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## New, Rare or Uncommon Fishes from Japanese Waters. VII. Description of a New Species of *Beryx*

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Two species of *Beryx*, hitherto recorded as "*splendens*" and "*decadactylus*", respectively, are fished commercially during autumn through spring by hook and line from the depths off Izu-Ōshima, in Sagami Bay and off south-eastern coast of Bōsō Peninsula (south of Tokyo), and since March, 1958, considerable quantity of "*splendens*" has been taken by trawl off Chōshi (Chiba Prefecture; east of Tokyo). Deep line fishermen in Odawara City are the most active in finding new fishing grounds for larger fishes of *Beryx*, and interested in their migration and life histories. The writer has often been asked to give lectures on *Beryx* and other deep-sea fishes for these fishermen, and has obtained in return from them valuable specimens of deep sea fishes, information and suggestions relevant to the ecology of the fishes. He takes great pleasure in expressing here his sincere thanks to them and to Mr. Y. HONDA (Agriculture and Fisheries Division, Odawara Municipal Office) for the cooperation, and more especially, for the specimens of the third species of *Beryx* from Sagami Bay which they call "Fusen-kinme" (meaning balloon *Beryx*). This species is believed new to science, and described below. It is rather rare in Sagami Bay. The writer has never seen it at the Central Wholesale Market of Tokyo.

### Description of *Beryx mollis*,\* new species

"Fūsen-kinme", new authorized Japanese name

*Study material*.—Adult female, measuring 330 mm in total length, 286 mm in fork length and 250 mm in standard length (from snout tip to the hind end of vertebral column; skin and muscles have been removed from the right side of the tail). Taken

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\* In reference to the soft flesh.

by hook and line in Sagami Bay off Odawara City, from a depth of several hundred meters, on (or around) March 12, 1959. Presented by the Young Fishermen's Club in Odawara through Mr. Yasuhiro HONDA. This is chosen as the holotype (Cat. No. 49583, Zoological Institute, Faculty of Science, University of Tokyo=ABE '59-26).

Adult female (Cat. No. ABE '59-27), measuring *ca.* 330 mm in total length, 275 mm in fork length and 240 mm in standard length (from snout tip to the hind end of vertebral column; skin and muscles of tail removed). Bears the same data as the holotype. This is one of the two paratypes. Skeletonized.

The other paratype (Cat. No. ABE '59-2), measuring *ca.* 330 mm in total length, 285 mm in fork length and 252 mm in standard length. Eviscerated and salted prior to receipt. Presented from the same club through the same fishery scientist as above. Taken on (or around) January 16, 1959, by hook and line, from a depth of several hundred meters in Sagami Bay off Iwa, at a fishing ground called "Hatake", by fishermen in Odawara City. The name of the fishing boat owned and used by the collectors is "Ōsugi-maru".

*Proportional dimensions of the holotype expressed in percentages of standard length.*—Greatest depth of body (at dorsal origin) *ca.* 43, greatest breadth of body (just behind operculum) *ca.*\* 16, length of head\*\* 34.4 (left) & 34.0 (right), least depth of caudal peduncle 10.8, horizontal diameter of eye 14.8 (left) & 14.4 (right), vertical diameter of eye 13.4 (left) & 13.2 (right), length of snout (measured by dividers) 7.9 (left) & 8.4 (right), bony interorbital breadth above eye-centers 11.6, bony interorbital breadth above anterior margins of eyes 8.2, breadth of belly between (outermost edges) ventral origins 11.3, greatest depth of upper jaw (at hind end) 7.2 (left) & 6.9 (right), greatest length of upper jaw 18.2 (left) & 18.3 (right), height of preorbital spine (measured from incised margin of preorbital) 2.2 on either side, length of longest (4th) dorsal spine 19.0, length of longest (2nd) soft ray of dorsal 24.2, length of longest (4th) anal spine 15.2, length of longest (1st) soft ray of anal 17.0, length of longest (4th & 5th from top) fin-rays of pectoral 28.6 (left) & 29.2 (right), length of ventral spine 16.8 (left) & 17.4 (right), length of longest (outermost 2, left; 2nd from outside, right) ventral soft rays 24.8 (left) & 25.8 (right), length of longest (2nd branched soft ray from top of upper lobe; tip of lower lobe damaged, but certainly not longer than the upper) caudal fin-ray 33.0, length of longest [4 uppermost gill-rakers on lower limb (left); 1 gill-raker at junction between upper and lower limbs and 3 uppermost gill-rakers of lower limb (right)] gill-rakers 6.2 (left) & 6.0 (right).

