Two rare ophichthid species of the genus Lamnostoma
(Pisces: Anguilliformes) from the western Pacific

Kiyotaka HATOKA* and Tetsuo YOSHINO**

西部太平洋域より得られたウミヘビ科魚類ハクテンウミヘビ属（新称）の
2 稀種（ウナギ目）

波戸岡清峰*・吉野哲夫**

抄録：ウミヘビ科ハクテンウミヘビ属（新称）の2稀種、ハクテンウミヘビ（新称）Lamnostoma polyophthalmum (Bleeker, 1853) と L. mindorum (Jordan and Richardson, 1908) が西部太平洋域から得られた。前者は日本からの初記録で、後者は台湾から初めて報告される。

Abstract: Two rare ophichthid species, Lamnostoma polyophthalmum (Bleeker, 1853) and L. mindorum (Jordan and Richardson, 1908) were described and figured on the basis of the specimens from the western Pacific. The former is recorded for the first time from Japan and the latter from Taiwan.

Key Words: Taxonomy; Pisces; Anguilliformes; Ophichthidae; Lamnostoma polyophthalmum; Lamnostoma mindorum; distribution; new record; Japan; Taiwan; western Pacific.

The ophichthid genus Lamnostoma had been created by Kaup (1856a) on the basis of the type species, Lamnostoma pictum Kaup, 1856, which was synonymized with Dalophis orientalis McClelland, 1845 by Jordan (1919). This genus was placed by many authors in the synonymy of Caecula (e.g. Herre, 1923). McCosker (1977) has resurrected and defined the genus osteologically and morphologically in his systematic work of ophichthid eels. As for the species of the genus, however, he did not review. Recently the present authors had opportunities to get some specimens belonging to the genus and identified them either with L. polyophthalmum (Bleeker, 1853) or L. mindorum (Jordan and Richardson, 1908). Specimens of the former species were collected from Okinawa Island and Papua New Guinea, and that of the latter from Taiwan. L. polyophthalmum has been known from the Indo-Australian Archipelago, to the Philippines in the north so far, and this is the first record of the species from Japan. L. mindorum has been known only from Mindoro and Luzon Islands, the Philippines and Waigeu Island, west of Papua New Guinea, and this is the first record of the species from Taiwan. Thus, descriptions on the speci-
mens of these two rare species of the genus Lamnostoma are given in this paper in detail.

The methods of measurements and vertebral counts follow Böhlke (1989). These specimens are deposited in the Osaka Museum of Natural History (OMNH), Department of Marine Sciences, University of the Ryukyus (URM) and the National Science Museum of Tokyo (NSMT).

Lamnostoma polyophthalmum (Bleeker, 1853)

New Japanese name: Hakuten-umihebi

(Figs. 1, 2 and 3; Table 1)

Dalophis polyophthalmus Bleeker, 1853a: 299 (type locality, Priaman, Sumatra).

Dalophis polijophthalmus: Bleeker, 1853b: 69 (cited).

Anguisurus punctulatus Kaup, 1856a: 50 (type locality, Java); Kaup, 1856b: 24, pl.2, fig. 12 (Java).

Sphagebranchus polyophthalmus: Kaup, 1856a: 51 (listed); Kaup, 1856b: 26 (short description of Bleeker's type specimen); Bleeker, 1864: 70, pl. 154, fig. 1 (Sumatra; Batjan); Weber and de Beaufort, 1916: 320, figs. 153 and 154 (Nias; Island Nako; Madura-strait).

Ophichthys polyophthalmus: Günther, 1870: 85 (Java; Sumatra; Batjan).

Ophichthys punctulatus: Güther, 1910: 403 (Samoa Island; Tahiti; Viti-Levu).


Lamnostoma orientalis (not of McClelland): McCosker and Castle, 1986: 179, fig. 42.8 and 2 figs in key on p. 177 (Natal, South Africa).

Caecula polyophthalma: Myers, 1989: 56 (Marianas in Micronesia).

Diagnosis: Preanus length 1.8-2.0 in total length, head length 7.5-10.2, body depth at anus 28-40; body width 0.9-1.2 in body depth at anus. Gill opening ventral. Dorsal fin arising 1/5-1/3 of head length behind level of posterior edge of gill opening.

