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SWORD-FISH *(XIPHIAS GLADIUS)* ATTACKS SUBMARINE (ALVIN)

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Introduction

On 6 July 1967 at 1422 hours EDT, the Woods Hole Oceanographic Institution submarine ALVIN (Mavor 1966) reached the sea floor of the Blake Plateau (dive No. 202; 31°09′N, 79°13′W). The water on the bottom in 610 meters was clear and the visibility with all the external lights on was 11 to 13 meters. The water temperature at the bottom was 7.9°C.

Soon after landing on the sea floor we noticed a large swordfish lying on the bottom about 10 meters away (Fig. 1). At first we mistook it for a hummocky feature of the sea floor, since its colour blended with that of the mud. The fish was to starboard of the submarine, a little ahead and parallel with it, heading into a bottom current of 0.5 kt (bearing 150° magnetic). Shortly after the submarine had moved 3 meters ahead (1428 hours EDT time), the fish suddenly arose from the bottom, turned immediately towards ALVIN, and attacked without hesitation. It struck just below the starboard window, (Fig. 2), thrusting its sword full length into the joint between the upper and lower parts of the fiberglass external hull. Through the starboard window we could observe the fish violently trying to disengage itself and, in the process, tearing some of the skin and flesh from its back. These wounds bled slightly.

When an indicator inside the submarine showed a possible leak in one of the external disconnect boxes, the dive was aborted and we commenced to return to the surface. During the ascent the fish periodically struggled, but failed to break free.

As ALVIN approached the surface, the divers, who assist in bringing the submarine onto the tender's cradle, threw a noose around the fish's tail, securing it to the submarine (Fig. 3). Taken from the water, the fish again struggled violently and, in so doing, wrenched off its sword, leaving it stuck in the gap between the hulls. However, the line

