

**First Record of the Butterfly Kingfish
Gasterochisma melampus (Scombridae)
from the North Pacific Ocean**

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In February 1993, a large butterfly kingfish *Gasterochisma melampus* Richardson was caught in the North Pacific north of the Hawaiian Archipelago by the longline fishing vessel *Sea Flower*. *Gasterochisma* is distributed widely throughout the Southern Hemisphere, usually between 35° and 50°S (Collette and Nauen, 1983; Fig. 1). It is most abundant in waters with sea surface temperatures of 8° to 10°C (Warashina and Hisada, 1972), south of the subtropical convergence zone. Temperature at the North Pacific locality was recorded by the captain as 16°C, but satellite data indicate a slightly warmer temperature of 17-18°C (Craig Motell, pers. comm., Hon. Lab. Nat. Mar. Fish. Serv., 2570 Dole St. Hon. HI 96822). Other fish taken on the same set included five swordfish, *Xiphias gladius* and two bigeye tuna, *Thunnus obesus*. In this note we describe this specimen and compare it with other large *Gasterochisma* from within its normal range. Morphometric characters and their abbreviations are the same as those used in previous scombrid papers such as Collette and Gillis (1992).

There is a single previous unpublished record of a specimen of *Gasterochisma* from north of its normal range. During the summer of 1976, the third author received photographs of an adult specimen which had been caught with a net at 37.8 km (23.6 miles) off General Villamil Beach in the Gulf of Guayaquil, Ecuador, from Sr. Luis A. Flores, International Game Fish Association representative.

***Gasterochisma melampus* Richardson, 1845
(Fig. 2)**

Material. USNM 325137, female, 1755 mm fork length (FL), 61 kg, about 670 km N of the Hawaiian Archipelago (30°N, 162°W), 5 Feb. 1993, fishing vessel *Sea Flower*.

The fish was taken on a monofilament longline gear set during the evening, allowed to soak overnight, and retrieved the next morning. Argentine shortfin squid *Illex argentinus* were used for bait, and light sticks were attached to every eighth branch line. Depth of set was estimated to be 30 m.

The specimen was frozen and sent to the National Museum of Natural History where it has been catalogued as USNM 325137. It will be dissected eventually and the bones placed in the osteology collection of the Division of Fishes. Samples of muscle tissue were removed for mtDNA analysis by Barbara Block of the University of Chicago.

Description. In most characters, the specimen is morphometrically (Table 1) and meristically similar to other large specimens of *Gasterochisma*. Fin ray counts include 15 spines in the dorsal fin, 10 rays plus 7 finlets in the second dorsal fin, 11 rays plus 6 finlets in the anal fin, and 20 rays in each pectoral fin. The dorsal spine count of 15 is lower than the usual count of 17-18 spines. The first dorsal fin does not extend back as far as is usual, perhaps due to some damage. This interpretation is supported by the significantly shorter first dorsal fin base (Table 1), 217 thousandths of fork length compared to a range of 317-337 thousandths for 9 other large specimens. There are about 14 patches of spines on the lower gill arch; these are not normal gill rakers as Collette and Nauen (1983) implied in their account of the species. These patches were described thoroughly for some Tasmanian specimens by Scott (1981). The jaw teeth appear larger than in other large *Gasterochisma* and number 35-31 (left-right) in the upper jaw and 30-26 in the lower jaw. The vomer has a patch of about 9 teeth, and there are about 11 teeth in a row on each palatine. Large cycloid scales cover the entire body. The postmortem color of the fish is dorsally deep blue, fading into silvery gray on the sides and shiny silver below.