Material examined: URM-P 2926, 12 specimens, 194-291 mm TL (total length), mouth of Benoki River, Kunigami, Okinawa Island, sandy shore, 6 June 1975, Coll. Shinsho Nishijima; NSMT-P 54555, 5 specimens, 156-251 mm TL, Sowam Village, 200km west of Wewak, New Guinea, sandy shore near mouth of a small river, 13 Sept. 1996, Coll. Satoshi Ishikawa and Shun Watanabe.

Description: Preanus length 1.8-2.0 in TL (51-55% of TL), head length 7.5-10.2 (9.8-13.3), predorsal length 5.6-7.8 (12.9-17.7), body depth at anus 28-40 (2.5-3.6). Upper jaw length 2.5-2.9 in HL (34-40% of HL), snout length 5.8-8.3 (12.1-17.3), eye diameter 12-27 (3.8-8.1), interorbital width 12-28 (3.5-8.3), gill opening 6.6-12.3 (8.1-15.1). Body width 0.9-1.2 in body depth at anus (87-108% of body depth). Total vertebrae 132-138, preanal 63-68, predorsal 10-12.

Body moderately elongate, round in cross-section (Fig.1). Anus located slightly behind midbody. Dorsal and anal fins low, their exact dimension of height obscure on account of their depressed condition. Dorsal fin arising 1/5-1/3 of head length behind the level of posterior edge of gill opening and ending close to caudal tip. Papua New Guinean (PNG) specimens have
Fig. 1. *Lamnostoma polyophthalmum*, URM-P 2926-#9, 250 mm TL, from Okinawa, Japan. Numerals of 1-3 indicate the connecting marker of each photos; A, position of anus; D, origin of dorsal fin.

Fig. 2. Head, gill-opening and dentition of *Lamnostoma polyophthalmum*, URM-P 2926-#9, 250 mm TL. Arrows indicate the position of frontal pore and median supratemporal pore. Scales represent 5 mm.
more posteriorly situated dorsal fin origin (predorsal length 15.3-17.7% of total length in PNG specimens vs 12.9-14.2% in Japanese ones; longitudinal distance between gill-opening and dorsal fin origin 30-33.9% of head length in the PNG specimens vs 19.9-31.2% in the Japanese ones) (Table 1). Anal origin just behind anus and its end on the same level of dorsal. Tip of tail fleshy fin-less point. Paired fin absent.

Snout sharp and pointed (Fig.2). Mouth large; anterior part of premaxillary tooth row exposing; lower jaw short and included, its tip under anterior nostril. Anterior nostril near tip of snout, with wrinkled or earlike margin; posterior nostril in upper lip, in front of eye, just behind a pendulous papilla. Eye small, middle of upper jaw. Gill opening ventral, slit-like cleft with a median fold of forming a pouch, about the same size of eye, converging forward; distance between anterior edges of gill slit about a half of that between the posterior.

Cephalic sensory pores minute (Fig.2). Supraorbital canal with 4 pores; antero-most pore just before anterior nostril on ventral surface of snout, two of them on dorsal surface of snout, and postero-most one situated postero-dorsally to eye. Frontal canal with one pore. Infraorbital canal with 6 pores; one antero-most pore between anterior and posterior nostril, two ones along upper lip, and three posterior to eye. Mandibular canal with 4 pores; in three specimens, 5 pores observed on one side of mandible. Preopercular canal with 2 pores. Supratemporal canal with 3 pores. Lateral line canal with 10-12 pores before gill opening, 63-67 before anus; these counts before anus about the same as vertebral counts before origin of anal fin (63-68).

Teeth slender, small canine, uniserial throughout (Fig.2). A chevron of 3-5 intermaxillary teeth, followed by a short gap, then 10-15 teeth on prevomer; these teeth larger than maxillary
Table 1. Comparisons of proportional dimensions and meristic characters of *Lamnostoma polyophtalmum* between Japanese and Papua New Guinean specimens.

