

A KEY TO THE SEA SNAKES IN THE GULF OF THAILAND

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ABSTRACT

A key to the fully aquatic venomous sea snakes found in the Gulf of Thailand is presented. The key uses external characteristics, numerous illustrations, a minimum of scientific terminology, and little or no complex scale counting. This key should be usable by local biologists, Royal Thai Navy personnel, and medical professionals who wish to identify a specific venomous marine snake from the Gulf of Thailand.

INTRODUCTION

The primary focus of this key is the fully aquatic venomous sea snakes found in the Gulf of Thailand (Figure 1). True sea snakes (family Elapidae) have neurotoxic venom, a paddle-like tail, dorsal nostrils, and small ventral scales or broad ventral scales with a strong central keel. Other groups of snakes also have invaded the sea. One of these, the non-venomous granulated file snake, *Acrochordus granulatus*, is common in the Gulf of Thailand. We have thus included it in the key. Some homalopsine snakes from the genera *Bitia*, *Cantoria*, *Cerberus*, and *Fordonia* live in the intertidal zones of Thai waters. These are not true sea snakes; they lack the paddle-like tail, and although mildly venomous, they are considered harmless to humans. The intertidal homalopsines are not included in our key. The species of sea snakes found along the Andaman sea coast in southern Thailand are also not included in our key but are covered in another publication (BUSSARAWIT, *ET AL.*, 1989).

Eleven publications over the past 75 years have compiled lists of true sea snake species found in the Gulf of Thailand (Table 1). These publications have reported as few as 7 and as many as 21 species. We have included all of the species which may be found in the Gulf of Thailand based upon specimen or literature records. However, we have excluded amphibious sea kraits (*Laticauda*) and 4 species of true sea snakes because we doubt they are present in the Gulf of Thailand or, if present, they occur only in extremely small numbers.

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Figure 1. Map of Gulf of Thailand region. All species of true sea snakes that have been documented from the Gulf of Thailand have been included in the key.



Figure 2. The short sea snake (*Lapemis curtus*). In one study of true sea snakes (Tu, 1974), 81% of all snakes captured from the Gulf of Thailand were *Lapemis curtus*.

One previous study (Tu, 1974) examined more than 13,000 snakes from the Gulf of Thailand, 10–20 miles off the coast of Nakhon Si Thammarat Province. This huge sample included 13 species; however, one species, the short sea snake (*Lapemis curtus*, Figure 2), accounted for 81% of the sample. We consider *Lapemis curtus* to include what was previously named *Lapemis hardwickii* (GRITIS & VORIS, 1990). Five other species, *Aipysurus eydouxii*, *Hydrophis cyanocinctus*, *Hydrophis torquatus*, *Thalassophina viperina*, and *Acrochordus granulatus*, made up another 12.7% of the total. Although these 6 species may not be found in the same percentages throughout the Gulf, it is likely that they are the most common. Four of these species are found within the first 7 couplets of this key, and all 6 are found within the first 14 couplets. Even though *Acrochordus granulatus* is not listed in the table of true sea snakes, it has been included in the key because of its abundance in this body of water and the favorable likelihood of encounters.

Previous sea snake keys often have been difficult for the non-herpetologist to apply because they use tooth counts, scale counts, and bone length ratios which require extensive preparation of specimens, or the difficult, detailed counting of tiny scale rows. We have attempted to create a key that uses external characteristics, illustrations, a minimum of scientific terminology, and little or no complex scale counting. Hence, this key should be usable by Royal Thai Navy personnel and medical professionals who are trying to identify the specific type of venomous marine snake that has bitten a person. This key will be most

Table 1. Sea snake species reported from the Gulf of Thailand by various authors over the past 75 years. Asterisks indicate species that are not included in the key due to absence or rarity in the Gulf of Thailand.

