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Field Guide to
Look-Alike Sharks and Rays Species of the Southeast Asian Region

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CONTENTS

SUMMARY

Despite their significance, most sharks and rays species look very similar and difficult to quickly identify even for experience taxanomists. With more than 300 species already recognised in the Southeast Asian Region, the challenge is becoming more complicated. Sharks and rays differ from one another in many characteristics; adding to the challenges of accurate identification.

However, obtaining reliable species composition and data of sharks and rays from catches is essential for effective fishery management and conservation for long-term sustainable use.This guide is intended to improve the knowledge of regional taxonomists and enumerators on identification of sharks and rays in their catch data reporting from varies fisheries in this region.

In addition to the publication of **Field Guide to Sharks of the Southeast Asian Region**by Ahmad and Annie(2012) and **Field Guide to Rays of the Southeast Asian Region** by Ahmad *et al.* (in press), this guide provides a simple user-friendly brief description on similarities and distinctive characteristics of 15 pairs of sharks, 20 pairs of rays and two pairs of skates look-alike species. Most of these species are found in abundance in this region.

Ahmad Ali
Annie Lim Pek Khiok
Fahmi
Dharmadi

FOREWORD

An accurate identification of elasmobranch species is one of the most difficult tasks especially for a look-alike species. Many groups, such as requiem sharks, weasel sharks, longtailed carpetsharks, wedgefishes, guitarfishes, stingrays, skates, devil rays and many other species may often look very similar within a family. In some cases, even experts may have difficulty in identifying some of the species.

Much of the original content of this document was written and compiled by Mr. Ahmad Ali and Ms. Annie Lim Pek Khiok with substantial assistance from Mr. Fahmi and Mr. Dharmadi of Indonesia. All of them are member of the IUCN Sharks Specialist Group for the Southeast Asian Region. I would like to express my sincere thanks to them for working very hard in preparing for this guide book, of which will be the first in this region with colourful pictures and comparative descriptions to aid in the identification of the look-alike species. This guide book will be in time for the forthcoming CoP16-CITES which will be held from 3 - 14 March 2013 in Bangkok, Thailand.

Last but not least I would like to thank the Japanese Government for supporting SEAFDEC and funding this publication through Japanase Trust Fund and express special thanks to Dr. Masaya Katoh, Deputy Chief of SEAFDEC/MFRDMD for his effort and commitments.

MAHYAM BINTI MOHD ISA
CHIEF SEAFDEC/MFRDMD

INTRODUCTION

Sharks, rays, skates and chimaeras (Class Chondrichthyes) are a highly diverse group of fish that evolved over 400 million years ago. Of the global current chondrichthyan fauna (more than 1200 species), at least 315 species recorded in the Southeast Asian Region, which including 174 species of sharks from 8 orders (29 families) and 141 rays from 5 orders (19 families). However information on chimaeras is still scanty. Until 2012 only two species of *Chimarea* and one *Hidrologus* are recorded.

Indonesia recorded the highest biodiversity of sharks with at least 114 species and 26 families followed by Philippines (94 species; 26 families), Thailand (64 species; 21 families), Malaysia (63 species;18 families), Brunei Darussalam (34 species; 13 families); Myanmar (34 species; 10 families), Vietnam (29 species; 13 families) and Cambodia with 11 species and 6 families (Ahmad and Annie, 2012).

As for rays,Indonesia also recorded the highest number with 101 species and 17 families followed by Malaysia (82 species; 14 families), Philippines (66 species;18 families), Thailand (55 species; 12 families), Cambodia (54 species; 14 families), Myanmar (46 species; 11 families), Vietnam (39 families; 12 families) and Brunei Darussalam with 35 species and 11 families (Ahmad *et al.* in press). The representation of the group at highest taxonomic levels of elasmobranch in this region is shown in **Table 1**. The total number of known species in this region is ever increasing as exploratory and taxonomic work ensues.

Table 1: Proportional species richness of shark and ray groups from Brunei Darussalam (B), Cambodia (C), Indonesia (I), Malaysia (MY), Myanmar (MN), Thailand (T), Philippine (P) and Vietnam (V)

ORDER	B	C	I	MY	MN	T	P	V
Hexanchiformes	-	-	3	2	-	1	3	1
Squaliformes	2		22	3	2	5	17	2
Pristiophoriformes	-	-	-	-	-	-	1	-
Squatiniformes	1	-	2	1	-	1	1	-
Heterodontiformes	1	-	1	1	-	1	1	1
Orectolobiformes	5	4	19	9	5	9	11	7
Lamniformes	1	-	10	2	-	5	8	1
Carcharhiniformes	24	7	57	45	27	42	52	17
Total Sharks	34	11	114	63	34	64	94	29
Pristiformes	3	4	4	3	4	4	4	4
Rhinobatiformes	3	7	13	9	4	9	11	4
Torpediniformes	3	6	10	9	6	7	5	6
Rajiformes	1	2	11	5	-	1	12	2
Myliobatiformes	25	35	63	56	32	34	34	23
Total skates and rays	35	54	101	82	46	55	66	39
TOTAL SHARKS, SKATES, RAYS	69	65	215	145	80	119	160	68

ACKNOWLEDGEMENTS

This guide book was made possible based on knowledge and experiences of the authors through their studies, especially in Malaysia, Brunei Darussalam, Indonesia and accumulated information by researchers from SEAFDEC Member Countries as well as references made from various sources available locally as well as internationally. All the authors involved in the publication of this guide book are also author /co-authors of 'Sharks and Rays of Malaysia and Brunei Darussalam' by Yano *et al.* (2005), 'Panduan Mengenali Ikan Yu di Malaysia, Brunei Darussalam, Indonesia dan Thailand' by Ahmad *et al.* (2008), 'Field Guide to Sharks in the Southeast Asian Region' by Ahmad and Annie (2012),' Field Guide to Rays in the Southeast Asia' by Ahmad *et al*. (in press), 'Economically Important Sharks and Rays of Indonesia' by White *et al.* (2006) and 'Sharks and Rays of Borneo' by Last *et al.* (2010).

The authors would like to express their sincere gratitude to the Director General of Fisheries Malaysia YH Dato' Ahamad Sabki bin Mahmood, Secretary-General of SEAFDEC Dr. Chumnarn Pongsri, Chief of SEAFDEC/MFRDMD Ms. Mahyam binti Mohd Isa, Deputy Chief of SEAFDEC/MFRDMD Dr. Masaya Katoh for their permission to publish and endless support in the research on elasmobranch in the Southeast Asian Region.

Last but not least, we are indebted to all staff of SEAFDEC/MFRDMD especially Mr. Abu Talib bin Ahmad, Mr. Raja Bidin bin Raja Hassan, Mr. Osman bin Muda, Mr. Nor Azman bin Zakaria and Mr. Aznan bin Zainal for helping us in many ways in the preparation for publication of this guide book.

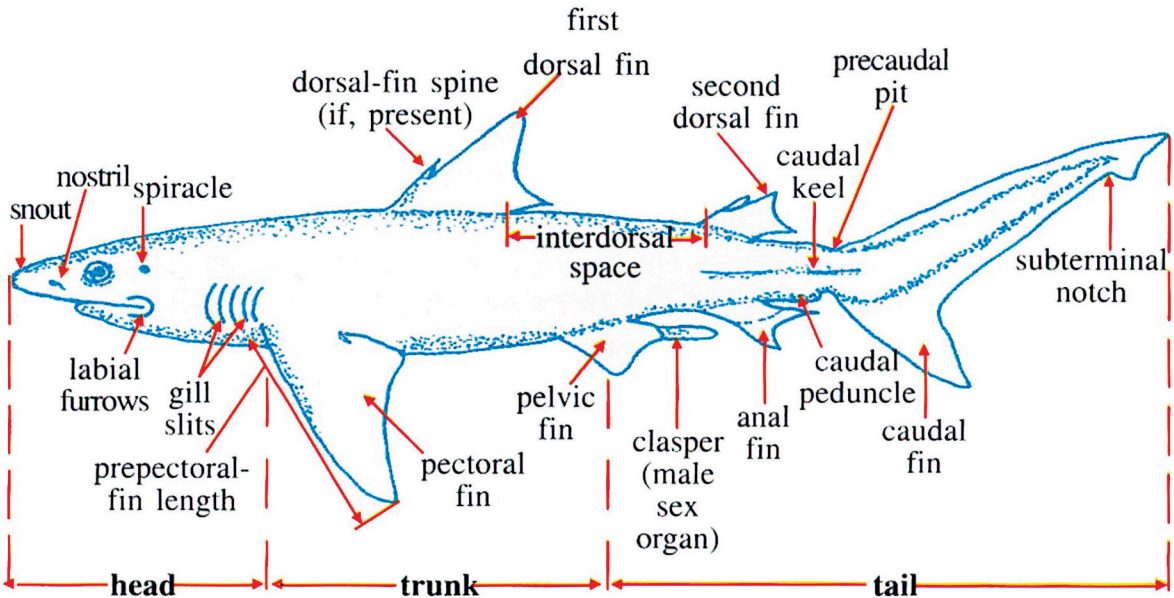
GLOSSARY

acute– sharp or pointed
alar thorns – paired patches of thorns on the outer disc of mature male skates
angular– forming a distinct angle
anterior– relating to front of or head end of an object
anal fin - single fin located on the underside behind the pelvic fins
barbel - a slender sensory skin projection on the snout of some species
bilobate– having two lobes
blotch– an enlarged area or patch that is different in colour
caudal fin - tail fin
caudal keel – a longitudinal fleshy ridge along side of the caudal peduncle
caudal peduncle – the posterior part of the body supporting the caudal fin
cephalic lobe – broad lobe on forehead of some rays
compressed– flattened laterally from side to side
concave– curved inwards (opposite of convex)
convex– arched, curved outwards (opposite of concave)
denticles- very small tooth-like plates that form the abrasive surface on the skin
depressed– dorsoventrally flattened from top to bottom
dorsal– relating to upper part or surface of back
dorsolateral– positioned or orientated between dorsal and lateral surfaces
dorsal fins - fins on upper surface
dusky– slightly dark or greyish in colour
electric organ – organ capable of delivering a mild electric shock
falcate– curved like a sickle
family– a group term for classifying organisms, containing one ore more closely related genera
fin origin - the forward-most point of attachment of a fin

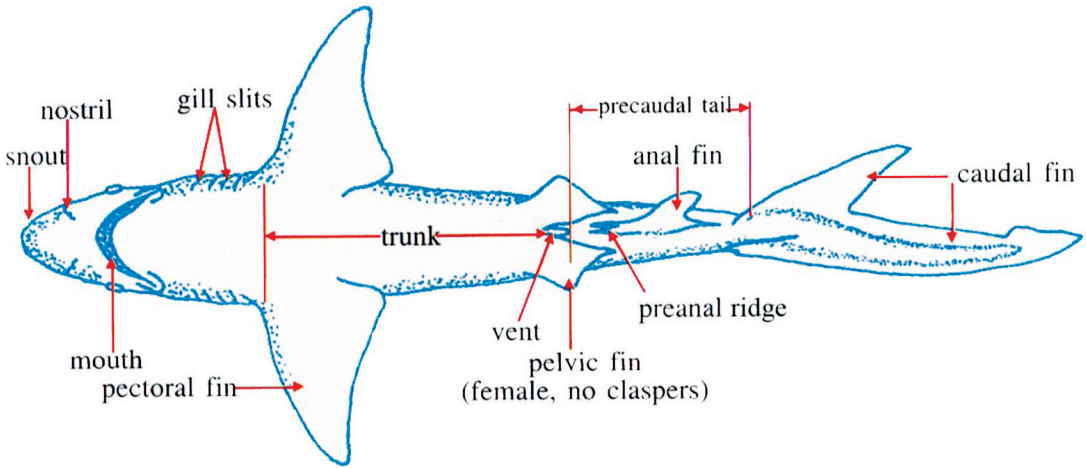
flank- side of the body
free rear tip (of fin) - rear tip of loose flap behind the fin attachment
fusiform– spindle-shaped, tapering at both ends
hammer-shaped– shaped with paired lateral expansions, like the head of a mallet
hymandibular pores – line of enlarged pores extending posteriorly from the mouth corners
infraorbital– area below the eye
inner margin (of fin) - edge between the fin attachment and the free rear tip
interdorsal– space on dorsal surface between 1st and 2nd dorsal fins
interdorsal ridge - raised ridge of skin between the 1st and 2nd dorsal fins
keel– a fleshy ridge; associated with caudal peduncle
lateral- refers to the side of the shark
longitudinal– lengthwise (opposite of transverse)
nictitating eyelid – a transparent, moveable membrane or inner eyelid that protects eye
nostril– external opening of the nasal organs
nuchal – pertaining to the nape
obtuse– broadly rounded or having a blunt end
ocellus– an eye-like spot or marking with a marginal ring
pearl thorn – nuchal thorn of stingrays shaped like an embedded pearl
pelvic fins - leading edge (of fin)
plain– uniformly coloured, without a contrasting colour pattern
posterior – relating to hind of or rear end of an object
precaudal pit – a transverse or longitudinal notch on caudal peduncle just anterior to origin of caudal fin in some sharks
quadrangular– shaped with four distinct edges or margins
reticulated–divided into a network
reticulations– markings in a general form of a net
rhomboidal– diamond-shaped

rostral cartilage – a gristly structure supporting the snout
rostral teeth – tooth-like projection on the side of the snout of sawfishes and sawsharks
rostrum– a projecting snout
rounded–margin evenly convex
saddle– a blotch extending across dorsal surface from one side to another
snout– part of head in front of eyes
spine– a sharp projecting point
spiracle - a respiratory opening behind the eyes in sharks and rays
subcircular – almost circular
subequal– almost equal
subterminal– positioned near but not at the end of an object
tail – part of fish between cloaca and orgin of the caudal fin
terminal – located at or forming the end of something
thorn - large dneticles on surface of a ray or skate
tip– the extremity of a part of a fish
ventral - refers to the undersurface of the shark