<table>
<thead>
<tr>
<th>Total length (TL)</th>
<th>Japan (N=12)</th>
<th>PNG (N=5)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>194-291 mm</td>
<td>156-251mm</td>
</tr>
<tr>
<td>Preanus length /TL</td>
<td>51-55%</td>
<td>52.4%</td>
</tr>
<tr>
<td>Head L. (HL) /TL</td>
<td>9.8-11.8%</td>
<td>11.3%</td>
</tr>
<tr>
<td>Body depth /TL</td>
<td>2.6-3.6%</td>
<td>3.1%</td>
</tr>
<tr>
<td>Predorsal L. /TL</td>
<td>12.9-14.2%</td>
<td>13.7%</td>
</tr>
<tr>
<td>Predoral L. /HL</td>
<td>113-127%</td>
<td>122%</td>
</tr>
<tr>
<td>Gill opening-Dorsal fin origin /HL</td>
<td>19.9-31.2%</td>
<td>24.4%</td>
</tr>
<tr>
<td>Snout L. (SNL) /HL</td>
<td>14.2-17.0%</td>
<td>15.4%</td>
</tr>
<tr>
<td>Eye diameter /HL</td>
<td>3.8-5.7%</td>
<td>4.8%</td>
</tr>
<tr>
<td>Mouth L. /HL</td>
<td>34-40%</td>
<td>37.1%</td>
</tr>
<tr>
<td>Suborbital L. /HL</td>
<td>3.4-4.8%</td>
<td>3.7%</td>
</tr>
<tr>
<td>Interorbital width /HL</td>
<td>3.5-6.6%</td>
<td>4.6%</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>Eye diameter /SNL</th>
<th>Japan (N=12)</th>
<th>PNG (N=5)</th>
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<tbody>
<tr>
<td></td>
<td>24-38%</td>
<td>30.7%</td>
</tr>
<tr>
<td>Gill opening (GO) /SNL</td>
<td>8.1-11.5%</td>
<td>10.1%</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Eye diameter /GO</th>
<th>Japan (N=12)</th>
<th>PNG (N=5)</th>
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<tbody>
<tr>
<td></td>
<td>39-56%</td>
<td>47.8%</td>
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<tr>
<td>Distance between anterior edge of gill opening /GO</td>
<td>0.8-1.1</td>
<td>0.9</td>
</tr>
<tr>
<td>Distance between posterior edge of gill opening /GO</td>
<td>1.5-2.2</td>
<td>1.7</td>
</tr>
<tr>
<td>Body width /Body depth (at anus)</td>
<td>87-108%</td>
<td>92.9%</td>
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</table>

<table>
<thead>
<tr>
<th>Total vertebral counts</th>
<th>Japan (N=12)</th>
<th>PNG (N=5)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>133-138</td>
<td>135.7</td>
</tr>
<tr>
<td>Vertebral counts before origin of dorsal fin</td>
<td>14-16</td>
<td>14.7</td>
</tr>
<tr>
<td>Vertebral counts before origin of anal fin</td>
<td>63-68</td>
<td>65.4</td>
</tr>
<tr>
<td>Lateral line pores before anus</td>
<td>63-67</td>
<td>65.0</td>
</tr>
<tr>
<td>Lateral line pores before origin of dorsal fin</td>
<td>10-12</td>
<td>10.7</td>
</tr>
</tbody>
</table>

and mandibular teeth. Maxillary teeth uniserial, small close-set, 35-40 in number. Mandibular teeth also uniserial, small close-set, 35-45 in number.

Body color faded a little after a long period of preservation in the Japanese specimens. Upper half of body brownish and lower white (Fig.1). Two rows of small white spots along lateral line (Fig.1); spots of the lower row situated on lateral line pores and those of the upper, close to the lower, 12-17 in number. Two series of white spots across occiput; spots of anterior series close together and a short white bars composed of similar spots directed forward along each side toward eyes; posterior series 3 in number and situated on pores of supraneural canal. Two longitudinal rows of white spot on dorsal side of neck, number of spots and interval between each spot variable (Fig.3). Tip and middle part of snout dusky. Cheek whitish.

**Distribution**: Tropical and subtropical Pacific Ocean from Sumatra in the west to Tahiti in the east, and to Japan in the north; South Africa in the Indian Ocean.

**Lamnostoma mindorum** (Jordan and Richardson, 1908)

(Figs. 4 and 5)

*Coelca mindora* Jordan and Richardson, 1908: 239, fig.4 (type locality, Mindoro Island, Baco
river after Herre (1953)).

_Caeacula mindora_: Herre, 1923: 182 (Mindoro Island; Waigeu Island); Herre, 1924: 107 (in key);


_Caeacula taylori_: Herre, 1923: 183, text-fig. 7, and pl. 6, fig. 2 (Cabatoan River, near Iba, Zambeles Province, Luzon Island); Herre, 1953: 95 (Bangar, La Union Province, Luzon Island).

**Diagnosis:** Preanus length 2.2 in total length, head length 8.4, body depth at anus 25; body width 1.1 in body depth at anus. Gill opening lateral. Dorsal fin arising slightly behind level of posterior edge of gill opening.