	Barne 1963	Cox 1991	McCarthy & Warrell 1991	Minton et al. 1965	Shuntov 1962	Smith 1920	Smith 1926	Smith 1943	Suvatti 1950	Taylor 1965	Tu 1974
<i>Aipysurus eydouxi</i>	YES	YES	YES	YES		YES	YES	YES		YES	YES
<i>Acalyptophis peronii</i>		YES		YES						YES	YES
<i>Astrotia stokesi</i> *		YES			YES			YES		YES	
<i>Enhydrina schistosa</i>	YES	YES		YES		YES	YES		YES	YES	YES
<i>Hydrophis belcheri</i>			YES								
<i>Hydrophis brookei</i>	YES	YES						YES		YES	
<i>Hydrophis caeruleus</i>	YES	YES	YES	YES		YES	YES	YES	YES	YES	
<i>Hydrophis cyanocinctus</i>	YES	YES	YES			YES	YES	YES	YES	YES	YES
<i>Hydrophis fasciatus</i>	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	
<i>Hydrophis klossi</i>	YES	YES	YES	YES		YES	YES	YES	YES	YES	
<i>Hydrophis lamberti</i>			YES			YES			YES		
<i>Hydrophis lapemoides</i> *											
<i>Hydrophis mamillaris</i> *											
<i>Hydrophis melanosoma</i> *											
<i>Hydrophis ornatus</i>	YES	YES	YES	YES			YES			YES	YES
<i>Hydrophis spiralis</i>					YES						
<i>Hydrophis torquatus</i>	YES	YES	YES	YES		YES	YES	YES	YES	YES	YES
<i>Kerilia jerdoni</i>	YES	YES	YES	YES			YES	YES	YES	YES	YES
<i>Kolpophis annandalei</i>		YES		YES			YES	YES	YES	YES	
<i>Lapemis curtus</i>	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
<i>Microcephalus gracilis</i>	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
<i>Pelamis platurus</i>	YES	YES		YES	YES	YES	YES	YES	YES	YES	
<i>Thalassophina viperina</i>	YES	YES	YES	YES	YES	YES	YES		YES	YES	YES
<i>Thalassophis anomalus</i>	YES	YES	YES	YES		YES	YES	YES	YES	YES	YES

useful for freshly killed sea snakes whose pattern and color are still visible. Preserved museum specimens whose color and pattern have faded may not be identifiable with this key.

USING THE KEY

While examining a marine snake, look first at the shape of the tail. If it is small, tapers quickly to a point, and is not vertically flattened into the shape of a paddle or oar, it is not a true sea snake and therefore not a potential threat to humans.

If the tail is flat and paddle-like, use this key to identify the species in the following manner. Read each couplet and decide which statement is true. If a number follows a statement, proceed to that numbered couplet. Continue this process until you arrive at the scientific identity of your specimen.

GLOSSARY FOR KEY

Body scales—scales on the upper portion of the body. These are small and may overlap or be juxtaposed.

Eye-mouth distance—Distance between the bottom of the orbit and the opening of the mouth.

Keels—a small fold or ridge on a scale causing it to rise above the rest of the scale.

Nasal scale (s)—the scale or scales containing the nostrils.

Prefronta—the scale or scales between or just posterior to the nasal scale (s).

Rostral—the scale or scales on the tip of the snout.

Supraocular—the scale directly above the eye.

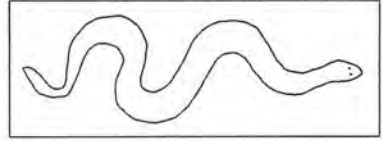
Tubercles—small, rounded ornaments on a scale. There may be one tubercle in the center of the scale or numerous ones scattered over the scale's surface.

Ventral scales—scales on the snake's belly. In land-dwelling snakes, these are usually very broad; but in sea snakes, they are greatly reduced in size.

KEY TO THE SEA SNAKES IN THE GULF OF THAILAND

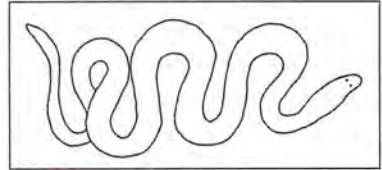
- 1a) Body stout, or bulky, in proportion to its length; head medium to large, and usually distinct from neck.

Go to 2



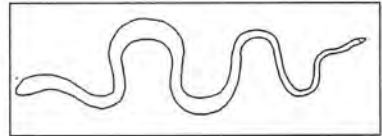
- 1b) Body not particularly stout; head medium to large, usually distinct from neck.

Go to 9



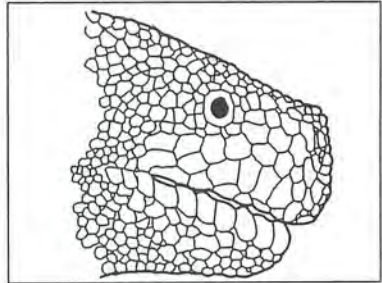
- 1c) Anterior body slender; head small to tiny, not distinct from neck.

