

A PRELIMINARY STUDY ON SEA SNAKES (HYDROPHIIDAE) FROM PHUKET HARBOUR, PHUKET ISLAND, THAILAND

*Somchai Bussarawit**, *A.R. Rasmussen*** and *M. Andersen***

ABSTRACT

Sea snakes were collected in different periods of the years 1985, 1987 and 1989 from fishing boats in Phuket harbour, Phuket Island on the west coast of peninsular Thailand.

The following species were found: *Laticauda laticaudata* (Linnaeus), *L. colubrina* (Schneider), *Thalassophina viperina* (Schmidt), *Kerilia jerdoni* Gray, *Microcephalophis gracilis* (Shaw), *Lapemis hardwickii* Gray, *Pelamis platurus* (Linnaeus), *Hydrophis caeruleus* (Shaw), *H. fasciatus* (Schneider), *H. ornatus* (Gray), *H. lapemoides* (Gray), *H. spiralis* (Shaw) and *H. cyanocinctus* Daudin.

A key to the species in the area is presented followed by a short description of each species collected. Remarks on the commercial value of sea snakes are included.

INTRODUCTION

Until 1926, when Malcolm A. Smith published his monograph on sea snakes, only scattered data on the sea snake fauna of the Andaman Sea could be found in literature (GUNTHER, 1864; BOULENGER, 1896; DE ROOIJ, 1917). In the following years a number of papers were published but with only a few exceptions (SMITH, 1930, 1943; TWEEDIE, 1961) they presented little knowledge not previously presented by SMITH (1926). TAYLOR's exhaustive work (1965) gave some new information, but concerning the Andaman Sea, however, most was based on existing literature, primarily SMITH (1930, 1943). In 1976 LIM & SAWAY investigated the distribution of some sea snake species along the coast of peninsular Malaysia. FRITH (1974, 1977) recorded some species from the area and later RASMUSSEN (1987, 1989) and most recently RASMUSSEN & ANDERSEN (submitted) reported additional species not previously recorded. These were caught in the years 1985, 1987 and 1989 from the west coast of peninsular Thailand.

This paper summarizes these new records and gives an overall view of the species collected in the area.

MATERIALS AND METHODS

Sea snakes were collected in Phuket harbour, Phuket Island, Thailand, September-

* Phuket Marine Biological Center, P.O. Box 60, Phuket 83000, Thailand.

** Zoological Museum, University of Copenhagen, Universitetsparken 15, DK-2100, Denmark.

November 1985, October-December 1987, and February-March 1989, from commercial fishing boats. The specimens are deposited in the reference collection in Phuket Marine Biological Center, Thailand (PMBC) and the Zoological Museum, University of Copenhagen, Denmark (ZMUC). The following key is based solely on specimens collected from Phuket harbour. The description of each species is based on a combination of the characters found in the sea snakes collected and previous descriptions found in literature. The literature used is given after each description. Number of maxillary teeth does not include fangs. The methods of counting follow SMITH (1926).

A Key to the Species from Phuket Harbour

1. a. Nasals separated by the internasals (Fig. 1).....2
- b. Nasals not separated by the internasals (Fig. 1).....3
2. a. 19 scale rows around body; upper lip dark *Laticauda laticaudata*
- b. 21-25 scale rows around body; upper lip yellow.....*Laticauda colubrina*
3. a. Less than 23 scale rows around midbody.....*Kerilia jerdoni*
- b. More than 23 scale rows around midbody 4
4. a. Ventrals much broader anteriorly than posteriorly (Fig. 2).....
 *Thalassophina viperina*
- b. Not as above.....5
5. a. Head elongated with snout bill-like and flattened, the gape opening very wide
 (Fig. 3).....*Pelamis platurus*
- b. Not as above.....6
6. a. Ventrals divided by a median fissure in the posterior part of body (Fig. 4), head
 very small, body slender anteriorly.....*Microcephalophis gracilis*
- b. Not as above.....7
7. a. Ventrals very small or difficult to discern, scale rows on flanks enlarged
 compared to dorsal scales (Figs. 5 & 6) *Lapemis hardwickii*
- b. Not as above.....8
8. a. Maxillary teeth 14 – 18..... *Hydrophis caeruleus*
- b. Maxillary teeth 4 – 13.....9
9. a. Head very small, body slender anteriorly, more than 410 ventral scales
 (Fig. 7).....*Hydrophis fasciatus*
- b. Not as above 10
10. a. Maxillary teeth 9 – 13..... 11
- b. Maxillary teeth 4 – 8 12
11. a. Body with dark grey bands dorsally, spaces between bands light grey, narrow
 and almost equidistant anteriorly (Fig. 8); tail with 6 – 11 grey bands with narrow
 whitish interspaces (Fig. 9).....*Hydrophis ornatus*
- b. Body with blackish-grey bands strongly dilated dorsally; tail with 3 – 5 feeble bands,
 tip black (Fig. 10).....*Hydrophis lapemoides*