*General appearance, and coloration of the holotype.*—The body is compressed and deep, tapering from near the anal origin rearwards. The eyes are very large, the

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\* Since the receipt of this specimen in a fresh state, it had been kept in a refrigerator for a few weeks, and thereafter has been preserved in alcohol. The breadth of the body seems to have been changed.

\*\* Measured parallel to the longitudinal axis of body. If measured by dividers, the length of head is 34.3 on either side.

horizontal diameter being certainly larger than  $1/2.5$  of the head length (measured from snout tip) and about  $1/2.5$  of the length from the tip of the lower jaw to the hind end of the operculum (mouth closed). The preorbital spine on either side of the snout is very conspicuous, flaring outward and directed posteriorly, the longitudinal axis being nearly horizontal. The height of this spine (measured from the antero-dorsal corner of the outer longitudinal concavity of the preorbital to the tip of the spine along its axis) is larger than the vertical diameter of the larger, posterior nostril, and slightly less than the distance from the anterior margin of the anterior nostril to the posterior margin of the posterior nostril. The bony interorbital area narrows very gently forwards, its breadth above the anterior margin of the eye on either side being  $1/1.8$  or  $1/1.9$  of the horizontal diameter of the eye. The fleshy, or rather membranous, interorbital breadth is slightly larger than the bony one. The scaled area on top of the head extends forwards beyond the line connecting the eye-centers, and just in front of the anterior end of the scaled area is a hole which is roofed by semitransparent skin. In front of this larger hole, just above the posterior nostril on either side (which is above the posterior end of the base of the preorbital spine and which is in advance of the anterior margin of the eye on either side) are a pair of smaller round holes, also roofed by semitransparent skin. Between them, and around the mid-dorsal line of the snout is a much smaller concavity which is also roofed by nearly transparent skin. There are another pair of round roofed holes above the anterior nostrils. The supramaxillaries, premaxillary, preorbital, suborbitals preoperculum, suboperculum and frontal on either side of the head are finely serrated, and the lower jaw has serrated keels. There is a fairly deep narrow longitudinal groove along the middle line of the palate. The antero-ventral rounded head of the maxillary is visible on either side of the vomer.

The dorsal and anal fins are covered basally by scales, and between the scale sheath on either side of the fins are "windows", one between every two soft fin-rays. These windows remind the writer of the similar structure in the dorsal and anal fins of *Diretmus argenteus* JOHNSON (*cf.* ABE, 1953, pp. 39 & 40, fig. 1).

The pectoral and ventral fins are long, both reaching beyond the vertical through the anal origin.

The lateral line is nearly parallel to the dorsal contour of the body, and extended nearly to the hind end of the middle caudal fin-rays.

The color in alcohol is pale yellowish red, the upper and lower parts of the caudal fin being deep-colored. The anal, pectoral, ventral, and the distal part of the dorsal fin are the most faintly colored. Prior to preservation, the color of the body and fins was lighter than in the two other congers found in Japanese waters.

*Fin-formulae of the holotype.*—D. IV 12 (=i+11; last fin-ray bifid to base). A. IV 28 (all soft rays branched; last fin-ray bifid to base). P. 16 (=ii+13+i) on either side. V. I 10 (innermost soft ray unbranched; other soft rays branched) (left)

& I 10 (all soft rays branched) (right). C. IV+ii+9+8+ii+III.

