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VARIATION IN PACIFIC *TRACHUROPS* *CRUMENOPHTHALMUS*

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Though little variable around the world, here and there one finds aberrant individuals or incipient races of *Trachurops* [*Selar*] *crumenophthalmus* (Bloch), which, while below the level of taxonomic recognition, show variations in body and fin form so considerable that they would characterize distinct species in genera allied to *Trachurops*, and are presumably associated with appreciable differences in habit. To what extent these differences in this and similar cases are phylogenetic and to what extent ontogenetic is an as yet unsolved problem in itself.

We may suppose that this is an old standardized species which for some reason bends without breaking, or, what seems more probable, that it is new and has only recently attained its abundance and wide distribution, as a corollary to which there is a tendency for certain individuals or groups to bud in this or that direction without sufficient time-element for the buds to become isolated or distinct.

A study of 5 full-grown specimens of similar size from different points in the eastern Pacific will illustrate the nature of variations referred to in this species. One is from the Gulf of California, collected in 1900 by L. Digue't and presented by the Duc du Loubat, another from Carmen Island (also in the Gulf of California); collected by C. H. Townsend in 1911, a third from the Panama market, collected by William Beebe in 1925; the others were collected in 1934 from the Tuamotus by Templeton Crocker, and in 1935 from the Honolulu market by William J. Morden.

GULF OF CALIFORNIA FORM.—No. 236, Amer. Mus. Nat. Hist., 185 mm. standard length. Depth in this length (greatest at origin of first dorsal), 3.6; head, 3.2. Eye in head, 3.2; pectoral, 1.1; caudal lobe broken. Width in depth at origin first dorsal, 1.8; at origin soft anal, 1.8. Dorsal soft rays, 24; anal, 22. Scutes, 25; straight part of lateral line in chord of its curve, 1.1. An appreciable ridge in middle of top of head.

Though from a locality which can not have been far from Carmen

Island, this form is more suggestive of that from Honolulu, in its thick cylindrical body, but is shorter-bodied with depth approximately that of our Panama specimen. Its greatest depth is at the first dorsal origin, and it shows the ridge on top of the head.

A small specimen with the same data is so much like it that this presumably is not an individual variant but represents a considerable body of fish, not sufficiently divergent for taxonomic recognition.

CARMEN ISLAND FORM.—No. 5502, Amer. Mus. Nat. Hist., 180 mm. standard length. Depth in this length (greatest at origin of second dorsal), 3.3; head, 3.3. Eye in head, 3.5; pectoral, 1.2; caudal lobe, 1.2. Width in depth at origin first dorsal, 2; at origin soft anal, 2.45. Dorsal soft rays, 27; anal, 22. Scutes, 32; straight part of lateral line in chord of its curve, 1.3. No ridge on top of head.

This form is deep behind, thick-bodied and pointed forward, with a long caudal and smooth lines, slight departures from normal which yet give it an unfamiliar appearance for *Trachurops* and suggest more Caranx-like habit and behavior. It has the ridge on top of head suppressed.

A second individual of about the same size with the same data is similar, and this presumably represents a small local group of fish differing somewhat in habits from the species in general, with characters too slight and indefinite for taxonomic recognition.

PANAMA FORM.—No. 7546, Amer. Mus. Nat. Hist., 175 mm. standard length. Depth in this length (greatest at origin second dorsal), 3.5; head, 3.2. Eye in head, 3; pectoral, 1.1; caudal lobe, 1.3. Width in depth at origin first dorsal, 2.2; at origin soft anal, 2.5. Dorsal soft rays, 26; anal, 22. Scutes, 30, straight part lateral line in chord of its curve, 1.3. A ridge in middle of top of head.

This form is close to the standard of the species as a whole, and to a figure of a somewhat smaller (approx. 145 mm.) Atlantic individual from Woods Hole (Jordan and Evermann, 1900, Bull. U. S. Nat. Mus., XLVII, fig. 385). It is perhaps more compressed than the Atlantic fish of equal size.

HAO ISL., TUAMOTUS FORM.—No. 12,661, Amer. Mus. Nat. Hist., 171 mm. standard length. Depth in this length (greatest at origin first dorsal), 4; head, 3. Eye in head, 2.7; pectoral, 1.3; caudal lobe, 1.8. Width in depth at origin first dorsal, 1.8; at origin soft anal, 1.85. Dorsal soft rays, 27; anal, 22. Scutes, 29; straight part of lateral line in chord of its curve, 1.4. A ridge in middle of top of head.