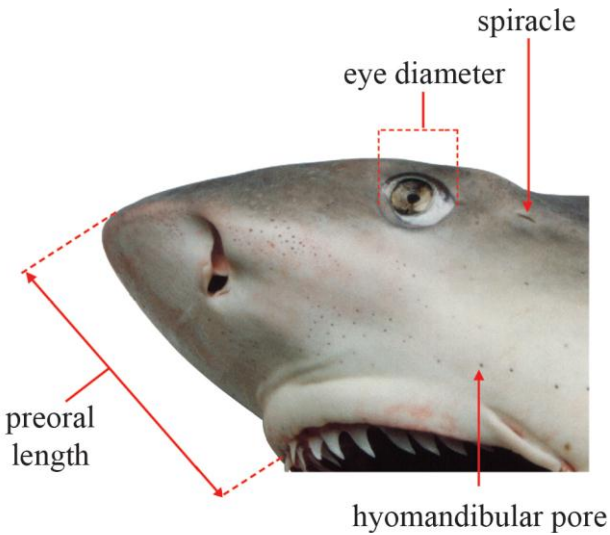
TECHNICAL TERMS AND MEASUREMENTS OF SHARK



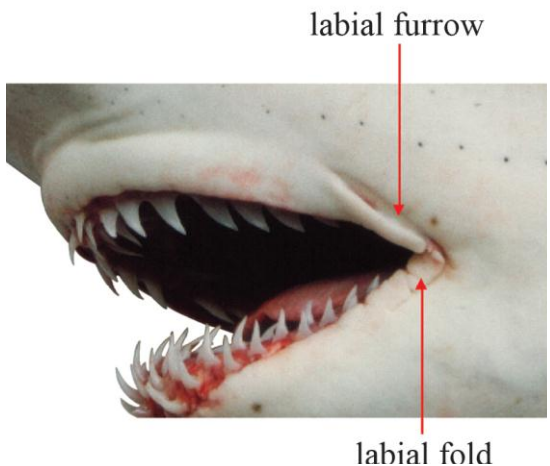
Structural features and dimensions



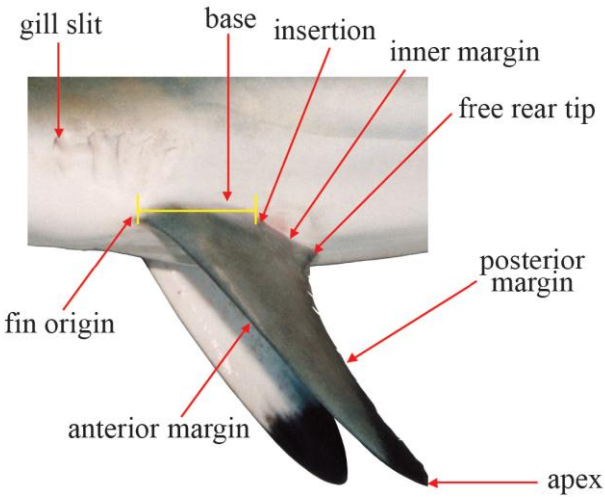
Ventral surface



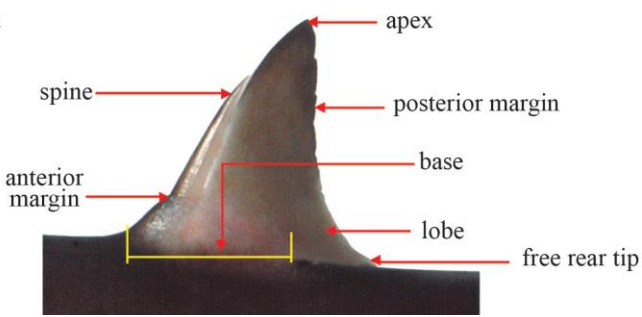
Hyomandibular pore, spiracle and eye



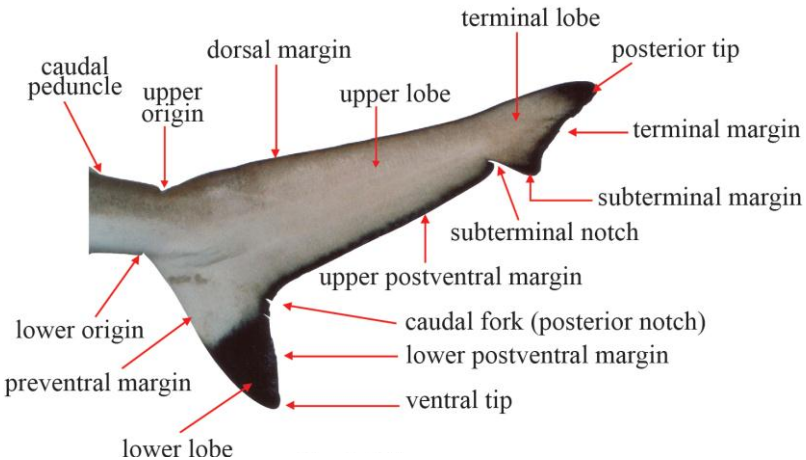
Labial furrow and labial fold



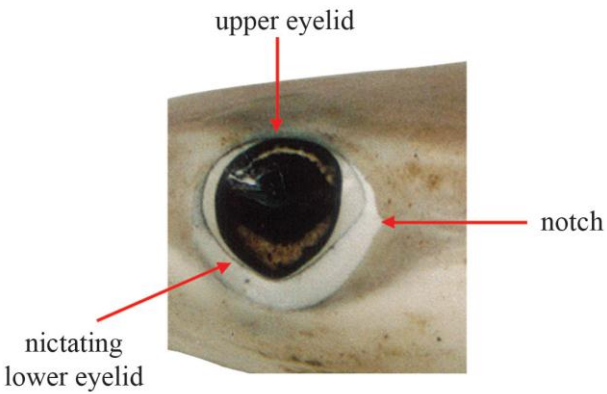
Pectoral fin



Dorsal fin



Caudal tail

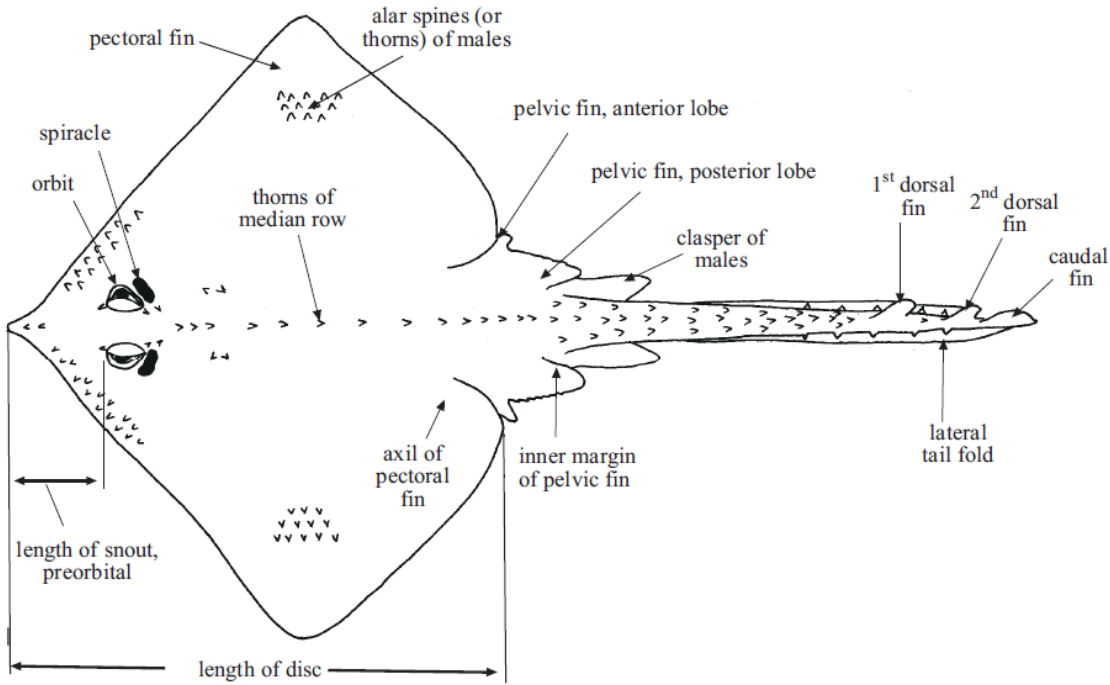


Eye

Shape of snout

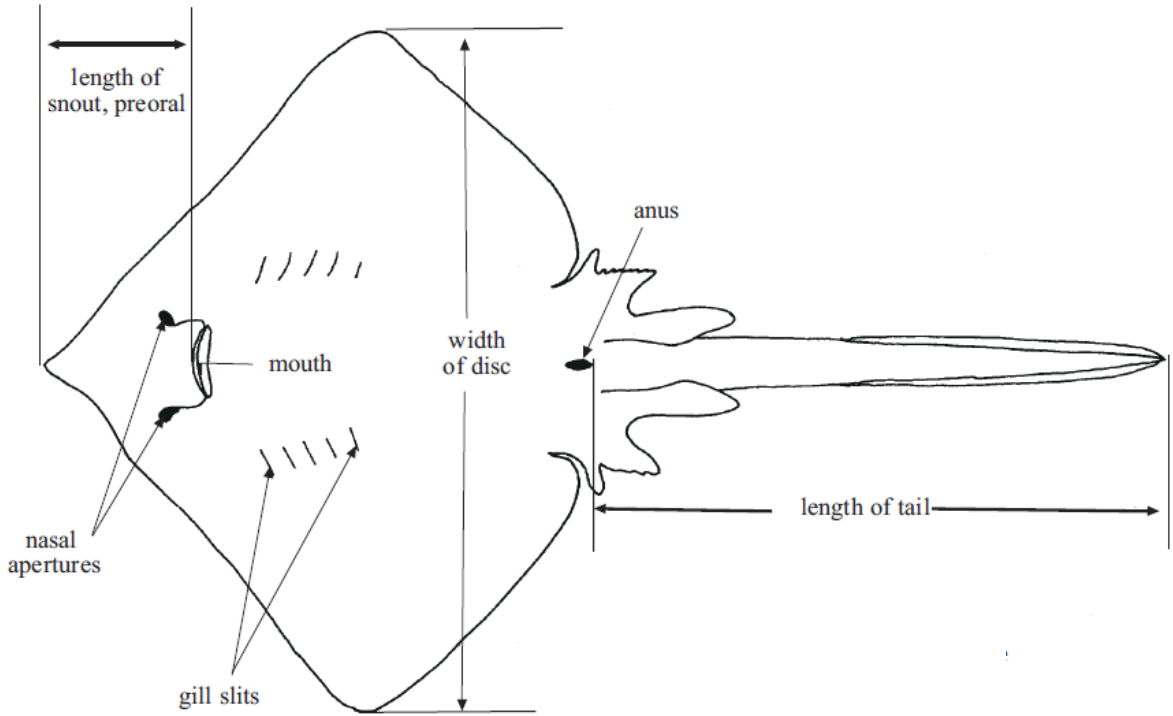
Precaudal pit longitudinalPrecaudal pit crescentic

TECHNICAL TERMS AND MEASUREMENTS OF RAY AND SKATE

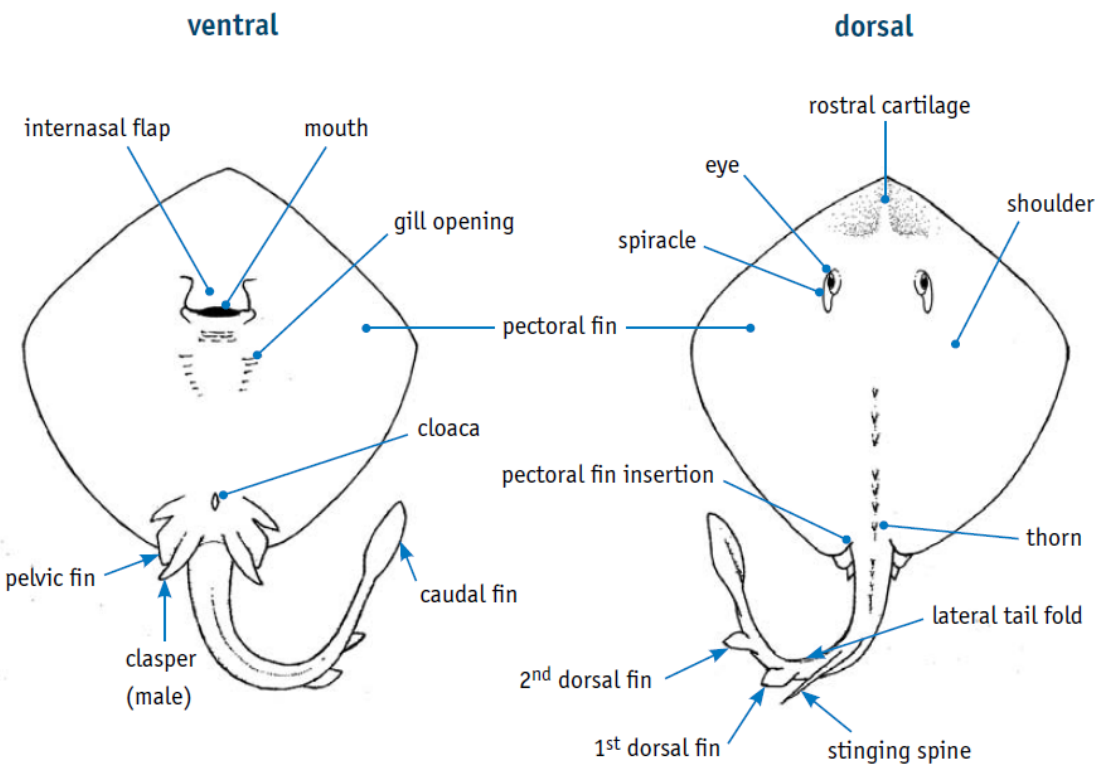


Dorsal view of a typical skate (Family Rajidae)

Source of illustration: Compagno, L.J.V. and Last, P.R. (1999)

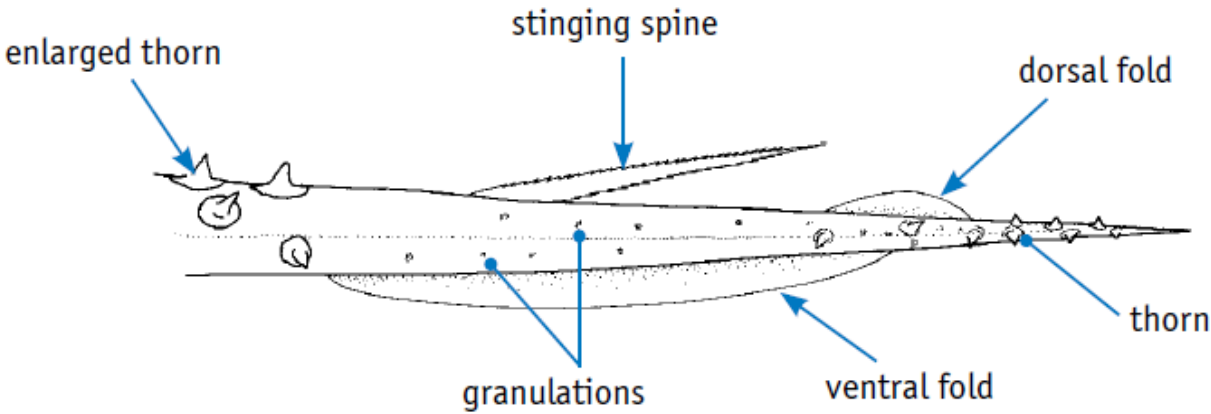


Ventral view of a typical skate (Family Rajidae)
Source of illustration: Compagno, L.J.V. and Last, P.R. (1999)



Structural features of rays

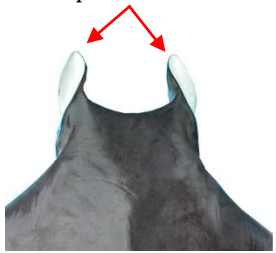
Source of illustration: Last *et al.* (2010)



Dorsal fins and thorns on ray tail

Source of illustration: Last *et al.* (2010)

Cephalic fins



Dorsal view of devil ray's head (Family Mobulidae)

A single convex rostral fin

Dorsal view of eagle ray's head (Family Myliobatidae)

Bilobed rostral fin

Dorsal view of cownose ray's head (Family Rhinopteridae)

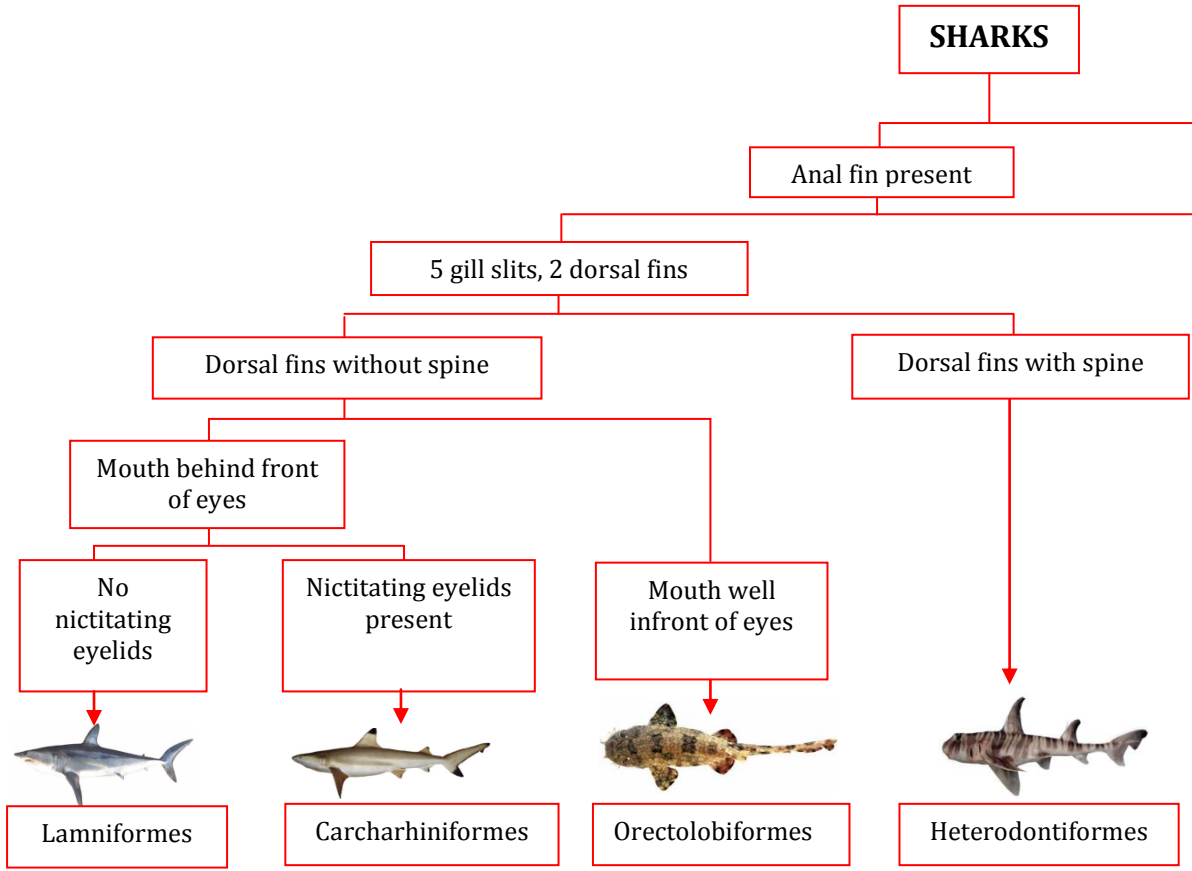
HOW USE THIS GUIDE

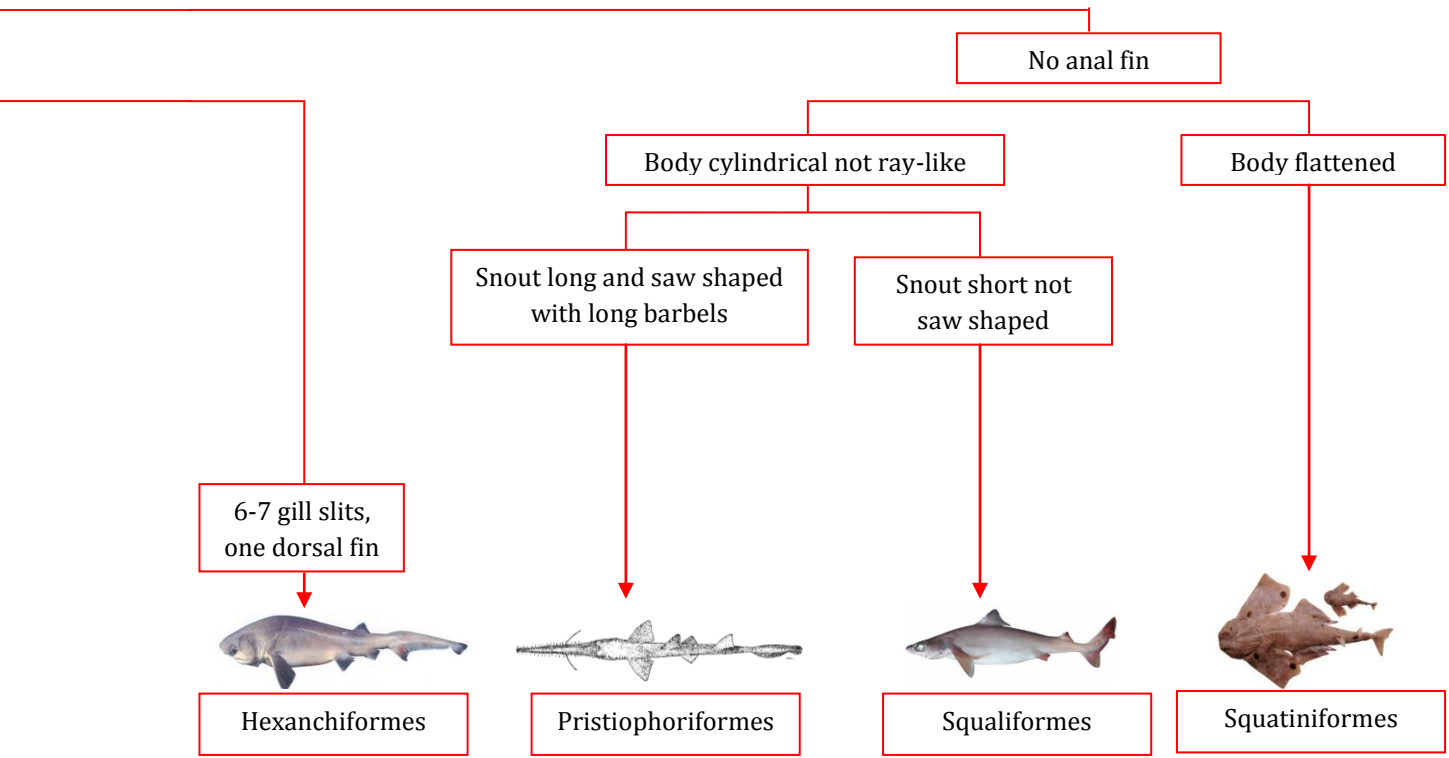
This guide book is designed to assist enumerators in the identification of look-alike sharks, skates and rays species and some of them are found in abundance in the South East Asian region. This to ensure all sharks, skates and rays landed are correctly identified and recorded. This guide contains simple, easy-to-use keys that highlight certain external distinguishing features for identification purposes.

The keys are further supported by detailed species information and illustrations so that identification can be made with confidence. Descriptive text and illustrations provided in the species were developed from field observations, photographs, and published references.

The user of this guide should have a basic level of general knowledge on taxonomy of sharks and rays encountered in Southeast Asian Region. Each page begins with Family of the sharks, rays or skates. Similarities (look-alike) between the pair of species are listed in alphabets. Scientific names and English names follow by an image of the species marked with numbers to distinguish the differences between the pair of look-alike species.