**Material examined:** OMNH-P 10015, 484 mm TL (total length), mouth of Hsiukuluan riv-er (秀姑巒溪), Hualien (花蓮), Taiwan, brackish water, 25 July 1996, Coll. Tien-sung Wang (王天送).

**Description:** Preanus length 2.2 in TL (46% of TL), head length 8.4 (11.9), predorsal length 7.4 (13.5), body depth at anus 25 (3.9). Upper jaw 2.7 in HL (36% of HL), snout length 8.4 (12.0), eye diameter 24 (4.2), interorbital width 12 (8.3), gill opening 6.4 (15.6). Body width 1.1 in body depth at anus (83% of body depth). Total vertebrae 143, preanal 58, predorsal 13.

Body moderately elongate and nearly cylindrical or slightly compressed (Fig.4). Anus located in front of midbody. Dorsal and anal fins low, their exact dimension of height obscure on account of their depressed condition. Dorsal fin arising slightly behind gill opening and ending close to caudal tip; anal origin just behind anus and its end on the same level of dorsal. Tip of tail fleshy fin-less point. Paired fin absent.

Snout sharp and pointed (Fig. 5). Mouth large; anterior part of premaxillary tooth row ex-posing. Anterior nostril one third of snout from tip of snout with short rim; posterior nostril in upper lip, before eye, opening between two pendulous papillae of upper lip. Posterior papilla of upper lip is very short. Eye small, slightly before middle of upper lip. Gill opening lateral, large, slit-like cleft, about 3.75 times as long as eye. Isthmus rather wide, about the same size of gill slit.

Cephalic sensory pores minute (Fig. 5). Supraorbital canal with 4 pores; antero-most pore just behind tip of snout, two of them on dorsal surface of snout, and postero-most one situated postero-dorsally to eye. Frontal canal with one pore. Infraorbital canal with 6 pores; one an-tero-most pore between anterior nostril and anterior papilla, the second one slightly before short posterior papilla, the others set in arc line. Mandibular canal with 4 pores. Preopercular canal with 2 pores. Supratemporal canal with 3 pores. Lateral line canal with 12 before gill opening, 57 before anus; the latter count about the same as vertebral count before origin of anal fin (58).

Teeth slender, small canine, uniserial throughout (Fig.5). A semicircle of 5 intermaxillary teeth, then 9 teeth on prevomer; these teeth larger than maxillary and mandibular teeth. Max-illary teeth uniserial, small close-set, 48-49 in number. Mandibular teeth also uniserial, small close-set, 35-45 in number; some anterior teeth larger than posterior.
Fig. 4. *Lamnostoma mindorum*, OMNH-P 10015, 484 mm TL, from Taiwan. Numerals of 1-4 indicate the connecting marker of each photos; A, position of anus; D, origin of dorsal fin.

Upper body brown and lower yellowish; brown color on trunk extending onto middle of lower half and these two colors on tail separated by a sharp line. Some narrow transverse line on middle part of body. Lateral line pore with small, more or less stellate white spots; another spots of same size situated close to every 5-10 lateral line spots. Two series of white spots

Fig. 5. Head and dentition of *Lamnostoma mindorum*, OMNH-P 10015, 484 mm TL. Arrows indicate the position of frontal pore and median supratemporal pore. Scales represent 5 mm.
across occiput; spots of anterior series very small and a short white bar composed of similar spots directed forward; posterior series obscure and 3 in number and situated on pores of supratemporal canal. Two rows of white spot on dorsal side of neck. Longitudinal series of white spots on cheek and upper part of branchial region. Snout and lower jaw brownish; ventral mesial part of lower jaw yellowish.

**Distribution:** Known only from Mindoro and Luzon Islands (northern Philippine), Waigeru Island (near New Guineas), and Taiwan.

**Discussion**

The species of *Lamnostoma*, which are distributed only in the tropical and subtropical Indo-Pacific, are easily recognized by their slender jaws and conspicuous white spotting on the head and lateral line. McCosker (1977) externally defined the genus *Lamnostoma* in his revisional work of the genera of ophichthid eels as follows: body stout, cylindrical, pointed at each end; body slightly longer than tail; snout pointed, its underside grooved; eye small to moderate; anterior nostril flush along snout, its posterior rim produced, posterior nostril usually associated with a pendulous flap; gill opening inferior, about equal to isthmus; origin of dorsal fin above or behind gill opening; supratemporal canal with three pores and preopercular canal with two; teeth slender, pointed, and recurved, uniserial or biserial in jaws, those of intermaxillary and prevomer largest and widely spaced; coloration generally darker dorsally, a series of white spots across nape. According to this definition, the present specimens should be included in the genus *Lamnostoma*.

