NOTES ON THE SPECIES OF MYCTOPHINE FISHES REPRESENTED BY TYPE SPECIMENS IN THE UNITED STATES NATIONAL MUSEUM

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INTRODUCTION

In a report published in 1928 on the deep-sea material of the order Iniomi obtained by the third oceanographic expedition of the Pawnee, under the direction of Harry Payne Bingham,¹ the author has endeavored to arrange all previously described species into complete analytical keys to the various families of which representatives were found in the investigated collections. For this purpose the available published descriptions had to be entirely relied upon for the taxonomic definition of the various forms included in the synoptic reviews, except in the cases where the single species were also represented in the Bingham Oceanographic Collection; criticism being otherwise only applied when obvious discrepancies were found to exist in the literature. In the case of the subfamily Myctophinae the earlier descriptions have, however, often proved to be rather inadequate and sometimes also inaccurate or even directly misleading. This holds particularly good of the descriptions rendered before the modern method of describing and classifying the fishes in question, first introduced by Lütken (1892), had won general recognition through the publication of Brauer's significant and extensive report on the deep-sea fishes obtained by the "Valdivia" expedition (Brauer 1906). When recently visiting the United States National Museum in connection with the preparation of further reports on the Bingham Oceanographic Collection, the author therefore took advantage of the opportunity to investigate the numerous type specimens of the said subfamily deposited in the former institution; the purpose of the investigation being to verify, supplement, or correct the original and current descriptions of the various species involved. The results of this investigation will be presented on

¹ Bulletin of the Bingham Oceanographic Collection, Yale University, vol. 3, art. 3.
the following pages, and it is hoped by the author that, with these observations supplementing the keys to the genera *Myctophum, Lampanyctus, Diaphus*, and *Lampadena*, already previously rendered in the above-mentioned report, a not only practical but also reliable foundation shall have been laid down for the future identification of most of the formerly deplorably confused species pertaining to the said four genera, which together constitute the subfamily *Myctophinae*.

The abbreviations first introduced by Brauer (1906) for the designation of the various groups or series of photophores will be used throughout in the following notes, in accordance with the practice now generally accepted in the modern literature on these fishes. The accompanying diagram and list of the abbreviations will sufficiently explain their use and meaning.

- **PLO** = suprapectoral organ.
- **PVO** = subpectoral organs.
- **PO** = thoracic organs.
- **VLO** = supraventral organ.
- **VO** = ventral organs.
- **SAO** = supra-anal organs.
- **AO** = anal organs.
  - **AO ant.** = antero-anal organs.
  - **AO post.** = postero-anal organs.
- **Pol** = postero-lateral organ(s).
- **Prc** = praecaudal organs.

The synoptic reviews of the four genera in question, given in the above-mentioned report upon the Bingham Oceanographic Collect-

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2 Zugmayer 1911, Taaning 1918 and 1928, Barnard 1925, Parr 1928, and others.
3 The fact that the abbreviations do not always correspond to the full terms employed in the different languages has been intentionally disregarded in the literature for the advantage of obtaining fixed international designations for the organs in question.
SYNOPSIS OF CONTENTS AND CONCLUSIONS

1. Partial or complete redescriptions, with diagrammatic illustrations are rendered of the following distinct species, which have heretofore remained inadequately or incorrectly defined in the literature:

- *Myctophum crenulare* Jordan and Gilbert.
- *Lampanyctus Güntheri* Goode and Bean.
- *Lampanyctus mexicanus* Gilbert.
- *Lampanyctus nannochir* Gilbert.
- *Lampanyctus alatus* Goode and Bean.
- *Diaphus wrolampus* Gilbert and Cramer.
- *Diaphus rafinesquei* Cocco.
- *Diaphus chrysorhynchus* Gilbert and Cramer.
- *Diaphus watasei* Jordan and Starks.
- *Diaphus effulgens* Goode and Bean.

2. In addition to the above, diagrammatic figures are rendered of the following, not formerly illustrated species:

- *Myctophum californiense* Eigenmann and Eigenmann.
- *Myctophum imitator* Parr (= *M. suborbitalae* Gilbert).
- *Lampanyctus microchir* Gilbert.
- *Lampanyctus punctatissimus* Gilbert.
- *Lampanyctus regalis* Gilbert.
- *Diaphus nipponensis* Gilbert.
- *Diaphus tanakae* Gilbert.

3. The following new species and subspecies are defined:

- *Myctophum fibulatum proximum*.
- *Lampanyctus taanini*, new name, to designate the form currently identified as *Lampanyctus gemmifer* Goode and Bean, the type of Goode and Bean's nominal species being found to actually represent *Lampanyctus crocodilus* Risso.

4. The following, previously established synonymies have been verified on the type specimens:

- *Myctophum tenua* Eigenmann and Eigenmann, synonym of *M. crenulare* Jordan and Gilbert.
- *Myctophum gilberti* Evermann and Seale, synonym of *M. pterotum* Alcock.

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5 Represented by the type specimens of *D. theta* Eigenmann and Eigenmann, *D. protoculus* Gilbert, and *D. nanus* Gilbert.
Centrobranchus gracilicaudus Gilbert, synonym of M. andreae Lütken.

Rhinoscopelus oceanicus Jordan and Evermann, synonym of M. affine Lütken.

Myctophum margaritatum Gilbert, synonym of M. affine Lütken.

Myctophum braueri Gilbert, synonym of M. reinhardtii Lütken.

Myctophum remiger Goode and Bean, synonym of M. hygomi Lütken.

Notoscopelus brachychir Eigenmann and Eigenmann, synonym of Lampanyctus elongatus Costa.

Notoscopelus quercinus Goode and Bean, synonym of L. elongatus Costa.

Lampanyctus lacerta Goode and Bean, synonym of L. dumérili Bleeker.

Myctophum protoculus Gilbert, synonym of Diaphus rafinesquei Cocco.

Diaphus nanus Gilbert, synonym of D. rafinesquei Cocco.

5. The status of the following specific designations as synonyms of previously described species can be established for the first time:

Myctophum townsendi Eigenmann and Eigenmann, synonym of Lampanyctus warmingi Lütken.

Lampanyctus gümtheri Goode and Bean redescribed as L. melanothorax by Parr 1928.

Lampanyctus alatus Goode and Bean redescribed by L. pseudoalatus by Taaning 1928.

7. For similar reasons the type specimen of Lampanyctus gümmeri Goode and Beane proved entirely foreign to the species currently identified by this name, and for which the new specific name of Lampanyctus taaningi is therefore introduced, while L. gemmifer Goode and Bean must be placed among the synonyms of L. crocodilus Risso.

8. The following species, currently regarded as synonymous with other forms of earlier description, could be reestablished as distinct from the latter:

Lampanyctus macdonalldi Goode and Bean.

Lampanyctus alatus Goode and Bean.

Diaphus watasei Jordan and Starks.
9. The taxonomic status of *Myctophum andreae* Lütken and *Lampanyctus ritteri* Gilbert, Fowler’s records of *Myctophum affine* from Hawaii (Fowler 1928, p. 69), the variations of *Diaphus rafinesquei* Cocco, and other items of minor importance are discussed.

10. The original or current definitions are verified without further discussion on all type specimens deposited in the United States National Museum, representing species of the subfamily Myctophinae not specially mentioned in any of the above lists.

**MYCTOPHUM CRENULARE** Jordan and Gilbert, 1883

*Tarletonbeania crenularis* Gilbert, 1915.

*Myctophum crenulare* Parr, 1928 (gives full synonymy).

*Tarletonbeania tenua* Eigenmann and Eigenmann, 1891.

Material investigated. Type specimen of *Myctophum crenulare* Jordan and Gilbert, No. 27402 U.S.N.M., Santa Barbara, California. Type specimen of *Tarletonbeania tenua* Eigenmann and Eigenmann, No. 42882, U.S.N.M., Coronados, California.

![Figure 2.—*Myctophum crenulare* Jordan and Gilbert](image)

A very adequate description of *M. crenulare* is rendered by Gilbert 1915 (p. 313), who first established the identity of the two above-mentioned nominal species.

*M. crenulare* differs from all other species of the genus *Myctophum* by the presence of only one *Pre* and by the absence of pores from all of the lateral line scales except a few of the most anterior ones. It is further characterized by the strong compression of head and body, by the slenderness of the caudal peduncle, and by the nearly rudimentary state of the ventral fins, while the pectorals are well developed.

The type specimen of *Tarletonbeania tenua* shows no significant differences at all from the type of *M. crenulare*, Gilbert’s opinion upon the identity of the two has therefore been fully accepted by the author.

The various body proportions of the species are also very characteristic, and rather different from the usual proportions of the genus
Myctophum, particularly with regard to the distances from the snout to the ventral and vertical fins, as will appear from the following table of measurements:

**Measurements of M. crenulare Jordan and Gilbert**

[In per cent of the total length without caudal fin]

<table>
<thead>
<tr>
<th>Type of</th>
<th>Tenua</th>
<th>Crenulare</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total length without caudal fin in mm.</td>
<td>61</td>
<td>46</td>
</tr>
<tr>
<td>Length of head</td>
<td>26</td>
<td>26.0</td>
</tr>
<tr>
<td>Diameter of eye</td>
<td>8</td>
<td>7.6</td>
</tr>
<tr>
<td>Greatest height</td>
<td>21</td>
<td>24.0</td>
</tr>
<tr>
<td>Length of lower jaw</td>
<td>18</td>
<td>18.5</td>
</tr>
<tr>
<td>Height of caudal peduncle</td>
<td>5</td>
<td>5.5</td>
</tr>
<tr>
<td>Snout to D</td>
<td>51</td>
<td>50.0</td>
</tr>
<tr>
<td>Snout to V</td>
<td>39</td>
<td>39.0</td>
</tr>
<tr>
<td>Snout to A</td>
<td>56</td>
<td>54.0</td>
</tr>
</tbody>
</table>

The illustration of the species previously rendered by Goode and Bean (1895, fig. 105, pl. 28, *Tarletonbeania tenua*), being rather inadequate and misleading in several respects, the accompanying diagram has been prepared from the above recorded specimens. Correctly defined in the previously rendered key.

*M. crenulare* has been taken only off the Pacific coast of North America.

**MYCTOPHUM IMITATOR** Parr, 1928

*Myctophum suborbitale* Gilbert, 1913 (name preoccupied, see Parr, 1928, p. 60).

*Myctophum simile* Taanning, 1928.

Material investigated. Type specimen of *Myctophum suborbitale* Gilbert, No. 74473, U.S.N.M. Suruga Bay, Japan.

The predorsal length of the type specimen is recorded by Gilbert 1913 as 55 per cent of the total length without caudal fin, but was found by the author to be only 45 per cent of the said measurement, the discrepancy probably being due to a misprint in Gilbert's report. The length of the head was likewise found to be probably more nearly 32 per cent of the total length without caudal fin, than 35 per cent as recorded by Gilbert. The distance from snout to ventral fins equals about 41 per cent of the same measurement.

No illustration of the species having previously been rendered the accompanying diagram was prepared from the type specimen. Correctly defined in the previously rendered key.

Known only from the coast of Japan.

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6 The figure represents a composite diagram, photophores which have become accidentally lost on the left side shown of the type of *M. crenulare*, on which the drawing is primarily based, have been entered by comparison with the right side and with the type of *Tarletonbeania tenua*. 
The type of *M. imitator* (suborbitale) is in every respect perfectly concordant with the brief preliminary diagnosis of *M. simile* rendered by Taanning, 1928 (p. 56), and, if the identity of the two should become definitely established by further investigation of the latter form, Taanning's name would have priority over the name of *M. imitator*.