KEY TO ORDER OF SHARKS




No anal fin
Body cylindrical not ray-like
Body flattened
Snout long and saw shaped with long barbels
Snout short not saw shaped
6-7 gill slits, one dorsal fin
Hexanchiformes
Pristiophoriformes
Squaliformes
Squatiniformes

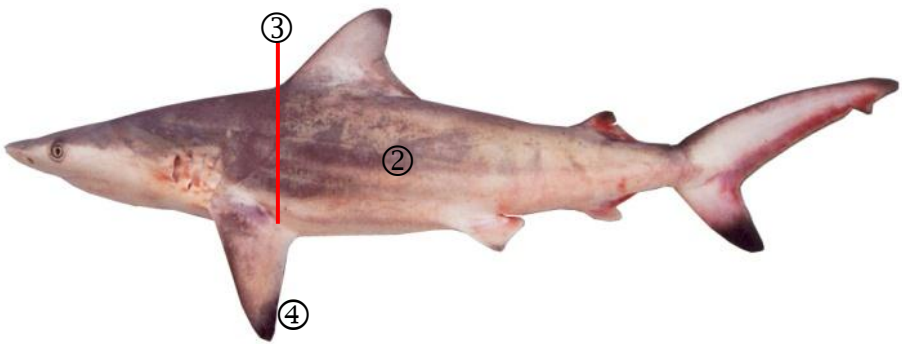
ORDER CARCHARHINIFORMES

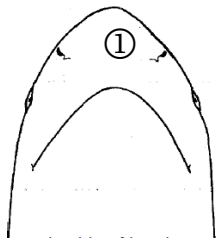
Family Carcharhinidae

a) Requiem sharks with small, wide-space nostrils
b) Labial furrows confined to mouth corners
c) Interdorsal ridge absent
d) Dorsal, pectoral and ventral lobe of caudal fin black tipped

Carcharhinus amblyrhynchoides (Whitley, 1934)

English name: Graceful shark



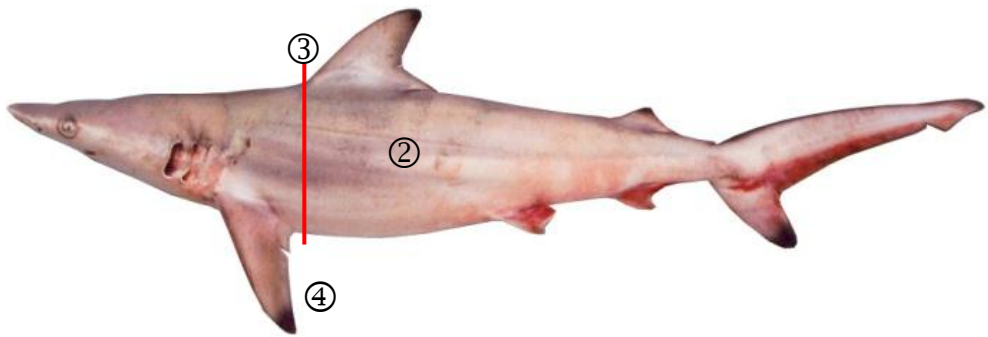


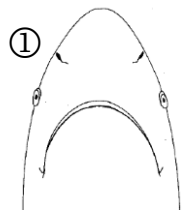
Distinctive characteristics

①Snout short and wedge-shaped
②Body stout with white bars
③First dorsal fin origin slightly forward of the free rear tips of pectoral fins
④ Pectoral fins moderately long and falcate with pointed tips

Carcharhinus limbatus (Müller and Henle, 1839)

English name: Blacktip shark





Distinctive characteristics

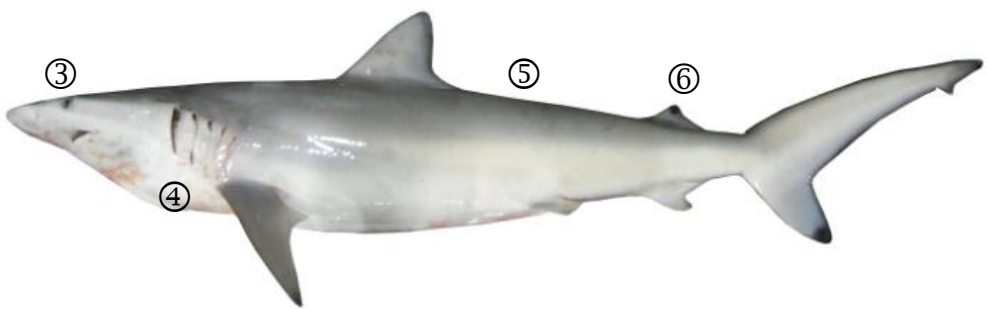
①Snout long and pointed
②Body slender with white bars
③First dorsal fin origin usually over or just behind pectoral fin insertion
④Pectoral fins moderately long and strongly falcate with narrow pointed tips

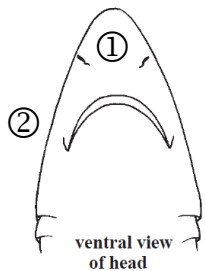
Family Carcharhinidae

a) Slender-bodied medium to large-sized shark
b) First dorsal fin origin over or just behind pectoral rear tips
c) Second dorsal fin, pectoral fin and ventral caudal-fin lobe black-tipped

Carcharhinus brevipinna (Müller and Henle, 1839)

English name: Spinner shark



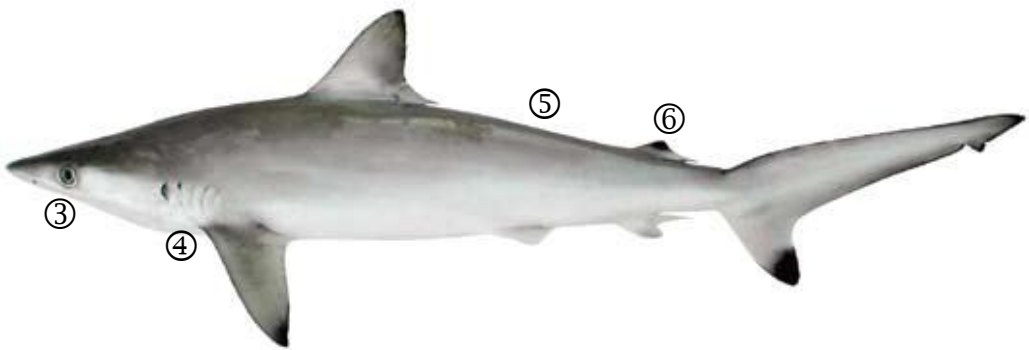


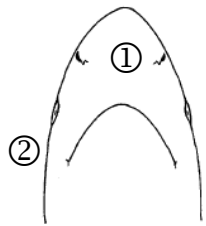
Distinctive characteristics

①Snout long and pointed
②Upper labial furrows elongate and prominent
③Eyes circular and fairly small
④Gill slits relatively long compared to *Carcharhinus sorrah*
⑤No interdorsal ridge
⑥Black marking on second dorsal fin rounded (all fins plain when juvenile)

Carcharhinus sorrah (Müller and Henle, 1839)

English name: Spottail shark





Distinctive characteristics

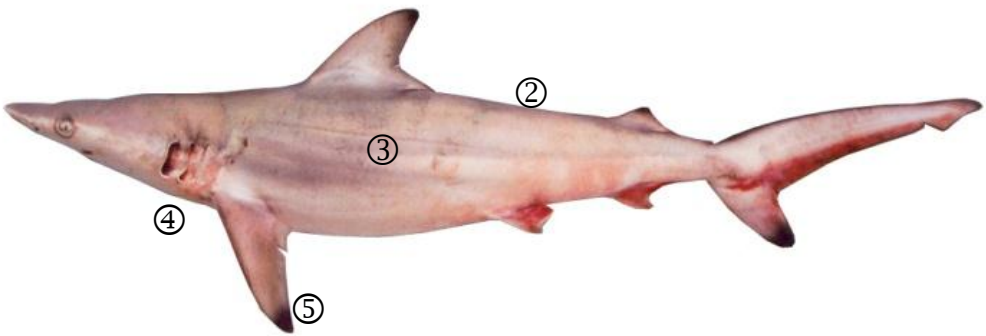
①Snout moderately pointed, parabolic and long
②Upper labial furrows short and inconspicuous
③Eyes circular and moderately large
④Gill slits relatively short compared to *Carcharhinus brevipinna*
⑤Low interdorsal ridge present
⑥Black marking on second dorsal fin not rounded

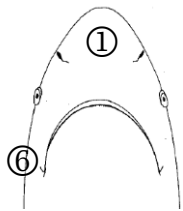
Family Carcharhinidae

a) Labial furrows confined to mouth corners
b) Fins and ventral lobe of caudal fin black-tipped
c) First dorsal fin origin usually over or just behind pectoral fin insertion

Carcharhinus limbatus (Müller and Henle, 1839)

English name: Blacktip shark



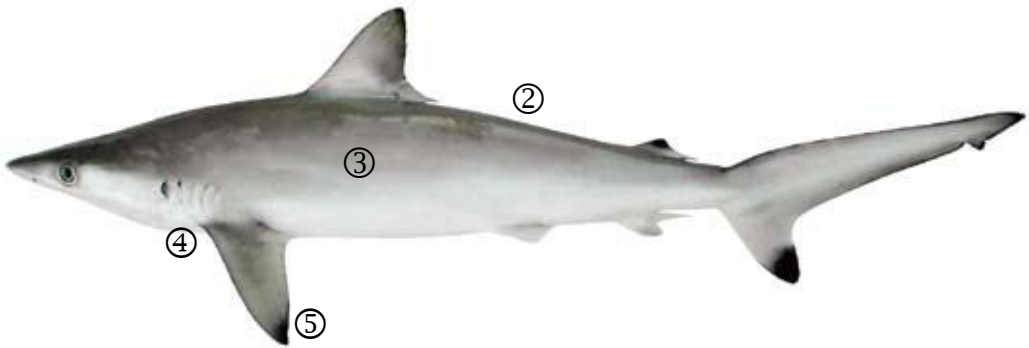


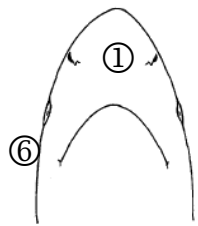
Distinctive characteristics

①Snout long and pointed
②Interdorsal ridge absent
③Body slender with white bars
④Gill slits relatively long as compared to *Carcharhinus sorrah*
⑤Pectoral fins moderately long and strongly falcate with narrow pointed tips
⑥Upper labial furrowsconspicuousas compared to*Carcharhinus sorrah*

Carcharhinus sorrah (Müller and Henle, 1839)

English name: Spottail shark





Distinctive characteristics

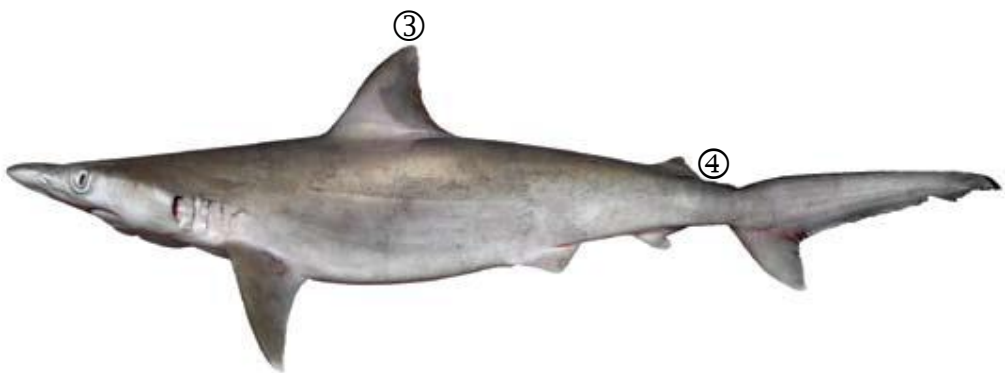
①Snout moderately pointed, parabolic and long
②Low interdorsal ridge present s
③Body slender without white bars
④Gill slits relatively short as compared to *Carcharhinuslimbatus*
⑤Pectoral fins moderately long; falcate with black tip
⑥Upper labial furrows short and inconspicuous

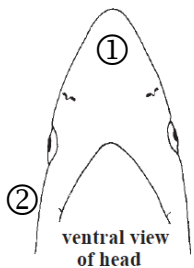
Family Carcharhinidae

a) A small shark; body relatively slender
b) Labial furrows very short
c) Interdorsal ridge absent
d) Second dorsal fin very low, inner margin over twice the fin height

Carcharhinus macloti (Müller and Henle, 1839)

English name: Hardnose shark



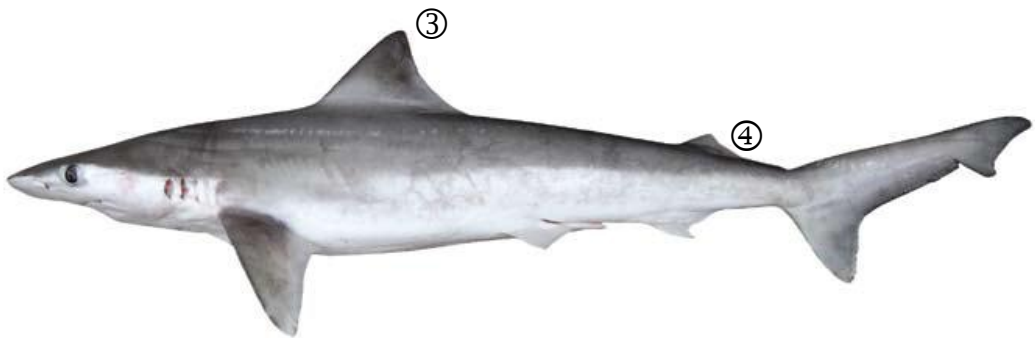


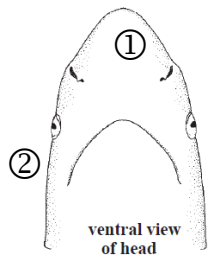
Distinctive characteristics

①Snout very long and pointed; rostrum very hard and strongly calcified
②Hypomandibular pores absent alongside mouth corners
③First dorsal fin moderately large, with a narrowly pointed apex
④Inner margin of second dorsal fin long, 2/3 of fin base

Carcharhinus borneensis(Bleeker, 1859)

English name: Borneo shark





Distinctive characteristics

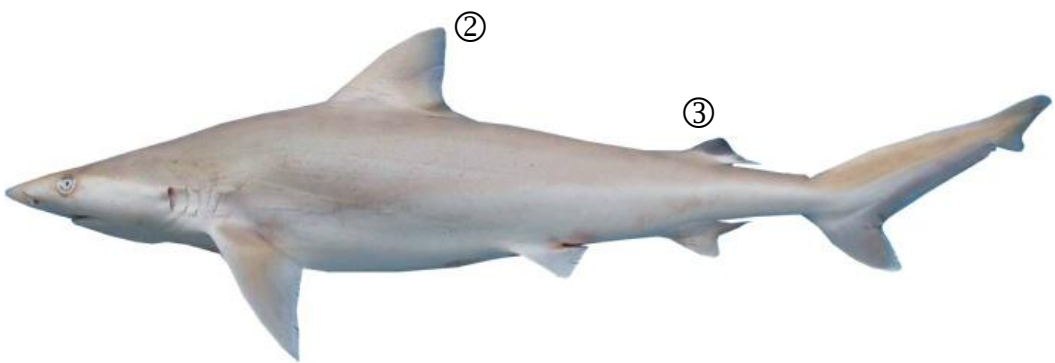
①Snout very long and narrowly pointed
②Hypomandibular pores conspicuously enlarged alongside mouth corners
③First dorsal fin moderately large, with a blunt pointed apex
④Inner margin of second dorsal fin short, ½ fin base or less

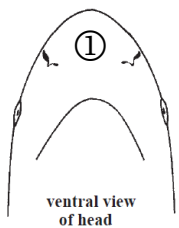
Family Carcharhinidae

a) A small grey shark
b) Origin of first dorsal fin over pectoral inner margin
c) Interdorsal ridge present
d) Second dorsal fin with a conspicuous black tip; other fins plain
e) Second dorsal fin large and high, inner margin short

Carcharhinus dussumieri (Müller and Henle, 1839)

English name: Whitecheek shark



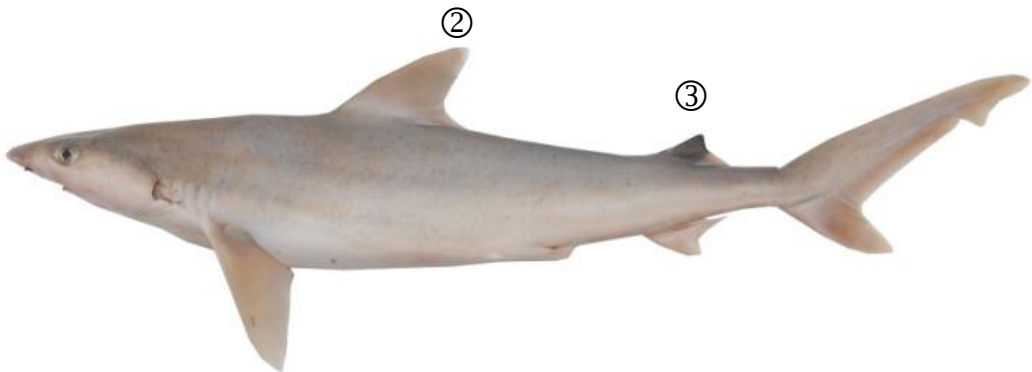


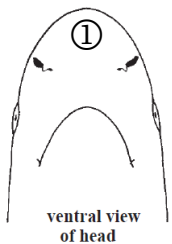
Distinctive characteristics

①Snout moderately long, broadly parabolic
②First dorsal fin triangular, erected
③Second dorsal fin with black marking (covering about ½ of fin)

Carcharhinus sealei (Pietschmann, 1913)

English name: Blackspot shark





Distinctive characteristics

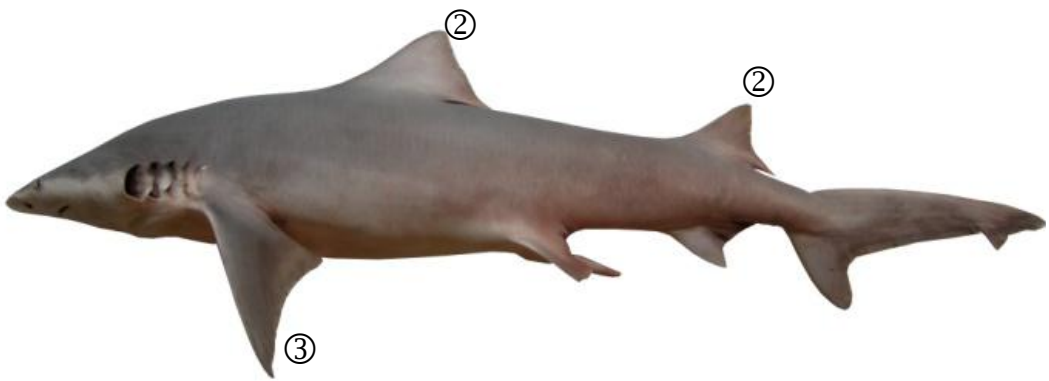
①Snout rather long, narrowly parabolic
②First dorsal fin moderately small, falcate with narrowly rounded apex
③Second dorsal fin with black marking (covering more than ½ of fin)

Family Carcharhinidae

a) Body fairly stout
b) First dorsal fin free rear tip just anterior to pelvic fin origin
c) Interdorsal ridge absent
d) Precaudal pit longitudinal
e) Fins plain

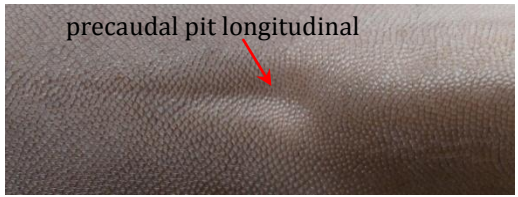
Lamiopsis tephrodes (Fowler, 1905)

English name: Borneo broadfin shark



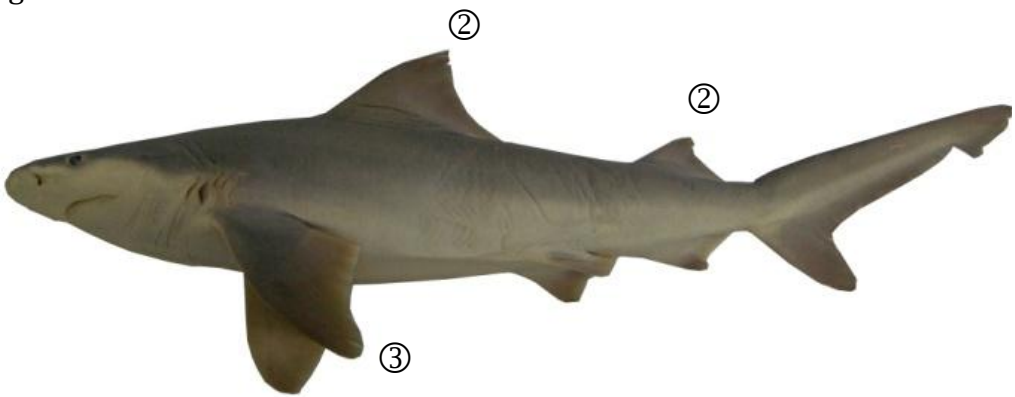
Distinctive characteristics

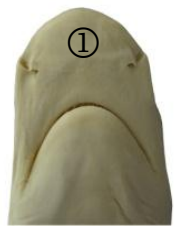
①Snout rather long, pointed (view ventrally)
②Second dorsal fin very tall,almost similar to height of first dorsal fin
③Pectoral fins large, broadly triangular, apex narrowly rounded