Remarks. The few items found in the stomach were in an advanced stage of digestion and included

Gasterochisma from North Pacific

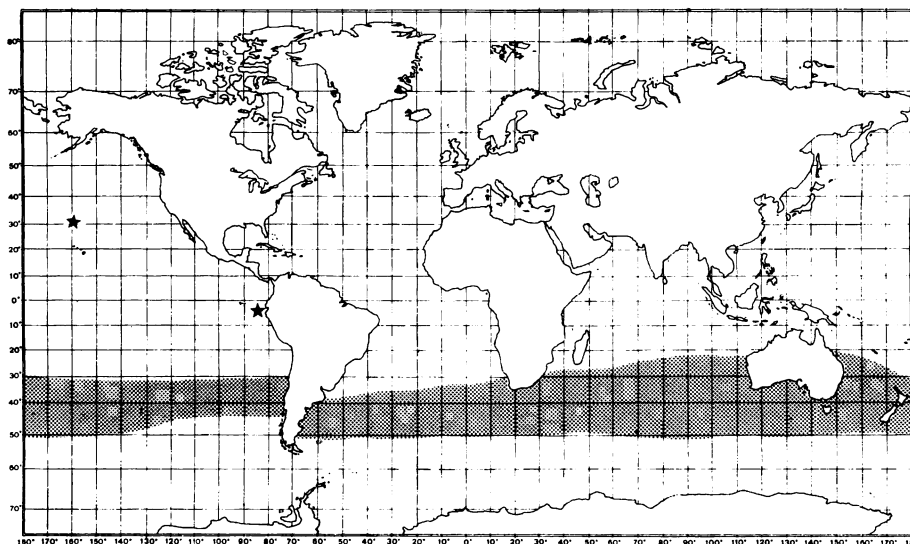


Fig. 1. Distribution of *Gasterochisma melampus* with two new northern records shown by stars. (Base map from Collette and Nauen, 1983).



Fig. 2. *Gasterochisma melampus*, 1755 mm FL, USNM 325137, caught north of the Hawaiian Archipelago with a wound inflicted by a cookie-cutter shark.

beaks from one pelagic octopus, two onychoteuthid and one ommastrephid squid, a few vertebrae and fin rays from an unidentified fish, and two bird feathers. Parasitic nematodes and pieces of monofilament

were also present in the stomach.

A wound (38 mm in diameter), presumably inflicted by a cookie-cutter shark (*Isistius brasiliensis*) was present posteriorly above the opercle (Fig. 2).

Comparative Material. Comparative material used for Table 1 and Figure 3 is housed at AMS, BMNH, CSIRO, MACN, NMNZ, RUSI, SAM, SIO, TMH, and USNM (abbreviations for museums follow Leviton et al., 1985).

Discussion. At 1755 mm FL, this is a large specimen of *Gasterochisma*. Collette and Nauen (1983) reported a size range of 740–1640 mm FL based largely on Warashina and Hisada (1972) who reported the lengths of 1708 specimens. One of the specimens on which Kohno (1984) based his osteological description appears to be the largest known specimen at 1950 mm.

The taxonomic history of *G. melampus* is complex. In fact, it has been described in three different

genera: as *Gasterochisma melampus* by Richardson (1845), based on a 181 mm FL juvenile from New Zealand; as *Lepidothynnus huttoni* by Günther (1889), based on a 167.6 cm (5½ foot) adult from New Zealand; and as *Chenogaster holmbergi* by Lahille (1903), based on a 1320 mm FL adult from the mouth of the Rio de la Plata, off Montevideo, Uruguay. One reason that this species was described three times is because earlier workers were unaware of the dramatic allometric growth changes, particularly in the length of the pelvic fin as noted by Scott (1981) and others. Growth of the pelvic fins has two distinct phases. Juveniles have very large pelvic fins, measuring about 30% of its FL. The pelvic fins

Table 1. Morphometric comparison of the *Gasterochisma melampus* from 30°N, 162°W (USNM 325137) with nine other large Pacific specimens, expressed as thousandths of fork length or head length

