

## Fishes Killed by the 1950 Eruption of Mauna Loa

III. Sternoptychidae<sup>1</sup>JANET HAIG<sup>2</sup>

THE EXTENSIVE COLLECTION of fishes yielded by the Mauna Loa lava flow of 1950 included 45 hatchetfishes (Sternoptychidae) belonging to four species. They are of particular interest in view of the fact that two of these species have not hitherto been reported from the Hawaiian Islands, nor from anywhere in the central Pacific region. One species known from the Hawaiian Islands was not included in the collections.

Three of the hatchetfishes were cooked to the point where the flesh was falling off the bones, and were utterly unfit for detailed study, although still identifiable. A few more were in mediocre condition. The great majority, however, were in an excellent state of preservation, even retaining some of the thin deciduous scales which are usually lost in sternoptychids collected by the more conventional methods.

The five Hawaiian members of the family Sternoptychidae have all been described and figured elsewhere, some of them many times. For this reason it was considered unnecessary to include lengthy descriptions and detailed figures in this paper. Aside from original

descriptions, the synonymies include references to Hawaiian localities only.

Sternoptychids are subject to great individual variation, the limits of which are still incompletely known, and data on this subject are useful in studies of the family. Measurements and counts for the lava flow material is therefore included in Table 1.

Particulars on the Mauna Loa lava flow and the collections appear in the first paper of this series (Gosline *et al.*, 1954).

The author is indebted to Dr. William A. Gosline for the opportunity to examine and report on this interesting collection, and to Dr. Leonard P. Schultz for supplying information on *Polyipnus nuttingi*.

## KEY TO THE HAWAIIAN STERNOPTYCHIDAE

1. Eye normal; anal fin undivided . . . . . 2
- Eye telescopic; anal fin divided; dorsal fin preceded by a transparent blade . . . . . 3
2. An abrupt ventral constriction between trunk and postabdominal region, this space filled by a transparent integumentary plate; dorsal fin preceded by a transparent blade . . . . . *Sternoptyx diaphana*
- No abrupt ventral constriction between trunk and postabdominal region; dorsal fin preceded by a forked spine . . . . . *Polyipnus nuttingi*

3. Photophores forming a nearly continuous series; two posterior abdominal spines, directed downward . . . . . *Argyrolepecus affinis*
- Photophores on postabdominal region in three groups . . . . . 4
4. A large posterior abdominal spine, serrated and directed backward, often with a second small spine above it; groups of photophores on postabdominal region separated by wide interspaces . . . . . *Argyrolepecus heathi*
- Two posterior abdominal spines, directed downward, not serrated; groups of photophores on postabdominal region separated by narrow interspaces . . . . . *Argyrolepecus sladeni*

*Sternoptyx diaphana* Hermann

*Sternoptyx diaphana* Hermann, 1781: 8, 33, pl. 1, figs. 1-2 (type locality, Jamaica).

*Sternoptyx diaphana*, Gilbert and Cramer, 1897: 416 ("Albatross" Sta. 3473, Kaiwi Channel, 313 fms.).

*Sternoptyx diaphana*, Gilbert, 1905: 609 ("Albatross" Stas. 3888 and 3904, off N coast of Molokai, 295-809 fms.; 3917, off S coast of Oahu, 294-330 fms.; 4005 and 4026, near Kauai, 368-1021 fms.; 4105, 4110, and 4111, Kaiwi Channel, 314-470 fms.; 4154, 4155, and 4166, near Bird Island, 293-1594 fms.).

*Sternoptyx diaphana*, Jordan and Seale, 1906: 190 (listed only).

*Sternoptyx diaphana*, Jordan and Jordan, 1922: 9 (listed only).

*Sternoptyx diaphana*, Fowler, 1928: 35 (listed only).

*Sternoptyx diaphana*, Fowler, 1938: 265 (listed only).

MATERIAL EXAMINED: 14 specimens, 20.3 to 53.7 mm. in standard length, taken off the Mauna Loa lava flow, Hawaii, by Moore *et al.*, June 3, 1950.

7 specimens, 29.7 to 45.3 mm. in standard length, taken off the Mauna Loa lava flow, Hawaii, by Y. Yamaguchi, June 6, 1950.

2 specimens, 24.2 and 30.5 mm. in standard length, taken off the Mauna Loa lava flow, Hawaii, by Gosline, Hayes, Keen, and Ellis, June 6, 1950.