***Glyphis* sp.**[sensu Last *et al.* 2008]

English name: Mukah River Shark





Distinctive characteristics

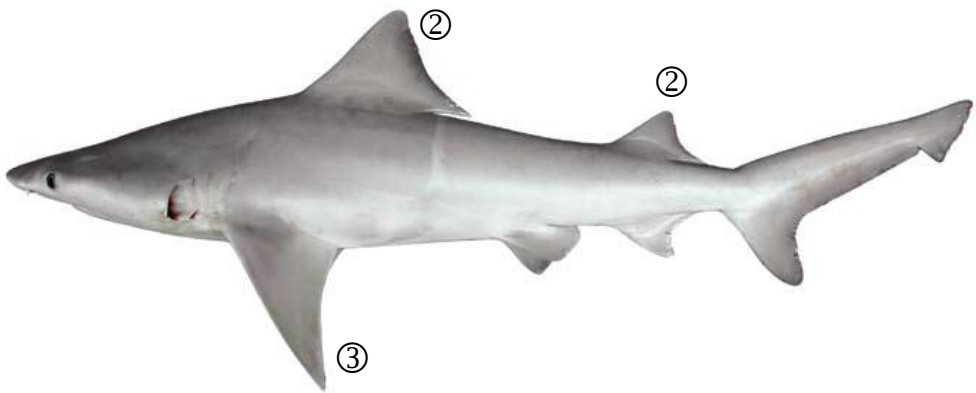
①Snout rather long, parabolic (view ventrally)
②Second dorsal fin moderately tall, slightly less than ½ of first dorsal fin
③Pectoral fin long with broad base; rounded tip

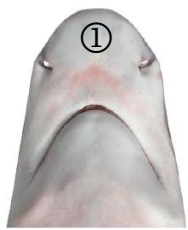
Family Carcharhinidae

a) Body fairly stout
b) Precaudal pits longitudinal
c) Fins plain
d) First dorsal fin free rear tip just anterior to pelvic fin origin
e) Interdorsal ridge absent

***Glyphis fowlerae*Compagno,**White & Cavanagh, 2010

English name: Borneo river shark



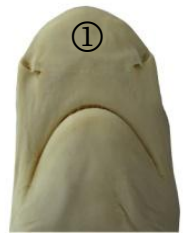


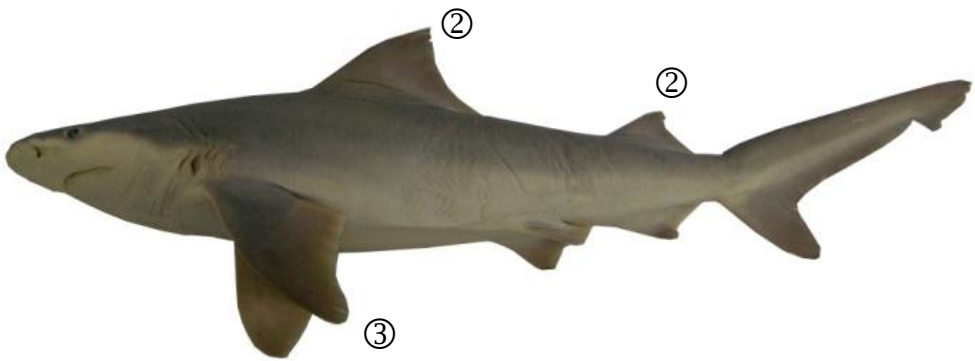
Distinctive characteristics

①Snout moderately long and rounded
②Second dorsal fin tall, 1/2 to 3/5 height of first dorsal fin
③Pectoral fin long with a very broad base; pointed tip

***Glyphis* sp.** [sensu Last *et al.* 2008]

English name: Mukah River shark





Distinctive characteristics

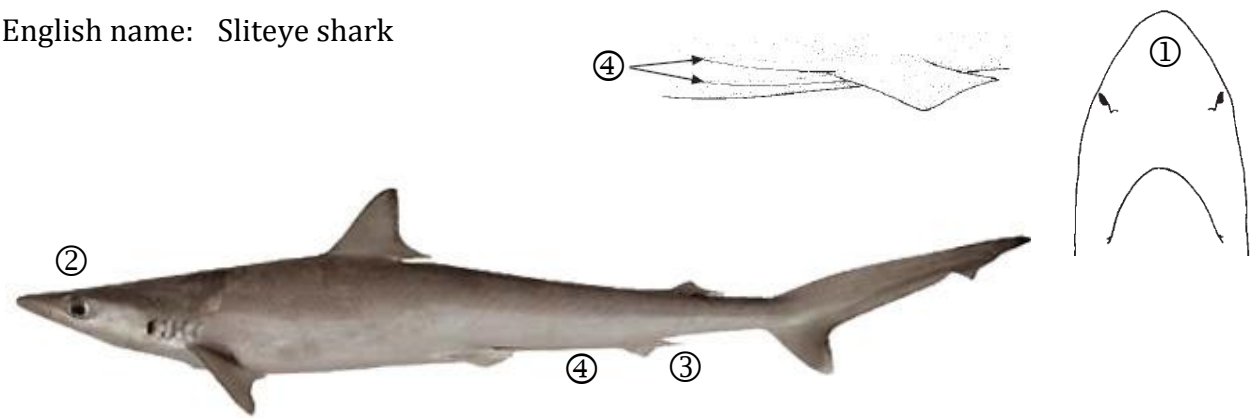
①Snout rather long, parabolic (view ventrally)
②Second dorsal fin moderately tall, slightly less than ½ of first dorsal fin height
③Pectoral fin long with broad base; rounded tip

Family Carcharhinidae

a) Small slender shark with relatively large eyes
b) First dorsal fin origin well behind the free rear tips of pectoral fins
c) Second dorsal fin less than half the height of first dorsal fin
d) Fins plain
e) Interdorsal ridge absent

Loxodon macrorhinus Müller and Henle, 1839

English name: Sliteye shark

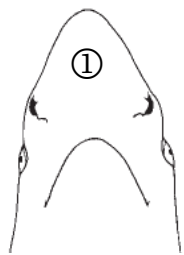


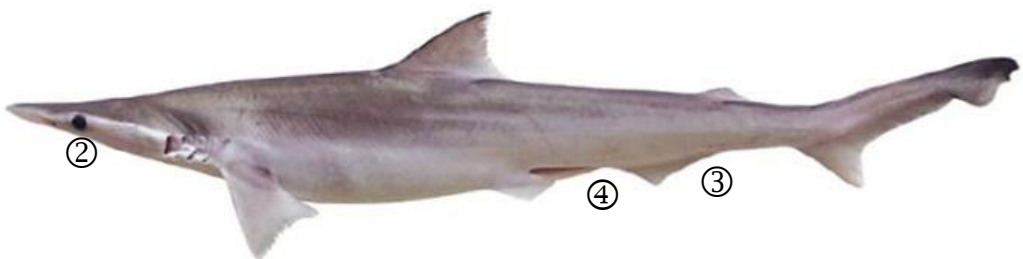
Distinctive characteristics

①Snout very long, parabolic
②Eyes large with distinct notch on its posterior edge
③Anal fin base short
④Preanal ridges very long, equal to anal-fin base length

Scoliodon macrorhynchos (Bleeker, 1852)

English name: Pacific spadenose shark





Distinctive characteristics

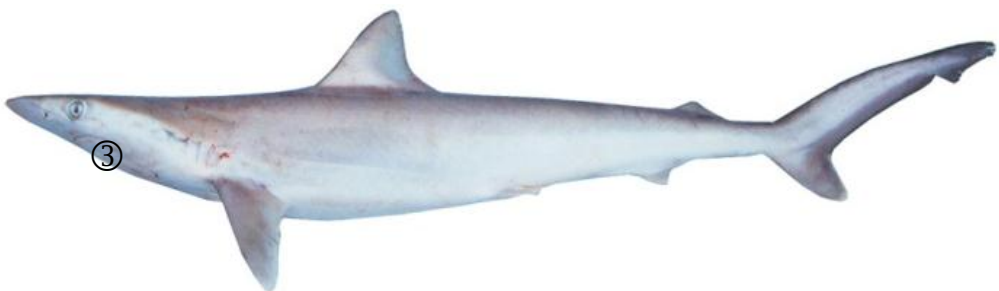
①Head and snout strongly depressed
②Eyes large but without notch on its posterior edge
③Much larger anal fin with long base
④Preanal ridges absent

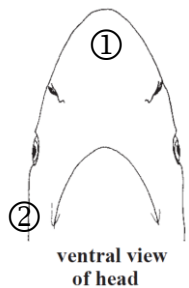
Family Carcharhinidae

a) A small, slender shark
b) Second dorsal fin smaller than anal fin, its origin opposite anal-fin insertion
c) Fins plain
d) Long preanal ridges, about equal to anal-fin base length
e) Interdorsal ridge absent

Rhizoprionodon acutus(Ruppell, 1837)

English name: Milk shark



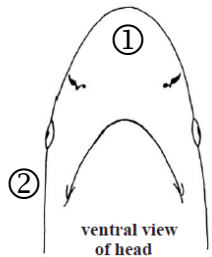


Distinctive characteristics

①Snout long and depressed, its length usually greater than mouth width
②Upper labial furrows long and prominent
③Hyomandibular pores along side mouth corners – more than 16 in total for both sides

Rhizoprionodon oligolinx Springer, 1968

English name: Grey sharpnose shark



Distinctive characteristics

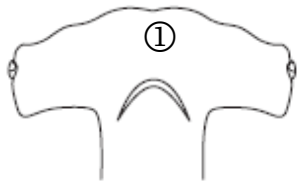
①Snout long and narrowly rounded
②Upper labial furrows short
③Hyomandibular pores along side mouth corners – more than 14 in total for both sides

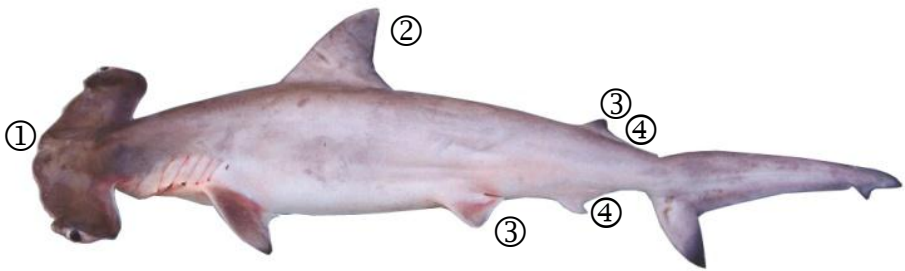
Family Sphyrnidae

a) Body elongate and laterally compressed
b) Head "hammer"-shaped
c) Pectoral fin short and broad
d) Upper precaudal pit forming a crescentic groove

Sphyrna lewini (Griffith & Smith, 1834)

English name: Scalloped hammerhead



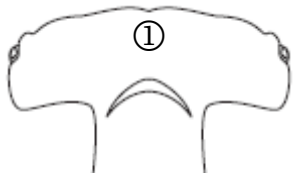


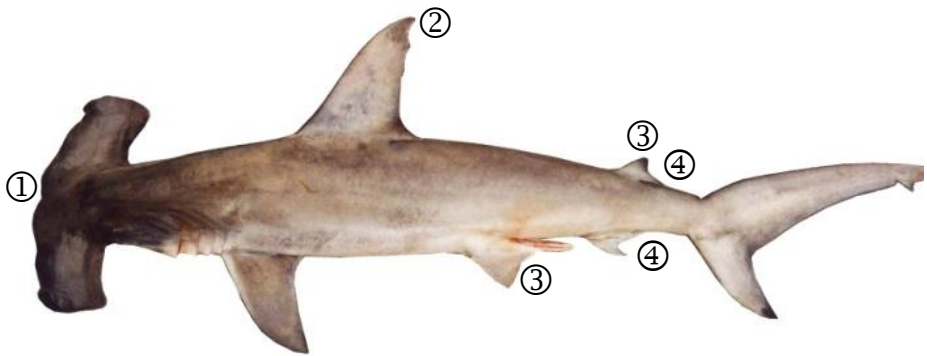
Distinctive characteristics

①Anterior margin of head convex
②First dorsal fin slightly falcate
③Posterior margin of second dorsal and pelvic fins concave to nearly straight
④Second dorsal-fin base about 3/5 to 4/5 the length of anal-fin base

Sphyrna mokarran (Ruppell, 1837)

English name: Greater hammerhead





Distinctive characteristics

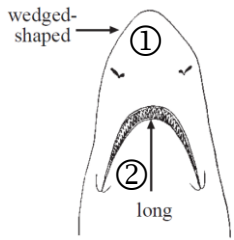
①Anterior margin of head nearly straight, shallowly indented at midline
②First dorsal fin very high and strongly falcate
③Posterior margin of second dorsal and pelvic fins deeply concave
④Anal-fin base longer than second dorsal-fin base

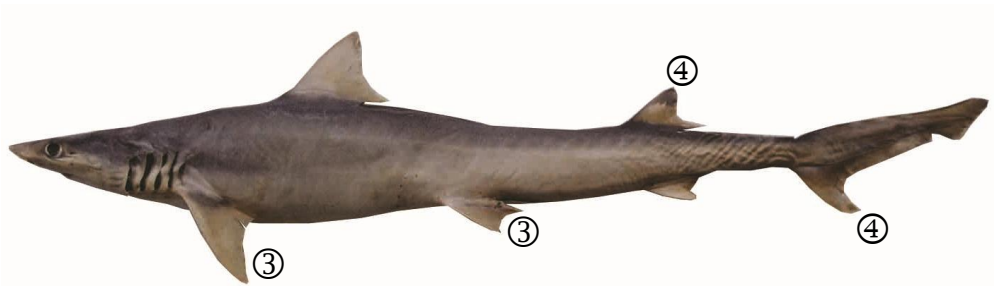
Family Hemigaleidae

a) Lower teeth protrude prominently when mouth is closed
b) Gill slits large, more than twice eye length
c) Eyes large with nictitating eyelids; spiracle small
d) Anal fin smaller than 2nd dorsal fin

Chaenogaleus macrostoma(Bleeker, 1852)

English name: Hooktooth shark



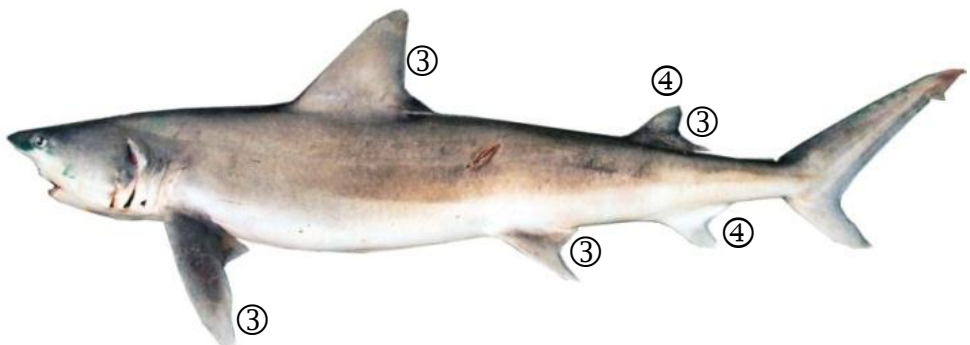


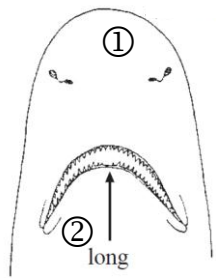
Distinctive characteristics

①Snout obtusely wedge-shaped
②Mouth parabolic and long
③Fins not falcate, posterior margins of pelvic and pectoral fins straight or slightly concave
④Second dorsal and terminal lobe of caudal fin sometimes black

Hemipristis elongata (Klunzinger, 1871)

English name: Fossil shark





Distinctive characteristics

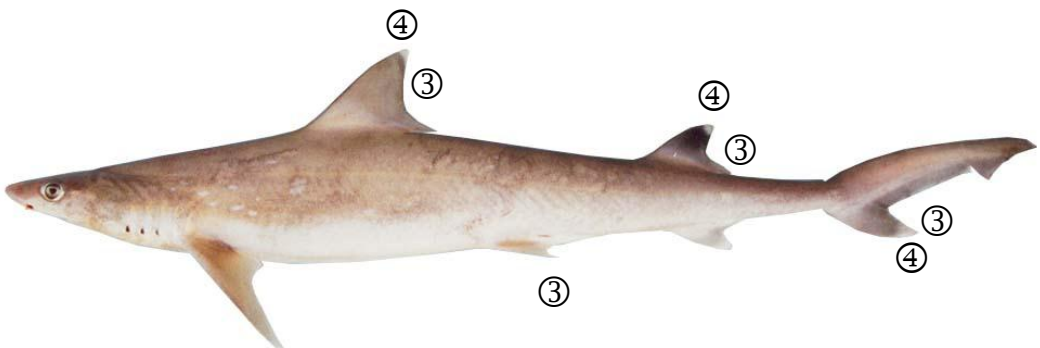
①Snout relatively long; bluntly rounded
②Mouth slightly parabolic and long
③Fins strongly falcate, posterior margins of pelvic and pectoral fins deeply concave
④Second dorsal fin tip white

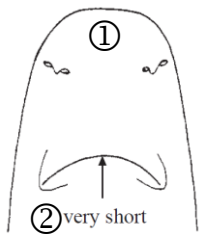
Family Hemigaleidae

a) Small to medium-sized sharks with cylindrical or slightly compressed bodies
b) Snout moderately long, depressed
c) Spiracles small
d) Gill slits small, less than twice eye length

Hemigaleus microstoma Bleeker, 1852

English name: Sicklefin weasel shark



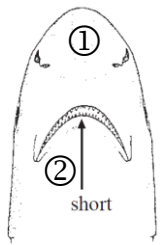


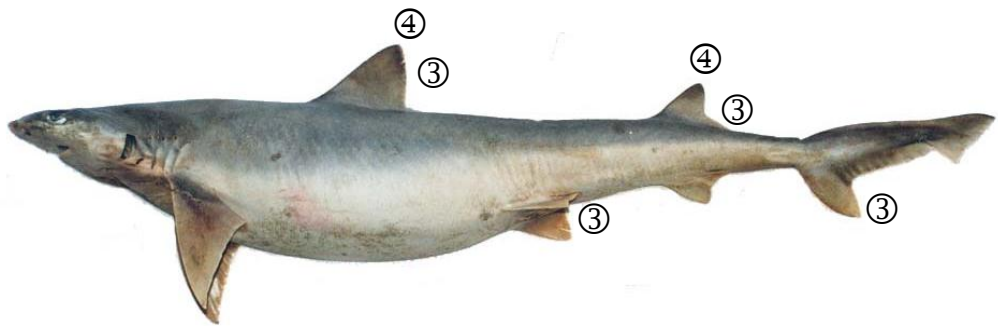
Distinctive characteristics

①Snout blunt
②Mouth very short and broadly arched
③Pelvic fins , dorsal fins and ventral caudal-fin lobe, strongly falcate
④Dorsal fins and lower lobe caudal fin with white tips

Paragaleus tengi (Chen, 1963)

English name: Straight-tooth weasel shark





Distinctive characteristics

①Snout pointed (view from underneath)
②Mouth short and narrowly arched
③Pelvic fins, dorsal fins and lower lobe of caudal-fin, not falcate
④Dorsal fins posterior margin dusky black

Family Alopiidae

a) Long curving asymmetrical caudal fin
b) Short ventral caudal lobe
c) Long narrow pectoral fins
d) First dorsal fin and pelvic fins large
e) Second dorsal fins and anal fins tiny

Alopias pelagicus Nakamura, 1935

English name: Pelagic thresher

Distinctive characteristics

①Head profile arched between eyes, no deep groves on nape
②Eyes smaller with orbits not expanded onto dorsal surface of head
③First dorsal fin base closer to pectoral-fin bases
④Pectoral fins straight with broad tips
⑤Caudal tip very slender with very narrow terminal lobe