**MYCTOPHUM PTEROTUM** Alcock, 1891

*Scopelus (Myctophum) pterotus* Alcock, 1891.

*Myctophum pterotum* Fowler, 1928; Parr, 1928 (full discussion of earlier synonymy).

*Myctophum gilberti* Evermann and Seale 1907.

Material investigated. Type specimen of *Myctophum gilberti* Evermann and Seale, No. 55900, U.S.N.M. Philippine Islands.

The identity of *M. gilberti* with *M. pterotum* Alcock, already suggested by Gilbert, 1913 (p. 81), could only be confirmed by an inspection of the type specimen of the former species.

**MYCTOPHUM FIBULATUM** Gilbert and Cramer, 1897

*Myctophum fibulatum* Parr, 1928 (with full discussion of earlier synonymy, p. 67).

Material investigated. Type specimen No. 47711, U.S.N.M. Hawaii.

A fairly accurate illustration of the type of this species has been rendered with the original description (Gilbert and Cramer, 1897 p. 411, and pl. 38, fig. 2), and the species has been further discussed in considerable detail by Gilbert 1913 (p. 81, under the heading of *M. pterotum* Alcock).

The type specimen differs somewhat from the specimens previously described and figured by the author (Parr, 1928, p. 67 and fig. 7) in having the *PLO* very close to the lateral line, and by having the last *Pre* immediately below, not directly in the end of the lateral line.

The legend (pl. 38, fig. 1) erroneously refers this figure to *Diaphus chrysorhynchus*, which is shown in figure 3 on the same plate and is referred to the above-discussed species.
line; while in the material obtained by the Bingham Oceanographic Expedition to the Bahamas, 1927, the PLO is considerably closer to the base of pectoral fin than to the lateral line, and the last Pre is always directly in the end of the lateral line. In the author's opinion these differences are not sufficiently significant to justify the introduction of an entirely separate species but a subspecific designation of the Atlantic form seems desirable.

The two PVO are in both forms arranged in an only very slightly inclined, nearly horizontal series.

Fowler, 1928 (p. 70) still includes M. fibulatum among the synonyms of M. pterotum Alcock, without giving any reasons for not accepting the arguments rendered by Gilbert 1913 (p. 81) for the distinctness of these two species.

M. fibulatum fibulatum has only been recorded with reliable identification from Hawaiian waters.

**MYCTOPHUM FIBULATUM PROXIMUM, new subspecies**

*Myctophum fibulatum* Parr, 1928.

Type specimen, No. 2184 Bingham Oceanographic Collection. Paratype deposited in the United States National Museum.

Distinct from *M. fibulatum fibulatum* by having the PLO nearer the base of pectoral fin than to the lateral line, and by having the last Pre directly in the end of the lateral line, as above described.

For illustration and further details see Parr, 1928 (pp. 67–69, and fig. 7). The anterior PVO is shown in a somewhat too low position in the figure.

Known only from the Tongue of the Ocean, Bahamas.

The species *M. fibulatum* as a whole has been correctly defined in the previously rendered key.

**MYCTOPHUM ANDREAE** Lütken, 1892

*Scopelus (Rhinoscopelus) andreae* Lütken, 1892.
*Rhinoscopelus andreae* Goode and Bean, 1895; Jordan and Evermann, 1896.
*Myctophum coccoi andreae* Brauer, 1904.
*Myctophum andreae* Brauer, 1906, Zugmayer, 1911.
*Centrobranchus andreae* Gilbert, 1911; Fowler, 1928.
*Centrobranchus gracilicaudus* Gilbert, 1905; Jordan and Jordan, 1922.
*Myctophum nigro-ocellatum* (part) Parr, 1928.

Material investigated. Type specimen of *Centrobranchus gracilicaudus* Gilbert, No. 51518 U.S.N.M. Hawaii.

The type of *Centrobranchus gracilicaudus* is in every respect perfectly concordant with the description and figure of *Myctophum*
andreae rendered by Lütken, 1892 (p. 245,8) and the author can therefore see no reason for maintaining the former as a separate species.

In the previously rendered key to the genus Myctophum (Parr, 1928, p. 62) M. andreae has become identified with M. nigro-ocellatum Günther through an unfortunate misinterpretation of a note upon these two species rendered by Taanning 1928 (p. 55), for which the author must apologize. M. andreae and M. nigro-ocellatum are easily differentiable from each other by the characters mentioned in the following supplementary key.9

I. First (lower) SAO above third VO. AO 4-7+8-12 10 M. nigro-ocellatum Günther 1889.

II. First (lower) SAO above fourth VO. AO 6+11. M. andreae Lütken 1892.

The synonymy of M. nigro-ocellatum should then read:

Scopelus nigro-ocellatus Günther, 1889.
Myctophum nigro-ocellatum Taanning, 1928; Parr, 1928 (part).
Centrobranchus choerocephalus Fowler, 1903 and 1928; Gilbert 1905, 1908, and 1913; Jordan and Jordan, 1928.

Myctophum (Myctophum) coccoi forma regularis Brauer, 1904.
Myctophum (Myctophum) choerocephalum Brauer, 1906.

A good illustration of M. andreae has been rendered by Gilbert 1905 (pl. 69, fig. 2) ("Centrobranchus gracilicaudus"), who also shows a specimen of M. nigro-ocellatum ("Centrobranchus choerocephalus") on the same plate (fig. 1).

M. andreae is known from the Indian and Atlantic oceans, and, as Centrobranchus gracilicaudus, from the Hawaiian waters and from Japan.

MYCTOPHUM PRISTILEPIS Gilbert and Cramer, 1897

Dasycopelus pristilepis Gilbert and Cramer, 1897.
Myctophum pristilepis Parr, 1928 (full synonymy).

Material investigated. Type specimen No. 47737, U.S.N.M. From Hawaii.

The original description and figure of this species (Gilbert and Cramer, 1897, p. 412 and pl. 39, fig. 1) has been supplemented by Gilbert, 1906 (p. 259 and pl. 3), with a very accurate illustration and a detailed discussion of its characters, to which the author has nothing to add. The species has been correctly defined in the previously

8 Lütken's figure shows the SAO equally spaced, but this feature probably is due to inaccuracy in the drawing and is not mentioned in the text. In the type of gracilicaudus the middle SAO is distinctly nearer to the lower than to the upper organ of the same series.
9 To be used for subdivision of point 9Y in the previously rendered key (Parr, 1928, p. 62).
10 5-7+9-12, according to Gilbert, 1905, p. 594 ("Centrobranchus gracilicaudus"); 4-5+8-9 according to Taanning, 1928, p. 55.

64440—29—2
rendered key. Fowler, 1928 (p. 67), combines this species with *M. asperum* Richardson, with which it is very closely related.

The type was obtained in Hawaiian waters. The typical form has later been recorded from near Mauritius (Gilbert, 1906), and an Atlantic subspecies *obtusirostre* is mentioned by Taanning (1928).

**MYCTOPHUM CALIFORNIENSE** Eigenmann and Eigenmann, 1889

*Myctophum californiense* Jordan and Evermann, 1896; Gilbert, 1913;
Townsend and Nichols, 1925; Parr, 1928.


Material investigated. Type specimen No. 41920, U.S.N.M. From San Diego, California.

The original description of *M. californiense* Eigenmann and Eigenmann (1889, p. 124) has been very adequately supplemented by Gilbert, 1913 (p. 78), the accompanying diagram of the type specimen, however, represents the first illustration of the species.

![Figure 4.—Myctophum californiense Eigenmann and Eigenmann](image)

The eyes and the head were found to be slightly larger in the type than in the specimen recorded by Gilbert, equaling 8.5 and 27 per cent, respectively, of the total without caudal fin, instead of 7.8 and 25 per cent of the same measurement.

Correctly defined in the previously rendered key.\(^{11}\)

Type locality: San Diego, California. Subsequently recorded also from Japan (Gilbert, 1913).

**MYCTOPHUM EVERMANNI** Gilbert, 1905

*Myctophum evermanni* Brauer, 1906; Gilbert, 1908 and 1913; Weber, 1913;
Weber and Beaufort, 1913; Jordan and Jordan, 1922; Fowler, 1928;
Parr, 1928.

Material investigated. Type specimen No. 51521, U.S.N.M. From Hawaii.

Adequately described and figured by Gilbert, 1905 (p. 597 and pl. 70, fig. 2).

Correctly defined in the previously rendered key.

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\(^{11}\) For "The last 3–4 posterior AO above the base A" (Parr. 1928, p. 64, point Z), read "The first 3–4 posterior AO above the base A."
Known from the waters around Hawaii, from the Indo-Australian Archipelago and from Japan.

**MYCTOPHUM AFFINE** Lütken, 1892

_Scopelus affine_ Lütken, 1892.

*Myctophum affine* Goode and Bean, 1895; Jordan and Evermann, 1896; Brauer, 1904 and 1906; Lønneberg, 1905; Gilbert, 1908, 1911, 1913, and 1915; Zugmayer, 1911; Fowler, 1912, not Fowler, 1928; Weber, 1913; Weber and Beaufort, 1913; Pappenheim, 1914; Jordan and Jordan, 1922; Fowler and Ball, 1925; Taanning, 1928; Parr, 1928.

*Myctophum opalinum* Goode and Bean, 1895; Jordan and Evermann, 1896; Waitte, 1903; Breder, 1927.

*Myctophum nitidulum* Garman, 1899.

*Rhinoscopelus oceanicus* Jordan and Evermann, 1903.

*Myctophum margaritatum* Gilbert, 1905.


An inspection of the above mentioned types can only serve to verify in every respect the identity of these two nominal species with the cosmopolitan _M. affine_ Lütken, as already made out by Brauer, 1906 (p. 190) and by Gilbert, 1908 (p. 217) and 1913 (p. 77).

Fowler, 1928 (p. 69), figures a young specimen (of about 30 mm. length without caudal fin), and describes another, of 72 mm. length, referring both to _M. affine_. These specimens do, however, neither seem identical with each other nor can either one of them be identified with Lütken’s _M. affine_, unless the description and figure should be very inaccurate and misleading. The illustration shows a specimen with prominent snout, 6 PO, 4 VO, SAO in a straight series, 10+5 AO, only one single Pre, anal origin under the anterior part of the base of dorsal fin, the ventrals inserted far in advance of the origin of dorsal fin, and no lateral line. If these features are accurately shown in the drawing the specimen certainly must represent an entirely new species most closely related to the group of _M. coccoi_ Cocco, _M. nigro-ocellatum_ Günther and _M. andreae_ Lütken, but has no relationship at all to _M. affine_ Lütken. The larger specimen is on the other hand described as having a “very short” snout, only 6+4 AO, 2 Pre, and a lateral line. That these two specimens can not be identical if figure and description are both reliable, is obvious without further discussion. That the larger specimen can not either be identical with Lütken’s _M. affine_ is indicated by the following features. The specimen is described as having “4 pectorals”; “2 anterolaterals”; “5 thoracic”; and “ventrals apparently 3.” The fact that there are 5 “thoracies” in addition to the 4 “pectorals” shows that there must be one photophore more on the

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12According to the scale of the illustration, fig. 13, in his Fishes of Oceania.
anterior part of the body than there is in *M. affine* (which has 1 \(PLO+2 PVO+5 PO=8\), only, instead of 9). According to the definition of antero-lateral organs (Goode and Bean, 1895, tentative arrangement of the genera of Myctophidae, with diagram and explanation of terms, inserted between pages 70 and 71, *loc. cit.*), the presence of two such photophores as described by Fowler would mean, in modern terms, that the second *VO* is elevated, a condition which also automatically explains the statement that there are apparently only 3 “ventrals,” the second *VO* being counted as an antero-lateral. Fowler’s larger specimen, therefore, would probably belong in division \(B, \Pi, e, 2, \omega\) (p. 60) in the previously rendered key to the genus *Myctophum* (Parr, 1928), but does not seem to have any relationship to *M. affine*, in which the 4 *VO* are all situated on the same level.