This form, with large head and eye and short caudal, more like that of *Decapterus* than *Trachurops* in character, is most aberrant. It has

the ridge on top of head, maximum depth at origin of first dorsal, and rather cylindrical body. Its peculiarities are quite sufficient to entitle it to taxonomic recognition. Though represented by but a single specimen, with a chance of this merely being an abnormal emaciated individual, the manner of its capture suggests correlation of its characters with peculiar nocturnal habits, hence I describe it as a new subspecies.

***Trachurops crumenophthalmus crockeri*, new subspecies**

DESCRIPTION OF TYPE.—No. 12,661, Amer. Mus. Nat. Hist. Collected October 27, 1934, at Boring Bay, inside the lagoon of Hao Island, Tuamotus, by Templeton Crocker; attracted by submerged light and netted at night.

Length to base of caudal, 171 mm. Other measurements as above. Gill-rakers on lower limb of arch, about 28. Shoulder process high, and broad across its obliquely truncate end.

Color in preservative blue-black above, brownish on the sides, somewhat silvery below. J. P. Chapin gives me the following from his notes of October 27 concerning this specimen: "Mr. Crocker showed me a small fish not a mackerel but looking a little like it which gave back an orange-red glow from the eye in the yacht's electric light."

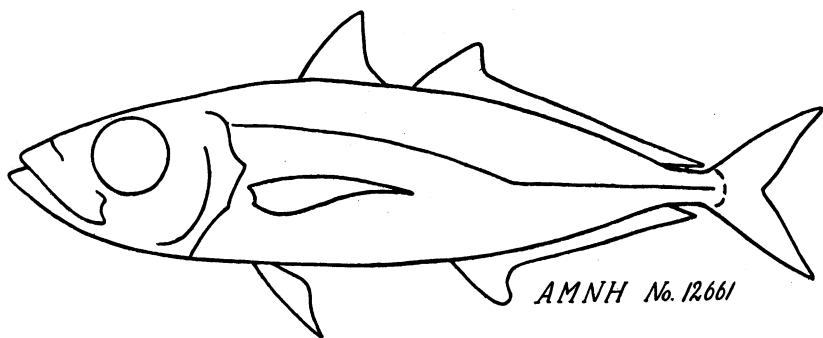


Fig. 1. *Trachurops crumenophthalmus crockeri*, type.

The dark color, large eye, small body and unusual caudal of this form are probably correlated with peculiar, perhaps nocturnal, habits.

HONOLULU FORM.—No. 12,680, Amer. Mus. Nat. Hist., 200 mm. standard length. Depth in this length (greatest from first to second dorsal origins), 4; head, 3.5. Eye in head, 3.2; pectoral, 1.3; caudal lobe, 1.35. Width in depth at origin first dorsal, 1.7; at origin soft anal, 1.7. Dorsal soft rays, 24; anal, 22. Scutes, 32; straight part lateral line in chord of its curve, 1.5. No ridge on top of head.

This is a decidedly long-bodied and cylindrical form with maximum depth extending between origins of first and second dorsals, and it also has the ridge on top of head suppressed at this size.

Seven other specimens collected at different times from the Hawaiian Islands and of different sizes (138 to 230 mm.), to hand for comparison, show only minor variations and differences correlated with size. It is safe to assume that this is at least the dominant form in that locality. All are slender (depth 4 to 4.3, except in the largest, 3.9). The body is relatively wide and ridge on top of head suppressed with greater size, subject to individual variation. The 230 mm. specimen has width in depth at origin first dorsal, 1.5; at origin soft anal, 1.6. Two of 144 to 145 mm. have the ridge slight to suppressed, whereas it is present in one of 156 mm. taken at another time, which is also compressed for this form, width in depth at origin first dorsal, 2; at origin soft anal, 2.3; and has the smallest eye of the series, 3.7. The 230 mm. specimen has the largest eye, 3.1, individual variation seemingly obliterating size variation in that character, as also in the number of scutes, more of which are usually developed in larger specimens, but only 26 in that of 230 mm. The arch of the lateral line is so low and meets the straight part at so slight an angle that proportional measurements between the two are not dependable or significant. The greater relative length of the pectoral in larger fish, which is characteristic of almost all carangin species, is here not very notable, but consistent; one of the smallest has this fin in head, 1.5, the largest has it 1.2, this fin being notably shorter than in specimens examined of the Manila form described beyond. Our 8 Hawaiian specimens represent 4 collections from this one general locality and give the impression that specimens of about the same size with the same data, presumably representing the same school or lot of fish, are more alike than specimens with other data, and that each big school of fish may show slight characters peculiar to itself.