Alopias superciliosus (Lowe, 1839)

English name: Bigeye thresher

Distinctive characteristics

①Head profile nearly straight between eyes, deep groove on each side on nape
②Eyes very large, extending onto surface of head
③First dorsal fin base closer to pelvic base than pectoral bases
④Pectoral fins falcate with pointed tips
⑤Caudal tip broad with wide terminal lobe

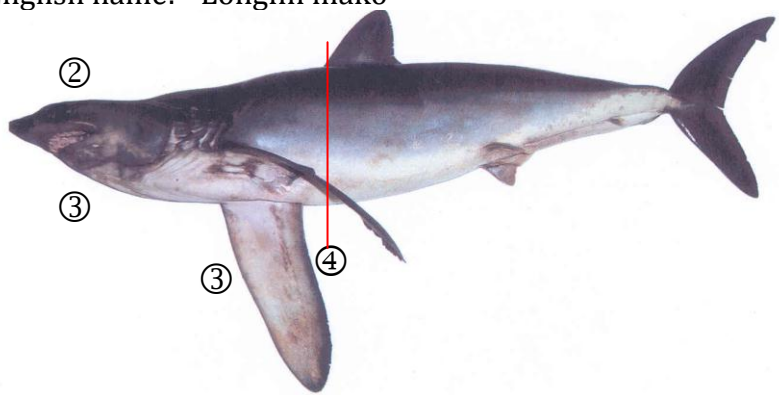
ORDER LAMNIFORMES

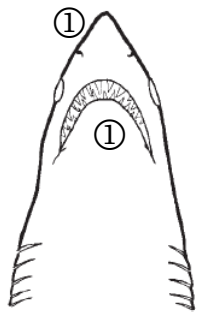
Family Lamnidae

a) Large mouth with large blade-like teeth
b) Long gill slits
c) Long pectoral fins; very small second dorsal and anal fins
d) Lateral keels in front of crescent shape tail

Isurus paucus GuitartMonday, 1966

English name: Longfin mako



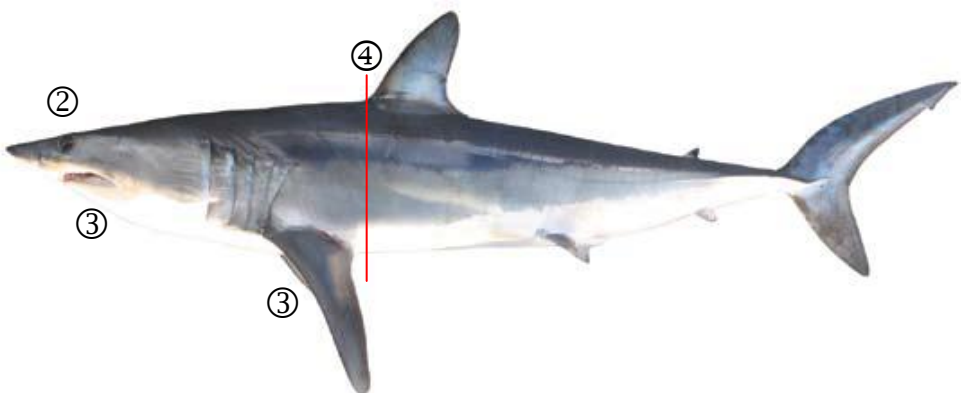


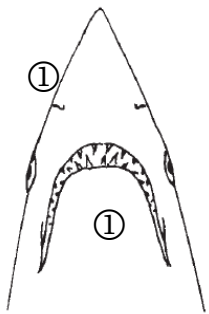
Distinctive characteristics

①Snout broadly pointed; mouth parabolic in shape
②Eyes relatively large
③Anterior margin of pectoral fin as long as head length
④Origin of first dorsal fin well behind pectoral free rear tip

Isurus oxyrinchus Rafinesque, 1810

English name: Shortfin mako





Distinctive characteristics

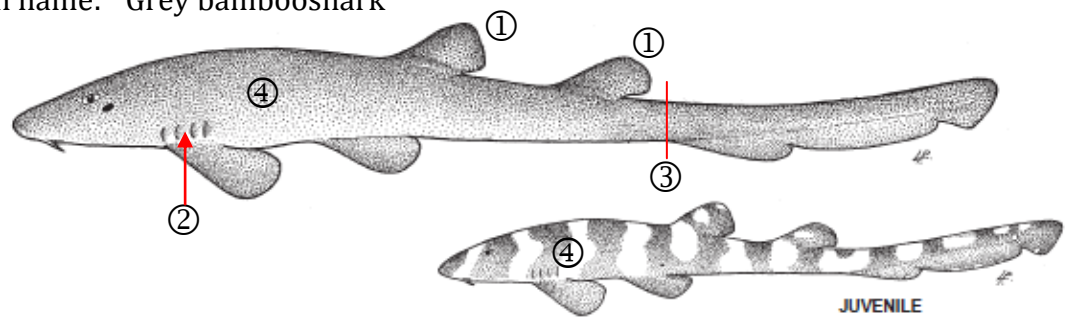
①Snout acutely pointed; mouth U-shaped
②Eyes relatively small
③Anterior margin of pectoral fin less than head length
④Origin of first dorsal fin over or just behind the pectoral free rear

ORDER ORECTOLOBIFORMES
Family Hemiscylliidae

a) Small, slender sharks with small transverse mouths in front of eyes
b) Second dorsal-fin origin well ahead of the anal-fin origin
c) First dorsal-fin origin about opposite rear halves of pelvic-fin bases
d) A long, low, keel-like rounded anal fin separate from the lower caudal origin by a narrow notch

Chiloscyllium griseum Müller and Henle, 1838

English name: Grey bambooshark



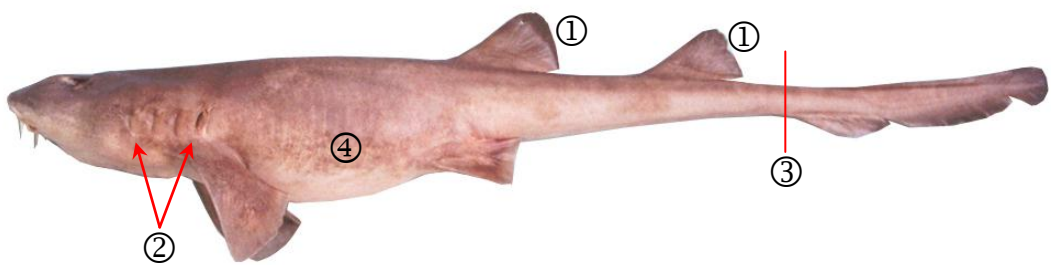
Source of illustration: Compagno, L.J.V. and Last, P.R. (1999)

Distinctive characteristics

①Dorsal fins fairly large and rounded
②All gill slits situated within pectoral fin base
③Origin of anal fin slightly behind free rear tip of second dorsal fin
④Colour pattern absent in adults; young with prominent dark saddle-marks without black edging

Chiloscyllium hasseltii Bleeker, 1852

English name: Indonesian bambooshark



Distinctive characteristics

①Dorsal fins with straight or convex posterior margins
②Two gill slits before origin pectoral fin and three gill slits within pectoral fin base
③Origin of anal fin further behind free rear tip of second dorsal fin compared to *Chiloscyllium griseum*
④No colour pattern in adults; young with transverse dark bands with prominent black edging

KEY TO ORDERS BATOIDS

BATOIDS

- Long snout saw-like

Pristiformes

- Snout not saw-like
  - Two dorsal fins; first dorsal fin origin near pelvic fin than tail tip
    - No electric organs

Rhinobatiformes

    - Electric organs present

Torpediniformes

0-2 dorsal fins; first dorsal fin origin near tail tip than pelvic fin

Pelvic fin divided into two lobes; no enlarged stinging spine on tail

Rajiformes

Pelvic fin with one lobe; usually with one or more enlarged serrate stinging spines on tail

Myliobatiformes

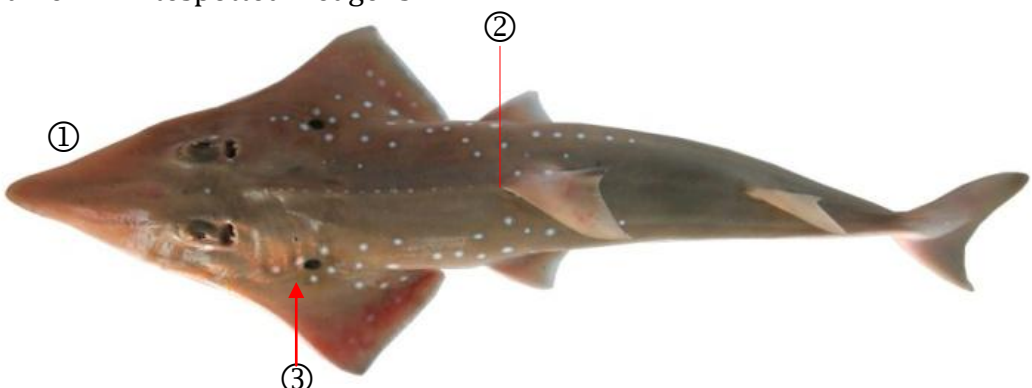
ORDER RHINOBATIFORMES

Family Rhynchobatidae

a) Two prominent dorsal fins; first originating closer to insertion of pelvic fins than to tail tip
b) Pectoral and pelvic fins separated slightly, not touching
c) Caudal fin with a well-developed lower lobe
d) Head triangular with two spiracular folds
e) Upper disc with small thorns

Rhynchobatus australiae Whitley, 1939

English name: Whitespotted wedgefish

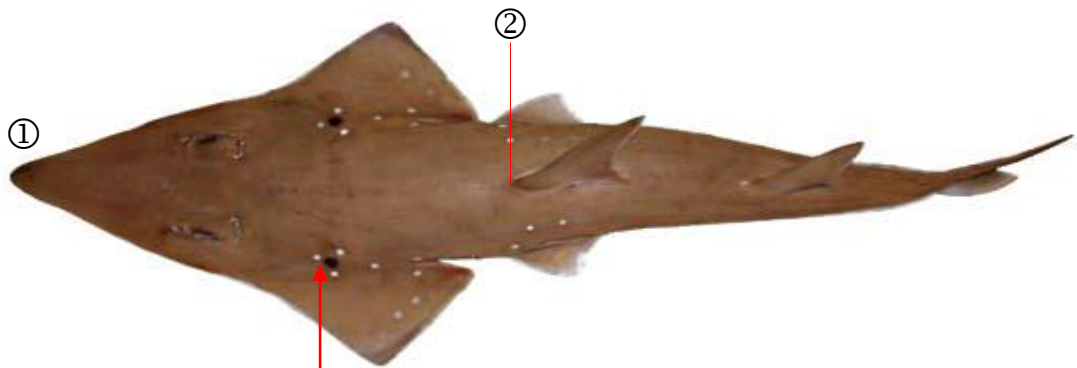


Distinctive characteristics

①Snout bottle-shaped, margin indented slightly near tip, bluntly rounded
②Origin of first dorsal fin posterior to pelvic fin origin
③Black spot on each pectoral fin surrounded by four white spots

Rhynchobatus laevis (Bloch & Schneider, 1801)

English name: Smoothnose wedgefish



Distinctive characteristics

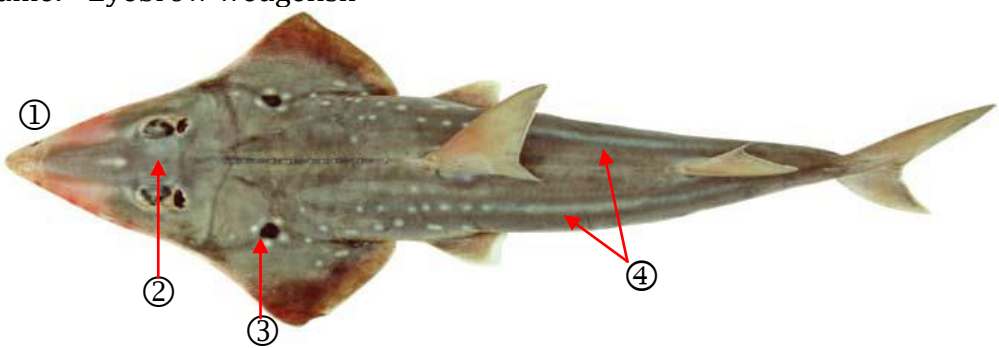
①Snout not constricted near tip
②Origin of first dorsal fin almost over pelvic fin origin
③Black pectoral spot usually closely surrounded by three white spots

Family Rhynchobatidae

a) Two prominent dorsal fins; first originating closer to insertion of pelvic fins than to tail tip
b) Pectoral and pelvic fins separated slightly, not touching
c) Caudal fin with a well-developed lower lobe
d) Upper disc with small thorns
e) Two spiracular folds

Rhynchobatus palpebratus Compagno& Last, 2008

English name: Eyebrow wedgefish

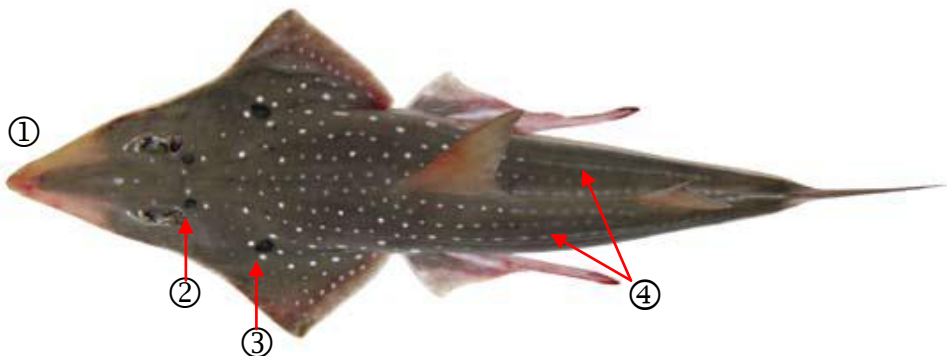


Distinctive characteristics

①Snout long and narrowly pointed (not bottle-shaped or broadly wedge-shaped)
② Black eye-brow like markings on orbital membrane
③Large, sharp-edged, black ocelli on pectoral-fin bases surrounded by four white spots
④Two short rows of spots on each side that terminate beneath first dorsal fin; sometimes pale faint line continue along the mid-dorsal

Rhynchobatus springeri Campagno& Last, 2010

English name: Broadnose wedgefish



Distinctive characteristics

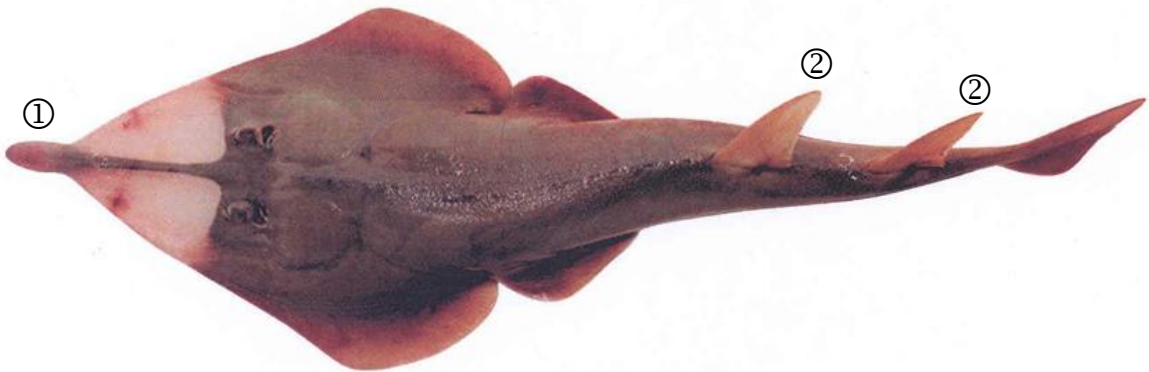
①A broadly wedge-shaped snout
②Blackish spot near to spiracle
③Black pectoral marking prominent, surrounded by four white spots
④3-4 postdorsal rows of spots on each side that continue to the caudal fin sometimes forming pale lines

Family Rhinobatidae

a) Medium size, grayish brown shovelnose ray
b) Small thorns and enlarged denticles along the dorsal midline
c) Pectoral and pelvic fins touch or overlapping
d) Ventral lobe of caudal fin not prominent

Glaucostegus thouin (Anonymous, 1798)

English name: Clubnose guitarfish



Distinctive characteristics

①Snout tip enlarged to form an elongate knob
②First and second dorsal fin slightly high

Glaucostegus typus (Bennett, 1830)

English name: Giant guitarfish

Distinctive characteristics
①Snout tip not forming a knob
②First and second dorsal fin high

ORDER TORPEDINIFORMES

Family Narkidae

a) Snout broadly rounded
b) Body surface entirely smooth; electric organs present
c) Eyes very small
d) Disc surface brownish in colour; rounded with triangular shape tail

Narke dipterygia (Bloch & Schneider, 1801)

English name: Spot-tail sleeper ray

Distinctive characteristics

①Spiracle lateral to eye; eyes very small compared to *Temera hardwickii*
②One dorsal fin present

Temera hardwickii Gray, 1831

English name: Finless sleeper ray

Distinctive characteristics

①Spiracle located behind bulging eye; eyes small

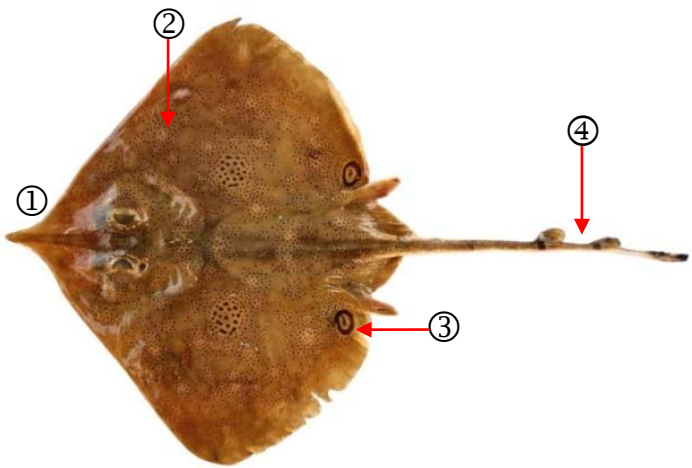
②No dorsal fin present

ORDER RAJIFORMES
Family Rajidae

a) Snout supported by a firm cartilage
b) Pelvic fin divided into two distinct lobes
c) Preorbital snout much less than eight times eye diameter
d) Tail slender (not filamentous), with two dorsal fins; no enlarge stinging spine on tail

Okamejei cairae Last, Fahmi & Ishihara, 2010

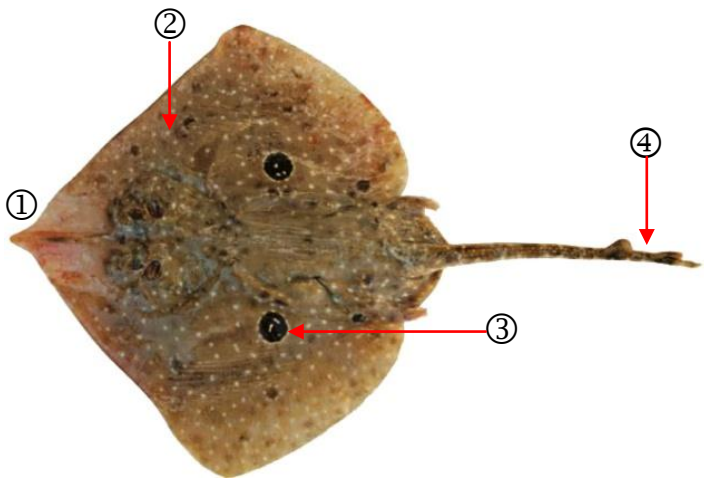
English name: Borneo sand skate



Distinctive characteristics
①Snout broadly triangular, long
②Dorsal surface yellowish brown with cluster of minute black flecks
③A pair of dark ring-like marking near axil of pectoral fin
④Thorns on tail minute; dorsal fin widely separately