Character	n	Min	Max	Mean	SD	USNM 325137
FORK LENGTH	9	830	1320	1159	172	1755
Snout-A	9	623	651	637	9	—
Snout-2D	9	590	626	603	11	—
Snout-1D	9	274	293	284	6	296
Snout-P2	9	271	293	282	7	291
Snout-P1	9	253	270	259	6	271
P1-P2	3	129	138	134	5	137
Head length	9	246	262	253	5	264
MAX DEPTH	8	231	289	260	17	234
MAX WIDTH	6	120	165	139	15	114
P1 Length	8	167	204	184	14	198
P2 Length	9	110	213	161	32	99
P2 INS-VENT	8	355	380	365	10	356
P2 TIP-VENT	6	160	233	197	31	254
Base 1D	9	317	337	324	6	217
Height 2D	6	92	101	96	3	84
Base 2D	9	72	112	91	12	75
Height A	5	75	89	80	5	74
Base A	9	61	93	79	9	68
Caud spread	6	247	332	288	34	285
Snout (Fleshy)	8	106	119	111	5	117
Snout (Bony)	9	96	110	102	4	111
Maxilla L	9	120	134	127	5	131
Postorbit	3	106	111	109	2	120
Orbit (Fleshy)	7	26	43	31	7	25
Orbit (Bony)	6	27	44	37	8	39
Interorbit	4	79	90	85	6	86
HEAD LENGTH	9	210	341	293	44	463
Caud spread	6	979	1272	1128	120	1080
Snout (Fleshy)	8	427	458	439	9	443
Snout (Bony)	9	385	422	404	12	421
Maxilla L	9	487	513	500	9	497
Postorbit	3	408	439	428	17	454
Orbit (Fleshy)	7	100	167	123	28	94
Orbit (Bony)	6	101	176	146	32	149
Interorbit	4	314	360	338	22	324

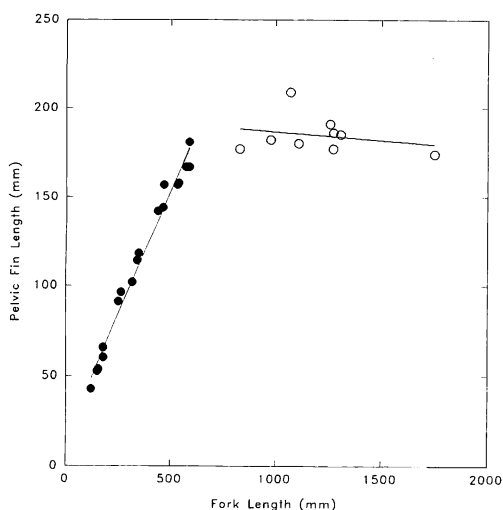


Fig. 3. Allometry in growth of the pelvic fins in *Gasterochisma melampus*. Growth of the pelvic fins continues in specimens up to about 700 mm FL (dots) and remains approximately constant in larger specimens (open circles).

continue to grow proportionally from 100 to 600 mm FL. At about 700 mm FL, growth of the pelvic fins essentially stops (Fig. 3). Our large 1755-mm specimen has the same length pelvic fins as specimens ranging in size from 800 to 1200 mm.

Gasterochisma melampus has been placed in a monotypic subfamily, Gasterochismatinae, of the Scombridae (Collette et al., 1984; Kohno 1984), but Johnson (1986) questioned its precise affinities and phylogenetic placement. Sequencing the cytochrome *b* gene (Block et al., 1993) shows that *Gasterochisma* falls within a radiation which includes primitive scombrids (*Scomber*) and gempylids (*Ruvettus*).

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北太平洋から初記録のガストロ

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尾叉長 1755 mm, 体重 61 kg のガストロ *Gasterochisma melampus* がハワイ諸島北方で延縄によって採集された。この個体は第

1背鰭棘が15本(通常17-18本)と少なく,第1背鰭基底長も通常の個体より短い。この状態は第1背鰭に損傷を受けたために生じたと考えられる。その他の特徴は,本種の通常の分布範囲である南半球で採集された個体と差異を示さなかった。本種の腹鰭の相対長は成長によって大きく変化する。幼魚では腹鰭は尾

叉長の30%の長さで,尾叉長100-600mmの個体では腹鰭は成長に比例して大きくなり,尾叉長700mmになると腹鰭の発達が止まる。採集された個体の腹鰭は,これまでに採集された尾叉長800-1200mmの個体とほぼ同じ長さであった。