Gilbert and Cramer (1897: 404) noted that they did not see the *Sternoptyx* listed from "Albatross" Sta. 3474 in *U. S. Comm. Fish and Fisheries, Rpt. of the Commissioner for 1892* (1894: 18). Two small *Sternoptyx diaphana* from this station are in the fish collections of the Natural History Museum of Stanford University, and bear catalog number 5697. "Albatross" Sta. 3474 is in Kaiwi Channel, 21°12'N × 157°38'30"W, 375 fms.

A lot of six small specimens in the Stanford collections, with catalog number 4928, is labelled "Albatross Stas. 2937 & 2808, Hawaiian Islands." There is also a label in the bottle stating "Bottle broken during earthquake." "Albatross" Sta. 2937 is in Kaiwi Channel, 21°14'06"N × 157°42'42"W, 47 fms. Sta. 2808 is in the open Pacific and not in the vicinity of the Hawaiian Islands. These two lots and their labels evidently became mixed as a result of the 1906 earthquake damage; and there is a possibility that the Sta. 2937 label was placed with the fishes by error, since it is unlikely that any of these specimens were captured at 47 fms. depth.

*Sternoptyx diaphana* has been reported from many parts of the Atlantic, Indian, and Pacific oceans. Some of the records may apply to *S. obscura* Garman, but it is questionable whether the latter should be retained as a distinct species. All the Hawaiian material examined is of the "*diaphana*" type with steeply inclined profile and large eye.

*Polyipnus nuttingi* Gilbert

*Polyipnus spinosus*, Gilbert and Cramer, 1897: 416 ("Albatross" Sta. 3476, S of Oahu, 298 fms.). Not *P. spinosus* Günther.

<sup>1</sup> Contribution No. 155 from the Allan Hancock Foundation. Manuscript received August 30, 1954.

<sup>2</sup> Allan Hancock Foundation, University of Southern California, Los Angeles.

*Polyipnus nuttingi*, Gilbert in Jordan and Starks, 1904: 581 (mentioned in connection with a Japanese species).

*Polyipnus nuttingi*, Gilbert, 1905: 609, pl. 73 (type locality, "Albatross" Sta. 4088, in the approach to the Pailolo Channel between Molokai and Maui, 279-306 fms. Additional material, not designated as paratypes: "Albatross" Stas. 3867, Pailolo Channel, 284-290 fms.; 3920, off S coast of Oahu, 265-280 fms.; 4089, 4090, 4091, and 4097, approach to Pailolo Channel, 286-308 fms.; 4121, off the NW coast of Oahu, 216-251 fms.; 4134, vicinity of Kauai, 225-324 fms.).

*Polyipnus nuttingi*, Jordan and Seale, 1906: 190 (listed only).

*Polyipnus nuttingi*, Jordan, 1921: 646 (off SW shore of Hawaii, killed by a lava flow from Mauna Loa).

*Polyipnus nuttingi*, Jordan and Jordan, 1922: 9 (listed only).

*Polyipnus nuttingi*, Fowler, 1928: 35 (Alika, District of Kau, Hawaii; duplicate of the specimen reported by Jordan, 1921).

*Polyipnus nuttingi*, Schultz, 1938: 142, 145 ("Albatross" Sta. 4102, USNM 51593, probably by error; see discussion, below).

*Polyipnus nuttingi*, Fowler, 1938: 265 (listed only).

*Polyipnus nuttingi*, Böhlke, 1953: 17 (6 specimens from "Albatross" Stas. 3867, 4090, 4077, and 4121, Stanford Nat. Hist. Mus. cat. no. 8518, designated lecto-paratypes. "Albatross" Sta. 4077 is at the NE and N coast of Maui, 99-106 fms.).

*Polyipnus nuttingi* is not represented in the present collection, but is included here for the sake of completeness.