**MYCTOPHUM REINHARDTI** Lütken, 1892

*Scopelus reinhardti* Lütken, 1892.

*Myctophum reinhardti* Parr, 1928 (with full synonymy).

*Myctophum braueri* Gilbert, 1905.

Material investigated. Type specimen of *Myctophum braueri* Gilbert, No. 51527 U.S.N.M., from Hawaii.

The identity of *M. braueri* Gilbert 1905 (p. 598 and Plate 70, fig. 113) with Lütken’s *M. reinhardti* has already been established by Gilbert, 1908 (p. 219), and can only be confirmed by the author after an inspection of the type-specimen of the former nominal species.

**MYCTOPHUM HYGOMI** Lütken, 1892

*Scopelus hygomi* Lütken, 1892.

*Myctophum hygomi* Parr 1928, (with full synonymy).

*Myctophum remiger* Goode and Bean, 1895.

Material investigated. Type lot of *Myctophum remiger* Goode and Bean 1895, No. 43792, 9 specimens from the western Atlantic.

Inspection of the type specimens of *M. remiger* G. a. B. only serves to verify the identity of this form with Lütken’s *M. hygomi* as already made out by Jordan and Evermann, 1986, page 573.

The sample showed the following compositions of organs in the anal series, each side being counted separately. \(6+7 AO\) in 4 cases; \(7+6 AO\) in 12 cases; and \(7+7 AO\) in 2 cases (1 specimen). Asymmetry of the nature \(\frac{6+7}{7+6} AO\) was found in two specimens.

Known from the Mediterranean, the Atlantic, and the Indian Oceans.

13 Misnamed *M. lütkeni* in the legend of the figure (see Gilbert, 1908).
LAMPANYCTUS WARMINGI Lütken, 1892

Scopelus (Nyctophus) warmingi Lütken, 1892b.

Lampanyctus warmingi Parr, 1928 (with earlier synonymy).

Myctophum townsendi Eigenmann and Eigenmann, 1889.

Lampanyctus townsendi Parr, 1928 (with earlier synonymy); Fowler, 1928.

Material investigated. Type lot of Myctophum townsendi Eigenmann and Eigenmann, 1889, No. 41921, U.S.N.M., from Cortez Banks, California.

The largest specimen of the sample of Myctophum townsendi, the only one which is still legible, is in every respect perfectly concordant with the Atlantic specimens of L. warmingi Lütken (see Taaning, 1928, p. 65, and Parr, 1928, p. 91), both with regard to proportions, photophores, and luminous scales. The latter are found in the same, characteristic arrangement as in L. warmingi in a single mid-ventral series between ventral fins and the vent, ending in a symmetrical pair, one on each side of the anal opening, (see also Gilbert, 1913, p. 99). A group of luminous scales below the throat, now lost in the type, has also been described by Gilbert (1913, p. 99). There is a whitish patch above the eye, preserved in a bad condition, only on one side, which may be an artefact or might possibly represent a luminous tissue, similar to the presumably luminous patches found in the same position in L. photophorae Parr, 1928. This feature is, however, of a highly questionable nature and taxonomic value, and the investigated lot shows no adequate reason at all for regarding L. townsendi as a distinct species from L. warmingi.

LAMPANYCTUS MARGARITIFER Goode and Bean, 1895

Notoscopeus margaritifer Goode and Bean, 1895.

Macrostoma margaritiferum Jordan and Evermann, 1896.

Myctophum (Lampanyctus) margaritiferum Brauer, 1906.

Lampanyctus margaritifer Parr, 1928.

Material investigated. Type specimen No. 43775, U.S.N.M. From the northwestern Atlantic.

The original figure of this species (Goode and Bean, 1895, fig. 98, pl. 26) apparently renders a fairly accurate picture of the arrangement of the photophores, being generally correct in as far as it is now possible to check up on the type-specimen. The only obvious difference worth mentioning is contributed by the fact that 5 VO in a straight series are found in the type, while only 4 of these organs are shown in the figure. The upper PVO has now become lost on both sides, but is shown above the base of the pectoral fin in Goode and Bean’s drawing.

Correctly defined in the previously rendered key.

Known only from the Newfoundland Banks.
**LAMPANYCTUS ELONGATUS Costa, 1844**

*Scopelus elongatus* Costa, 1844.
*Lampanyctus elongatus* Parr, 1928 (with full synonymy).
*Notoscopeus brachychir* Eigenmann and Eigenmann, 1889.
*Catablemmela brachychir* Eigenmann and Eigenmann, 1891.
*Notoscopeus quercinus* Goode and Bean, 1895.
*Macrostoma quercinum* Jordan and Evermann, 1896.
*Myctophum* (*Lampanyctus*) *quercinim* Brauer, 1906.

Material investigated. Type specimen of *Natoscopeus brachychir* Eigenmann and Eigenmann, 1889, No. 76336, U.S.N.M. From Cortez Banks, California. Type specimen of *Natoscopeus quercinus* Goode and Bean, 1895, No. 43789, U.S.N.M. From the Newfoundland Banks.

Only a few of the photophores can still be made out with certainty on either of the two above mentioned type specimens, which are in a rather bad condition. There is, however, nothing to refute the view already previously held by the author that *Natoscopeus brachychir* and *quercinus* are both perfectly identical with *Lampanyctus elongatus* Costa, as already made out by Jordan and Evermann, 1896 (p. 556) in the case of the former of the two nominal species.

**LAMPANYCTUS CASTANEUS** Goode and Bean, 1895

*Natoscopeus castaneus* Goode and Bean, 1895.
*Macrostoma castaneum* Jordan and Evermann, 1896.
*Myctophum* (*Lampanyctus*) *castaneus* Brauer, 1906.
*Lampanyctus castaneus* Parr, 1928.

Material investigated. Type specimen No. 31706, U.S.N.M. From the northwestern Atlantic.

The condition of the type specimen makes it quite impossible to observe any details of specific significance, practically all of the photophores having now become lost. Nothing can therefore be added to the unfortunately rather inadequate original description, and the accuracy of the details shown in the only illustration of this species (Goode and Bean 1895, fig. 95, pl. 25) can not be determined.

**LAMPANYCTUS GÜNThERI** Goode and Bean, 1895

*Lampanyctus guntheri* Goode and Bean, 1895; Jordan and Evermann, 1896; Waite, 1910 (?); Parr, 1928.
*Myctophum* (*Lampanyctus*) *guntheri* Brauer, 1906; Pappenheim, 1914.
*Lampanyctus melanothorax*, Parr, 1928.

Material investigated. Type specimen No. 43777, U.S.N.M. Newfoundland Banks.

It appears from an inspection of the above type specimen that the lateral line scales of *L. guntheri* are very much enlarged indeed, particularly on the posterior part of the body, where their broad posterior (free) margins extend over approximately three-fourths,
or more, of the entire height of the caudal peduncle. The fact that
the said species was referred by Goode and Bean, 1895, to the genus
*Lampanyctus*, in the restricted sense in which this generic designation
was employed by the said authors to embrace only the species
which combined among other characters the feature of having the
scales of the lateral line "scarcely larger than the others," is there-
fore inexplicable, and has caused the author previously to redescribe
the species under the name of *L. melanothorax*. The specimens re-
ported by Waite, 1910, as having the lateral line scales only scarcely
enlarged may possibly pertain to another species, if a similar mis-
leading use of these descriptive terms has not also been made by
Waite.

The type specimen of *L. Güntheri* is in all other respects quite con-
cordant with the material of *L. melanothorax* Parr previously re-
ported upon (see Parr, 1928, p. 99), as will appear from a comparison
of the accompanying diagram of the former with the figure and de-

![Figure 5.—Type specimen of Lampanyctus Güntheri Goode and Bean. Supra- and infra-caudal luminous scales lost](image)

scription of the latter (*loc. cit.*). Most of the luminous scales, the
second and third *Per*, and possibly the sixth postero-anal organ have
become lost, however, in the type of *L. Güntheri*, but there is no reason
to assume that these organs, when present, would have differed from
those of the nominal *L. melanothorax*.

The species has been recorded from Atlantic and Australian waters.
*L. gaussi* Brauer 1906, which has been identified with *L. Güntheri*
by Taaning 1928, differs according to Brauer's description in having
6 *VO* and a luminous scale at the base of ventral fin, while only 5 *VO*
and no luminous scale in the said position are found in *L. Güntheri*.

**LAMPANYCTUS MEXICANUS** Gilbert, 1891

*Myctophum mexicanum* Gilbert, 1891.
*Nannobrachium mexicanum* Jordan and Evermann, 1896.
*Myctophum (Lampanyctus) mexicanum* Brauer, 1906.
*Lampanyctus mexicanus* Parr, 1928.

Material investigated. Type specimen No. 76343, U.S.N.M. From
the Gulf of California.

---

14 The original illustration of the species (Goode and Bean, 1895, fig. 90, pl. 24) is also
totally misleading in this respect.
PLO at the lateral line. First PVO well below and anterior to the second PVO. 5 PO, the fourth elevated approximately to the level of the upper PVO. Interspace between first and second PO enlarged. VLO very low, its distance from the base of ventral fin only about one-third of its distance from the lateral line. 4 VO, the second VO elevated to the level of the VLO. SAO broadly angulate. First SAO above the interspace between third and fourth VO, somewhat nearer to the vertical from the former. Second SAO above and behind fourth VO and slightly higher than first SAO. Third SAO at the lateral line, somewhat behind the vertical from second SAO. The continuation of the line through second and third SAO passes well behind the last VO. Only 4 widely spaced antero-anal organs, with the interspaces gradually decreasing caudalwards. None of the antero-anal organs elevated. 2 Pol, the upper at the lateral line, well behind the vertical from the lower Pol, which is situated well behind and somewhat higher than the last antero-anal organ. The anterior organs of the postero-anal series have unfortunately now become lost in the type specimen, but four organs are found on each side on the posterior part of the caudal peduncle in a continuous, horizontal series along the ventral outline of the tail, ending at the bases of the lower caudal rays. These four organs evidently must comprise the posterior postero-anals and the anterior (lower) praecaudals and their arrangement indicates these two series to be perfectly confluent. The ultimate Pre is situated close to, but very distinctly above the end of the lateral line. No intermediate organ was found between this upper praecaudal and the above described posterior organ of the ventral series (see figure), but there is a possibility that such organs may originally have been present and have subsequently become lost in the type specimen. This possibility is, however, not confirmed by the original description, according to which there were "six pairs of spots along the under side of tail, and three along base of lower caudal lobe" (Gilbert, 1891, p. 52), when the specimen was

The pectoral fins have practically completely disappeared in this species and their bases can therefore scarcely serve as orientation points for describing the positions of the photophores.
still in a comparatively fresh state of preservation. In modern terms the above quoted description should therefore probably read: Six postero-anals. The three anterior (or lower) Préc situated along the base of lower caudal lobe. With further details as above described.

The obscure terminology of the original description has caused the species to be recorded as having 6+6 AO (Brauer, 1906, p. 167) or 6+5 AO (Parr, 1928, p. 84), the actual numbers being 4+6 (?) AO+4 Préc, as above made out. Otherwise correctly defined in the previously rendered key.

6–7 infracaudal and 3 supracaudal luminous scales, not elevated on procurent caudal spines.