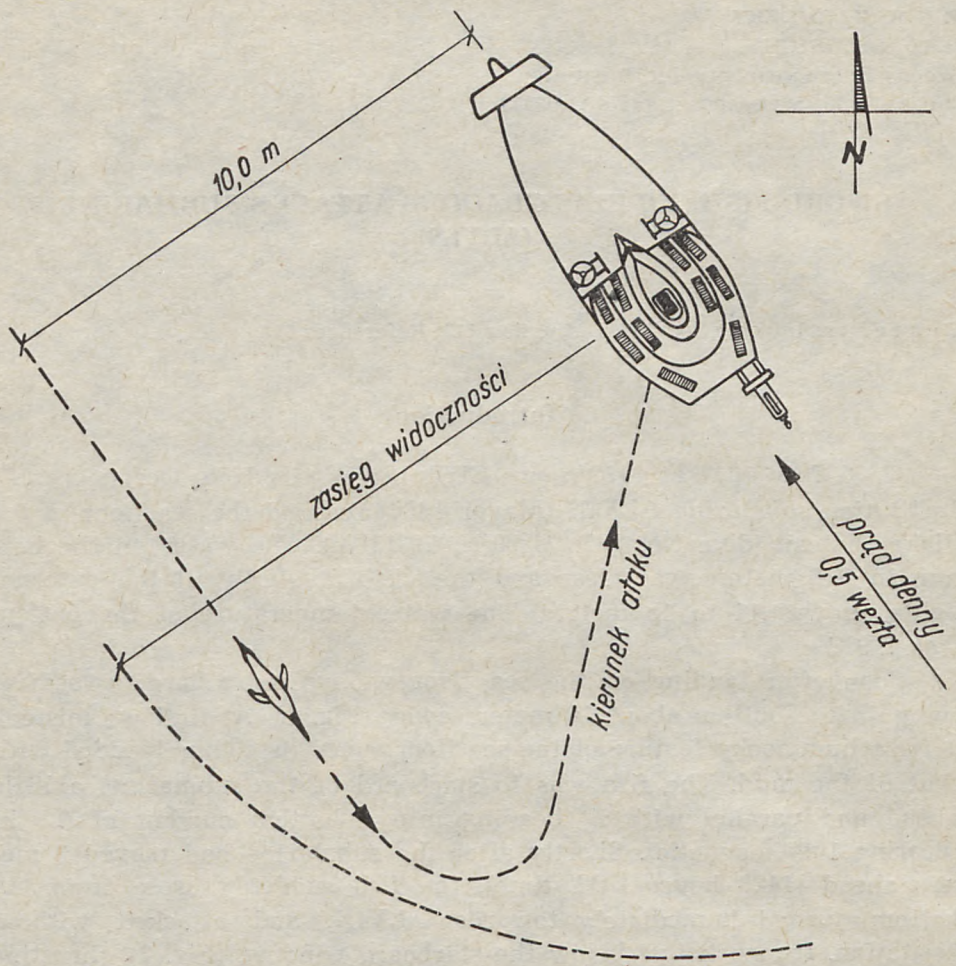

Fig. 1. The relative positions of ALVIN and the sword-fish on the floor, of the Blake Plateau

Ryc. 1. Moment ataku ryby miecznika na podwodny statek badawczy „Alvin"

around its tail prevented loss of the fish. While being raised the fish vomited several squid.

It proved to be broadbill swordfish, *Xiphias gladius* Linnaeus 1758, 2.45 m long (fork length including bill) and weighing 89 kg. Its stomach protruded from its mouth. In addition to the damage done to the sword, the lower jaw had also been broken some 8 cm from its tip by the force of impact. Since no ichthyologist was aboard, the sex was not determined.

After some two hours' work, the crew removed the sword wedged in the submarine. The inclined surface of the fibreglass hull had deflec-

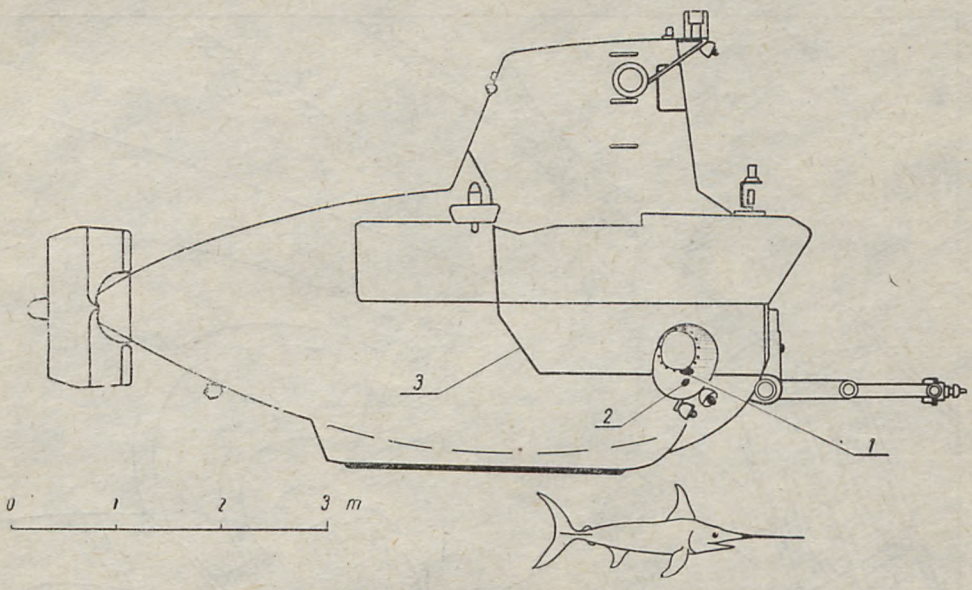

Fig. 2. ALVIN and the sword-fish drawn to scale, showing the location of the joint in the external, flooded hull of the submarine, the point of impact and the sword entry at the starboard window: 1 — sword wedged here, 2 — point of impact, 3 — junction in external (flooded) hull

Ryc. 2. „Alvin" i miecznik w zbliżonej skali widziane zewnątrz statku podwodnego pogrążonego w wodzie oraz punkty uderzenia i wbicia miecza w okno prawej burty: 1 — miejsce wbicia miecza, 2 — miejsce uderzenia, 3 — spaw zewnętrznej powłoki kadłuba

ted the sword towards the joint of the hull, and the 76-cm sword was thrust in as far as its base. The sword just barely missed the electrical cables and disconnect box and had scraped along the steel inner hull. The force of impact must have been formidable, although the mass difference between one tenth of a ton of fish and fifteen tons of submarine did not permit the attack to register. Inspection of the disconnect boxes showed no flooding and no damage to the insulation of the electrical cables.