In Schultz (1938: 145), in the synonymy of *Polyipnus nuttingi*, appears the following entry: "*Polyipnus spinosus* (non Günther) GILBERT and CRAMER, U. S. Nat. Mus., vol. 19, p. 416, 1897 (U. S. N. M. no. 51593, co-types, 33 specimens, 34 to 70 mm., *Albatross* station 4102, between Maui and Molokai

Islands, Hawaii, 122 to 132 fathoms, July 23, 1902)." This is obviously an error, as Gilbert and Cramer (1897) made no reference to specimens from "Albatross" Sta. 4102. An inquiry to Dr. Schultz brought the reply that this record (in Schultz, 1938: 145) belongs in his preceding paragraph with U. S. N. M. 51599 (reference to Gilbert, 1905) and that his following paragraph ("U. S. N. M. no. 47720, one specimen, 41 mm., *Albatross* station 3476, latitude 21°09'N, longitude 157°53'W., December 6, 1891") is the reference that should go with Gilbert and Cramer.

Gilbert (1905), however, made no reference to *Polyipnus nuttingi* from "Albatross" Sta. 4102, nor did any author subsequently until the publication of Schultz's paper. Dr. Schultz (*in litt.*) informs the writer that in the U. S. National Museum catalog, opposite no. 51593, "4102" is written in the "original number" column. At the time he wrote his paper Dr. Schultz assumed that this was an "Albatross" station number, but he now believes that this may be incorrect as the number 4102 was entered in different ink than the original entry and must have been added later. These specimens with catalog number 51593 are all contained in a single jar, with the original label in Gilbert's handwriting "*Polyipnus nuttingi* co-types," but without any "Albatross" station numbers.

Gilbert made his identifications at Stanford University and retained specimens from Stas. 3867, 4090, and 4121, as well as Sta. 4077 which was not included in his 1905 report. This material is still at Stanford, and was recorded by Böhlke (1953: 17) and seen by the present writer.

Dr. Schultz concludes that the remaining specimens, from Stas. 3920, 4089, 4091, 4097, and 4134, were wrapped by Gilbert in a single package with one label and sent back to the U. S. National Museum. Apparently, then, number "4102" was applied in the U. S. National Museum catalog to an aggregate of 33 specimens from several stations and

TABLE 1  
MEASUREMENTS\* AND COUNTS OF HAWAIIAN STERNOPTYCHIDAE

	<i>S. diaphana</i>	<i>A. affinis</i>	<i>A. beathi</i>	<i>A. sladeni</i>
Head.....	286-332	281-343	298-358	324-364
Orbit.....	161-210	124-140	142-157	132-155
Snout.....	46-72	75-90	86-108	66-92
Gape.....	198-261	232-261	250-274	258-289
Snout to D origin.....	630-764	470-490	461-543	502-543
Snout to V origin.....	539-670	568-640	555-591	615-675
Snout to P origin.....	278-459	311-405	330-362	338-399
Snout to A origin.....	542-693	628-679	590-645	639-706
1st D ray to ant. abdominal spine.....	875-1065	531-605	555-591	604-656
1st D ray to post. abdominal spine.....	800-989	352-433	414-466	511-541
D ray 1 to A ray 1.....	725-890	318-347	268-308	403-433
Ant. abd. spine to post. abd. spine.....	262-413	385-423	355-374	386-417
Ht. dorsal blade.....	164-242	24-37	59-82	29-50
Dorsal rays.....	10-11	9	8	9
Anal rays.....	13-15	13	11	11-12
Pectoral rays.....	9-11	11	11	9-11
Ventral rays.....	5	6	6	6
Gillrakers.....	11-17	17-22	19-21	18-20
	(5-7+ 6-10)	(7-9+10-13)	(8-9+11-12)	(8-9+10-11)

\* Measurements are given in thousandths of the standard length. They reflect the great intraspecific variation occurring in fishes of this family, even within a restricted geographical area; and point up the fact that caution must be used when one attempts to separate species on the basis of proportional differences.

does not represent an "Albatross" station number.

Schultz (1938: 142) gave the locality "south of Minamitori Shima, Marcus Islands" for this species, in addition to the Hawaiian Islands. Being unable to locate this reference in the earlier literature, the present writer consulted Dr. Schultz, who replied (*in litt.*) that he is unable to verify the Marcus Island locality and that for the present it should be considered an error. Matsubara's (1950) statement that the species occurs in Japan was probably based on Schultz's record. Norman (1939: 20) reported it from the Zanzibar area, basing his identification on Schultz's revision of the genus.

#### *Argyropelecus affinis* Garman

*Argyropelecus affinis* Garman, 1899: 237 (type locality, "Albatross" Sta. 2117, off Bird Island in the West Indies, 683 fms.).

