft. grey shark (*Carcharhinus menisorrah*) was upon Hobson, swimming at a slightly upward inclination directly at his face. The mouth of the shark was open, and movement of the jaws was distinctly recalled. Instinctively Hobson projected his right arm, catching the onrushing shark under the head. This, combined with a twisting, ducking motion, diverted the shark's forward rush over Hobson's left shoulder. The shark turned abruptly and circled so close that the spear which was still in the left hand could not be brought into play. As the shark circled, Hobson turned with it, pushing it away several times with his open hand until the shark was circling at a distance of approximately 4 ft.—enough room to bring the spear into use. The blunt end, which happened to be the end toward the shark, was used as a prod, and after a few jabs the shark opened its circle to approximately 10 ft. The shark appeared to be rapidly losing its aggressiveness. It seemed that apprehension toward the diver was now displacing the attack response which had asserted itself seconds before. As the boat approached, the shark fled into the adjacent deep water. The entire incident lasted only a few seconds and took place entirely on the bottom.

The shark was recognized by a deformation of the dorsal fin as one which had been involved in many of the behavior experiments conducted during the summer. It was, therefore, very familiar with the sight of humans in the water. There had been no apparent hesitation involved in its attack. Presumably its approach was made from deep water, coming over the edge of the reef which was within 10 ft. of the attack site. An approach from any other direction would have been observed.

Although the use of bare hands in warding off a shark has generally been discouraged (Gilbert *et al.*, 1960: 326), this was the only recourse in the present situation. The effectiveness of the hands in this case was no doubt largely due to the relatively small size of the shark. No lacerations of the hands occurred.

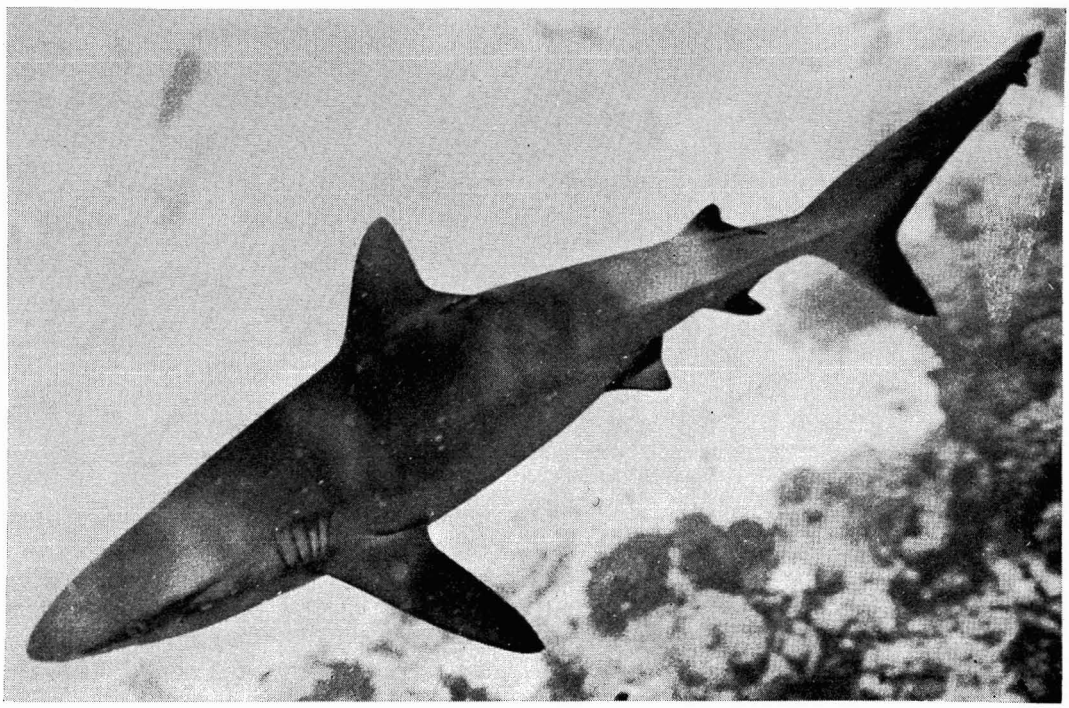

FIG. 2. *Carcharhinus menisorrah,* the species which was involved in both incidents, is common in the lagoons of most Pacific atolls, attaining a length of about 7 ft. (Photo: E. Hobson.)