Go to 15



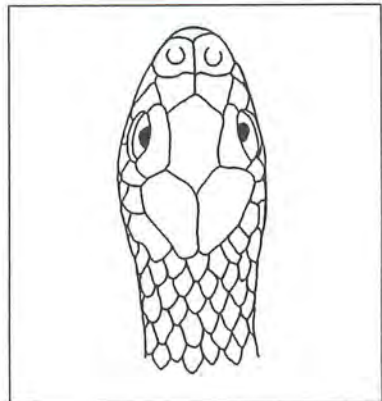
- 2c) All scales on head and body granular; white rings encircle body.

Acrochordus granulatus



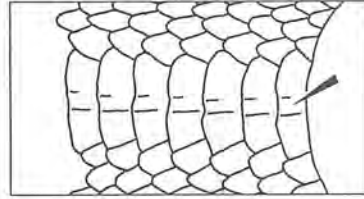
- 2c) Scales not granular; some large, plate-like scales on top of head.

Go to 3



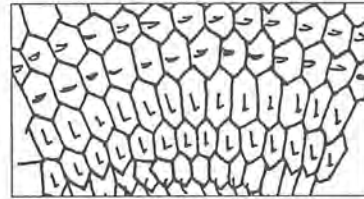
- 3a) Body scales smooth and in 17 rows; large ventral scales with a central keel; subcaudal scales single.

Aipysurus eydouxii



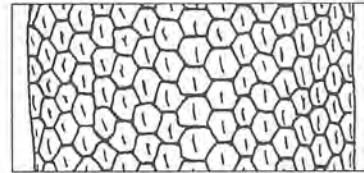
- 3b) Body scales with keels or tubercles, in more than 17 rows.

Go to 4



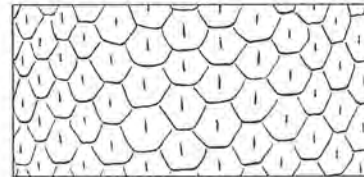
- 4a) Body scales do not overlap, they form a distinct bead-like pattern.

Go to 5



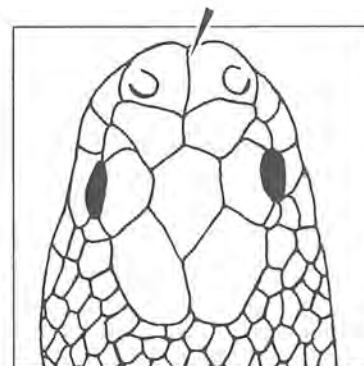
- 4b) Body scales overlap, not bead-like.

Go to 8



- 5a) Nasal scales in contact.

Go to 6

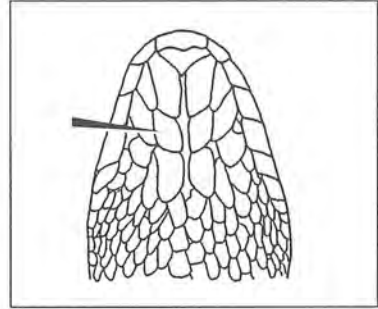


- 5b) Nasal scales not in contact.

Go to 7

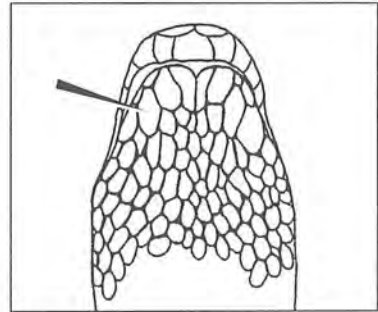
- 6a) Distinct chin shields (plate-like) with anterior pair smaller than posterior pair.

Thalassophina viperina



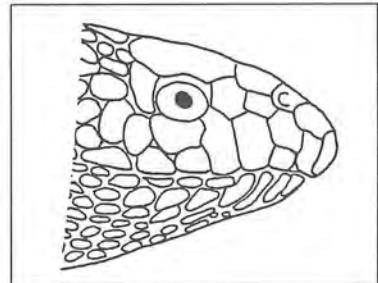
- 6b) Chin shields may be distinct or obscure, if present anterior pair larger than posterior pair.

Lapemis curtus



- 7a) Dorsal scales tiny [74–93 scales around body]; chin shields obscure; beak-like face due to rostral and prefrontal scales overlapping lower jaw.