The swordfish was dressed and over 54 kg of meat provided a succulent supplement to the ship's fare.

DISCUSSION

Only recently has it become clear that broadbills range over considerable depth. Probably because of the long tradition of a successful harpoon fishery, it has been assumed that the swordfish is a creature of the near-surface. Even in the relatively young longline fishery,

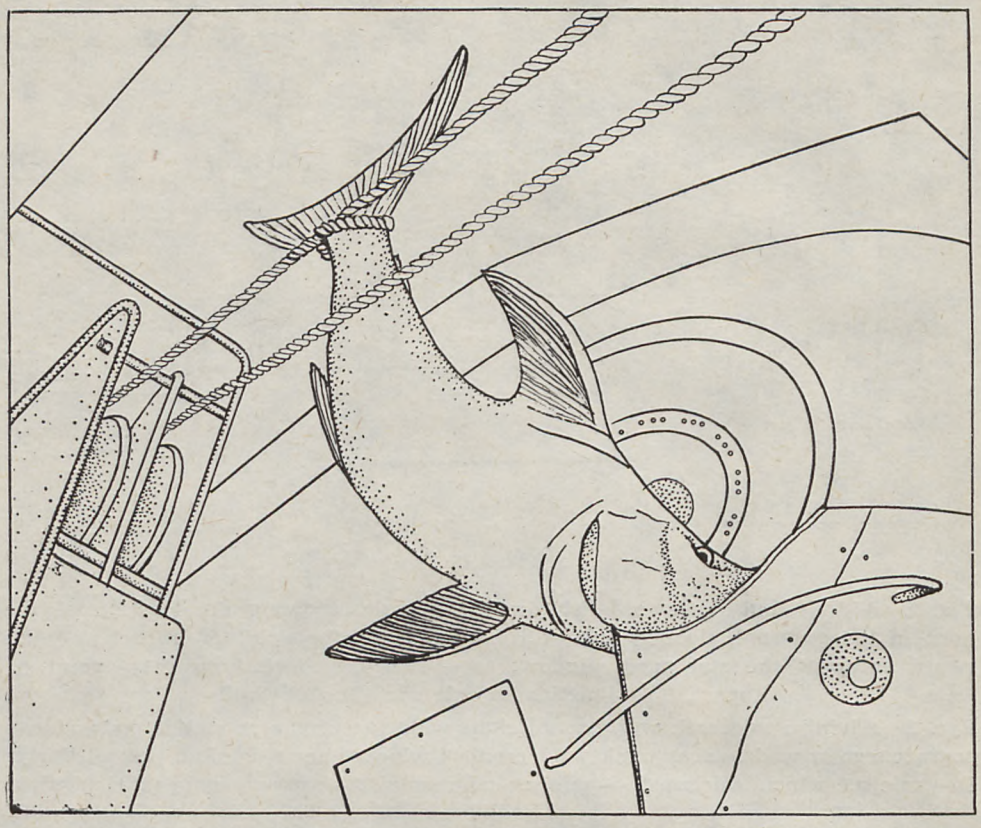

Fig. 3. The sword-fish with its bill stuck in the joint of fibreglass hull, secured by the line over its tail to the submarine. DSRV ALVIN is being hoisted in its cradle to the deck level of the catamaran tender R/V LULU

Ryc. 3. Ryba miecznik z mieczem wbitym w złącze pleksiglasowej powłoki z ogonem przywiązanym liną do statku. Podwodny statek badawczy ALVIN jest windowany na pokład katamarana badawczego LULU

broadbills are only rarely taken on hooks set as deep as 180 m, but, of course most sets are shallower. Bigelow and Schroeder, 1953) speak of incidental captures on halibut lines set as deep as 200 fm (ca. 365 m), and Eschmeyer records the capture of two immature specimens in a balloon trawl fished on the bottom in 190 fm (ca. 350 m). There is a record (*Anonymous* 1963) of a large broadbil that apparently attacked and became fouled in a heavy polypropylene line at a point which had been at a depth of 1000 ft. (ca. 305 m).