MATERIAL EXAMINED: 2 specimens, 40.3 and 58.3 mm. in standard length, taken off

the Mauna Loa lava flow, Hawaii, by Y. Yamaguchi, June 6, 1950.

1 specimen, 59.5 mm. in standard length, taken off the Mauna Loa lava flow, Hawaii, by Gosline, Hayes, Keen, and Ellis, June 6, 1950.

*Argyropelecus affinis* has been recorded from the Indian and the north and south Atlantic oceans, and the writer has seen considerable material from the eastern Pacific. However, until the present time it has not been reported from the central Pacific region.

#### *Argyropelecus heathi* Gilbert

*Argyropelecus heathi* Gilbert, 1905: 601, pl. 72, fig. 1 (type locality, "Albatross" Sta. 4107, Kaiwi Channel, between Oahu and Molokai, 350-355 fms.).

*Argyropelecus heathi*, Jordan and Seale, 1906: 190 (listed only).

*Argyropelecus heathi*, Jordan and Jordan, 1922: 9 (listed only).

*Argyropelecus beathii*, Fowler, 1928: 35 (Alika, District of Kau, Hawaii).  
*Argyropelecus hemigymnus*, Schultz, 1938: 146, 148 (listed from Hawaiian Islands). Hawaiian records not *A. hemigymnus* Cocco.  
*Argyropelecus beathii*, Fowler, 1938: 265 (listed only).

MATERIAL EXAMINED: 3 specimens, 20.3 to 27.6 mm. in standard length, taken off the Mauna Loa lava flow, Hawaii, by Y. Yamaguchi, June 6, 1950.

1 specimen, 30.3 mm. in standard length, taken off the Mauna Loa lava flow, Hawaii, by Gosline, Hayes, Keen, and Ellis, June 6, 1950.

The only previously known specimen of this species in addition to the holotype was recorded by Fowler (1928). This specimen, which was killed by the Mauna Loa lava flow of 1919, was presented by the collector to the Bernice P. Bishop Museum and thus was not among the fishes reported by Jordan (1921) from that lava flow collection.

Although not reported in the literature from any area outside of the Hawaiian Islands, the species is also known from the eastern Pacific on the basis of records as yet unpublished.

The reasons for retaining *Argyropelecus beathii* as a separate species from *A. hemigymnus* Cocco will be discussed in a forthcoming paper by Dr. Rolf L. Bolin and the present writer.

#### *Argyropelecus sladeni* Regan

*Argyropelecus sladeni* Regan, 1908: 218 (type locality, Salomon, Chagos Archipelago, Indian Ocean, 400–500 fms.).

MATERIAL EXAMINED: 1 specimen, 64.4 mm. in standard length, taken off the Mauna Loa lava flow, Hawaii, by Hayes and Burke, June 2, 1950.

3 fragmented specimens, taken off the Mauna Loa lava flow, Hawaii, by Moore *et al.*, June 3, 1950.

10 specimens, 47.4 to 75.9 mm. in standard length, plus 1 fragmented specimen, taken off the Mauna Loa lava flow, Hawaii, by Y. Yamaguchi, June 6, 1950.

Opinion differs among various authors as to the status of several closely related *Argyropelecus* species, of which *A. sladeni* is one (Norman, 1930: 301, 304, text fig. 13; Parr, 1937: 46, 50, text figs. 18, 19; Schultz, 1938: 147, 153). Until collections from all parts of the world are compared, this problem cannot be resolved. However, the Hawaiian specimens are of the relatively slender-bodied type with long upper preopercular spine and low dorsal blade, and fall within the limits of *A. sladeni* as interpreted by all three of the authors cited above. It seems best to assign them to this species for the present.

*A. sladeni*, as presently defined, is known from the Atlantic, Antarctic, Indian, and east and west Pacific oceans. It has not previously been reported from the Hawaiian Islands or anywhere in the central Pacific area.

#### RELATIONSHIPS

Aside from those pertaining to the Hawaiian Islands, there are no published records of hatchetfishes from the central Pacific region. Nevertheless it is probable that future collecting will add several more species to the five now known from this area. In view of the fact that most sternoptychids are very widely distributed, occurring in several of the great oceans, it would be difficult to make a general statement as to the relationships of the central Pacific sternoptychid fauna or to predict which species would be most likely to be found there in the future.

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