Kolpophis annandalei

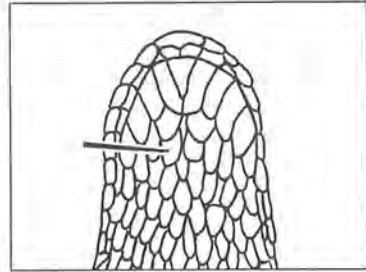


- 7b) Dorsal scales not tiny [31–35 rows]; 2 pairs of chin shields present; face not beak-like; scales heavily keeled; face blunted.

Thalassophis anomalus

- 8a) Light colored bands on neck one scale length or less in width; posterior chin shields separated by a pair of small scales.

Hydrophis ornatus

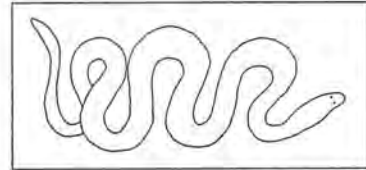


- 8b) Light colored bands on neck more than one scale length in width and may be indistinct.

Hydrophis lamberti

- 9a) Body scales do not overlap, most are smooth; yellow, black and brown colors on body; dorsal pattern lacks crossbands; elongated head; compressed body.

Pelamis platurus

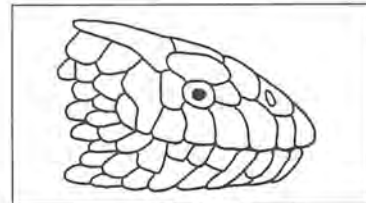


- 9b) Not as above; body scales overlap; pattern uniform or with crossbands or rings.

Go to 10

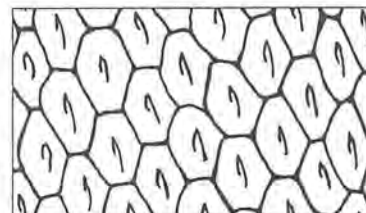
- 10a) Smooth scales, or slight keels; eye diameter less than eye-mouth distance, eyes small; dorsal pattern extends to at least the ventrals, narrow black bands 2-3 scale lengths wide.

Hydrophis spiralis



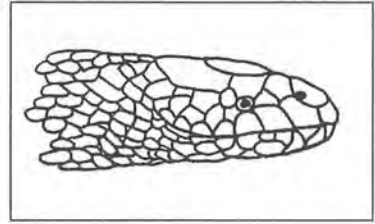
- 10b) Scales keeled, scales overlap slightly.

Go to 11



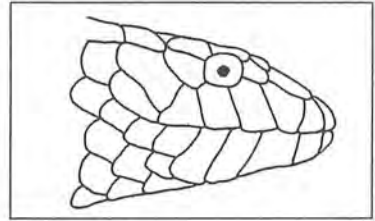
- 11a) Body exceptionally long; eye diameter three-fourth's of the eye-mouth distance—eye small; dorsal pattern variable.

Hydrophis cyanocinctus



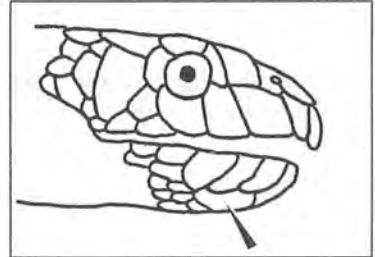
- 11b) Eye diameter equal to or greater than the eye-mouth distance (these snakes have relatively large eyes).

Go to 12



- 12a) Chin shields obscure, one slightly enlarged pair separated by several scales; rostral divided into 3 parts, and projects downward; head scales frequently with tubercles giving them a pebbled texture.

Enhydrina schistosa

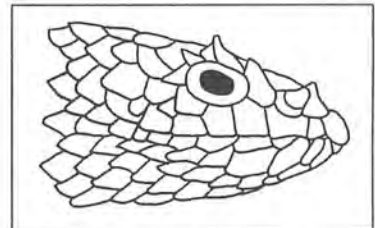


- 12b) Chin shields distinct; usually 2 pairs; rostral single, broader than high, and does not project downward.

Go to 13

- 13a) Supraocular scales with spine-like projections over eye; parietal scales fragmented.