The type specimen shows the following proportions in per cent of the total length without caudal fin (44 mm.). Length of head 30. Diameter of eye 6.8. Length of lower jaw 23. Greatest height 18. Distance from snout to dorsal fin 50. Distance from snout to ventral fins 42. Distance from snout to anal fin 60.

The advanced position of the ventrals relative to the dorsal fin, the low position of the VLO; the low number of photophores in the antero-anal series and the comparatively few scales are the distinguishing features of the species.

**LAMNANYCTUS MICROCHIR** Gilbert, 1913

*Lampanyctus microchir* Gilbert, 1913; Parr, 1928.

Material investigated. Type specimen No. 74468, U.S.N.M. Suruga Bay, Japan.

A fully adequate and very accurate description of this species has already been rendered by Gilbert, 1913 (p. 101), but no illustration has so far been published. The accompanying diagram has therefore been prepared from the type specimen.

Correctly defined in the previously rendered key. Known only from the type specimen.

The praecaudals being arbitrarily counted as four when they are confluent with the postero-anals (see Parr, 1928, p. 77).

64440—29—3
LAMPANYCTUS NANNOCHIR Gilbert, 1891

Myctophum mannochir Gilbert, 1891 (part).
Nannobrachium mannochir (part), Jordan and Evermann, 1896; Gilbert, 1895.
Lampanyctus mannochir Gilbert, 1913, Pare, 1928.

Material investigated. Type lot No. 44291, U.S.N.M. 8 specimens from off the coast of the State of Washington.

In spite of the various, quite extensive discussions of its taxonomic status rendered by Gilbert (1895, p. 399; 1913, p. 100, and 1915, p. 315, under L. leucopsarum), subsequent to its original description (Gilbert, 1891, p. 51), L. mannochir has up to the present date remained a very obscurely and unsatisfactorily defined species. After an inspection of the type sample deposited in the United States National Museum the author is able, however, to verify the specific distinctness of Gilbert's species from the closely related L. leucopsarum Eigenmann and Eigenmann 18 as well as from all other forms included in the genus Lampanyctus. The following description of the type sample, of which only one specimen is sufficiently well preserved to show the arrangement and numbers of the photophores, may serve for future identification.

17 A second type specimen (No. 1459 of the Leland Stanford Junior University Museum, from the same haul as the type-sample in the U.S.N.M.) has also been assigned to the species in a later publication by Gilbert (1895, p. 400), wherein a more restricted definition of L. mannochir is rendered. It is obvious, however, that the specimens of L. leucopsarum, with which species L. mannochir was at first confounded, must have become weeded out of the type sample of the latter species, probably by Gilbert himself, subsequent to the publishing of the original description, as no such specimens are found in the sample to-day.

18 The author has had opportunity to examine the type of L. leucopsarum Eigenmann and Eigenmann in the Museum of Comparative Zoology, Cambridge. This specimen differs from the above-discussed type of L. mannochir in having the upper SAO and P01 only about the length of one of their own diameters, or even considerably less (Pot), removed from the lateral line; by the presence of 4 Pre in an equally curved series, well separated from the postero-anal organs; and by the presence of 5 VO, the second being elevated and advanced to a position nearly vertically above the first VO. No traces of a VLO are found in the type of L. leucopsarum, and there seems to be no indication of such organ ever having been present on the specimen. A comparison with the type of L. mannochir might further suggest the possibility that the so-called VLO of the latter species should actually be homologous with the second VO of the type of L. leucopsarum, this organ having in the former species merely become further elevated and advanced to a position slightly anterior to the vertical from the first VO. On the basis of this assumption both species might be defined as having lost their VLO. The type of L. mannochir must otherwise be defined as distinct from the type of L. leucopsarum in having only 4 VO as compared to the unquestionable 5 VO of the latter, in direct contradiction of the comparative tabulation of the features of these two species given by Gilbert, 1895 (p. 399). Other differences in proportions, etc., claimed by the said author could not be verified on the type specimens, which, on the contrary, seem quite concordant in all measurements. A thorough revision of the various collections referred to each of the respective species is highly desirable to clear the confusion existing in all previous descriptions. The types of both species agree in the practically rectilinear arrangement of the SAO, the lower one of which is situated entirely behind the vertical of the last VO; and also in having the Pre well separated from the postero-anal series.
NOTES ON MYCTOPHINE FISHES—PARR

Total length without caudal fin 97 mim. Proportions in per cent of the total length without caudal fin: Length of head 28. Diameter of eye 6.6. Length of lower jaw 22. Greatest height 19. Distance from snout to dorsal fin 46. Distance from snout to ventrals 40.5. Distance from snout to anal fin 56.

Origin of anal fin below the end of the anterior three-fifths of the base of dorsal fin. The general appearance of the species will be sufficiently evident from the accompanying diagram.

PLO nearer to the lateral line than to the base of pectoral fin. Upper PVO vertically above lower PVO. 5 PO, the fourth elevated to approximately midway between the levels of the upper and the lower PVO. The interspace between first and second PO enlarged. VLO approximately midway between the lateral line and the base of ventral fin, or lower, only slightly in advance of the vertical from the anterior VO. 4 VO with gradually decreasing intervals, the first interval being the widest. 3 SAO in a very slightly curved, nearly straight, series, with the lower organ well behind and only slightly higher than the fourth VO. This lower SAO probably represents the fifth VO of earlier descriptions. Second SAO only slightly nearer to the lower than to the upper SAO. Upper SAO about 3 of its own diameters below the lateral line canal. 7+7 AO (determined by comparison between the different specimens in the type-sample). Pol posterior to the vertical from the last antero-anal organ and about 3 of its own diameters below the lateral line canal. The postero-anal series begins at a considerable distance (about equal to two normal photophore-intervals or even more) behind the end of the base of anal fin. 3 Pre, well separated from the postero-anal organs and apparently arranged in a nearly straight or only very

Figure 8.—Lampanyctus nannochir Gilbert

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19 The measured specimen, on which the following description and figure are mainly based, carried the tin tags of the sample and probably represents the holotype of the species. Only the numbers and accurate arrangement of the posterior ventral series (AO and Pre) were determined by comparison with the other specimens.

20 See footnote 18 on the preceding page.
slightly curved series, with the upper organ somewhat below the end of the lateral line.

The luminous scales are difficult to make out, but it is obvious that the infracaudal scales have occupied considerably more than one-third of the length of the caudal peduncle, as claimed by Gilbert 1895, probably more nearly two-thirds of the same. The supra-caudal series, however, has scarcely been more than half the length of the infracaudal series, thus conforming with Gilbert's statement. The various published records of the species are of highly questionable taxonomic validity.

LAMPANYCTUS MACDONALDI Goode and Bean, 1895

Nannobrachium macdonaldi Goode and Bean, 1895; Jordan and Evermann, 1896.

Material investigated. Type specimen No. 39478, U.S.N.M. Northwestern Atlantic.

The above type specimen is in most respects quite concordant with the redescription of Günther's L. niger rendered by Brauer, 1906 (p. 242), and differs from the three new species L. ater, L. lineatus and L. cuprarius introduced by Taaning, 1928 in having the VLO inserted far below the lateral line. Brauer describes the VLO as being situated "ein wenig" (a little, somewhat), below the lateral line in the specimens examined by him, and his figure (1906, fig. 159), shows its distance from the lateral line as only about one-third of its distance from the base of ventral fin. In the type of L. macdonaldi the ratio between these two distances equals about 2:3. In L. macdonaldi the PLO is also inserted approximately midway between the lateral line and the base of pectoral fin, and the two PVO are situated nearly vertically above each other; while in Brauer's description and figure of L. niger the PLO is close to the lateral line and the PVO are arranged in a very oblique series with the upper organ well in advance of the lower. For these reasons the author has felt justified in reestablishing L. macdonaldi Goode and Bean as a separate species, and the following brief synopsis may serve for its identification, as a supplement to point 22 (p. 87), in the previously rendered key (Parr, 1928).

v. VLO a little or far below the lateral line.

n. PLO near the lateral line. PVO in an oblique series, with the upper photophore well in advance of the lower. VLO much nearer to lateral line than to base of ventral fin.

L. niger (Günther) Brauer, 1906.

---

21 The L. niger recorded by Gilbert, 1905 (p. 591) and 1913 (p. 100), obviously is identical with the L. ater described by Taaning, 1928, having the VLO immediately below the lateral line and the first BAO above the interspace between second and third VO; but on the other hand is not concordant with the redescription of L. niger rendered by Brauer, 1906 (p. 242) [see Parr, 1928, pp. 87 and 104]. Fowler, 1928 (p. 68), merely refers to Gilbert's descriptions.
n. **PLO** about midway between lateral line and the base of pectoral fin. **PVO** in an approximately vertical series. **VLO** only moderately closer to the lateral line than to the base of ventral fin, the ratio between the two distances being only about 2:3.

**L. macdonaldi** Good and Bean, 1895.

v. **VLO** immediately below the lateral line.

The inadequacy of the original figure and description (Goode and Bean, 1895, fig. 110, pl. 29, and p. 94), makes it desirable to refigure and redescribe **L. macdonaldi** in full detail.

Total length of type specimen exclusive of caudal fin 104 mm. Proportions in per cent of the total length without caudal fin: Length of head 29. Diameter of eyes 5.8. Length of lower jaw 23. Greatest height 17. Height of caudal peduncle 10.5. Distance from snout to dorsal fin 46. Distance from snout to ventrals 43. Distance from snout to anal fin 58.

![Figure 9](image-url)

**Figure 9.—** *Lampanyctus macdonaldi* Goode and Bean. The number of separate infra- and supra-caudal luminous scales cannot be clearly made out in the type specimen


**PLO** about midway between lateral line and base of *P. PVO* nearly vertically arranged. 5 **PO**, the fourth elevated to midway between the levels of lower and upper **PVO**. **VLO** about two-thirds as distant from the lateral line as from the base of ventral fin. 4 **VO**, all on the same level. 3 **SAO**, broadly angulate. First **SAO** above the interspace between second and third **VO**. Second **SAO** only very slightly higher, well behind the vertical from the last **VO**. Upper **SAO** close to the lateral line, on a line with the second **SAO** which passes well behind the fourth **VO**. 7 anteranal organs, equally spaced in a gently convex curve, none ele-
vated. 2 Pol, the upper close to the lateral line and well behind the vertical from the lower Pol, which is again well behind, but not so very much higher than, the last antero-anal organ (see figure). 7 postero-anals, entirely behind the base of anal fin and confluent with the praecaudals, which have been counted as four. Ultimate Pre immediately below the end of the lateral line, vertically above or even very slightly in advance of the penultimate Pre. Interspace between ultimate and penultimate Pre greatly increased.

Supracaudal luminous plates occupy only about one-third of the distance between adipose and caudal fins, while the infracaudal plates extend through almost the entire length of the caudal peduncle. The numbers of the luminous scales can not be counted.

But for the type specimen there is no reliable record of the species.

**LAMPANYCTUS OMOSTIGMA** Gilbert, 1908

*Lampanyctus omostigma* Gilbert, 1908; Jordan and Jordan, 1922; Parr, 1928, Fowler, 1928 (?).

Material investigated. Type specimen No. 75769, U.S.N.M. From the Marquesas Island.

*Lampanyctus omostigma* has been very adequately and accurately described and figured by Gilbert, 1908 (p. 232 and pl. 5).

Correctly defined in the previously rendered key.

**LAMPANYCTUS REINHARDTI** Jordan, 1922

*Nyctimaster reinhardtii* Jordan, 1922; Jordan and Jordan, 1922.

*Lampanyctus omostigma* (part ?), Fowler, 1928.

Material investigated. Type lot No. 84095, U.S.N.M. (2 specimens from the coast of Hawaii).