12. a. Interspaces between bands 2 – 4 times broader than bands posteriorly (Fig. 11)
*Hydrophis spiralis*
 b. Interspaces between bands narrower than the bands posteriorly (Fig. 12).
*Hydrophis cyanocinctus*

Description of Species Collected
Genus *Laticauda* Laurenti

Head shields complete, large; nasals separated by the internasals, nostrils lateral (Fig. 1). Scales smooth, imbricate; ventrals large, at least half as broad as the body. Because of the large ventrals, *Laticauda* is able to crawl on land, and both *L. laticaudata* and *L. colubrina* spend considerable time out of the water (TAYLOR, 1965; COGGER *et al.*, 1987).

Traditionally *Laticauda* was included in Hydrophiidae (SMITH, 1926) but MCDOWELL (1969, 1972) argued that *Laticauda* is not closely related to the true sea snakes; for further study see MCDOWELL, 1972, BURGER & NATUSUNO, VORIS, 1977 MCCARTHY, 1986 and COGGER *et al.*, 1987.

***Laticauda laticaudata* (Linnaeus)**

L. laticaudata was caught in 1987 for the first time on the west coast of peninsular Thailand (RASMUSSEN, 1989). Two specimens were collected.

Head and body: subcylindrical of nearly uniform diameter throughout.

Scale rows: 19 on neck and body.

Ventrals: 219 – 252.

Colour: head black with a light horseshoe-shaped mark on top. Body bluish-grey above, with black cross-bands completely encircling body. Belly yellowish between the black crossbands (SMITH, 1926, 1943; TAYLOR, 1965; MCCARTHY, 1986; RASMUSSEN, 1989).

***Laticauda colubrina* (Schneider)**

L. colubrina was reported by FRITH (1974) for the first time on the west coast of peninsular Thailand. Later FRITH (1977) caught several specimens. We collected two specimens, one in 1985 and one in 1987.

Head and body: head normally with an azygous scale present between the prefrontals. Head and body subcylindrical and of nearly uniform diameter throughout.

Scales rows: 21 – 23 on neck and 21 – 25 on body.

Ventrals: 213 – 249.