*Scales of the holotype.*—The scales are ctenoid; strongly ctenoid on the belly, head and posterior part of the body. There is no disc underneath the free part of each scale. The distinct longitudinal lines passing through scales and running parallel to the lateral line resemble the latter. The number of the pored scales in the lateral line is 67 (to the end of the vertebral column) +9 (left) & 63 (to the end of the vertebral column) + 11 (right). The number of the scales in an oblique row from the dorsal origin down and rearwards to the scale just above the lateral line is  $1/2$  8 (left) &  $1/2$  9 (right). The number of the scales in an oblique row from the anal origin up and forwards to the scale just below the lateral line is *ca.* 18 or 19 on either side of the body. The number of the predorsal scales is *ca.* 27. The number of the longitudinal scale rows on the caudal peduncle at the anteriormost rudimentary caudal fin-rays (rather, spines) is 1 (on mid-dorsal line) + 4 (above lateral line) + 1 (on lateral line) + 4 (below lateral line) + 1 (on mid-ventral line) on either side of the body. The scales below the eye on either side are arranged rather irregularly, and the number of the scale rows is *ca.* 5. (counted either vertically or horizontally). The suboperculum is covered ventrally by a few scales.

*Branchiostegals, pseudobranchiae, gills and gill-rakers of the holotype.*—The inner fold of the left branchiostegal membrane laps over the right anteriorly. The number of branchiostegals is 8 on either side. The pseudobranchiae are well developed. Gills 4; a slit behind the 4th.

The gill-rakers are fairly long. Their number is 6+1+15 (left) & 5+16(right).

*Teeth, tongue and isthmus of the holotype.*—The teeth are all very small. They are arranged in a fairly broad band on each premaxillary, and in a narrow band on each palatine. The vomerine teeth are in a small triangular patch. The teeth of the lower jaw are in a narrow band on either side, the anterior teeth being larger than all the other teeth.

The tongue is short, and triangular.

The isthmus is high, scaled ventrally, and compressed anteriorly.

*Notes on the paratypes.*—In the following account, figures and words pertaining to the eviscerated paratype (Cat. No. ABE '59-2), if any, are given in *Italics* in parentheses. Greatest depth of body 42.1 (*43.7*), greatest breadth of head just behind eyes 19.2, greatest breadth of trunk just behind gill-opening 17.3, breadth of belly at ventral origins 11.3, least depth of caudal peduncle (*10.9*), length of head 33.8 on either side (*32.9 on either side*), horizontal diameter of eye 14.6 on either side (*14.7 left; 13.9, right*), vertical diameter of eye 14.2 (left) & 14.6 (right) (*14.3, left; 14.7 right*), bony interorbital above eye-centers 9.0 (*10.1*), length of snout (*7.5, left; 7.9, right*), length of preorbital spine (method of measurement as in that of the holotype) 1.7 (left) & 1.9 (right) (*2.3, left; 2.6, right*).

D. IV 13, all soft rays branched; last soft ray bifid to base; last and penultimate soft rays fairly close together (*IV 13, anteriormost soft ray alone unbranched; last*

*soft ray bifid to base*).

A. IV 31, all soft rays branched ; last soft ray bifid to base (*IV 32, all soft rays branched, last soft ray bifid to base ; last and penultimate soft rays fairly close together*).

P. 16 on either side; uppermost 2 soft rays unbranched and other soft rays branched (*17 on either side; uppermost 2 soft rays and lowermost 1 soft ray unbranched in left pectoral ; uppermost 2 soft rays alone unbranched in right pectoral fin*).

V. I 10, all soft rays branched (*I 10, all soft rays branched*).

C. IV + ii + 9 + 8 + iii + II (skeletonized).

Total number of vertebrae 24 = 10 + 14.

Number of proximal segments of dorsal radials (interneurons) 19. Number of distal segments\* of dorsal radials 3 (for spines) + 13 (for soft rays). Number of middle segments\* of dorsal radials (1) + 8 + (1); they are each connected with a proximal radial for each of the posterior soft rays. Number of proximal segments of anal radials (interhaemals) 33. Number of distal segments\* of anal radials 2 (for spines) + 31 (for soft rays) Number of middle segments\* of anal radials 26.