*Lamnostoma polyophthalmum* was described by Bleeker (1853) on the specimen collected from Sumatra. The present 17 specimens agree well with the original description and the figure of Bleeker's Atlas (1864, pl.154, fig.1).

*L. polyophthalmum* is closely related to *L. orientalis* (McClelland, 1845). We cannot recognize the nature of *L. orientalis* because the original description is too short and is not accompanied by figure. However, according to Day (1878), Weber and de Beaufort (1916), Herre (1923) and Kner (1865), which reported the occurrences of *L. orientalis* near the type locality, Colamanandel Coast of India, *L. orientalis* is distinguished from *L. polyophthalmum* in having the origin of dorsal fin situated just behind the posterior end of the gill opening. Distance between the gill opening and the dorsal fin origin of *L. polyophthalmum* is 25-43 % of head length (Weber and de Beaufort, 1916), which indicates that *L. polyophthalmum* has the origin of dorsal fin situated far behind the gill opening. Except for the position of the origin of the dorsal fin, there is no conspicuous difference between them.

In the present study, there exists small difference in the position of the origin of dorsal fin between Japanese and Papua New Guinean (PNG) specimens. PNG specimens have the dorsal fin origin more posteriorly situated (Table 1). This difference is very small as compared with that between *L. polyophthalmum* and *L. orientalis*, but may show that there exist some local populations in *L. polyophthalmum* which are morphologically different and *L. polyophthalmum* and *L. orientalis* are both extremes in one species. To clarify this problem more samples and examining the holotype of *L. orientalis* (if extant) are needed.
*L. orientalis* reported from Natal (McCosker and Castle, 1986, fig. 42.8) seems to be conspecific to our materials judging from its position of the origin of the dorsal fin and vertebral counts.

Vertebral counts data shown as the holotype of *Dalophilis polyophthalmus* in Böhlke (1982) are mistakenly printed and the counts are those of *Ophichthys polyophthalmus* Bleeker, 1864 (Böhlke, personal communication).

*Lamnostoma mindorum* was described on the basis of a single specimen collected from Mindoro Island by Jordan and Richardson (1908). The present specimen from Taiwan agrees well with the original description except for position of the origin of the dorsal fin. In the text of the original description, distance between the gill opening and the dorsal fin origin is 1/4 of head length against 1/7 in the present specimen. However, recalculated value of the distance based on the figure (p. 239, fig. 4) is 1/7 and the same as that of our specimen. Since the original description, only two distinct occurrences of this species have been reported: Weber and de Beaufort (1916) from Waigeu; Herre (1953) from Luzon. So the present record is the fourth one of this species.

*Caecula taylori* Herre, 1923 is a junior synonym of *L. mindorum*. Herre (1923) mentioned that *C. taylori* is different in having more deep body (18.2 in total length vs. 25-30 in *L. mindorum*). However, body depth measured and recalculated from the figure (pl. 6, fig. 2) is 25 in total length. Accordingly, the proportional dimension of body depth of *taylori* is within the range of *mindorum*.

The species of *Lamnostoma* are said to be generally collected from freshwater (McCosker, 1977). The present specimens from Japan, Taiwan and Papua New Guinea are collected from brakish water or near mouth of rivers.

Specific names of the present two species should be spelled grammatically as *polyophthalmum* and *mindorum* respectively, because the gender of the generic name *Lamnostoma*, derived from the Greek "lamna" (a horrible man-eating monster) and "stoma" (mouth), is neuter.

**Acknowledgment**

We wish to express our gratitude to the following persons who have provided the valuable materials: Mr. T.-S. Wang, Hualien, Taiwan; Dr. K. Tsukamoto, Mr. S. Ishikawa and Mr. J. Inoue, Ocean Research Institute, University of Tokyo; Dr. K. Matsuura, National Science Museum of Tokyo. A part of materials in this report were collected by the support of the Japan Ministry of Education, Science, Sports and Culture, Grant-in-Aid for International Scientific Research (Field Research) #08041139.

Thanks are also due to Dr. E.B. Böhlke for sending the literature and the information on vertebral counts of the ophichthid eels, *Ophichthys polyophthalmus*.

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