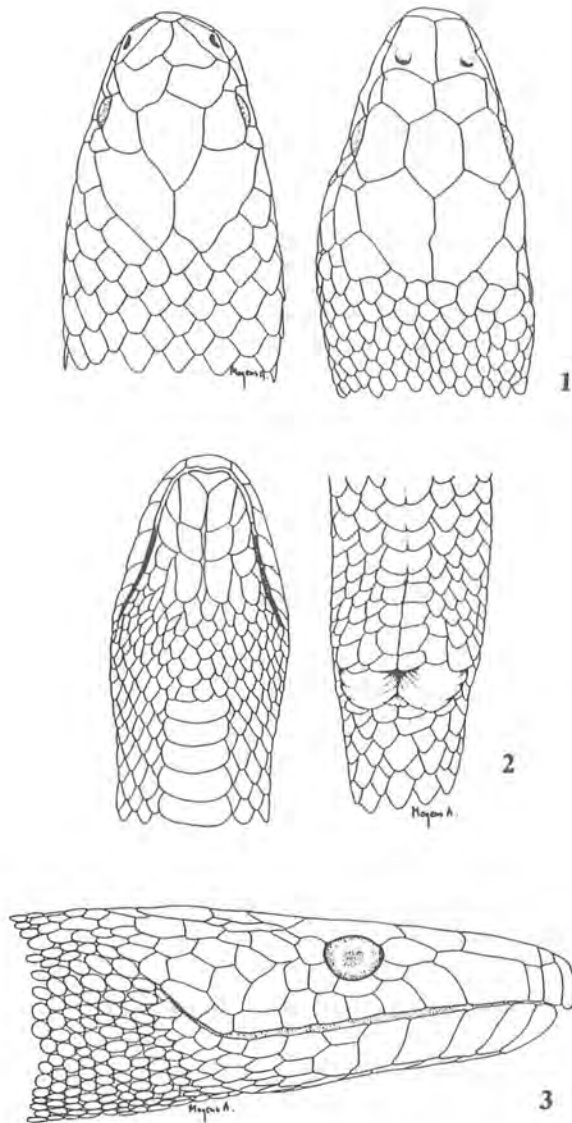


Figure 1. Dorsal view of the head of *Laticauda laticaudata* (left) and *Hydrophis ornatus* (right), showing the presence and absence of internasals (drawing: M. Andersen).

Figure 2. Ventral view of head and vent region *Thalassophina viperina*. Notice enlarged ventrals in the anterior part of the body (drawing: M. Andersen).

Figure 3. Lateral view of head of *Pelamis platurus*. Notice flattened snout and the very wide gape (drawing: M. Andersen).

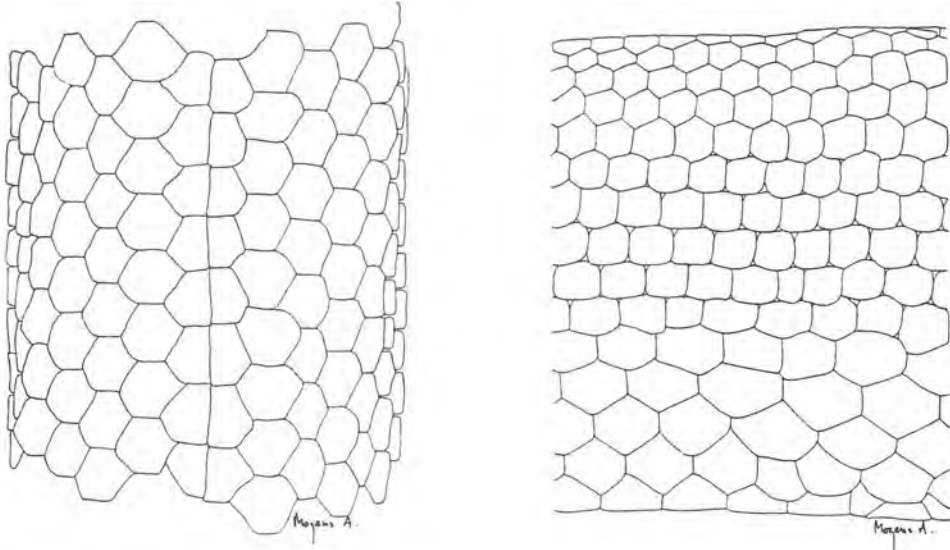


Figure 4. (left). Ventral view of posterior part of *Microcephalophis gracilis*. Notice ventrals divided by a median fissure (drawing: M. Andersen).

Figure 5. (right). Lateral view of *Lapemis hardwickii*, midbody. Notice enlarged scales in the lower-most scale rows (drawing: M. Andersen).

Colour: snout yellow, the colour extending backwards on each side of the head above the eye as far as the temporal shields and along the upper lip, leaving a dark bar in between. The rest of the head black, this colour continues laterally to the first or first and second bands upon the neck through a streak along either side of the lower jaws, leaving an elongated yellow patch in between. Body bluish-grey, with black cross-bands, completely encircling body, the bands narrowing on the ventrals. Belly yellowish between the black bands (SMITH, 1926; TAYLOR; 1965; FRITH, 1974, 1977).

Genus *Thalassophina* Smith

Ventrals very broad anteriorly, narrow posteriorly (Fig. 2). Head short, distinct from neck, snout broadly rounded.

TAYLOR (1965) used the genus name *Praescutata* from WALL (1921). However, Wall retracted the name *Praescutata* on the insert named ERRATA, bound between the table of contents and first page of text of the same volume and thus published simultaneously with it. On these ERRATA the reader is instructed to read *Thalassophis* (the old genus of *T. viperina*) for *Praescutata*. In 1926 SMITH erected a new genus, *Thalassophina* and in his references of *Thalassophina viperina* he rightly

lists WALL (1921) as using *Thalassophis*. This means that the name *Praescutata* must be regarded as a typographical error. Despite that, SMITH (1943) mentions WALL's (1921) *Praescutata* as antedating *Thalassophina* by five years, which indicates that SMITH overlooked WALL's ERRATA in 1943, but not in 1926. Based on these considerations we prefer to use the genus name *Thalassophina* made by SMITH in 1926.

