AMERICAN MUSEUM NOVITATES

Number 310 | Published by THE AMERICAN MUSEUM OF NATURAL HISTORY New York City. | April 24, 1928

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A MACKEREL (*SCOMBER SCOMBRUS*) WITH A RUBBER BAND ROVE THROUGH ITS BODY

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On August 1, 1927, Dr. John E. Bailey of Clinton, Conn., presented to the American Museum a specimen of the common mackerel which is the subject of this article. All that is known of the fish is that it was obtained from the market of Byron Baisden of Clinton, Conn., on July 31, 1927, and that it had been caught off Montauk or Block Island, probably on the preceding day. It came to me with the viscera in pretty bad shape, was at once put in 70 per cent alcohol, was later photographed, and has been studied in the endeavor to ascertain how this rubber band came to be rove through the body.

This fish is a specimen of the common blue-backed mackerel, *Scomber scombrus*, 13.25 inches (336 mm.) in standard length (from tip of lower jaw to the base of the caudal fin), and 15.75 inches (400 mm.) "over all" length between perpendiculars; and its girth in the region of the insertion of the rubber band is, after long immersion in alcohol, 6.25 inches (158 mm.). It came to me in fair condition so far as external parts were concerned and its torn mouth indicated that it had been caught on a hook—it was evidently feeding freely. Save for the rubber band there was nothing abnormal about it.

With regard to the band, considering the fish from the exterior, the facts are as follows. Measuring back in the mid-lateral region of the body 5.13 inches (130 mm.), we come to the hole where the rubber band was inserted about midway of the depth of the body. This hole was considerably larger than the band and allowed it to be freely drawn back and forth through the hole. The band was continuous, without knot or visible point of junction of ends—in short it was exactly as it came from the maker, a cross-section cut from a rubber tube. Being delayed in the study of the fish, and finding that the band was becoming soft from the action of the alcohol, I ran a bit of cord through the hole to mark its place.

The fish had certainly worn the band for a long time and had evidently gotten it on or in its body when the band was new and very contractile. Furthermore, it had worn this band in two positions. Study

of the figures will show that at first the band had extended squarely across the body vertically over the hole through which it ran in the body of the fish. Here it had by pressure made a distinct groove clear across the back, shallowest on the right side but much deeper (at least twice) on the left. No scales were to be found in this groove, the bottom of which was made up of the integument, here tough and (after months in alcohol) leathery. The groove was most marked in the mid-dorsal region. Here the extreme end of the first dorsal spine had been bent down but not permanently distorted. Not so, however, the second ray, which was normally the longest in the spinous dorsal. The band crossed this spine apparently about the middle. The outer half was gone and the very end was permanently bent down like a human toe that has a cramp (the "hammer toe" of orthopedic surgery). The third ray had its end bent in the same fashion. Of the fourth ray nothing was left but a rudiment of the base. Then came a space about 0.4 inches (6 mm.) long in which spines were entirely lacking. Judging by the intervals between spines one and four, there must be about two spines lacking here. All these structures point to the fact that the fish acquired the rubber band when it was new and very elastic, and that it exerted not merely a steady but a strong pressure on the fish.

Later the band (possibly losing some of its elasticity) became shifted backward 0.7 inch (17 mm.) and formed a new groove which it was occupying when it came to the Museum. Here, despite its loss of elasticity and possibly as a result of its having some "play," the band cut a wide channel across the back—4 mm. wide at the narrowest point on the dorsum, 6 mm. at the widest on the left side, and 9 on the right side. This groove is not a simple scaleless depression in the integument as is the forward groove, but is cut down through the skin and clear into the muscle segments. This cut extends downward on either side clear to the hole tunnelling the body. Marked also are the results on the spines, four of which are affected. The first one (apparently about the 6th or 7th of a normal spinous dorsal) has the extreme outer end apparently gone. Of the next spine, the point (6 mm. long) is broken off and hanging in the membrane. The third has quite half its length gone, and the fourth, like the fourth at the other groove, is reduced to a mere stump not more than 2 mm. long. This, it should be noted, lies just on the anterior edge of the groove. Caudalwards of this stump I am able to find three shorter spines (the last a mere rudiment deep in the groove). Here then can be counted 11 spines, and since the fish normally has 11 or 12 in the first dorsal, it apparently has the full number. However, in the anterior groove across

the dorsum there is lacking at least one and possibly two spines. Apparently then, if one or two spines are lacking, this fish has at least one spine too many. However, the hindmost spine of all (number 12 or 13) is a mere rudiment in this specimen, and would never have projected above the groove in which the spinous dorsal folds down. Probably it is never found and counted in any specimen.