This purely nominal species is entirely without taxonomic value, being quite unidentifiable either from the types or from the original description, on account of the dried out condition of the specimens on which it has been based, and the consequent inadequacy of its diagnosis. It may be taken for granted from their general appearance that the type specimens represent some species of the genus Lampanyctus, but nothing is known or perceptible of the numbers and arrangement of their photophores.

Fowler, 1928 (p. 69), provisionally identifies *L. reinhardtii* with *L. omostigma*. This view on the taxonomic status of the former nominal species is quite probably correct, but can neither be proved nor disproved on the basis of the above discussed type specimens; and, as the same will also hold good of any other theory that might be advanced, the author has deemed it advisable not to accept or attempt any identification at all.
LAMpanyctus punctatissimus Gilbert, 1913

*L. punctatissimus* Gilbert, 1913; Parr, 1928.

Material investigated. Type specimen No. 74469, U.S.N.M. Suruga Bay, Japan.

Adequately and accurately described by Gilbert, 1913, p. 103, but not formerly illustrated. The accompanying diagram has therefore been prepared from the type specimen.

*VLO*, upper *SAO*, *Pol* and *Pref* immediately below the lateral line.22

Correctly defined in the previously rendered key.

Known only from Japan.

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Lampanyctus stilbius Gilbert, 1913

*Lampanyctus stilbius* Gilbert, 1913; Parr, 1928; Fowler, 1928.

Material investigated. Type specimen No. 757768, U.S.N.M. Marquesas Island.

Very accurately and adequately described and figured by Gilbert 1908 (p. 235 and pl. 6).

Correctly defined in the previously rendered key.

Recorded only from the type locality.

Lampanyctus ritteri Gilbert, 1915

*Lampanyctus ritteri* Gilbert, 1915; Parr, 1928.

Material investigated. Type specimen No. 75807, U.S.N.M. Monterey Bay, California.

Adequately described and figured by Gilbert, 1915 (p. 318 and fig. 3, pl. 15). The presence of a very minute photophore on the shoulder, mentioned by Gilbert, as a small humeral spot, in addition to a similar small photophore above the posterior corner of the mouth identifies this species with division *c* (p. 88), instead of division *d*.

---

22 "Near the lateral line but not in contact with it."
These spots are, however, both so minute that they will probably not be recognizable in small or even moderate sized specimens, the type specimen being very large, 120 mm. without caudal fin. This particularly holds good of the photophore on the shoulder. The species will therefore probably more often be looked for in the said division $d$, in which it has previously been placed, or even in division $a$ (loc. cit., p. 83). In division $c$, $L. ritteri$ will be easily recognizable by the low position of its $VLO$, which is only about midway between the lateral line and the base of ventral fin, while it is situated immediately below the lateral line in the three other species of the same division ($L. punctatissimus$, $L. jordani$, and $L. stilbius$). In division, $a$, the species will seem very close to $L. macdonaldi$, as described on the preceding pages, being differentiable, however, by the higher position of its $PLO$, which is much closer to the lateral line than to the base of pectoral fin, instead of midway between as in $L. macdonaldi$, and also by the slightly lower position of its $VLO$. The differentiation of $L. ritteri$ in division $d$ has been treated in the previously rendered key.

**Known only from the coast of California.**

**LAMPANYCTUS REGALIS** Gilbert, 1892

*Mycophyllum regale* Gilbert, 1892.
*Nannobrachium regale* Jordan and Evermann, 1896.
*Mycophyllum (Lampanyctus) regale* Brauer, 1906.
*Lampanyctus regalis* Gilbert, 1915; Parr, 1928.

Material investigated. Type specimen No. 44289, U.S.N.M. Coast of California.

The original diagnosis (Gilbert, 1892, p. 7) has been supplemented by a detailed, and in general very accurate description rendered by Gilbert, 1915 (p. 316), but no illustration has been previously published.

As in the case of $L. ritteri$, the "somewhat larger luminous body... on lower posterior portion of cheeks" is so minute that there is a considerable probability of its being unrecognizable in small
specimens. 5 VO were found to be present instead of only 4 as described by Gilbert. 33

Correctly defined in the previously rendered key.

Recorded only from the coast of California.

LAMPANYCTUS ALATUS Goode and Bean

_Lampanyctus alatus_ Goode and Bean, 1895; Jordan and Evermann, 1896.

(Not Taaning, 1918, 34 and Breder, 1927, 35)

_Myctophum (Lampanyctus) alatum_ Brauer, 1906; Zugmayer, 1911; Baernard, 1925.

_Lampanyctus pseudoalatus_ Taaning, 1928, Parr, 1928.

Material investigated. Type sample No. 43769, U.S.N.M. Two specimens from the Gulf of Mexico.

An inspection of the above two type specimens reveals the identity of _Lampanyctus alatus_ Goode and Bean with _L. pseudoalatus_ Taaning, 1928, by the presence of a luminous scale (or a pair of luminous scales) in the adipose dorsal fin as well as by the comparatively high fin counts already previously recorded by Goode and Bean (1895, p. 79). [D 13, A 17–18, as compared with D 11–13, A 14–15 in _L. pusillus_ Johnson (according to Taaning, 1928, p. 66).] The VLO's have, on the other hand, become completely lost in both specimens, and the organ indicated in Goode and Bean's figure (loc. cit., fig. 92, pl. 24) in what might be an approximately normal position for a VLO, evidently gives a somewhat misplaced representation of the elevated fourth PO, which is well preserved in the specimens, but otherwise not shown in the illustration. This error in the original drawing certainly has given ample justification for the introduction of Taaning's new species _L. pseudoalatus_, which, however, must now be included among the synonyms of _L. alatus_ Goode and Bean, as above made out. The existing confusion in the literature makes a complete redescription and a new figure of the species desirable.

**Measurements of type sample of Lampanyctus alatus Goode and Bean, 1895 No. 43769 U.S.N.M.**

[In per cent of the total length without caudal fin]

<table>
<thead>
<tr>
<th>Total length without caudal fin in mm</th>
<th>47</th>
<th>44</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of head</td>
<td>28</td>
<td>27</td>
</tr>
<tr>
<td>Diameter of eyes</td>
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<td>6.8</td>
</tr>
<tr>
<td>Length of lower jaw</td>
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<td>22</td>
</tr>
<tr>
<td>Greatest height</td>
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<td>17</td>
</tr>
<tr>
<td>Height of caudal peduncle</td>
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<td>9</td>
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<td>Snout to D</td>
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<td>47</td>
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<tr>
<td>Snout to V</td>
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<td>41</td>
</tr>
<tr>
<td>Snout to A</td>
<td>57</td>
<td>58</td>
</tr>
</tbody>
</table>

33 The author is indebted to Messrs. B. A. Bean and E. D. Reid, of the division of fishes, United States National Museum, for kindly verifying the correctness of this observation.
34 _L. pusillus_ Johnson, according to later identification by Taaning (1928, p. 66).
35 _Lampanyctus warngi_ Lütken, _Myctophum macrochir_ Günther, and _Myctophum imitator_ (Parr) [= _M. suborbitale_ Gilbert].
Pectoral fins long, reaching to or beyond the origin of anal fin.

Minute luminous organs scattered over the head and body. A moderate, but conspicuous, photophore in the middle of each cheek. PLO close to the lateral line. 2 PVO in a slightly oblique series, the upper a little anterior to the lower. 5 PO, the fourth elevated approximately to the level of the lower end of the base of pectoral fin. VLO lost in the types, close to the lateral line according to Brauer 1906 and Taaning 1928. 4 VO, all on the same level. SAO angulate. Anterior SAO above the interspace between second and third VO, slightly but distinctly higher than second SAO. Second SAO well behind vertical from the last VO, which is situated entirely in advance of the line through second and third SAO. Upper (third) SAO at the lateral line. Second SAO approximately equidistant from third SAO and fourth VO. AO 7+6, none elevated. The postero-anal series begins well behind the base of anal and is posteriorly confluent with the 4 Prc, which are differentiable, however, by their smaller size and the shorter intervals between the first and second and between the second and third organs. Interspace between third and fourth Prc greatly increased. Fourth Prc immediately below the lateral line, somewhat in advance of the vertical from the third Prc. 2 Pol, in a straight, oblique series with the last antero-anal photophore, and with the upper organ immediately below the lateral line, well behind the vertical from the lower.

Four supra- and four infra-caudal luminous scales, the latter occupying a somewhat greater portion (about two-fifths) of the length of the free caudal peduncle than do the former. A luminous scale, or pair of scales in the adipose fin.

The species has been recorded from the Atlantic and Indian oceans.
NOTES ON MYCTOPHINE FISHES—PARR

LAMpanyctus crocodilus Risso, 1810

Gastropelcous crocodilus Risso, 1810.
Lampanyctus crocodilus Parr, 1928 (with earlier synonymy).
Lampanyctus gemmifer Goode and Bean, 1895; Jordan and Evermann, 1896.
(Not Brauer, 1906; Zugmayer, 1911; Pappenheim, 1914; Taaning, 1928; and Parr, 1928.)

Material investigated. Type specimen of Lampanyctus gemmifer, Goode and Bean, No. 35604, U. S. N. M. Western Atlantic.

An inspection of the above type specimen reveals the perfect identity of Goode and Bean's species with the L. crocodilus already described by Risso in 1910, as clearly shown on the accompanying diagram. Three photophores are found on each cheek, in the arrangement typical of L. crocodilus and a luminous scale is present in the adipose fin.

Further discussion of the characters of the specimen is unnecessary with the very adequate descriptions of L. crocodilus already available in the literature (Brauer, Holt and Byrne, Taaning; see synonymy in Parr, 1928, p. 90).

With L. gemmifer thus eliminated as a separate species, however, it now becomes necessary to designate a new name for the truly distinct taxonomic form currently identified with Goode and Bean's nominal species.

LAMpanyctus taaningi, new species

Myctophum (Lampanyctus) gemmifer Brauer, 1906; Zugmayer, 1911; Pappenheim, 1914.
Lampanyctus gemmifer Taaning, 1928; Parr, 1928.

Specimen No. 2301, of the Bingham Oceanographic Collection, "Pawnee" Station 25, 1927, Exuma Sound, Bahamas, has been designated as the type. A paratype from the same haul has been deposited in the United States National Museum.

The species is easily distinguished from the above L. crocodilus Risso by the absence of luminous scales in the adipose fin and by the presence of only two photophores on each cheek.

Figure 13.—Lampanyctus crocodilus Risso, drawn from the type specimen of Lampanyctus gemmifer Goode and Bean
As a very adequate and generally accurate figure and description of the species has already previously been rendered by Brauer 1906 (p. 246), we can here confine ourselves to a few notes on minor differences observed in the above recorded type and paratype.

The upper organ on the cheeks is in both specimens slightly, but distinctly nearer to the posterior margin of the orbit than to the praeopercular margin. The posterior margin of the lower Pol barely touches the line through the centers of the upper Pol and the last AO anterior, these three organs thus not forming an entirely straight series, but only nearly so. The type specimen has 6+7 AO, well separated from the four Pre. In the paratype 6+8 AO are found, the AO posteriores being confluent with the 4 Pre. The latter organs are, however, also in this case readily distinguishable from the AO posteriores by their slightly smaller size and closer arrangement. Third Pre only very slightly, barely noticeably, below the line from the second to the fourth Pre. Interspace between third and fourth Pre increased. The above recorded numbers of AO differ from those given by Brauer on account of the fact that only the two most posterior Pre as here understood were counted as praecaudals by the said author.

Recorded only from the Atlantic.

Named in honor of Å. Vedel Taaning in recognition of his valuable contributions to our knowledge of the biology and taxonomy of the Myctophinae.