Thalassophina viperina (Schmidt)

T. viperina (one specimen) was collected for the first time on the west coast of peninsular Thailand in 1987 (RASMUSSEN, 1989).

Head and body: head short and distinct from neck, body subcylindrical with the greatest diameter in the posterior part of body.

Scale rows: 27 – 34 on neck, 37 – 50 on body.

Ventrals: 226 – 274.

Colour: grey above, white below, the two colours meeting on flanks in a fairly clear line of demarcation (as in the single specimen collected at Phuket harbour) or grey above with 25 – 35 black rhomboids usually more or less confluent or completely banded (SMITH, 1926; TAYLOR, 1965; RASMUSSEN, 1989). Concerning change of genus for *T. viperina* see MCDOWELL (1972).

Genus *Kerilia* Gray

Poison fang moderate, followed with little or no interval by 7 – 9 teeth. Scales on body strongly keeled and in regular rows.

Kerilia jerdoni Gray

K. jerdoni was collected on the west coast of peninsular Thailand for the first time in 1985 (RASMUSSEN & ANDERSEN, submitted)

Head and body: head short, snout declivous and much narrowed anteriorly (Fig. 13). Body of almost equal diameter throughout and showing relatively little compression.

Scale rows: 19 – 21 around body.

Ventrals: 200 – 256.

Colour: head grey or greenish above, yellowish or white below, first band around body more or less interrupted by parietales (Fig. 13). Colour on body greyish yellow between bands dorsally, yellowish or white laterally and ventrally. Bands black, widened dorsally, narrowing laterally and in some specimens encircling the body. Tail as body, tip always black (SMITH, 1926; TAYLOR, 1965; MCDOWELL, 1972; RASMUSSEN & ANDERSEN, submitted).

Genus *Microcephalophis* Lesson

Very small-headed sea snake, body slender anteriorly. Diameter of body 3 to 5 times that of the neck. Ventrals entire anteriorly, more and less completely divided by longitudinal furrow posteriorly. *Microcephalophis* either included in *Hydrophis* or regarded as a distinct genus (see MCDOWELL, and VORIS, 1977).

***Microcephalophis gracilis* (Shaw)**

Two specimens were collected for the first time on the west coast of peninsular Thailand in 1989, belonging to the subspecies *M. gracilis microcephalus* (SMITH, 1926, 1930).

Head and body: head small, body slender. Ventrals entire anteriorly, but more and less completely divided by a longitudinal furrow posteriorly (Fig. 4).

Scale rows: 21 – 23 on neck, 35 – 43 on body.

Ventrals: 250 – 350.

Colour: head bluish-grey, body bluish-grey on the upper half and whitish on the lower. Bands on body dark, feeble or absent. Each scale surrounded by a black margin.

Genus *Lapemis* Gray

Head large, body stout, the lower-most scale rows on flanks enlarged (Fig. 5). Ventrals small, usually distinct anteriorly, very small or absent posteriorly (SMITH, 1926; TAYLOR, 1965; MCDOWELL, 1972).

***Lapemis hardwickii* Gray**

A common species on the west coast of peninsular Thailand. The local fishermen catch thousands of specimens for the leather industry.

Head and body: head large, body stout, rarely more than 1 m in length. Some of the

specimens have enlarged spines on the scales.

Scale rows: males 23 – 31 on neck, females 27 – 35 on neck. Males 25 – 37 on body, females 33 – 41 on body.

Ventrals: 141 – 230, difficult to discern.

Colour: head pale olive to black; juveniles black. Body with 35-50 dorsal bars which are greenish, greyish or yellowish olive, body whitish below (Fig. 6). The bands taper to a point on the flanks or in some specimens encircle the body (rare, mostly juveniles). The dorsal bars often fused, leaving the entire back uniform in colour (SMITH, 1926; TAYLOR, 1965; MCDOWELL, 1972; LIM, 1982).

Genus *Pelamis* Daudin

Ventrals very small, divided by a median longitudinal furrow, or indistinguishable from the dorsal scales.

***Pelamis platurus* (Linnaeus)**

The only truly pelagic sea snake, and the only species found well beyond the Indo-Malayan and Australian centers of distribution of the the sea snakes (KROPACH, 1975).