Okamejei jensenae Last&Lim, 2010

English name: Philippine ocellate skate



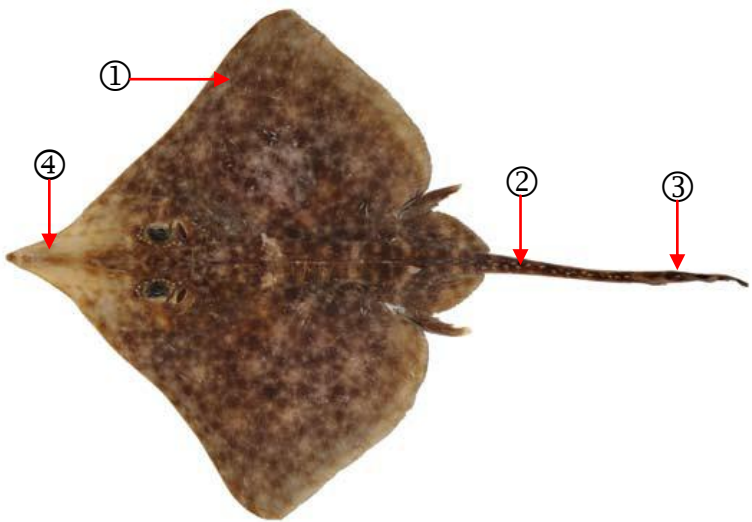
Distinctive characteristics
①Snout broadly triangular, slightly long
②Dorsal surface brownish with scattered yellowish spots
③A pair of large dark spots with white-spotted borders
④Thorns on tail small; dorsal fin relatively close together

Family Rajidae

a) Snout supported by a firm cartilage
b) Pelvic fin divided into two distinct lobes
c) Preorbital snout much less than eight times eye diameter
d) Tail slender (not filamentous), with two dorsal fins; no enlarge stinging spine on tail

Dipturus kwangtungensis (Chu, 1960)

English name: Kwangtung skate

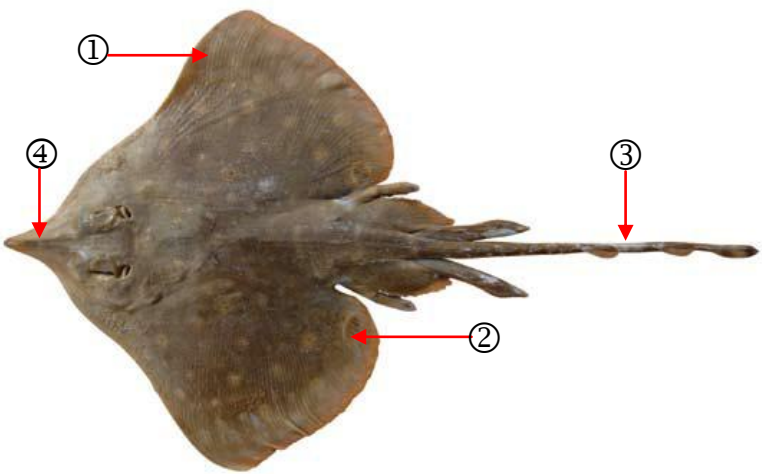


Distinctive characteristics

①Dorsal surface with cloudy pattern of pale blotches surrounded by spots
②Thorns on tail confined to midline
③Dorsal fins not widely separated
④Cartilage on snout very long

Okamejei hollandi (Jordan & Richardson, 1909)

English name: Yellowspotted skate



Distinctive characteristics

①Dorsal surface brownish with pale blotches

②Axil of pectoral fin with a pale-edged brown blotch

③Dorsal fins very widely separated

④Cartilage on snout moderately long compared to *Dipterus kwantungensis*

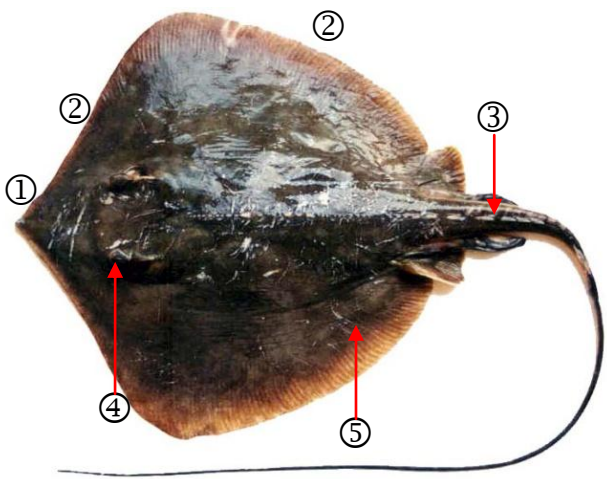
ORDER MYLIOBATIFORMES

Family Dasyatidae

a) Medium size stingray with rhomboidal disc
b) A median row of thorns from behind the head to the tail base
c) Thorns small anteriorly, becoming enlarged on posterior half
d) Tail length not more than twice disc width

Dasyatis akajei (Müller & Henle, 1841)

English name: Red stingray

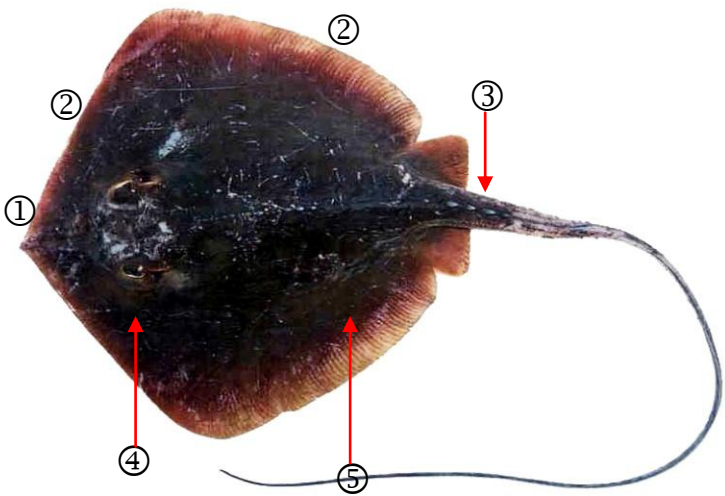


Distinctive characteristics:

①Snout triangular and pointed
②Anterior margin slightly concave, posterior margin convex
③Thorn size twice that of *Dasyatis fluviorum*
④Upper margin of eyes and behind spiracles orangish
⑤Disc reddish brown above; uniform white with a broad yellowish margin below

Dasyatis fluviorum Ogilby, 1908

English names: Estuary stingray



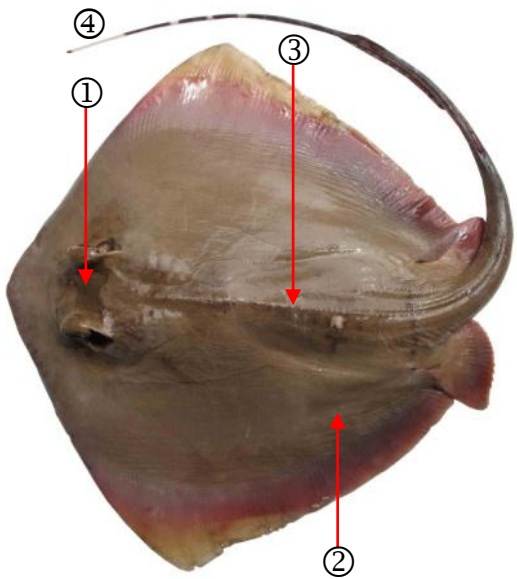
Distinctive characteristics:
①Snout broad triangular, tip pointed
②Anterior margin straight, posterior margin convex
③Thorn size about half that of *Dasyatis akajei*
④Upper margin of eyes and behind spiracles yellowish
⑤Disc dark brown above, pale below

Family Dasyatidae

a) Snout short, broadly triangular
b) Disc rhomboidal with angular apices
c) Tail with prominent dorsal and ventral skin folds
d) No thorns on tail before sting

Dasyatis parvonigra Last & White, 2008

English name: Dwarf black stingray

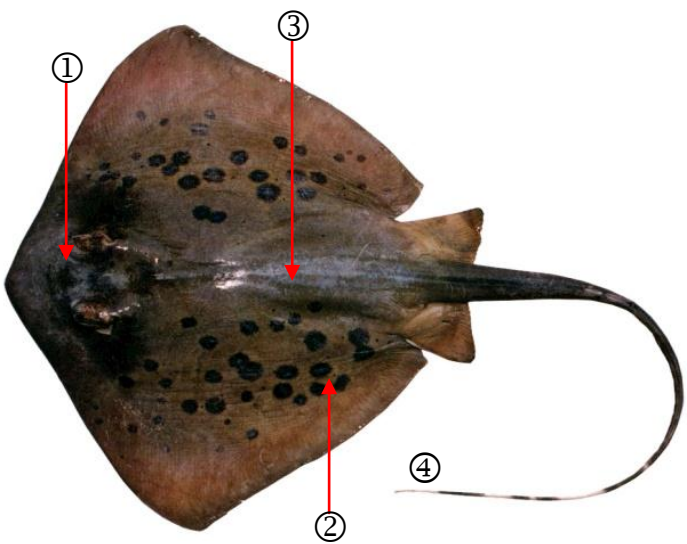


Distinctive characteristics

①No dark bar through eyes (sometimes very faint bar)
②Upper disc dark brown without blue spots
③Thorns confined to central disc
④Tail banded with broad white segment near tail tip

Neotrygon kuhlii (Müller & Henle, 1841)

English name: Bluespotted stingray



Distinctive characteristics

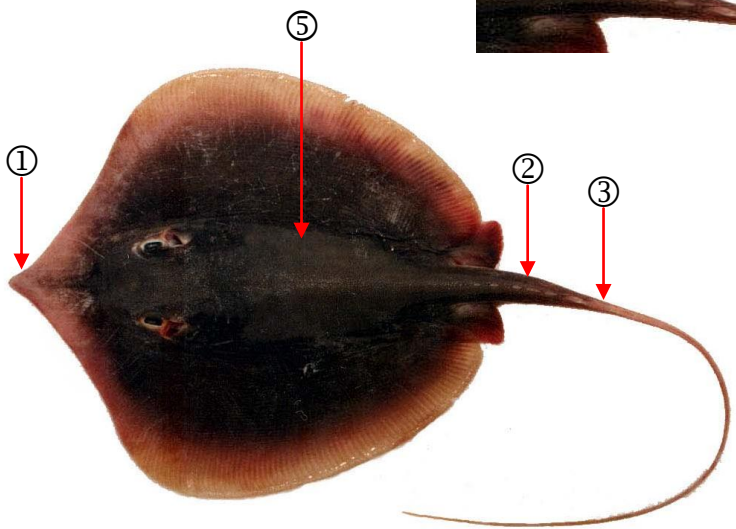
①A black bar through eyes
②Bright blue spots on upper disc
③Short thorns confined to midline of disc
④Tail banded beyond sting with slightly narrower white segment near tail tip

Family Dasyatidae

a) Snout triangular
b) Disc width equal to disc length
c) Profile of disc almost oval, plain grayish or brownish above
d) Narrow bands of flat denticles on central disc

Himantura walga (Müller & Henle, 1841)

English name: Dwarf whipray

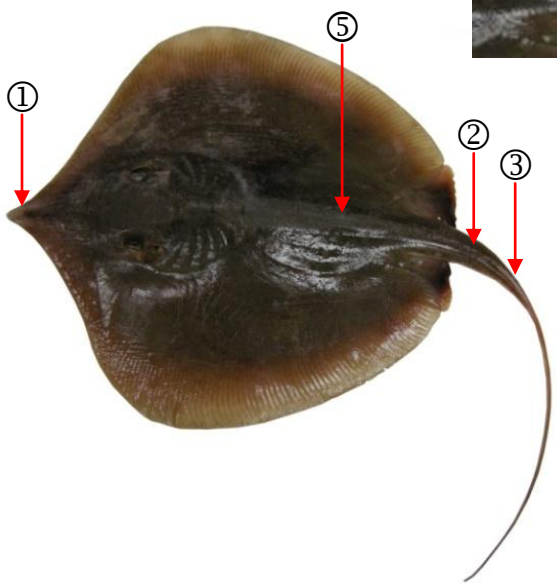


Distinctive characteristics

①Snout triangular and pointed
②Tail longer than body length with mostly 4 - 6 enlarged, spear-like thorns
③Tail with two spines
④Thorns on tail very elongate, much longer than ½ eye diameter
⑤Bands of flat denticles on central disc wider than *Himantura imbricata*

Himantura imbricata (Bloch & Schneider, 1801)

English name: Scaly whipray



Distinctive characteristics

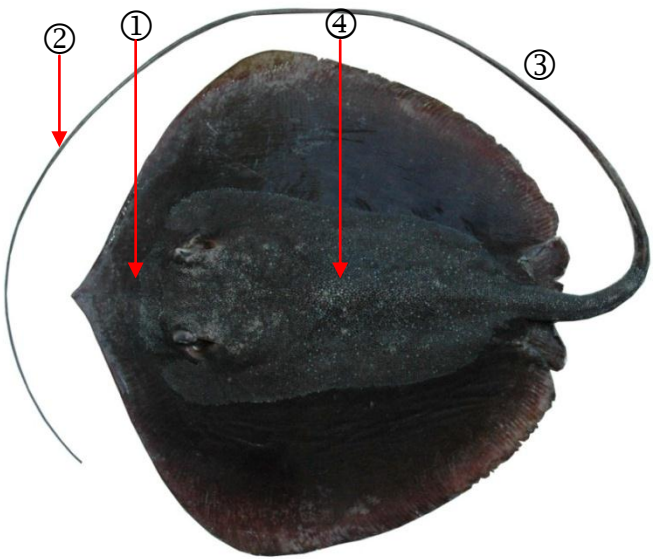
①Snout triangular and narrowly pointed
②Tail shorter than body length; with four enlarged, spear-like thorns
③Tail with more than one (usually 2-3) stinging spines
④Thorns on tail not elongate, much shorter than ½ eye diameter
⑤Bands of flat denticles on central disc very narrow compared to *Himantura walga*

Family Dasyatidae

a) Snout short and broadly triangular
b) Disc profile almost oval, brownish or grayish above
c) Denticle bands on disc broad with margin rounded on snout

Himantura pastinacoides (Bleeker, 1852)

English name: Round whipray

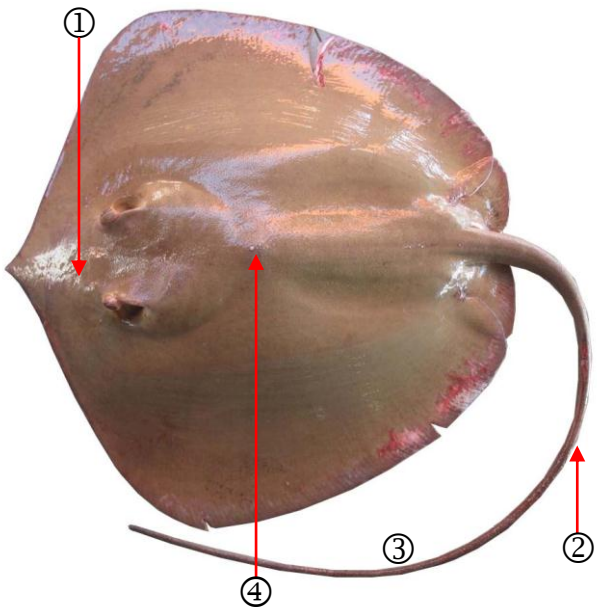


Distinctive characteristics

①Broad bands of denticles very distinctive
②Tail long, whip-like and dark posteriorly
③Tail length more than two time length of body width
④One large, greenish pearl thorn on central disc. Disc colour dark as compared to *Himantura* cf *pastinacoides*

Himantura cf *pastinacoides*

English name: Brown whipray



Distinctive characteristics

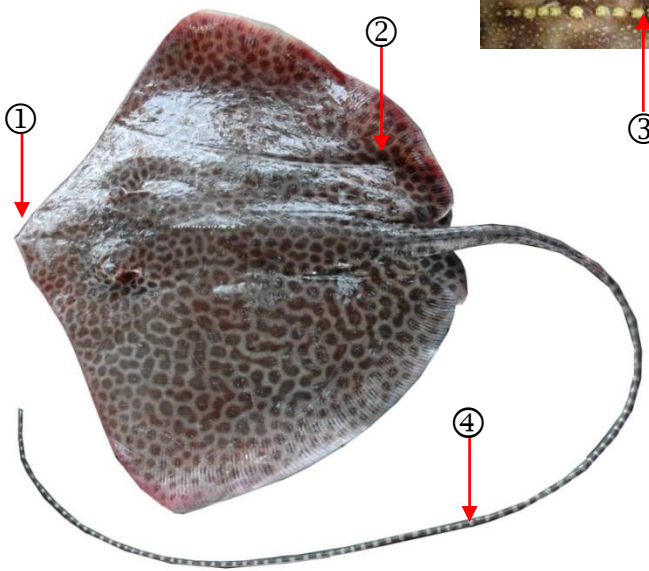
①Broad bands of denticles flat
②Tail long, whip-like and plain light brown
③Tail length slightly longer than body width
④One large, yellowish pearl thorn on central disc. Disc colour brown

Family Dasyatidae

a) Disc profile somewhat quadrangular
b) Broad band of flat denticles on central disc
c) Midline of tail before sting without thorns
d) No skin folds on tail

Himantura leoparda Manjaji-Matsumoto & Last, 2008

English name: Leopard whipray

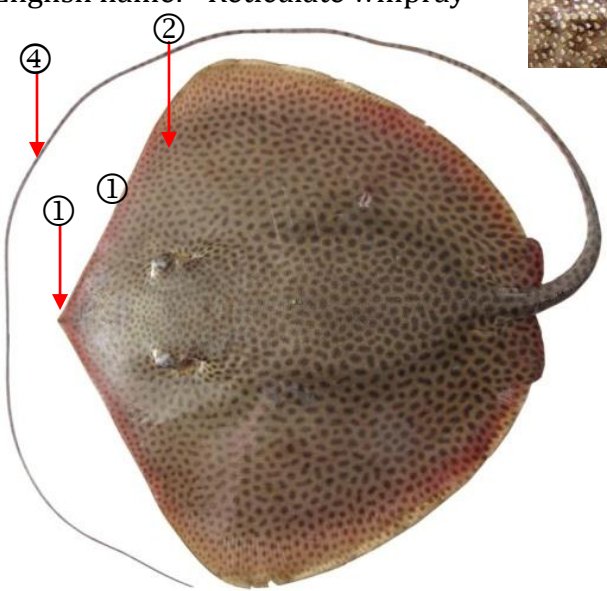


Distinctive characteristics

①Snout broadly triangular; tip pointed
②Upper surface of disc with leopard-like markings
③Central disc with row of up to 15 heart-shaped thorns
④Tail long, whip-like, variably banded (rarely faint)

Himantura uarnak(Forsskal, 1775)

English name: Reticulate whipray



Distinctive characteristics

①Snout broadly triangular; anterior margin of disc almost straight

②Upper surface of disc with fine dark spots and reticulations

③Central disc with two heart-shaped thorns

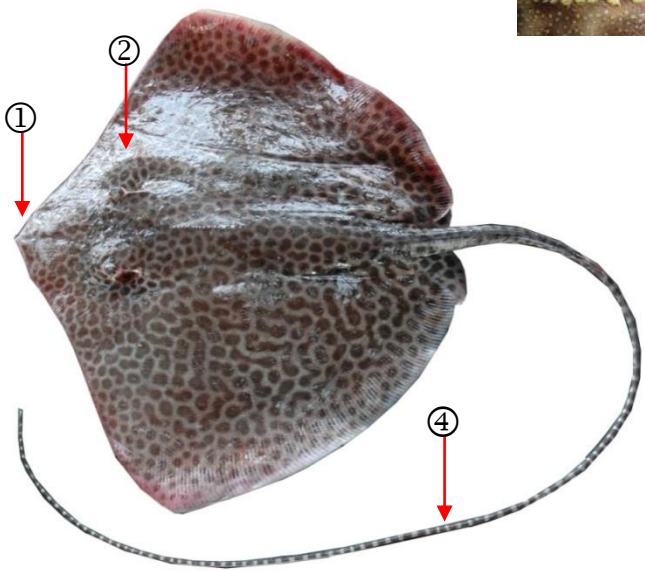
④Tail long, whip-like, variably banded (often faint in adults)