**DIAPHUS UROLAMPUS** Gilbert and Cramer, 1897

*Myctophum* (Diaphus) *urolampus* Brauer, 1906.

*Diaphus urolampus* Jordan and Jordan, 1922; Parr, 1928.

Material investigated. Type specimens No. 47709, U.S.N.M. (3 specimens).

An inspection of the type-specimens did not serve to confirm the statement rendered by Gilbert (1908, p. 227, under discussion of *D. agassizi*), that the upper antorbitals are "apparently no longer functional," but on the contrary revealed the organs in question as being, at least macroscopically, apparently perfectly equivalent with the presumably functional upper antorbitals of such species as *D. dumerili* Bleeker, *D. hypolucens* Parr and others. Each of the upper antorbitals in *D. urolampus* has a small, but very distinct body of whitish, supposedly luminous tissue imbedded in densely pigmented black tissues. There are no lower antorbitals, and no supra- or suborbital organs. The species thus properly belongs in division II A 1 in the key previously rendered by the author (Parr, 1928,
NOTES ON MYCTOPHINE FISHES—PARR

p. 115), together with D. agassizi Gilbert 1908,26 but not in a separate Division I.

D. urolampus is distinct from D. dumerili Bleeker, in which species it was tentatively included by Weber and Beaufort, 1913,27 in the absence of a suborbital organ, in the elevation of the first AO anterior and in having the VLO situated close to the lateral line, not at a considerable distance below it. The latter feature also distinguishes D. urolampus from D. agassizi Gilbert, with which species it is otherwise very closely related. These differences have been further made out in the following supplementary key to the species of the genus Diaphus, which have only one small antorbital organ on each side, entirely above the nostril (Division II A in the previously rendered key, Parr 1928, p. 115).

I. Upper SAO and Pol close to or in contact with the lateral line.
   A. VLO in contact with or very close to the lateral line. First AO anterior elevated.

   D. urolampus Gilbert and Cramer.

   D. dumerili Bleeker.
   D. agassizi Gilbert.
   (See Parr 1928, p. 115.)

II. Upper SAO and Pol well below the lateral line.

   D. gemellari Cocco.
   D. dofleini Zugmayer.
   D. nipponensis Gilbert.
   (See Parr 1928, pp. 115-116.)

Measurements of Diaphus Urolampus Gilbert and Cramer, 1897. Type specimens No. 47709 U.S.N.M.

[In per cent of total length without caudal fin]

<table>
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<tr>
<th></th>
<th>90</th>
<th>79</th>
<th>75</th>
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<td>Length of head</td>
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<td>Length of lower jaw</td>
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<td>Diameter of eye</td>
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<td>Distance snout to A</td>
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</table>

Upper antorbital very small, but distinct and normally developed. No lower antorbital, no supra or suborbital organs. PLO much closer to the lateral line than to the base of pectoral fin. PVO in a straight series with the anterior PO. Fourth PO elevated to some-

26 D. dumerili Bleeker, 1856, has for practical purposes been included both in this division and in Division IV, where it properly belongs, as the suborbital organ, though always present, is often difficult to make out on account of its minuteness.

27 This view has been accepted by Fowler, 1928 (p. 68).
what above the level of the upper \(PVO\).\(^8\) \(VLO\) in contact with the lateral line. 5 \(VO\). 3 \(SAO\), the lower slightly in advance of the fifth \(VO\) and of the line through second and third \(SAO\). Second \(SAO\) much closer to the lower \(SAO\) than to the upper, which is in contact with the lateral line. First \(AO\) anterior sharply elevated, last \(AO\) anterior also very conspicuously above the level of the rest of the series. \(AO\) 7+6. 4 \(Prc\), the last organ slightly below the end of the lateral line.

The original illustration (Gilbert and Cramer, 1897, pl. 38, fig. 1) being inadequate for showing the accurate arrangement of the photophores, the accompanying diagram (fig. 14) was prepared from the type specimen.

Two specimens have a very conspicuous median dorsal luminous area on the caudal peduncle, occupying the greater part of the distance between the caudal and the adipose dorsal fin.

Known only from Hawaiian waters.

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**Figure 14.—Diaphus ubolampus Gilbert and Cramer**

**Diaphus Agassizi** Gilbert, 1908

\(Diaphus agassizii\) Gilbert, 1908 and 1913; Parr, 1928; Fowler, 1928.

\(Myctophum\) (\(Diaphus\)) \(lacerta\) (part) ? Brauer, 1906.

Material investigated. Type specimen No. 75764, U.S.N.M. From the Marquesas Islands.

The original description and figure (Gilbert, 1908, p. 226 and pl. 2), together with the remarks upon some of its features subsequently added by the same author (Gilbert, 1913, p. 85) give a very adequate and accurate conception of the characters of this species, making further comment unnecessary.

The species is distinct from \(D.\) \(dumerili\) Bleeker by the absence of a suborbital organ and by the elevation of the first \(AO\) anterior, and from \(D.\) \(urolampus\) Gilbert and Cramer by having the \(VLO\) situated only "very slightly nearer lateral line than base of ventrals."

Properly defined in the previously rendered key (Parr, 1928, Division II \(A\) 1, p. 115).

Known from the Marquesas Islands and from Japan.

\(^8\) This character can not be considered very reliable except in perfect specimens.
NOTES ON MYCTOPHINE FISHES—PARR

DIAPHUS DUMERILI Bleeker, 1856

Scopelus dumerili Bleeker, 1856.
Lampanyctus lacerta Goode and Bean, 1895.
Diaphus nocturnus (Poey) Gilbert, 1906.
Diaphus dumerili Parr, 1928 (with earlier synonymy); Fowler, 1928.

Material investigated. Type specimen of Lampanyctus lacerta Goode and Bean, 1895, No. 43778.

An inspection of the type specimen of Goode and Bean's Lampanyctus lacerta can only serve to confirm in every detail its perfect identity with the species now designated as Diaphus dumerili Bleeker according to Weber and Beaufort, 1913. (See Parr 1928, p. 126.)

D. dumerili differs from D. agassizi Gilbert and D. urolampus Gilbert and Cramer in the possession of a minute suborbital organ, which is always present, but sometimes difficult to make out. D. dumerili has its VLO situated approximately midway between the lateral line and the base of ventral fin or, more frequently, somewhat above this point.²⁹

The species has been very adequately described and figured by Gilbert, 1906 (p. 255 and pl. 1) under the name of "Diaphus nocturnus Poey," and has been further discussed in various details by Weber and Beaufort, 1913, and by Parr, 1928.

Recorded from the Atlantic and from East-Indian waters.

Taanning, 1928 (p. 58) designates the Atlantic material of D. dumerili as D. dumerili nocturnus, without discussing the differences by which this subspecies can be distinguished from the East Indian form.

DIAPHUS NIPPONENSIS Gilbert, 1913

Material investigated. Type specimen No. 74467, U.S.N.M.

This species has been adequately described by Gilbert, 1913 (p. 86), and correctly defined in the previously rendered key.

²⁹ This feature is not always quite reliable for the differentiation of groups 1 and 2, Division II A in the key previously given by the author (Parr, 1928, p. 115) and the main significance should therefore in this case be attached to the positions of the upper SAO and the Pol as described in the same key.
A diagram of the type specimen is rendered in the accompanying Figure 15, the species not having been previously illustrated.

Known only from Japan.

**DIAPHUS GLANDULIFER** Gilbert, 1913

Material investigated. Type specimen No. 74472, U.S.N.M.
Accurately and adequately described and figured by Gilbert, 1913 (p. 90 and pl. 11, fig. 2). Correctly defined in the previously rendered key.

Known only from Japan.

**DIAPHUS RAFINESQUEI** Cocco, 1838

*Nycophus rafinesquei* Cocco, 1838.

*Diaphus rafinesquei* Parr, 1928 (with full synonymy).

*Diaphus theta* Eigenmann and Eigenmann, 1891; Goode and Bean, 1895; Jordan and Evermann, 1896; Berauer, 1906.

*Myctophum protoculus* Gilbert, 1891.

*Diaphus nanus* Gilbert, 1908 and 1913.

Material investigated. Type lot of *Diaphus theta* Eigenmann and Eigenmann, 1891, No. 41914, U.S.N.M. (2 specimens). Type specimen of *Myctophum protoculus* Gilbert, 1891, No. 44290, U.S.N.M. Type specimen of *Diaphus nanus* Gilbert, 1908, No. 75765, U.S.N.M.

The claim of *D. theta* Eigenmann and Eigenmann to specific distinctness from *D. rafinesquei* Cocco has heretofore been mainly or entirely based upon the alleged smaller size of the eyes in the type of the former nominal species. An examination of the type specimens, however, served to show that no such difference seems to exist, the eyes of *D. theta* being quite as large as those of the normal *D. rafinesquei*, with a diameter equalling more than one-third of the length of the head or 10 to 12 per cent of the total length without caudal fin. *D. theta* is therefore herewith included among the synonyms of *D. rafinesquei*.

The identity of *Myctophum protoculus* Gilbert with *D. theta* Eigenmann and Eigenmann has already been realized by the author of the former species (footnote by Gilbert in Jordan and Evermann 1896, p. 564), and could only be further confirmed by an inspection of the type.

The lack of taxonomic differences between the descriptions of *Diaphus nanus* rendered by Gilbert, 1908 and 1918, and the current descriptions of *D. rafinesquei* Cocco has already previously prompted the author to include the former name among the synonyms of the latter species (see Parr, 1928, pp. 131 and 135). This opinion stands unaltered after examination of the type specimen of *D. nanus*. 
Although the three above-considered types have thus all been included in the older species *D. rafinesquei* Cocco, 1838, it is nevertheless desirable to give a more detailed account of the investigated specimens for the purpose of deciding their possible racial relationships and the taxonomic priority of their names, in case it should prove possible to subdivide the species, as here understood, into statistical groups of subordinate rank along the lines of taxonomic differentiation followed by Taaning, 1918 and 1928, by the introduction of his two new species, *D. holti* and *D. mollis*. The type specimens considered in the present paper, however, only seem to give further confirmation of the opinion already expressed by the author (Parr, 1928, pp. 131–135) that such subdivision can only be applied to comparatively restricted geographic regions, for the purpose of defining ecological races, but does not enable us to make taxonomic differentiations of general validity and therefore can not serve as a basis for the definition of separate species.

*Table of measurements*

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<td>65 65 62</td>
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The arrangement of the photophores in the three types is shown in the accompanying diagram.

In *D. "theta"* the upper *SAO* and the *Pol* are much nearer to the lateral line than to the ventral series of photophores, while the *VLO* is considerably closer to the base of ventral fin than to the lateral line, and the *PLO* is situated about or slightly below midway between the latter and the upper end of the base of pectoral fin. The *SAO* are placed in an approximately straight and nearly equally spaced series, and the first anterior *AO* is not elevated. *AO 5+6. Pre* well separated from the posterior *AO*. According to the definitions first given by Taaning (1918) *D. "theta"* should thus agree with *D. holti* Taaning in the positions of the anterior *AO* and of the *VLO*, differing from *D. rafinesquei* Cocco in both of these respects.
According to the later synopsis by the same author (Taaning, 1928), however, we find the type of *D. "theta"* differing very conspicuously from *D. holti* by the higher positions of the *Pol* and the upper *SAO* in the former. It further differs from Taaning's new species *D. mollis* (Taaning, 1928) by having the *SAO* in a nearly straight series, and should thus, according to the above-mentioned synopsis, be identifiable with *D. rafinesquei*, from which it has already been shown to be taxonomically different according to Taaning's definitions of 1918. It may further be mentioned that *D. "theta"* seems to differ from all of the above-discussed species in having 6 posterior *AO*, while the maximum recorded by Taaning for any of the forms described by him is 5 *AO* post. In most of the respects above considered *D. "theta"* agrees with specimen No. 2147.