Head and body: head flat, snout elongated almost bill-shaped (Fig. 3), body compressed. Scales more or less hexagonal or quadrangular in shape.

Scale rows: 49 – 67 on body.

Ventrals: 264 – 406 usually divided or broken up and indistinguishable from the dorsal scales.

Colour: black above, yellow below, the two colours well-defined, tail yellow with black markings (SMITH, 1926; LIM, 1982). For colour variation see KROPACH (1975).

Genus *Hydrophis* Latreille

Ventrals small, distinct throughout and normally entire. *Hydrophis* is the largest genus in the family Hydrophiidae, with approximately 25 species. From Phuket six species have been collected.

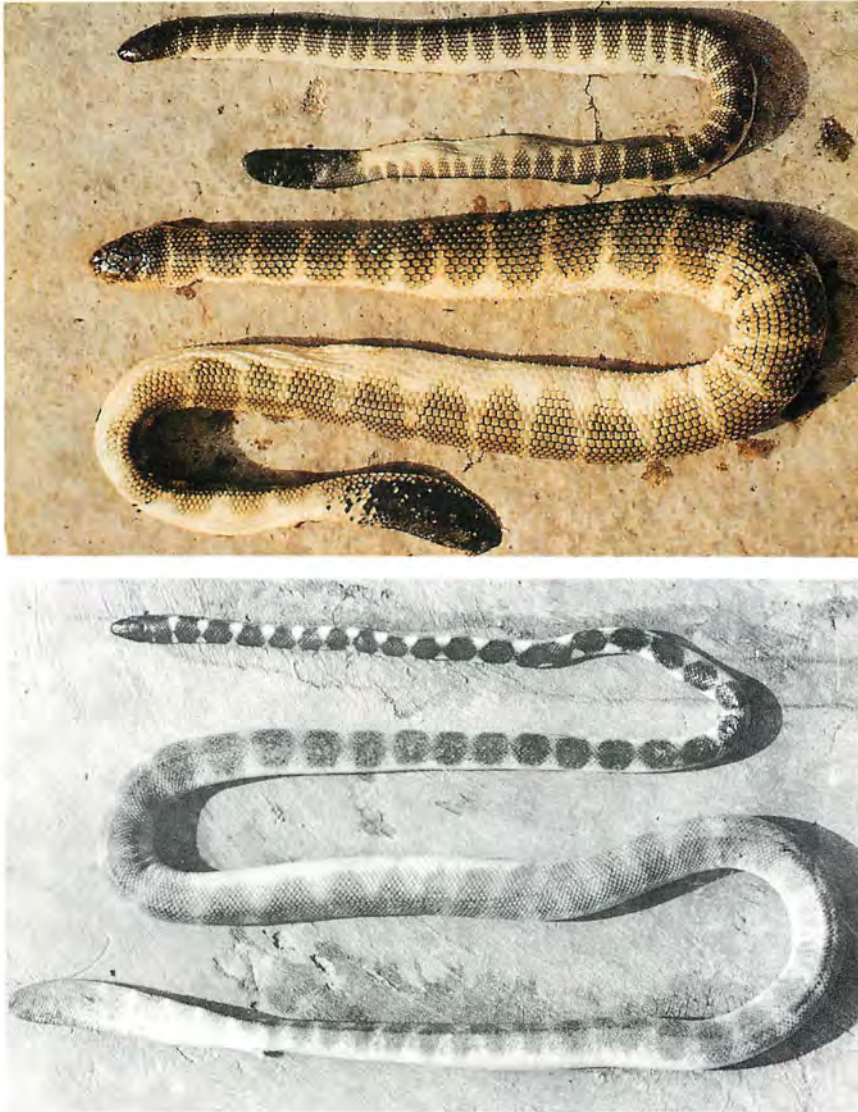


Figure 6. (upper) *Lapemis hardwickii*, juvenile and adult. Notice black head and tail of the juvenile (photo: Andersen & Rasmussen).

Figure 7. (lower) *Hydrophis fasciatus*. Notice the small head and slender body anteriorly (photo: Andersen & Rasmussen).



Figure 8. (upper) Head of *Hydrophis ornatus*. Notice the narrow, greyish interspaces between the dark bands (photo: Andersen & Rasmussen).

Figure 9. (middle) Habitus of *Hydrophis ornatus* (photo: Andersen & Rasmussen).