ALVIN is not the only submarine that has encountered broadbills. During a series of five dives in the northern Gulf of Mexico, in which the junior author participated, broadbills were sighted on three occasions from the Westinghouse Corporation DSRV DEEPSTAR 4000. On

dive No. 217 (28 May 1967, 29°28′N, 86°53.7′W) swordfish were seen in the midwater at 450 m and on the bottom at 630 m. On dive No. 219 (29 May 1967, 29°25′5″N, 86°57′W) a fish was seen in the midwater at 340 m.

That broadbills may approach the bottom is not unexpected, for such bottom-living fishes as rattails (*Macrouridae*) and sometimes haddoock *(Melanogrammus)* have been found in their stomachs (Bigelow, Schroeder 1953) They have also been taken in bottom trawls (Eschmeyer 1963), and were not infrequently hooked on the bottom trawl-lines set for halibut and tilefish during the period when that fishery flourished (Bigelow, Schroeder 1953). The ALVIN sighting shows that broadbills may at times even rest on the bottom.

Generally considered a warm-water fish, the submarine sightings indicate that broadbills tolerate water much cooler than has previously been thought. The ALVIN encounter occurred in water at 7. 9°C. The DEEPSTAR sighting at 630 m was in water of 8°C; the mid water sighting at 450 m occurred in water between 8° and 10°C.

Singe Pliny (Plinty...), reports of swordfish attacks have appeared with fair regularity, though attention must be paid to the recorder's use of the word swordfish. "Swordfish" refers variously to the broadbill *Xiphias,* to istiophorids, in particular the marlins *Makaira,* and even to the killer whale, *Orcinus orca.* Presumably unprovoked attacks by *Xiphias* on whales have been reliably reported within the last century by True, Ruud, Jonsgard, and Nemoto (True 1880).

Unprovoked attacks by *Xiphias* on inanimate objects are rare. Smith reports the finding of many marlin spears, but of only one broadbill sword, in bales of rubber adrift as flotsam in the Indian Ocean. Most unprovoked attacks on vessels by "swordfish" hurn out to have been made by marlins, and not *Xiphias* (Bigelow, Schroeder 1953). On the other hand, the provocation provided by a heavy harpoon and lily iron is enough to make attacks so common that certain cautious fishermen have put iron plates or concrete slabs in the bottom of their dories to prevent such incidents.

What precipitates an unprovoked broadbill attack remains a matter of speculation. It cannot, as in the case of a shark attack, be understood as a part of the feeding behaviour since the objects of the broadbill's attacks are so large. It is possible that the attack is defensive, although it is most doubtful that the majority of whales, for example, pose any threat to a swordfish. The problem was appreciated early, and probably best answered, by Oppian who wrote (Oppian 1772).

Nature her Bounty to his Mouth confined, Gave him a Sword, but left unarm'd his Mind.

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ATAK MIECZNIKA (*XIPHIAS GLADIUS*) NA ŁÓDŹ PODWODNĄ „ALVIN"

Streszczenie

Dnia 6 lipca 1967 r. łódź podwodna „Alvin" z Instytutu Oceanograficznego z Woods Hole osiągnęła dno Blake Plateau na głębokości 610 m. Widzialność przy wszystkich zewnętrznych światłach statku wynosiła 11—13 m, temperatura wody 7,9°C. Na dnie leżała ryba miecznik, która zaatakowała „Alvina" i wbiła swój cały miecz między górną a dolną część okna. Ryba miotała się, by wyciągnąć „miecz", lecz tylko raniła sobie skórę i mięśnie. Postanowiono wrócić na powierzchnię. Ogon ryby przywiązano. Pomiary wykazały, że długość miecznika wynosiła 2,45 m, ciężar 89 kg, długość miecza około 76 cm. Tego rodzaju nie prowokowane ataki miecznika na obiekty martwe w morzu są rzadko spotykane. Obserwacje nad biologią miecznika są aktualnie prowadzone i stanowią cenny przyczynek do badań nad tym gatunkiem.

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