It is plain that the anterior groove is the older, since the posterior had the band in it when the fish was brought in, and since this had the groove cut down into the very muscles. It seems probable that the band, while *in situ* in the anterior groove, cut this down also into the flesh. This has the added proof of the condition of the spines in the first groove. If this conjecture be true, then, when the band became shifted backward, regeneration of integumentary tissue across the bottom of the groove took place, but the groove was not filled in.

Close inspection of Figs. 1 and 3 will show that below the tunnel there is, on the side of the body, a distinct line from the hole to the under side of the body. This shows best on the fish's right side, but it is to be seen on the left side also, though here it is confused by a crease in the abdominal wall. This latter in its upper half is confluent with the marking referred to, but in its lower half it slants foward of the marking.

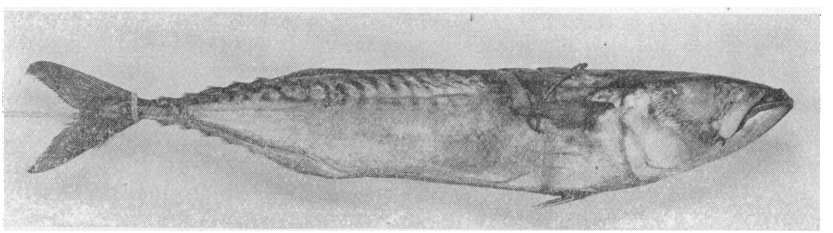

Fig. 1. The mackerel seen from the right side with the rubber band displaced toward the head. The first groove (now healed) extends across the back over the hole. When the fish was taken the rubber band, still strong and elastic, was found in the hinder and more recent groove which had been cut down into the muscles of the back. Note the mark in the skin extending ventrally from position of the band.

The marking is continued across the ventral surface of the abdominal wall. This looks as if the rubber band encircled the ventral as well as the dorsal part of the body. The data set forth in the preceding part of this paper, but especially in the last paragraph, lead to the conjecture that the band once encircled the fish, that it gradually cut through the soft tissues, that these severed tissues reunited, regenerated, and that the band thus

eventually came to rest (at least temporarily) in the position in which it extended squarely through the abdomen. For confirmation of this the fish was dissected, but a most unfortunate condition was revealed. When the fish reached me, one and possibly two days after it had been caught, the internal organs were pretty far gone, though the exterior was in fair condition. I at once made two cuts in the abdomen to admit the preservative, and immersed the fish in 70 per cent alcohol.

Months later, on opening it up, great was my disappointment to find that the greater part of the internal organs had gone to pieces and that the decomposed parts had been washed out. Furthermore, the peritoneal lining of the abdomen was gone and the body wall itself was much broken up, ribs and shreds of muscle extending out into the cavity. All that could be found was that the internal openings of the holes in the body

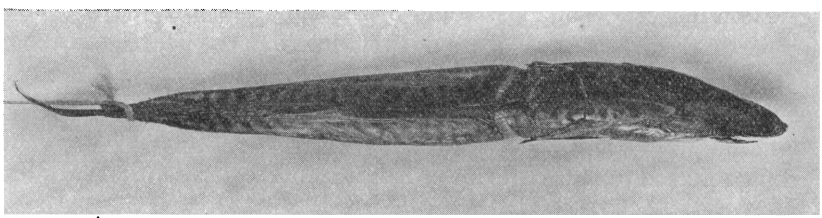

Fig. 2. Dorsal view of mackerel showing the band and the old and new grooves. Note the distorted spines, especially the one in the first groove. These, even better than the size and depths of the grooves, indicate the pressure exerted by the rubber band.

walls were much larger than the outer apertures, apparently indicating that that part of the band extending through the abdomen had been subject to considerable agitation and that this had caused the formation of funnel-like openings on the inner sides of the body wall. There seemed to be faint traces of vertical lines in the muscles of the inner body wall, but the muscles are in such bad condition, so frayed out, that these appearances may be and probably are entirely accidental. In any case these markings cannot be offered as evidence of the upward passage of the rubber band.