Figure 10. (lower) Habitus of *Hydrophis lapemoides* (photo: Andersen & Rasmussen).



Figure 11. (upper) *Hydrophis spiralis*. Notice the black bands, posteriorly with interspaces broader than the bands (photo: Andersen & Rasmussen).

Figure 12. (lower) *Hydrophis cyanocinctus*. Notice the dark bands, posteriorly with interspaces narrow than the bands (photo: Andersen & Rasmussen).

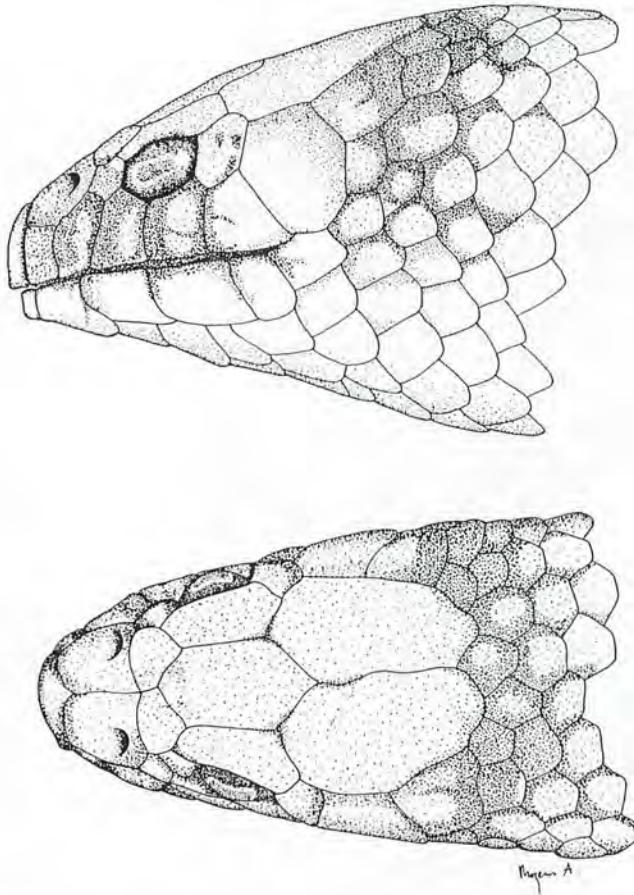


Figure 13. Head of *Kerilia jerdoni* in lateral and dorsal view (drawing: M. Andersen).

Hydrophis caeruleus (Shaw)

In 1989 we collected the first specimen of *H. caeruleus* recorded on the west coast of peninsular Thailand.

Head and body: head moderately small, body not very slender anteriorly, slightly compressed posteriorly.

Scale rows: 31 – 43 on neck, 38 – 54 on body.

Ventrals: 253 – 334.

Colour: head black above, sometimes with a light curved mark on top. Body whitish below, bluish-grey above, with 40 – 60 bands more or less discernible. Each scale surrounded by a black margin (SMITH, 1926; TAYLOR, 1965; MCDOWELL, 1972; COGGER, 1975).

Hydrophis fasciatus (Schneider)

Specimens collected in 1987 and 1989 constitute the first records on the west coast of peninsular Thailand.

Head and body: head very small, body long and slender anteriorly and compressed posteriorly (Fig. 7).

Scale rows: 25 – 31 on neck and 39 – 49 on body.

Ventrals: 410 – 514.

Colour: body very variable in colour and pattern. Anteriorly black or black with white spots on the flanks, or white with dark brown bands encircling the body. Posteriorly white with black bands, or greyish with oval black spots dorsally. In some specimens the ground colour may be cream with blackish brown bands (SMITH, 1926; TAYLOR, 1965; LIM, 1982).

Hydrophis ornatus (Gray)

Caught in 1985, 1987 and 1989. A complete analysis of those collected in 1985 and 1987 has been done by RASMUSSEN (in press).

Head and body: head large and body robust (Fig. 9).

Scale rows: 34 – 41 on neck and 42 – 54 on body.

Ventrals: 235 – 298.

Colour: head olive-green or greyish above, whitish below. Body with broad dark greyish bands. Interspaces light grey, narrow and almost equidistant anteriorly (Fig. 8), below whitish. 30 – 56 bands on body. Tail with dark greyish bands with narrow whitish interspaces. Number of bands on tail 6-11 (SMITH, 1926; TAYLOR, 1965; RASMUSSEN, in press).