Number of pored scales along lateral line *ca.* 70 + 11 on left side ; *ca.* 70 + 11 on right side (*76 = ca. 65 + 11 on left side ; 77 on right side*). Number of scales in an oblique row from dorsal origin down and rearwards to the scale just above lateral line  $1/2 \ 7$  on left side (*1/2 + 1 fairly smaller than the lower scales + 7 on left side*), number of scales in an oblique row from anal origin up and forward to the scale just below lateral line *ca.* 17 on left side. (*Disc uuderneath the free part of the scale absent*).

Pseudobranchiae well developed in the two paratypes.

Gills 4 ; a slit behind and behind the 4th.

Number of gill-rakers 6 + 18 on either side.

Branchiostegal mambrane on either side not lapping over the other, the margins being symmetrical anteriorly. Number of branchiostegals (which are rather short) 8 on either side in the two paratypes.

Number of pyloric caeca *ca.* 20.

Peritoneum black. Air-bladder large. Pneumatic duct may be absent.

One of the paratypes (Cat. No. ABE '59-29) was skeletonized prior to the discovery in April, 1959, of the hidden "windows" at the proximal parts of the dorsal and anal fins of the holotype of the present new species, and he has not examined the windows of the former specimen. The other paratype (Cat. No. ABE '59-2) has these "windows" as does the holotype.

As in the holotype, many of the head bones in the paratypes are finely serrated. The presence of serrations on the five keels of the dentary in the types of the pre-

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\* The usage of the term "distal segment" is the same as that adopted by ABE, 1957 & 1958. The usage of the term middle segments differs from that adopted by ABE & TAKASHIMA, 1958.

sent new species is unique among the Japanese members of *Beryx*, and in this respect it resembles *B. splendens* of Madeira. The opercular keel is not serrated in the paratypes as in the holotype.

*Distinctive characters.* The present new species resembles *Beryx splendens* and *B. decadactylus* of Madeira and the two species of Japanese congeners hitherto recorded as "*splendens*" and "*decadactylus*" in general appearance, but it differs from the former two Atlantic species in the absence of the disc underneath the free part of each scale, and differs from the two latter Japanese congeners in having serrations on the keels of the lower jaw, in the smaller number of the soft rays of the dorsal fin (12 or 13 in *mollis*; 14 in "*splendens*"; 19 in "*decadactylus*"), and in having softer flesh.\*

*Relationships.* The present new species more closely resembles *Beryx splendens* LOWE in general appearance than it does *Beryx decadactylus* CUVIER, but differs from the former in lacking a disc underneath the free part of each scale and in having a salient keel on the operculum. Of the two Japanese species of *Beryx* hitherto recorded as "*splendens*" and "*decadactylus*", respectively, both of which lack the disc of the scale mentioned above, "*splendens*" differs from the present new species in having much shorter spine on the preorbital and more fin-rays in the dorsal and pectoral and in lacking serrations on the keels of the lower jaw; "*decadactylus*" differs from the present new species in the depth of body, in having more fin-rays in the dorsal and in lacking serrations on the keels of the lower jaw. The present writer is of the opinion that the Japanese species of *Beryx* hitherto identified as "*splendens*" and "*decadactylus*", respectively, should be named anew. Unfortunately, he has not been, and in the near future will not be, able to study on the local or individual variation of the serrations of the head bones and the development of the preorbital spine and the disc of the free part of the scale in all the members of *Beryx*.

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\* It may be added here that experienced fishermen in Odawara say that, unlike two other congeners, it comes up to the sea surface like a balloon when taken by hook and line.

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#### Explanation of pls. 4-6

Pl. 4, fig. 1. *Beryx mollis*, n. sp. Holotype.

" fig. 2. " " " Showing the "windows" of the soft dorsal; skin near the fin-base removed.

Pl. 5, fig. 3. *Beryx mollis*, n. sp. Holotype. Showing the "windows" of the soft anal; skin near the fin-base removed.