Family Dasyatidae

a) Disc profile somewhat quadrangular
b) Broad band of flat denticles on central disc
c) Midline of tail before sting without thorns
d) No skin folds on tail

Himantura leoparda Manjaji-Matsumoto & Last, 2008

English name: Leopard whipray

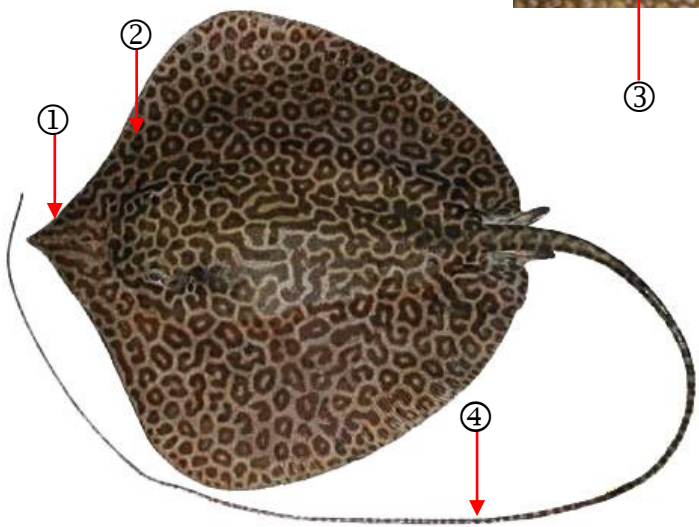


Distinctive characteristics

①Snout broadly triangular; tip pointed
②Upper surface of disc with leopard-like markings
③Central disc with row of up to 15 heart-shaped thorns
④Tail long, whip-like, variably banded (rarely faint)

Himantura undulata(Bleeker, 1852)

English name: Honeycomb whipray



Distinctive characteristics

①Snout strongly pointed

②Upper surface of disc with pattern of large ocelli and honeycombe-like reticulations

③Central disc usually with dominant pearl-shaped thorns with 2-3 slightly smaller thorns

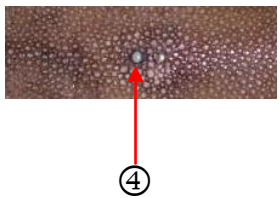
④Tail long, whip-like, with dark pattern/bands

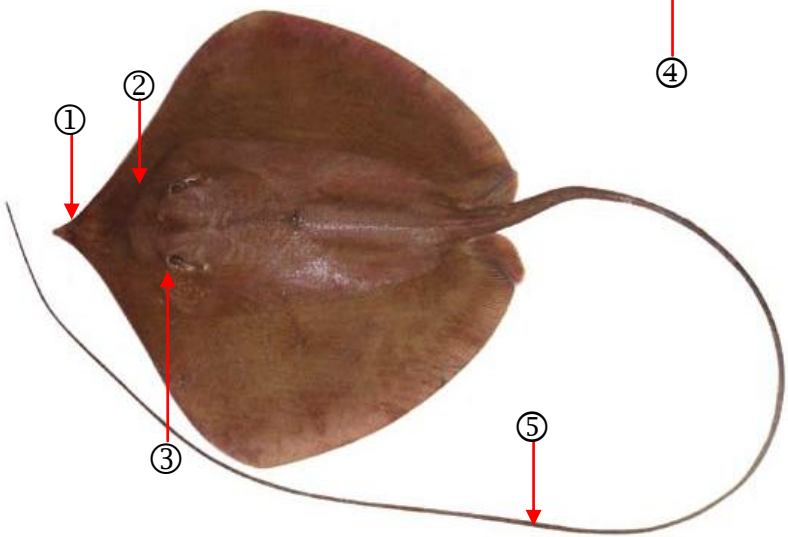
Family Dasyatidae

a) Snout triangular
b) Upper surface brownish to gray (without pattern)
c) Denticle band very broad
d) Eyes small

Himantura uarnacoides (Bleeker, 1852)

English name: Bleeker's whipray,

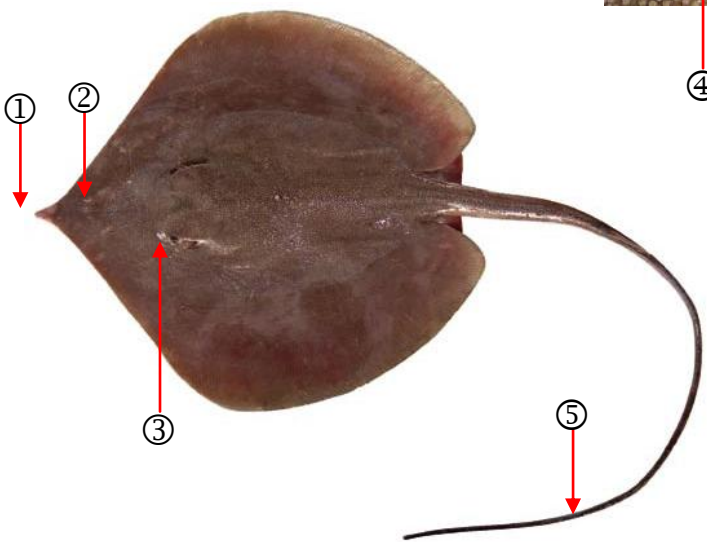




Distinctive characteristics:
①Snout narrowly triangular
②Denticles band broad, margin rounded on snout
③Eyes small; mouth not protrusible
④Central disc with 1 -3 large pearl thorns
⑤Tail very long, whip-like and pale (not banded)

Himantura lobistoma Manjaji-Matusumoto & Last, 2006

English name: Tubemouth whipray



Distinctive characteristics:

①Snout extremely elongate and broadly triangular

②Denticles band very broad, margin pointed on snout

③Eyes very small; mouth protrusible

④Central disc usually with 2-4 small pearl thorns

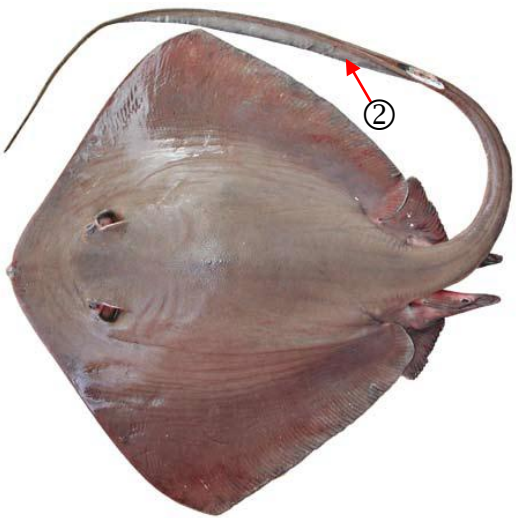
⑤Tail long, whip-like, plain and not banded

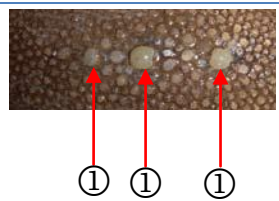
Family Dasyatidae

a) Disc profile quadrangular
b) Snout short and rounded; apex lacking denticles
c) Broad band of flat denticles on central disc
d) Tail base relatively broad, no thorn row along middle of tail
e) Ventral skin fold terminating well before tail tip

Pastinachus gracilicaudus Last & Manjaji, 2010

English name: Narrowtail stingray

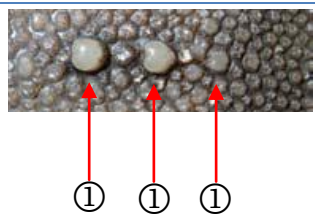




Distinctive characteristics:
①1-3 nuchal thorns; the larger between two smaller ones
②Tail fold pale, relatively slender [max. depth usually less than 3 times height of tail above]

Pastinachus atrus (Macleay, 1883)

English name: Bananatail ray



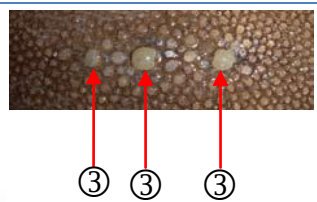
Distinctive characteristics:
①1-3 thorns (thorns larger compared to *P. gracilicaudus*)
②Tail fold blackish, very deep [max. depth more than 3.5 times height of tail above]

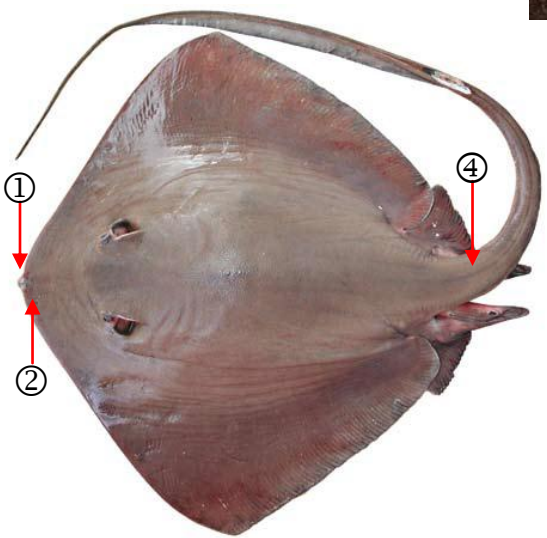
Family Dasyatidae

a) Disc profile quadrangular
b) Broad band of flat denticles on central disc
c) Tail base relatively broad
d) Ventral skin fold slender (max. depth < 3 times height of tail above)
e) Ventral skin fold terminating well before tail tip

Pastinachus gracilicaudus Last & Manjaji, 2010

English name: Narrowtail stingray



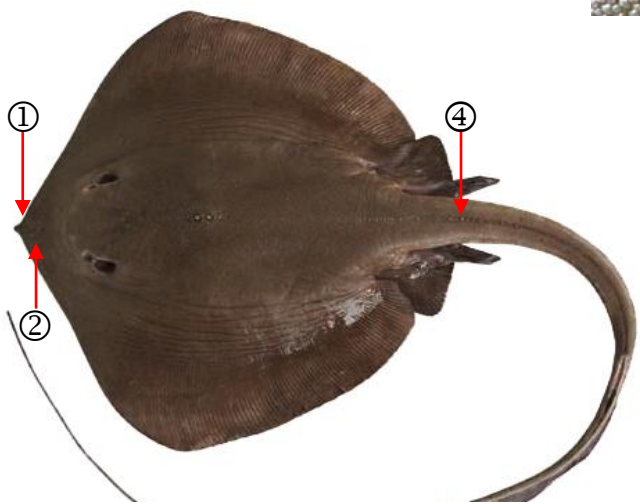


Distinctive characteristics

①Snout short and rounded
②Snout apex lacking denticles
③1-3 nuchal thorns (smaller compared to *P. stellurostris*)
④Middle of tail without row of small thorns

Pastinachus stellurostris Last, Fahmi & Naylor, 2010

English name: Starrynose stingray



Distinctive characteristics

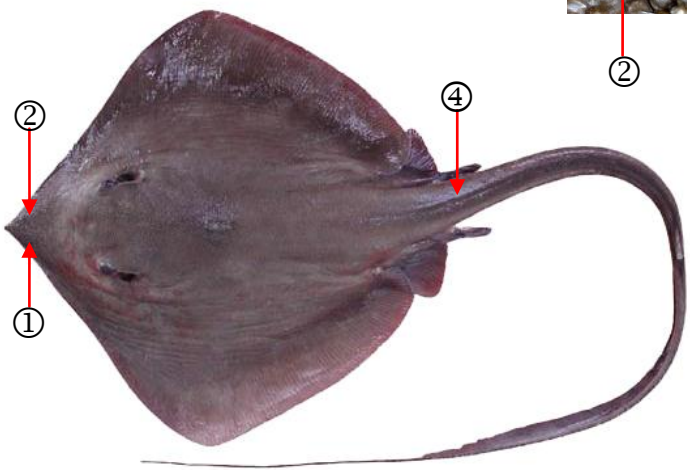
①Snout acute and broadly triangular
②Snout apex covered with enlarged, star-shaped denticles
③Two enlarged nuchal thorns
④Row of small thorns along middle of tail

Family Dasyatidae

a) Disc profile strongly quadrangular
b) Broad band of flat denticles on central disc
c) Tail relatively broad-based
d) Tail fold slender (max depth <3 times height of tail above)
e) Ventral skin fold terminating well before tail tip

Pastinachus solocirostris Last, Manjaji & Yearsley, 2005

English name: Roughnose stingray

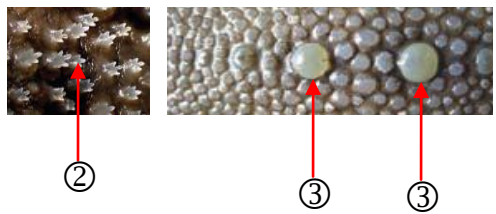


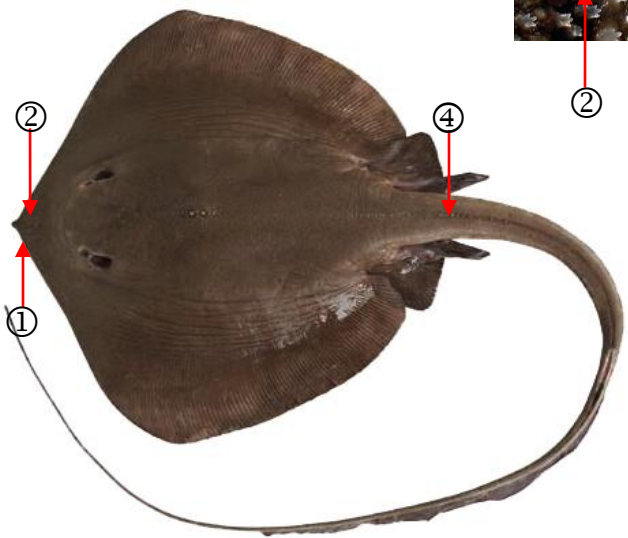
Distinctive characteristics

①Snout acute and narrowly triangular
②Snout apex covered with enlarged, spear-shaped or fork-like denticles
③One enlarged nuchal thorn in between two small nuchal thorns
④No thorns on midline of tail

Pastinachus stellurostris Last, Fahmi& Naylor, 2010

English name: Starrynose stingray





Distinctive characteristics

①Snout acute and broadly triangular

②Snout apex covered with enlarged, star-shaped denticles

③ Two enlarged nuchal thorns

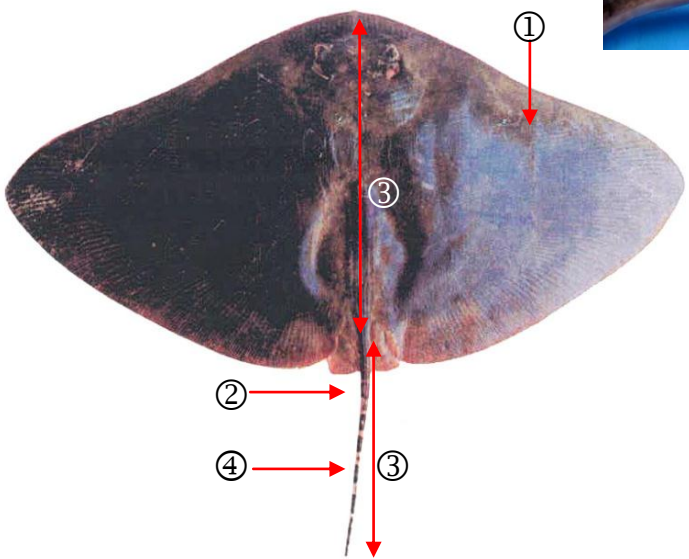
④Row of small thorns along middle of tail

Family Gymnuridae

a) Medium size ray with a very broad and flattened butterfly-shaped disc (more than 1.5 times length)
b) No dorsal fin, sometimes with a rudimentary dorsal fin
c) Dorsal surface of disc uniform brown or yellowish-brown or with scattered and light spots

Gymnura japonica (Schlegal, 1850)

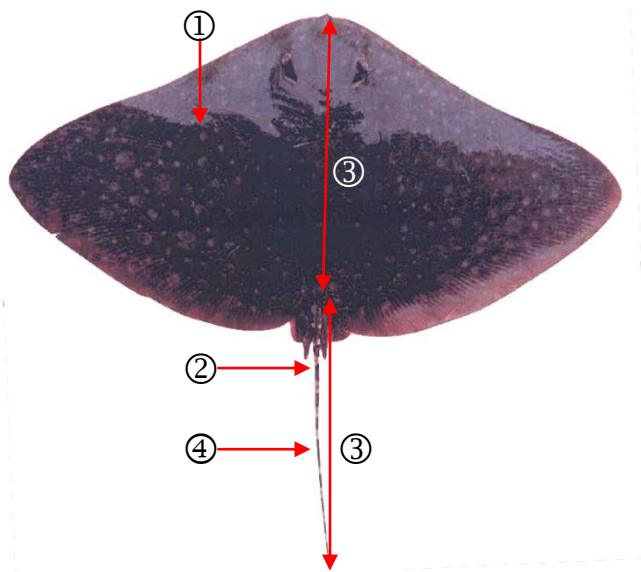
English name: Japanese butterfly ray



Distinctive characteristics:
①Dorsal surface plain, sometimes with numerous small dark flecks
②A small sting on tail
③Tail from cloaca to tip about half as long as snout-vent length or less
④Six or fewer dark bands on tail

Gymnura poecilura (Shaw, 1804)

English name: Longtail butterfly ray



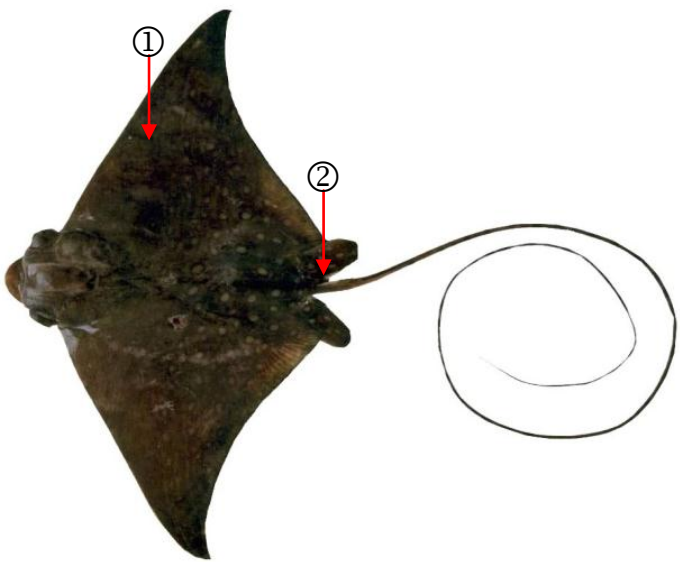
Distinctive characteristics:
①Dorsal surface with faint whitish spots (sometimes plain)
②No sting on tail
③Tail from cloaca to tip as long as snout-vent length
④9-10 dark bands on tail

Family Myliobatidae

a) Eagle ray with a plain or faintly banded upper disc
b) No stinging spine
c) A skirt-shaped internasal flap
d) A single fleshy lobe around the snout that is not connected to the pectoral fins

Aetomylaeus maculatus (Gray, 1832)