**Figure 16.**—*Diaphus rafinesquei* Cocco. Represented by the type specimens of *D. theta* Eigenmann and Eigenmann, *D. protoculus* Gilbert, and *D. nanus* Gilbert.
of the Bingham Oceanographic Collection (see Parr, 1928, pp. 131-135, and fig. 25), which differs, however, in having the PLO much nearer to the pectoral fin than to the lateral line, and in having the Pre confluent with the posterior AO. Specimen No. 2146 B. O. C. also shows 6 photophores in the postero-anal series and further approaches D. "theta" in having a somewhat, though not very conspicuously, increased interspace between the last AO posterior and the first Pre, but also differs in the lower positions of its PLO, upper SAO, and Pol. The discordance between the various specimens with 6 posterior AO, and the consequent impossibility of basing a recognition of a separate species or subspecies "theta" on this feature, is further increased when we also include the type specimen of D. "protocus" in our considerations.

The type of D. "protocus" agrees with the type of D. "theta" in having 6 posterior AO, well separated from the Pre, and in having the VLO nearer to the base of ventral fin than to the lateral line. It differs from D. "theta," however, in having the first anterior AO slightly but distinctly elevated (see the diagram), in having the PLO, VLO, upper SAO, and the Pol inserted conspicuously lower than in the type of the said form, and in having the SAO arranged in an obtuse angle with the interspace between the second and third organ much greater than that between the first and second. According to Taaning's synopsis this species should thus seem related to D. mollis Taaning, but the difference from the other specimens of the rafinesquei-type, investigated by the author, with regard to the length of the maxillary, which is used by Taaning as a diagnostic character, is altogether too slight to be considered taxonomically significant; and it is, unfortunately, impossible to give any statements concerning the size of the luminous scale at PLO or the accurate positions of the suborbital organs on account of the shrinkage of

30 The discontinuity of the two series is shown as slightly too distinct in the diagrammatic illustration of this specimen (Parr, 1928, fig. 25), while it is very distinct and conspicuous in the type of D. "theta."

31 The previous statement (Parr, 1928, p. 132) that specimen No. 2146, B. O. C., agrees "fairly well" with the definition of D. holti Taaning in having the upper SAO and Pol "about equidistant from the lateral line and the ventral row of photophores" is based upon the vertical distance above the horizontal level of the next following organ in the ventral series (first anterior AO and first posterior AO, respectively), and is merely of relative and approximate value, being absolutely accurate only of the Pol, while the upper SAO, though distinctly lower than in specimen No. 2147, B. O. C., and much lower than in specimen No. 2148, B. O. C., is still somewhat above the point of equidistance between the two morphological levels referred to.

32 The specimens are too small and too old to give accurate measurements, but in spite of the fact that the VLO is also in D. "theta" considerably closer to the ventral fins than to the lateral line, the VLO is still conspicuously lower in the type of D. "protocus," as will appear from an inspection of the accompanying diagram. The same also holds good of the PLO, which in D. "theta" is only slightly below midway between the base of pectoral fin and the lateral line, while it is much closer to the former in D. "protocus."
the specimen. \textit{D. "protoculus"} does in all the above considered respects, particularly with regard to the positions of upper \textit{SAO} and \textit{Pol}, agree very well with specimen No. 2146 B. O. C., differing however, by the arrangement of the \textit{SAO}, which in the latter specimen are found in a gently curved, although somewhat unequally spaced series continuous with the last \textit{VO}, not in an obtuse angle as in the type of \textit{D. "protoculus"}.

The type specimen of \textit{D. "nanus"} differs from those of \textit{D. "theta"} and \textit{"protoculus"} in having only 5 + 5 \textit{AO} (not 6 \textit{AO} posteriores). According to Gilbert 1908, p. 225, the \textit{VLO} should be "half way between lateral line and the base of ventrals"; in the author's opinion, however, they now seem distinctly closer to the lateral line. \textit{PLO} somewhat nearer to the pectoral base than to the lateral line. Upper \textit{SAO} and \textit{Pol} much nearer to lateral line than to the ventral series of photophores. \textit{SAO} in an obtuse angle. First \textit{AO} anterior elevated nearly to the level of the second \textit{SAO}. \textit{Pre} well separated from the \textit{AO} posteriores. In all these respects \textit{D. nanus} should thus be perfectly concordant with \textit{D. mollis} Taaning, as already suggested by Taaning when he introduced the latter species. As in the case of the specimens in the Bingham Oceanographic Collection, however, the length of the maxillaries does not show sufficient difference from the measurements of the other specimens such as for instance the type specimen of \textit{D. protoculus} (see the table, p. 33) to make the form taxonomically recognizable as a separate species on the basis of this character.

On the basis of these observations on the type specimens of \textit{D. theta, D. protoculus,} and \textit{D. nanus} the author can only feel confirmed in the opinion that the subdivision of the \textit{rafinesquei}-like forms into entirely separate species according to the definitions rendered by Taaning (1918 and 1928) is absolutely impracticable, although such subdivision may possibly be of great value for differentiating ecological races or local subspecific forms within restricted oceano-graphical areas.

The accurate dimensions of the luminous scale at \textit{PLO} and the exact natural position of the posterior suborbital organ can not now be made out with reliability in any of the above considered type specimens.

\textbf{Key to the Species of Diaphus with Two Separate Antorbital Organs (One Upper and One Lower) and One Distinct Supraorbital Organ on Each Side}

The discovery that a distinct and very well developed supraorbital organ, in addition to the upper antorbital, is present on each side not only in \textit{D. adenomus} Gilbert, 1908, and \textit{D. anteorbitalis} Gilbert, 1913,\textsuperscript{33}

\textsuperscript{33} See Parr, 1928, p. 119, key to the genus \textit{Diaphus}, Division VI.
as already made out in the original descriptions of these species, but also in *D. chrysorhynchus*\(^\text{34}\) Gilbert and Cramer, 1897, and *D. wata- sei*,\(^\text{35}\) Jordan and Starks, 1904, makes a new key to this group of the genus *Diaphus* desirable.

I. Supraorbital organ short, triangular, entirely in advance of the vertical from the center of the eye. Upper antorbital moderate or rather large.

A. *PLO* much nearer to the lateral line than to the base of pectoral fin. Head comparatively large, its length equaling 29-31 per cent of the total length without caudal fin. Diameter of eyes 8.1-8.7 per cent of the same measurement, or about 3.4-3.6 in the length of the head. Upper *SAO* and *POL* close below the lateral line. *AO* 6+5-6.

*B. chrysorhynchus* Gilbert and Cramer, 1897.

B. *PLO* much nearer to the base of pectoral fin than to the lateral line. Head smaller, its length only equal to about 26 per cent of the total length without caudal fin. Diameter of eyes about 6.5 per cent of the same measurement, or about 4 in the length of the head. Upper *SAO* and *POL* more than 2 diameters below the lateral line. *AO* 7+5.

*D. watasei* Jordan and Starks, 1904.

II. Supraorbital long and slender, extending to or beyond the vertical from the center of the eye, "in the form of a narrow streak." Upper antorbital small.

A. *PLO* only very slightly below midway between the lateral line and the base of pectoral fin, its distance above the latter equaling about \(\frac{7}{8}\) of its distance below the former. Eyes about 3.8-4 in head.

*D. anteorbitalis* Gilbert, 1913.

B. *PLO* nearly twice as far from the lateral line as from the base of pectoral fin, the ratio between the two distances being as 16:9. Eye about 4\%\%5 in head.

*D. adenomus* Gilbert, 1905.

**DIAPHUS CHRYSORHYNCHUS** Gilbert and Cramer, 1897


Material investigated. Type sample No. 47710, U.S.N.M. (6 specimens).

The original definition and figure of this species (Gilbert and Cramer, 1897, p. 409 and pl. 38, fig. 3)\(^\text{36}\) being in many respects inadequate for proper identification, it has been deemed advisable to render a full description and diagrammatic illustrations of the essential features observed on the type material.

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\(^{34}\) See Parr, 1928, p. 120, key to the genus *Diaphus*, division 9.

\(^{35}\) This species has in the previously rendered key (Parr, 1928, p. 122) been identified with *D. coeruleus* Klunzinger, according to the precedent set by Gilbert, 1913.

\(^{36}\) In Gilbert and Cramer's report the figures 2 and 3 on plate 38 and the corresponding references in the text have, by misprint, become exchanged for each other, figure 2 actually representing *Myctophum rubatum* and figure 3 *Diaphus chrysorhynchus*, while the legends and references have these species in the opposite arrangement on the plate.
Measurements of Diaphus chrysorhynchus Gilbert and Cramer

[In per cent of the total length without caudal fin]

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</tbody>
</table>

The description of the supraorbital organ as "a triangular or heart-shaped portion of it (the "anteorbital gland") at the antero-dorsal angle of the orbit" has proved inadequate for conveying to subsequent investigators the proper conception of the morphological status of the organ in question. This supraorbital organ is quite distinctly, although narrowly, separated from the upper antorbital by a dividing ridge running obliquely upwards and mesad in a transverse plane at the anterior end of the snout. The suborbital thus occupies a shallow, more superior and lateral concavity of its own, while the concavity of the upper antorbital is entirely transverse and forwardly directed (compare the figs. 17 and 18). There is apparently no continuity between the luminous tissues of the upper antorbital and the supraorbital organs in any of the specimens, the very conspicuous dividing ridge appearing as a narrow, lack lustrous, black line between the highly lustrous, silvery tissues of the organs themselves. These features of the circumorbital organs in D. chrysorhynchus are strongly affirmative of the opinion already previously expressed by the author that the so-called upper antorbital of such forms as D. effulgens Goode and Bean, 1895, is not homologous with the upper antorbital organs of the other Myctophinae, but rather with the constricted supraorbital portion of the upper antorbital in D. metopodampus, which is again undoubtedly homologous with the supraorbital of D. chrysorhynchus. A comparison between the accompanying diagram (fig. 16) and the illustration of the circumorbital organs in D. effulgens already previously rendered (Parr, 1928, fig. 30, no. 6, p. 140) makes this relationship quite obvious. The author therefore no longer feels any hesitation in regarding the circumorbital organs of Division IX in the key to the genus Diaphus (Parr, 1928, p. 120) as developed through the differentiation of a
separate supraorbital organ followed by a complete fusion of the upper and lower antorbitals on each side. Division IX then differs from the group treated in the key on page 37 (Division VI, Parr, 1928) by this latter feature, while the upper and lower antorbitals in the latter group, now under consideration, always remain distinct from each other.

The upper antorbitals of *D. chrysorhynchus* are quite large and only narrowly separated from each other as shown in the figure 17. The lower antorbital has a long, narrow, posterior ventral extension along the lower margin of the eye, ending approximately at the vertical from the center of the pupil or even beyond this point.

*PLO* conspicuously nearer to the lateral line than to the base of pectoral fin. *PVO* in a straight series with the anterior *PO*. Fourth *PO* elevated approximately to the level of the upper *PVO*. *VLO* about midway between the lateral line and the base of ventral fin.

**Figure 18.—Diaphus chrysorhynchus Gilbert and Cramer**

5 *VO*. *SAO* in a very steeply inclined, straight line, the continuation of which falls well behind the last *VO*. Interspace between first (lower) and second *SAO* much smaller than that between the second and the third (upper) *SAO*. 6+5 *AO* were counted in 11 cases, 6+6 *AO* in one case, each side being counted separately. First anterior *AO* elevated to a level about midway between that of the lower and that of the middle *SAO*. Last anterior *AO* also elevated. Upper *SAO* and *Pol* close to the lateral line. First posterior *AO* behind the base of anal fin. 4 *Prc*, equally spaced and curved, widely separated from the posterior *AO* and with the upper organ well below the end of the lateral line.