" fig. 4. *Beryx mollis*, n. sp. Holotype. Showing the top of the head.

" fig. 5. " " " Showing the preorbital spine and serrated keels on the lower jaw.

Pl. 6, fig. 6. *Beryx mollis*, n. sp. Holotype. Showing the broad interpelvic area.

" fig. 7. The so-called "*Beryx decadactylus*" (above) and *Beryx mollis*, n. sp. (holotype)(below), both prior to preservation.

Plate 4

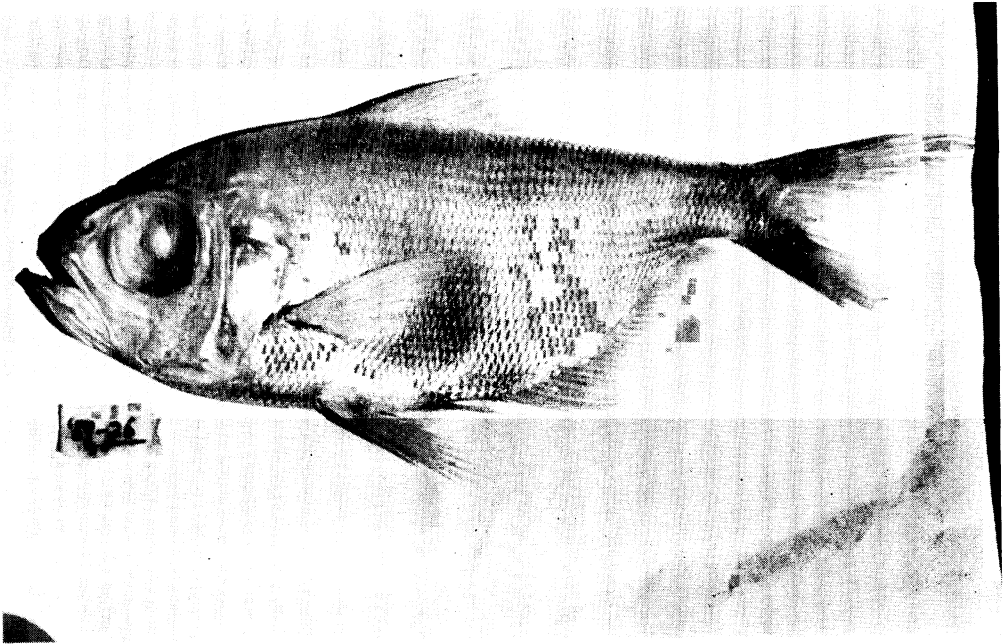


Fig. 1

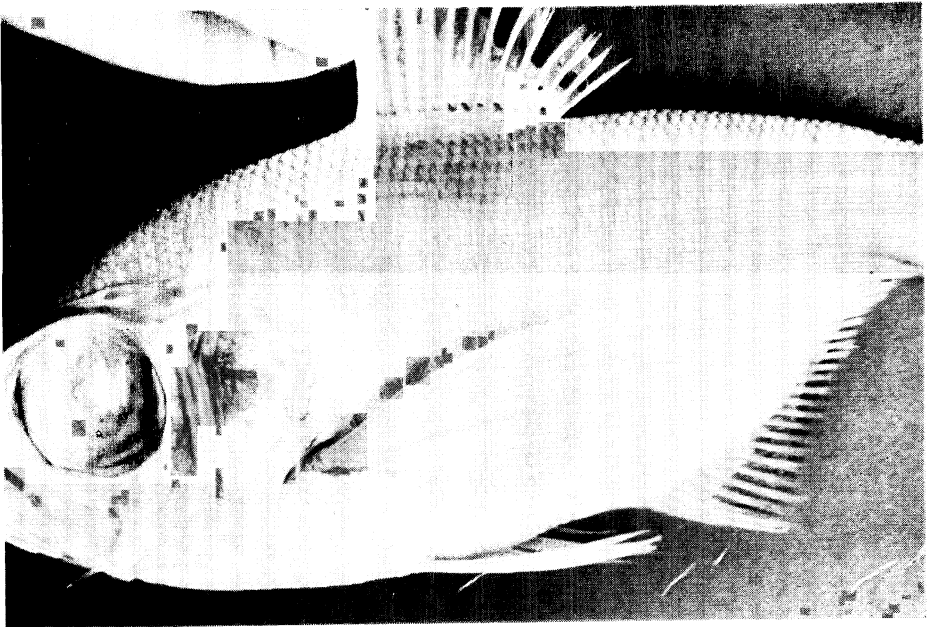