Wakiya, 1924 (Ann. Carn. Mus., XV), lists and figures three species of this genus from Japanese seas, which have been tentatively synonymized with *Trachurops crumenophthalmus*, namely: *Selar mauritianus*, 177 mm. standard length, Kii (Pl. xviii, fig. 2); *Selar torvus*, 218 mm. standard length, Bonin Isl. (Pl. xix, fig. 1); *Selar macrophthalmus*, 175 mm. standard length, Bonin Isl. (Pl. xviii, fig. 3). The first is essentially undifferentiable from standard *crumenophthalmus*, the second seems to be identical with our Honolulu form, and the third is notably deep, compressed and large-eyed. Hence we may deduce that the Honolulu form has a very wide distribution across the North Pacific

in the general latitude of the Tropic of Cancer, and appropriately recognize it taxonomically, as an incipient species or as a subspecies. It presumably stands for a very large body of fish, the distinctive characters of which are in part phylogenetic, and in part ontogenetic and correlated with habits; and, whereas it is presumably dominant over its range, there is no reason to suppose that it completely replaces other forms there, as a true geographic race of birds or land mammals is supposed to do.

MANILA FORM.—The American Museum collections contain 4 small specimens from Manila, which represent an aberrant, deep, compressed form, with notably large head and eye, and seem to be identical with Wakiya's *Selar macrophthalmus*. If so, they presumably represent a considerable body of fish occupying this western corner of the Pacific, and may appropriately be recognized taxonomically as a subspecies.

They are No. 3920, Amer. Mus. Nat. Hist., 126 to 132 mm. standard length. Depth in this length, 3.4 to 3.6; head, 3 to 3.3. Eye in head, 2.7 (all four); pectoral, 1 to 1.2; caudal lobe (broken), est. 1.3 to 1.4 (2 specimens). Width in depth at origin first dorsal, 2.1 to 2.2 (and 2.7 once); at origin soft anal, 2.6 to 2.8. Dorsal soft rays, 25; anal, 21 (once) to 22. Scutes, 28 to 30; straight part lateral line in chord of its curve, 1.1 to 1.2. Ridge on top of head present.

We are assuming that the Manila form and the Honolulu form occur together in the Bonin Islands, and being very divergent forms that they do so as would distinct species, though neither is specifically separable from cosmopolitan *crumenophthalmus*. Differences in dentition given by Wakiya I am unable to verify; and may note that teeth in this genus are variable and change considerably with age.

TAXONOMY.—The conservative course is to follow Wakiya and identify our Honolulu form with *Caranx torvus* Jenyns, 1841, 'Zool. Voy. "Beagle,"' p. 69, Pl. xv, Tahiti, and it may stand as *Trachurops crumenophthalmus torva* (Jenyns); to identify our Manila form with *Caranx macrophthalmus* Rüppell, 1828, 'Atl. Reise Nord. Afr.,' p. 97, Pl. xxv, fig. 4, Red Sea, and this may stand as *Trachurops crumenophthalmus macrophthalmus* (Rüppell). However, I have examined Jenyns' and Rüppell's figures carefully, and, whereas they are unquestionably suggestive of these two forms, respectively, I suspect they are based on less aberrant fish not worth taxonomic recognition. Also the general study of variation in the species makes this seem more likely than that these remote individuals should be identical with Honolulu and Manila forms. If it proves to be the case, I would prefer

to recognize these forms from their narrower range as indicated above, though it should necessitate naming them anew. A small specimen to hand, 109 mm. standard length, from Sagami (No. 500, Amer. Mus. Nat. Hist., probably collected by Bashford Dean), seems to be the Honolulu form and corroborates Wakiya's reference to it (as *S. torvus*) from Japan.