Known only from Hawaiian waters.

**DIAPHUS WATASEI** Jordan and Starks, 1904

Material investigated. Type specimen No. 51443, U.S.N.M.

This species was identified by Gilbert, 1913 (p. 95) with *D. coerules* Klunzinger 1871 and his example was followed by the present author in the previously rendered key to the genus *Diaphus* (Parr,
1928, p. 122). An inspection of the type specimen, however, tends to make this identity seem rather problematical on account of the fact that a well developed supraorbital organ, quite distinct from the moderate upper antorbital, apparently is to be found in the original D. watasei. A slight damage of the type specimen has made it impossible to make out the nature or presence of the upper organs of the circumorbital series on the left side of the head, but conditions on the right side do, in the author’s opinion, scarcely leave room for any doubt as to the existence of a distinct supraorbital organ, similar to the corresponding organ in D. chrysorhynchos in shape, nature, and position; but considerably smaller. Such supraorbital organs have not been described for D. coerulescens, and D. watasei must therefore, at least tentatively, be regarded as taxonomically distinct from the former species, although agreeing very closely in most other respects.

**Figure 19.—Diaphus watasei Jordan and Starks**

The original illustration (Jordan and Starks, 1904, p. 581) being inadequate for showing the exact arrangement of the photophores and circumorbital organs, the accompanying diagram has been prepared from the type specimen.

*PLO* much nearer to the base of pectoral fin than to the lateral line. 5 *PO*. Fourth *PO* elevated approximately to the level of the upper *PVO*. *VLO* approximately midway between the lateral line and the base of ventral fin. 5 *VO*. *SAO* nearly equally spaced in a steeply inclined, straight line, the continuation of which passes well behind the last *VO*. *AO* 7+5. First anterior *AO* elevated to about midway between the levels of the first (lower) and second *SAO*. The posterior part of the antero-anal series is also gradually elevated toward the *Pol* with which the series is practically continuous. This elevation is noticeable from the fifth to the seventh antero-anal organs, inclusive (fig. 19). Upper *SAO* and *Pol* more than two of their own diameters removed from the lateral line. First postero-

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67 The organs in question are shown on the left side of the specimen in the accompanying diagram, fig. 18, to make the drawing harmonize with the other illustrations for the present report.
anal organ well behind the base of anal fin. 4 Pre, equally spaced in an even curve, well separated from the posterior AO and with the upper organ well below the end of the lateral line.

Total length without caudal fin 108 mm. Proportions in per cent of the total length without caudal fin: Length of head, 26. Diameter of eye, 6.5. Length of lower jaw, 19.5. Greatest height, 19.5. Distance from snout to dorsal fin, 42. Distance from snout to ventral fins, 44. Distance from snout to anal fin, 64.

The VLO of D. coeruleus is described as being closer to the bases of the ventral fins than to the lateral line, not about midway between as in the type of D. watasei, but with the possible exception of the arrangement of the photophores in the posterior part of the antero-anal series, this seems to be the only difference of any significance whatever which would appear to verify the taxonomic distinctness of the two species, above suggested as a possibility on the basis of the described observations on the circumorbital organs of D. watasei.

The type specimen of D. watasei was obtained in Sagami Bay, Japan.

**DIAPHUS ANTEORBITALIS** Gilbert, 1913

*Diaphus anteorbitalis* Parr, 1928.

*Lamprossa anteorbitalis* Jordan and Hubbs, 1925.

Material investigated. Type specimen No. 74471, U.S.N.M.

This species has been very adequately and accurately described and figured by Gilbert, 1913 (p. 92 and pl. 12, fig. 1), and has been correctly defined in the previously rendered key.

The distance from the upper end of the base of pectoral fin to the PLO was found to be 3.5 mm., the distance from PLO to the lateral line canal being only 4 mm.

The type specimen apparently is a spent, the sex therefore being indeterminable without microsections.

Known only from Japan.

**DIAPHUS ADENOMUS** Gilbert, 1905

*Diaphus adenomus* Jordan and Jordan, 1922; Parr, 1928; Fowler, 1928.

Material investigated. Type specimen No. 51533, U.S.N.M.

The author can not agree in the statement made by Gilbert, 1913, p. 92 (under discussion of *D. anteorbitalis*) that "in *D. adenomus*, both the superior preorbital and the extension between eye and nostril are lacking." An inspection of the type specimen on the contrary reveals the presence of a small, but quite distinct upper antorbital organ, which seems perfectly similar to the corresponding organ in *D. anteorbitalis*. The author was altogether quite incapable of dis-
covering any differences between the type specimens of these two species with regard to their circumorbital organs.

*D. adenomus* has otherwise been quite accurately and adequately described and figured by Gilbert, 1905 (p. 592 and pl. 68, fig. 1), and correctly defined in the previously rendered key.

The distance from the upper end of the base of pectoral fin to the PLO was found to be 4.5 mm., the distance from PLO to the lateral line canal being 8 mm.

The type specimen is a female.

The statement rendered by Fowler, 1928 (p. 68), that this species is "possibly not distinct from *D. coeruleus* (Klunzinger)" would equally well apply also to the rest of the four species mentioned in the key on page 37, if the presence or absence of a supraorbital organ should prove insignificant as a taxonomic character, or if such organ should appear to be present also in the true *D. coeruleus*. The former possibility seems rather remote, however, and the latter possibility is not indicated in either of the descriptions of *D. coeruleus* given by Klunzinger, 1871, and by Brauer, 1906.

It must on the other hand also be admitted that none of the four species would be satisfactorily differentiable from each other or from *D. coeruleus* on the basis of the photophores of the body alone, and the differences in proportions would also seem comparatively insignificant if not supplemented by differences in other respects.

*D. adenomus* is known only from Hawaiian waters.

**DIAPHUS EFFULGENS** Goode and Bean, 1895

*Aethoprora effulgens* Goode and Bean, 1895.  
**Diaphus effulgens** Parr, 1928 (with full synonymy).

Material investigated. Type specimen No. 43770, U.S.N.M.

The original description of this species (Goode and Bean, 1895, p. 87) being in several aspects quite inadequate with regard to the distribution of the photophores, it has been deemed advisable to render a full account of the arrangement of these organs in the type specimen and a diagram has been prepared for convenience in interpreting the description.

The upper and lower antorbitals on each side have become fused to form a pair of very large luminous organs,38 occupying practically

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38 See p. 38. To avoid confusion by the use of the key to the species the fused upper and lower antorbitals were in the previous treatise on these fishes designated simply as lower antorbitals, in accordance with the precedent set by Brauer, 1906, and generally followed in the later literature, although the author was already at that time strongly inclined to doubt the correctness of the homologization implied by the use of such terminology. (See Parr, 1928, p. 140.) The supraorbital organs were correspondingly designated as upper antorbitals. According to the new terminology, herewith introduced, the definition of Division IX (Parr, 1928, p. 120) should read: A small supraorbital organ on each side. Upper and lower antorbitals completely fused. The latter character then distinguishes this division from the division treated on p. 37 in the present report.
the entire snout anterior to the eyes and meeting each other at the median ethmoidal crest, as shown in the previously rendered diagram of the frontal view of this species. (Parr, 1928, fig. 30, 6, p. 140.) There is a small supraorbital organ between the upper posterior part of the fused antorbitalis and the anterodorsal margin of the eye, in close contact with but quite distinct from the former organ. PLO nearer to the base of pectoral fin than to the lateral line. The two PVO in a straight series with the anterior PO. Fourth PO elevated approximately to the level of the upper PVO. VLO about midway between the lateral line and the base of ventral fin. Probably 5 VO, but the fourth is missing in the type specimen. Second and third VO elevated in a straight series with the first VO. 3 SAO in a very steep, practically straight line, the continuation of which passes well behind the last VO. Interspace between lower and middle SAO much smaller than that between the middle and upper organs. The anteroanals are arranged in an equally curved,

![Figure 20.—Diaphus effulgens Goode and Bean](image)

...semicircular series which can be continued anteriorly to include the upper SAO and posteriorly to the Pol. 6 anteroanal organs are found in the type, but a somewhat increased interspace between the fourth and the fifth indicate the probability of another organ having been present in the undamaged specimen. Pol and upper SAO well below the lateral line (about two-thirds of their own diameters removed from the latter), their distances from the nearest AO ant. considerably larger than the interspaces between the anteroanal organs themselves. 5 posteroanals in a straight series beginning entirely behind the base of anal fin. 4 Pre, equally spaced and curved, with the upper organ well below the end of the lateral line.

Total length without caudal fin 118 mm. Proportions in per cent of the total length without caudal fin: Length of head 31. Diameter of eye 10.6. Length of lower jaw 19. Greatest height 23. Greatest vertical height of the snout anterior to the eyes 12. Distance from snout to ventral fin 47. Distance from snout to dorsal fin 43. Distance from snout to anal fin 65.
The great height and very characteristic outline of the steep, even slightly prominent snout has not been clearly shown in the original illustration of this species. (Goode and Bean, 1895, fig. 103, pl. 27.) Type specimen from stomach of cod taken on Brown's bank in the Gulf of Maine.

Correctly defined in the previously rendered key.

**DIAPHUS LUCIDUS** Goode and Bean, 1895

_Aeothoprora lucida_ Goode and Bean, 1895.

*Diaphus lucidus* Parr, 1928 (with full synonymy).

Material investigated. Type specimen No. 44084, U.S.N.M.

There is nothing to add to the discussion of this species already previously rendered by the author. (Parr, 1928, p. 141.) Recorded only from tropical east American waters.

**Figure 21.—Diaphus tanakae Gilbert**

**DIAPHUS TANAKAE** Gilbert, 1913

*Diaphus tanakae* Parr, 1928.

Material investigated. Type specimen No. 74470, U.S.N.M.

An inspection of the type specimen brings out the fact that the antorbital organs, particularly the upper antorbitals, are proportionately so much larger in _D. tanakae_ than in _D. problematicus_ Parr (1928, p. 143) that the author feels satisfied that there can be no reason for maintaining any doubt about the distinctness of these two species. The upper antorbitals of _D. tanakae_ are very large, extending mesad to a comparatively short distance from the median ethmoidal crest, each occupying about two-thirds or three-fourths of the distance between the latter and the anterior external margin of the orbit. The lower antorbitals extend to the level of the lower margins of the eyes.

Gilbert's description is in all other respects perfectly adequate and accurate, and the species has been properly defined in the previously rendered key.

No illustration of _D. tanakae_ has heretofore been published. Known only from Japan.
NOTES ON MYCTOPHINE FISHES—PARR

DIAPHUS SIGNATUS Gilbert, 1908

*Diaphus signatus* Parr, 1928, Fowler, 1928.

Material investigated. Type specimen No. 75767, U.S.N.M. *Diaphus signatus* has been adequately and accurately described and figured by Gilbert, 1908. (P. 228 and pl. 3.) Correctly defined in the previously rendered key. Marquesas Islands.

LAMPADENA SPECULIGERA Goode and Bean, 1895

*Lampadena speculigera* Jordan and Evermann, 1896; Brauer, 1906; Parr, 1928.

Material investigated. Type specimen No. 43797, U.S.N.M.

The present condition of the type specimen unfortunately makes it quite impossible to determine any details of taxonomic significance, most of the photophores having become completely lost. North Atlantic.

LIST OF ARTICLES REFERRED TO IN THE PRECEDING NOTES

For a full bibliography see Parr, 1928, pp. 180–193.

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BLEEKER, P.:


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