Hydrophis lapemoides (Gray)

Caught in Thai waters in 1985 for the first time (RASMUSSEN, 1987). Considered a rare species (SMITH, 1943); however, in 1987 and 1989 we collected about 100 specimens.

Head and body: head moderate, body neither particularly elongated nor compressed.

Scale rows: 29 – 35 on neck, 41 – 54 on body.

Ventrals: 290 – 404.

Colour: head greenish-brown with or without yellow curved mark above; body whitish in colour, with blackish-grey bands strongly dilated dorsally and disappearing ventrally in most of the specimens. Tail with a few bands, tip black (Fig. 10). In some of the specimens the bands are connected or even fused making the specimens greyish above and whitish below. The juveniles are completely banded. (Smith, 1926, 1943; VOLSOE, 1939; TORIBA & SAWAI, 1981; RASMUSSEN, 1987).

Hydrophis spiralis (Shaw)

FRITH (1977) published for the first time *H. spiralis* for Thai waters. We collected a total of about 30 specimens in 1987 and 1989. *H. spiralis* is one of the largest species of sea snakes known (FRITH, 1977).

Head and body: head large, body heavy, not slender anteriorly.

Scale rows: 25 – 31 on neck and 33 – 38 on body.

Ventrals: 295 – 362.

Colour: head yellowish with sporadic blackish markings, body with more or less complete narrow black bands encircling body, at least posteriorly much narrower than their interspaces. Between bands yellow dorsally and some times with black spots, yellowish ventrally, black bands bordered by a few scale rows of clear yellow

colour, especially laterally. Tail black (Fig. 11) (SMITH, 1926; FRITH, 1977).

Hydrophis cyanocinctus Daudin

Collected in 1985, 1987 and 1989. A very large sea snake reaching nearly 2 m in length.

Head and body: head robust, body heavy, not slender anteriorly, in large specimens the body is compressed posteriorly.

Scale rows: 27–35 on neck and 37–47 on body.

Ventrals: 290–404.

Colour: head black, or yellow with black markings. Body with more or less complete black bands which are dilated dorsally; yellow-green or whitish between bands dorsally (Fig. 12); yellowish-white ventrally, sometimes with a black stripe. Tail black on the tip. The juveniles have the strongest coloration, with black bands encircling body. *H. cyanocinctus* can be separated from *H. spiralis* in having interspaces narrower than bands posteriorly (SMITH, 1926, 1930, 1943; TAYLOR, 1965; LIM, 1982).

DISCUSSION

Probable Species in the Area

Future investigations in the area will probably reveal the presence of more species. Actually, we found the absence of *Enhydrina schistosa* somewhat mysterious as it is known from the area and regarded as being fairly common. This may be due to the fact that we got our sea snakes mainly from sea-going fishermen and *E. schistosa* appears to be a sea snake of shallow, muddy coastal waters and river mouths (LIM, 1982).

SMITH (1930) mentioned, among others, the following species from the west coast of Malaysia, as far north as Penang which is right on the border of our area: *Hydrophis klossi* and *H. torquatus*. A little further south on the west coast SMITH enumerated *Thalassophis anomalus*, *H. brookei*, *H. melanosoma* and *Microcephalophis cantoris* as being present. Furthermore LIM (1982) mentioned *Disteira stokesi* as occurring in the area. None of these has been recorded on the west coast of peninsular Thailand but they are very likely to be found some day.

Remarks on Commercial Uses of Sea Snakes

For many years sea snakes have been part of the trash fish biomass for the fish meal factories, but with the rising prices of their skin, sea snakes are now sorted out and sold separately.

During our daily collecting visits in the harbour we soon discovered that *Lapemis hardwickii* is by far the most numerous species in the area and consequently the one used for skin-making.

According to fishermen, each cruise yields between 50 and 300 specimens of *Lapemis hardwickii*, each of which is bought by the local skin-drier for 3 or 4 baht. The snakes are skinned and the skins are dried in the sun and flattened. They are then sold for 15 baht each to a leather factory in Bangkok, where the skins are tanned and subsequently turned into belts, shoes and money pouches sold in souvenir shops. Finally, the meat is sold to fish meal factories or crocodile farms, where it is used as forage.

Smoked sea snake meat for human consumption is popular in Japan and may thus be a product worth consideration for export

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