TABLE 2

SUMMARY OF SIMILARITIES AND DIFFERENCES BETWEEN THE TWO INCIDENTS

	FIRST INCIDENT	SECOND INCIDENT
Activities at time of incident	spear fishing	spear fishing
Dead or injured fish present	yes: 1	yes: 1
Skin diving or SCUBA	skin diving	skin diving
Species of shark	*Carcharhinus menisorrah*	*Carcharhinus menisorrah*
Number of sharks in area	3–5	1
Size of sharks (length)	5–7 ft.	6 ft.
Date	Sep. 1, 1960	Sep. 2, 1960
Time of day	approx. noon	approx. noon
Condition of sky	clear, few clouds	clear, few clouds
Condition of sea	calm	calm
Location of incident	lagoon, Eniwetok	lagoon, Eniwetok
Distance from shore	200 yd.	35 yd.
Near deep water	yes	yes
Underwater visibility	100 ft. +	100 ft. +
Depth of water	25 ft.	15 ft.
Depth at which incident occurred	surface	15 ft., bottom
Water temperature	approx. 85° F.	approx. 85° F.
Nature of bottom	coral reef	coral reef
Number of persons in water	3	1
Nature of approach	direct, fast	direct, fast
Area of body approached	feet	head
Persistency of shark	moderate	considerable

DISCUSSION

The two incidents are summarized in Table 2. The authors believe that neither the coloration of the swimmer's equipment, the condition of the water, nor the time and nature of the day are significant. There are four major differences between the two incidents which are believed to be significant: (1) the number and relative positions of persons in the water, (2) the number of sharks in the vicinity, (3) the site of the incidents, the first on the surface, the second on the bottom, and (4) the location of the diver relative to the wounded fish. There are three major similarities between the two incidents which are believed to be significant: (1) both occurred in the vicinity of, and subsequent to, the spearing of a fish; (2) both occurred near deep water; and (3) both involved the same species of shark, which attacked without hesitation.

The last point may be explained by two facts. First, throughout the summer, Hobson, Mautin, and others noticed that *C. menisorrah* was a far more aggressive shark than the other two species which are common in the lagoon (*C. melanopterus* and *Triaenodon obesus*). This view is supported by Harry (1953: 48), who reports that the natives of the Tuamotus fear this species and claim it will attack man. Second, both incidents occurred within approximately a mile of where shark behavior experiments were conducted throughout the summer. Hobson recognized the shark in the second incident as having been a participant in these experiments, and it is probable that the sharks involved in the first incident had also had considerable experience with seeing human beings in the water. It is the belief of Hobson, Mautin, and others that the sharks became progressively bolder towards humans during the course of the summer. Thus it may be significant that both incidents occurred at the end of the summer.

It appears that one can generalize to this extent. Some species of sharks, for example *C. menisorrah,* are attracted to an area where there are injured fish. Apparently stimuli originating with the injured fish release an excited, highly motivated pattern of exploratory behavior in the shark. At such times many sharks seem to be particularly reactive to any unnatural disturbances created by humans in the general area.

This was illustrated by the response to the commotion at the surface of the water in the first incident. Furthermore, it seems they may also attack a human simply because he is located in an area of high concentration of the postulated stimulating factor, such as occurred in the second incident. In both incidents, visually directed thrusts at the sharks using hands, feet, or spear proved effective in momentarily warding off the attacking shark. Eibl-Eibesfeldt and Hass (1959: 746) and others have also noted the effectiveness of a pointed shaft as a shark deterrent.

CONCLUSIONS

1. Sharks may be expected to appear wherever spear-fishing activities are undertaken, particularly in those areas where aggressive species are known to occur.

2. When sharks appear under these circumstances they may attack a human located within the immediate area of the stimulating factor as well as humans associated with an unnatural amount of activity in the general area.

3. Sharks which have become familiar with the sight of humans in the water may be more likely to attack humans than those which have not.

4. The conclusion reached by others—that visually directed blows, preferably using a pointed instrument (such as a spear shaft), are effective in warding off sharks—is confirmed.

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