Acalyptophis peroni

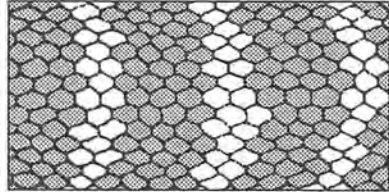


- 13b) Not as above; supraoculars do not extend over eye; parietals not fragmented.

Go to 14

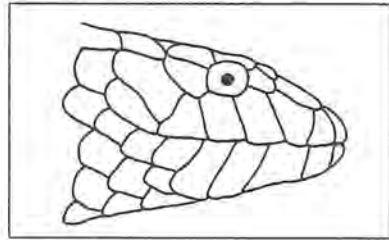
- 14a) Dorsal pattern extends onto anterior venter; light colored rings 1–2 scales wide separate darker rings 3–5 scales wide; head with turquoise markings from prefrontal through eyes to temporals.

Hydrophis torquatus



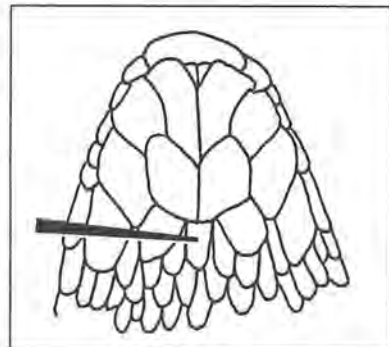
- 14b) Dorsal pattern does not extend to belly; pattern composed of 34–50 dark crossbands; scales heavily keeled; snout sloping.

Kerilia jerdoni



- 15a) Second pair of chin shields separated by small scale (s); dorsal scales overlap and are keeled; head dark blue-black and without yellow markings.

Hydrophis caerulescens

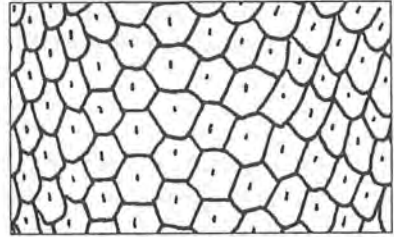


- 15b) Second pair of chin shields form mental groove along with first pair.

Go to 16

- 16a) Dorsal pattern does not extend on to venter;
scales with a central tubercle.

Hydrophis belcheri



- 16b) Dorsal pattern extends onto venter.

Go to 17

- 17a) Head black or dark olive with turquoise patches;
7–8 supralabials; scales on thickest portion of
body squarish.

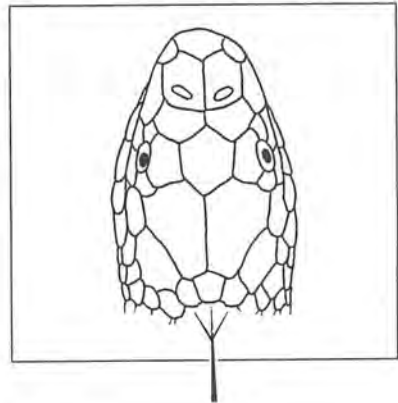
Hydrophis torquatus

- 17b) Head lacks turquoise coloration; 7 or fewer
supralabials.

Go to 18

- 18a) Head shiny, jet black; 3 scales separate
temporals on each side of head; most scales
with keels have the keels interrupted so that
each scale has two keels.

Hydrophis fasciatus

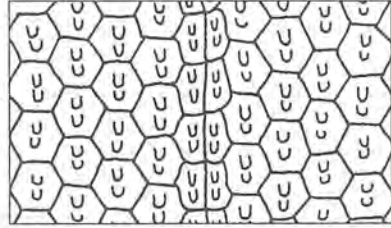


- 18b) Head not jet-black, head small to very small.

Go to 19

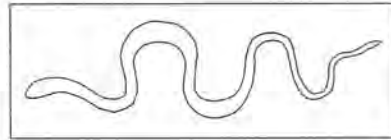
- 19a) Thickest portion of the body equal to 5 times the head width (head is tiny); ventral scales divided; scales on thickest portion of body do not overlap and are hexagonal.

Microcephalophus gracilis



- 19b) Thickest portion of the body less than five times the head width. Ventrals not divided.

Go to 20



- 20a) Thickest portion of the body about 2 head widths; scales at thickest part of body triangular with rounded apex pointing posteriorly; 50–75 bands encircle body; head black to olive.

Hydrophis klossi

- 20b) Thickest portion of the body about 3 head widths; scales at thickest portion of body overlap little and are squarish.

Hydrophis brookii

ACKNOWLEDGMENTS

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