Fig. 2



Plate 5

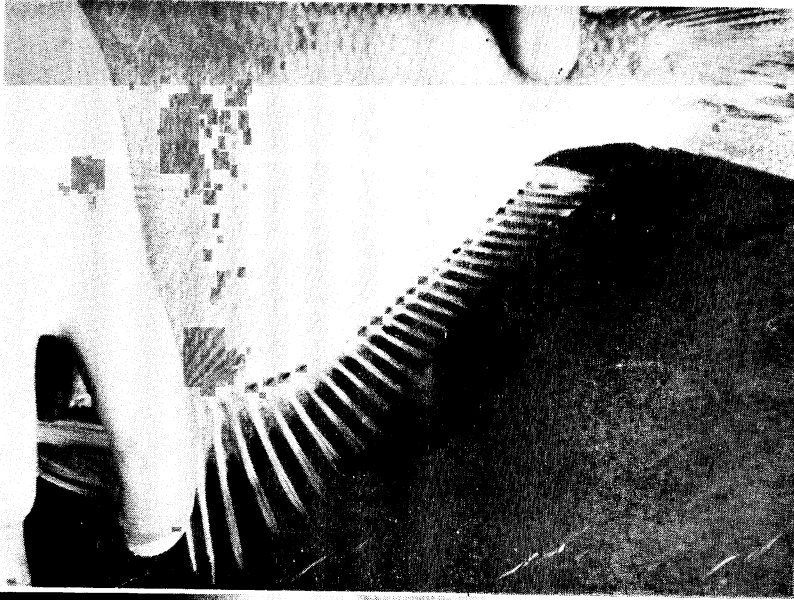


Fig. 3

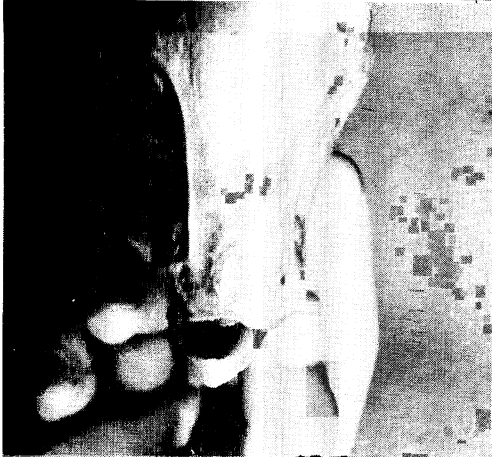


Fig. 4



Fig. 5

Plate 6

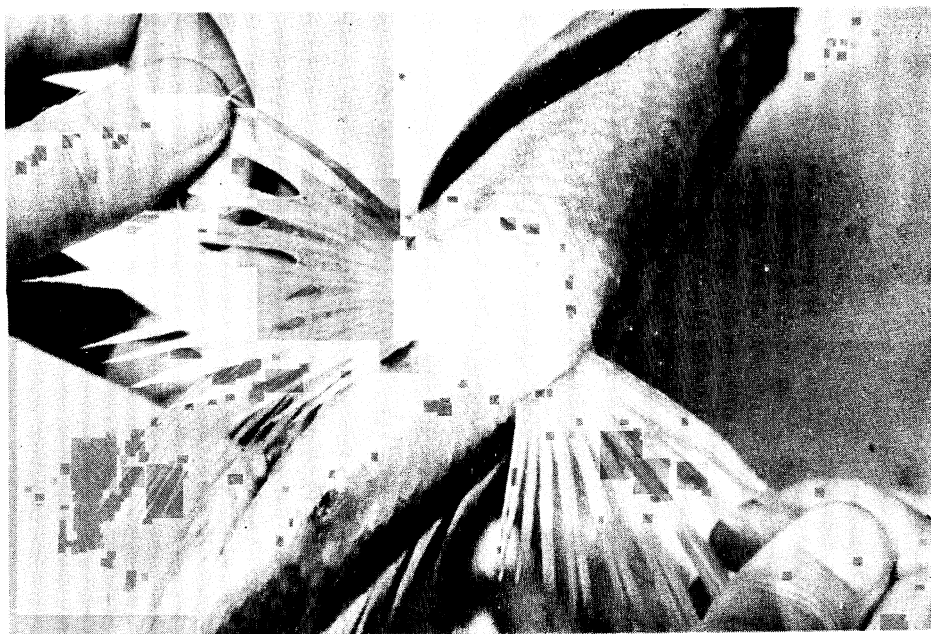


Fig. 6

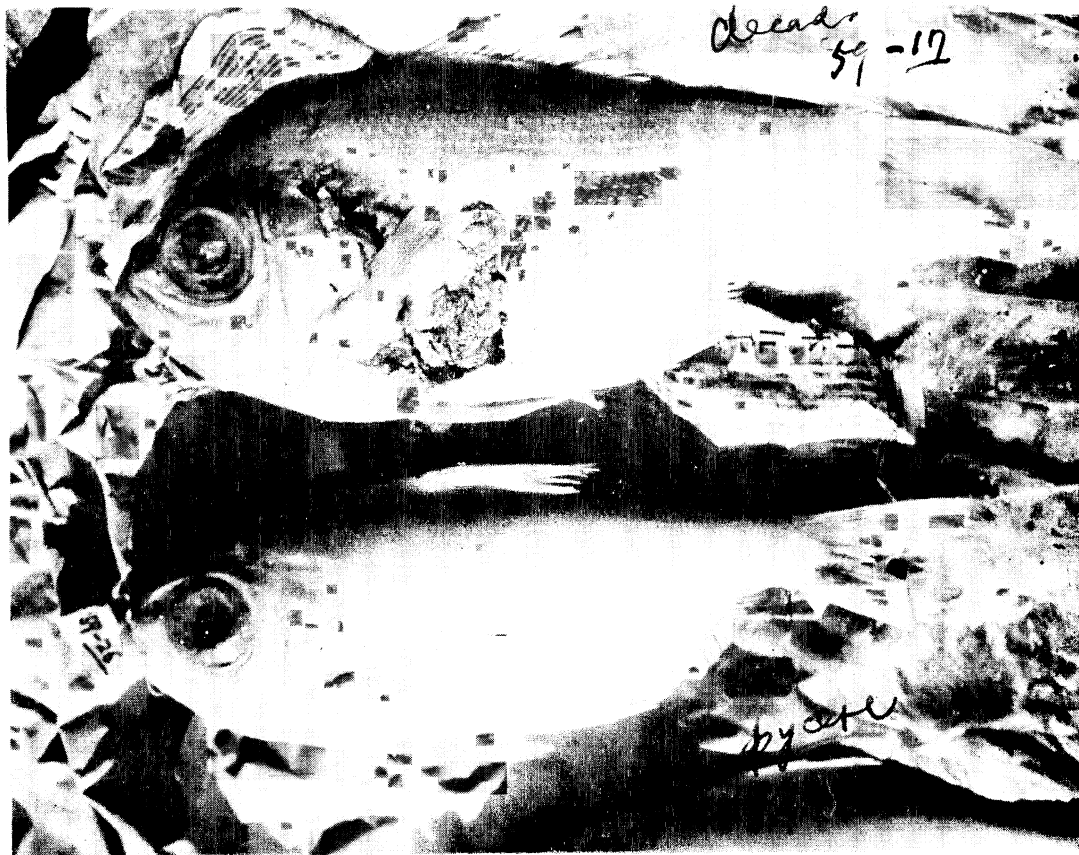


Fig. 7