Much had been hoped for from a study of the viscera. Had the alimentary tract been held up in a loop above the rubber band, it would have been strong evidence that the band had cut through the body wall in its upward migration due to its contractility. It could not have cut through the alimentary canal without of course causing death.

For an explanation of this phenomenon, one is left largely in doubt. The band was in the position shown in the photographs, and by examination immediately after the fish was handed to me it was seen that it was absolutely continuous, without knot or any indication of point of junction of ends—it was a band made by transversely cutting a seamless rubber tube. Since this is true, it could only have gotten in place by the fish, when younger and smaller, running its head through the band and getting it round its body at the largest circumference. In proof of this, attention is called to the lines extending from the hole down one side, across the abdomen and up the other side to the other hole.

As the fish grew larger the band exerted greater pressure and presently formed a groove across the abdomen. As time went on the band cut deeper (upwardly) and regeneration took place closing up the cut

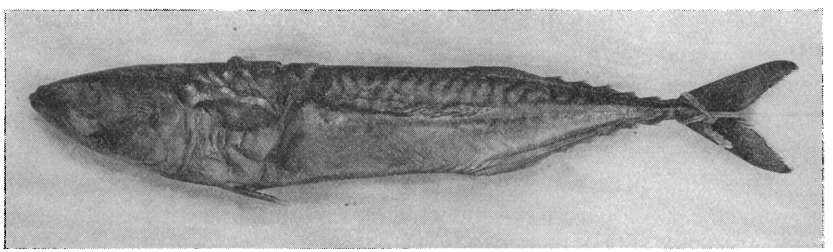

Fig. 3. View of mackerel from left side, showing conditions much as in Fig. 1. Note here the mark on the side of the fish below the hole. This is somewhat obscured by a crease in the body wall, which, however, turns forward leaving the mark fairly clear below.

below as this progressed above, until the condition came about which existed when the fish was caught. The time element here is uncertain for we do not know how large the fish was when it acquired the rubber cincture, nor do we know the life of a rubber band in salt water. But, as the facts are, there is no other explanation or even conjecture tenable. We are caught in a cul-de-sac.

But the proffered explanation is not so preposterous as it seems. Elsewhere[1] I have brought together all the available data on foreign bodies embedded in the tissues of fishes. I myself have twice found such —once a pipefish, and again the vertebral column of a fish embedded in the mesenteric folds of living and perfectly healthy fishes. I also re-

[1]Gudger, E. W. 'Foreign Bodies Found Embedded in the Tissues of Fishes.' Natural History, 1922, XXII, pp. 452–457, 6 figs.

corded three hitherto unpublished instances from the notes of the late Vinal Edwards, of the U. S. Fisheries Laboratory, Woods Hole, Mass., and then brought forward three general statements and eight specific instances of sand-eels or similar sharp-nosed fishes found in the peritoneal cavity of other fishes. However, more remarkable still was the case of a mummified hermit-crab found in the body cavity of a cod fish.

Of metallic objects, an account was given of two cod hooks with portions of attached lines imbedded in the liver of an apparently healthy cod. Most remarkable of all was a knife with the blade closed in its brass handle (2¾ inches long) embedded in the muscles of the back of a large cod—the flesh where the knife was found being 2½ inches thick. Two of Vinal Edwards' specimens were of fish skeletons "in the meat near the backbone" of their fish hosts. It is hard to understand how these objects reached these positions in the muscles, but they were there.

In considering any or all of these unusual matters, the remarkable regenerative powers and relative freedom from infection of fishes among the cold-blooded vertebrates must be considered. They survive the loss of important parts and indeed often regenerate them, when such loss in the higher vertebrates would almost inevitably bring about death. I have in my possession a little fish which has lost its tail fin and yet seems hardly the worse for it. Then I have collected figures and descriptions of a large number of fishes which have suffered similar loss but in which healing has taken place, and the dorsal and anal fins, now nearly confluent, have to a certain extent taken over the function of the lost part.

These facts would seem to form the basis of the only explanation possible of the rubber band rove through the body of the mackerel under consideration.