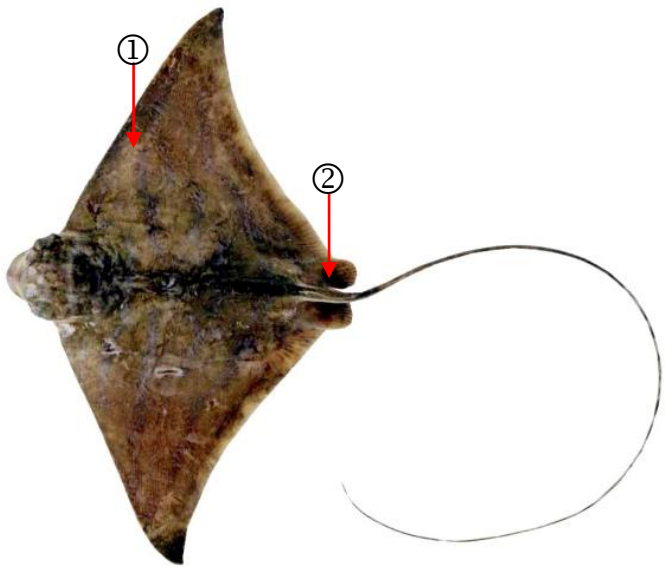
English name: Mottled eagle ray



Distinctive characteristics:
①Upper surface brown with white spots
②Dorsal-fin posterior margin upright, its origin slightly posterior to pelvic-fin insertion

Aetomylaeus nichofii(Bloch & Schneider, 1801)

English name: Banded eagle ray



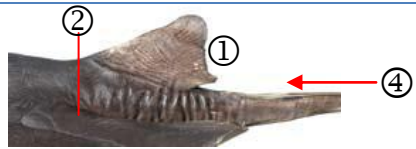
Distinctive characteristics:
①Upper surface yellowish brown with five bluish bands
②Dorsal-fin posterior margin strongly angled, its origin slightly anterior to pelvic-fin insertion

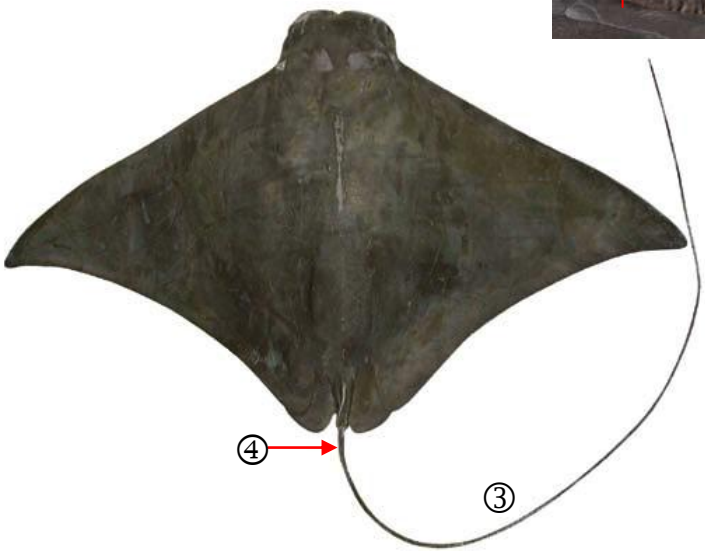
Family Rhinopteridae

a) Snout strongly notched medially to form two lobes
b) Upper teeth with 7 rows of teeth

Rhinoptera javanica Müller and Henle, 1841

English name: Javanese cownose ray

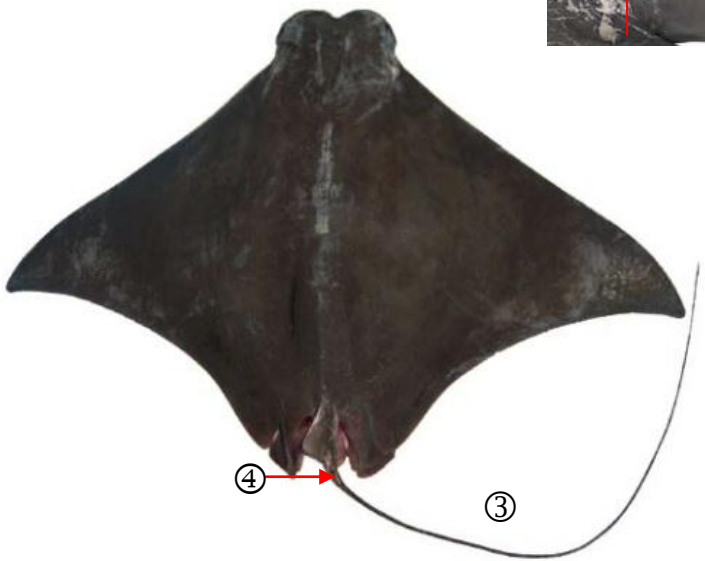




Distinctive characteristics
①Posterior margin of dorsal fin strongly concave
②Dorsal fin origin distinctly behind pectoral fin insertions
③Tail long, about 2.6 - 3.4 times disc length
④ Small sting absent on tail base

Rhinoptera jayakari Boulenger, 1895

English name: Short-tail cownose ray



Distinctive characteristics

①Posterior margin of dorsal fin almost upright.

②Dorsal-fin origin over or slightly forward of pectoral fin insertions

③Tail short, about 1.4 - 1.8 times disc length

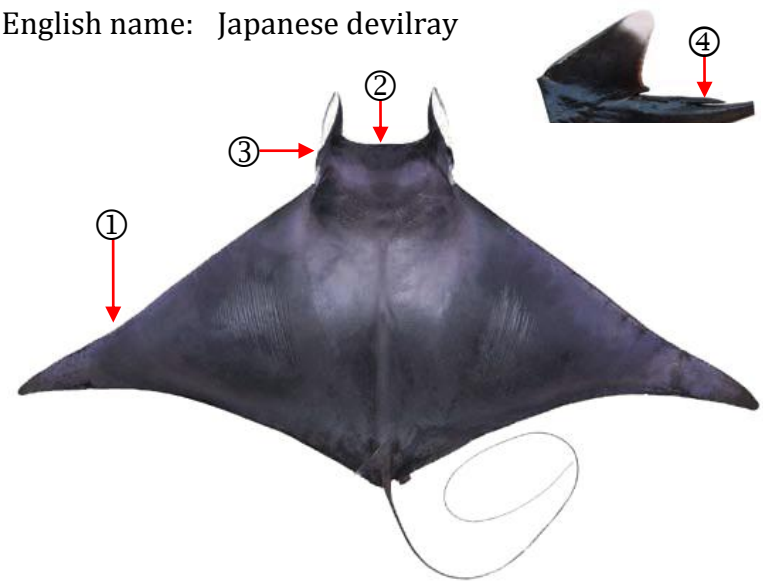
④ Small sting present on tail base

Family Mobulidae

a) Mouth subterminal, located on underside of head
b) Dorsal fin conspicuously white tipped
c) Head short; disc broad and less falcate
d) Dorsal fin white tipped

Mobula japanica (Müller and Henle, 1841)

English name: Japanese devilray

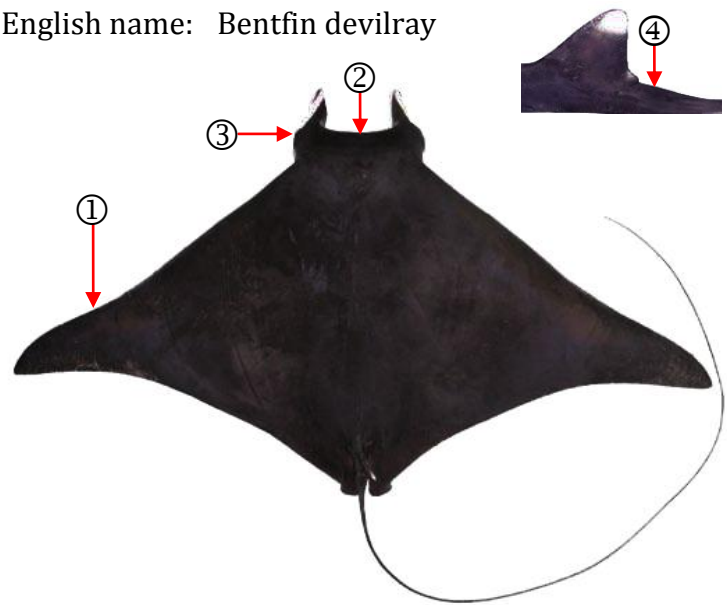


Distinctive characteristics

①Outer anterior margin of pectoral fin with slight concavity
②Anterior margin of snout almost straight and wider
③Spiracles a short elliptical transverse slit
④Tail base round; sting present

Mobula thurstoni (Lloyd, 1908)

English name: Bentfin devilray



Distinctive characteristics

①Outer anterior margin of pectoral fin with distinct concavity

②Anterior margin of snout slightly concave and narrow as compared to *M. japanica*

③Spiracle subcircular, located underneath disc edge

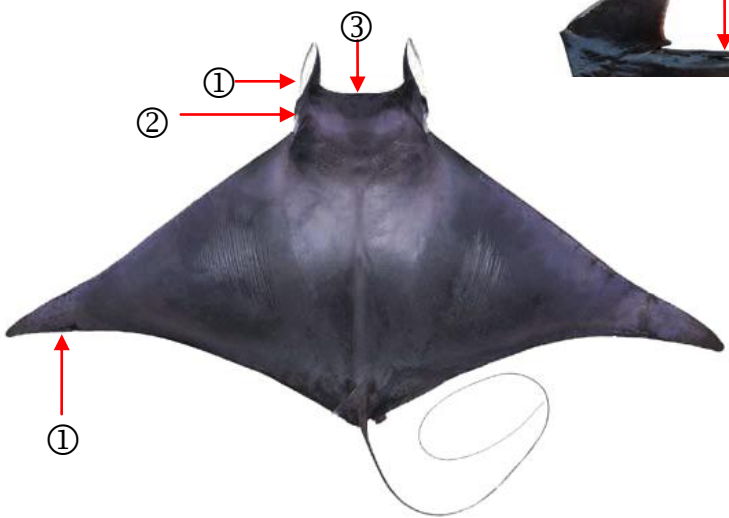
④Tail base depressed

Family Mobulidae

a) Mouth subterminal, located on underside of head
b) Teeth usually in both jaw; sometimes abnormally absent from lower jaw
c) Spiracle slit-like and dorsal to plane of pectoral disc
d) Large species, reaching more than 3.1 m disc width

Mobula japanica (Muller and Henle, 1841)

English name: Japanese devilray

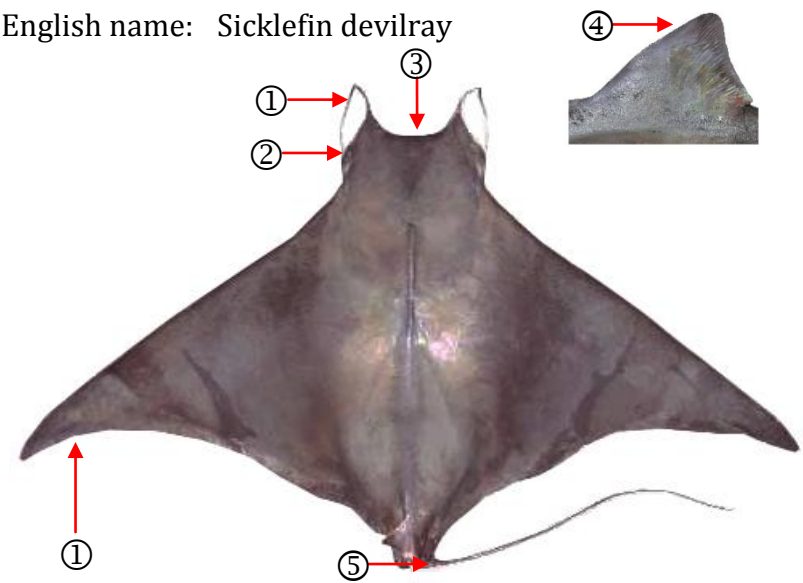


Distinctive characteristics

①Head short; disc broader and less falcate
②Spiracles a short elliptical transverse slit
③Anterior margin of snout slight straight
④Dorsal fin white tipped
⑤ Sting on tail base present

Mobula tarapacana (Philippi, 1892)

English name: Sicklefin devilray



Distinctive characteristics

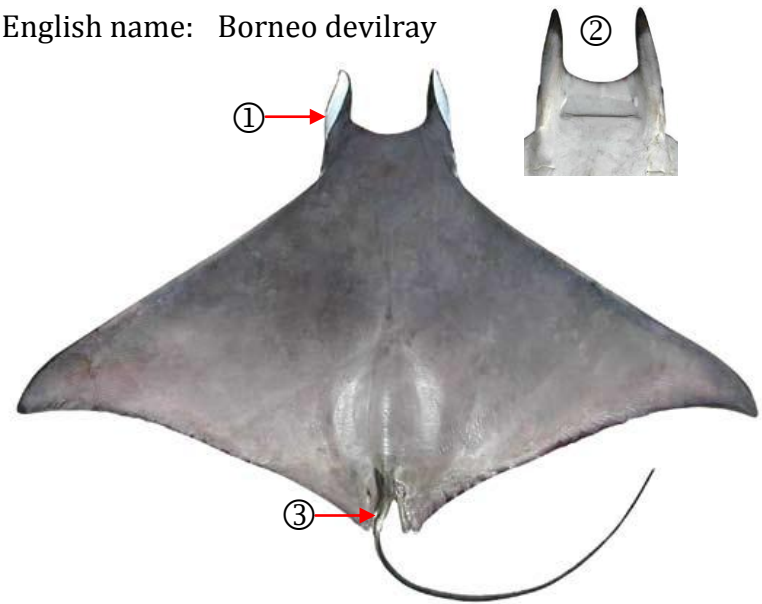
①Head longer, disc relatively narrower and strongly falcate
②Spiracles an elongated longitudinal slit
③Anterior margin of snout slightly curved
④Dorsal fin plain, not white-tipped
⑤No sting on tail base

Family Mobulidae

a) Mouth subterminal, located on underside of head
b) Spiracle located underneath disc edge
c) Base of tail almost quadrangular in cross section

Mobula sp.

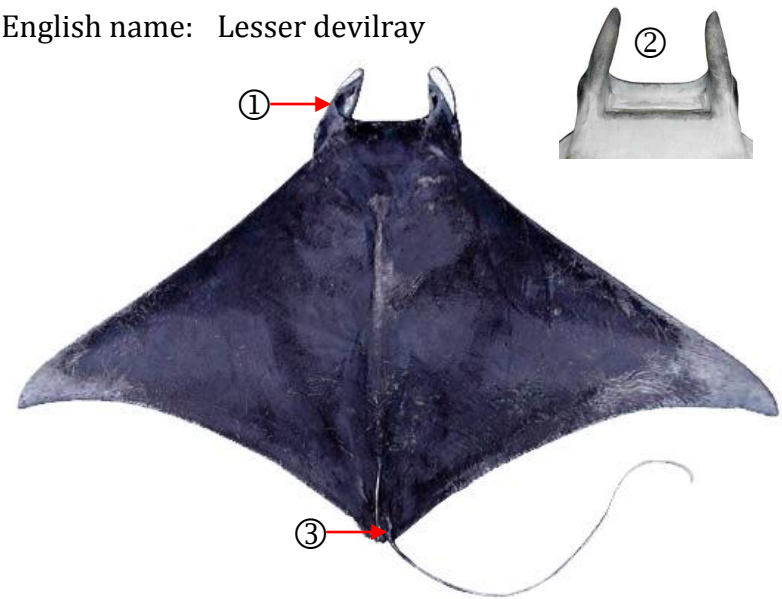
English name: Borneo devilray



Distinctive characteristics
①Cephalic lobes relatively long, about 15% DW
②Anterior margin of snout deeply concave
③Dorsal fin white tipped

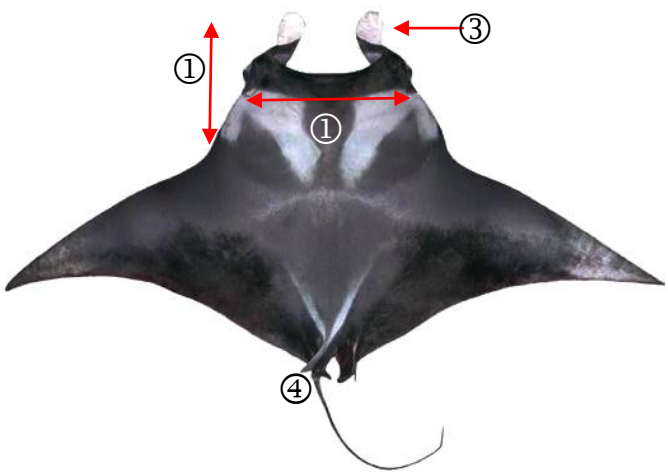
Mobula kuhlii (Müller and Henle, 1841)

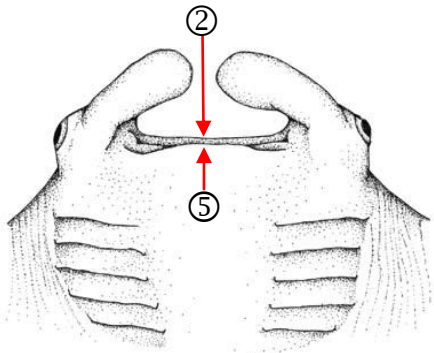
English name: Lesser devilray



Distinctive characteristics
①Cephalic lobes relatively short, about 12-14% DW
②Anterior margin of snout slightly concave
③Dorsal fin not white tip

Genus *Manta*

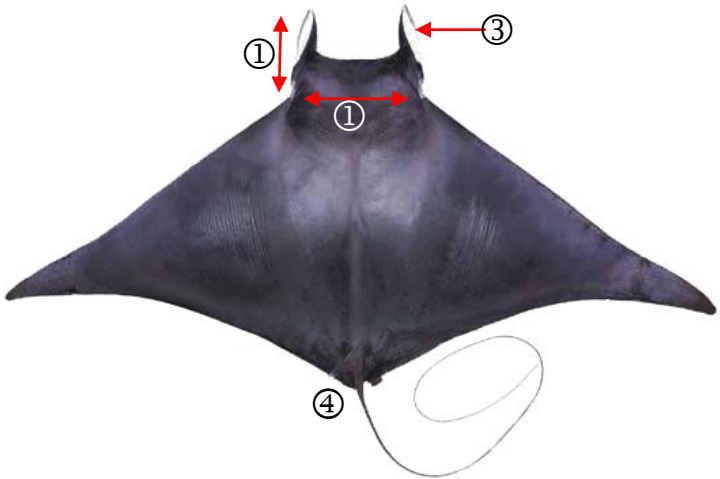


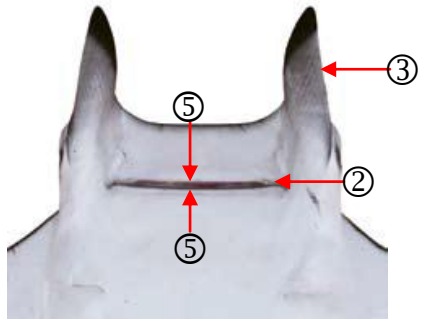


General characteristics

① Head very broad with long head fins
② Mouth terminal, located at end of snout tip
③ Cephalic fins not straight
④ Tail usually without a spine
⑤ Teeth usually in lower jaw only, abnormally present in both jaws

Genus *Mobula*





General characteristics

① Head narrower and short head fins
② Mouth subterminal, located on underside of head
③ Cephalic fins almost straight
④ Small sting sometimes on tail base
⑤ Teeth usually in both jaws

INDEX

Scientific names

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ABOUT THE AUTHORS

Mr. Ahmad Ali is a Senior Researcher of SEAFDEC/ MFRDMD in Kuala Terengganu Malaysia**.** He is also Co-Regional Vice Chair, IUCN Shark Specialist Group for Southeast Asia Region since 2007. He is an author and co-authored of many books and papers on taxonomy, biology and management of elasmobranch.

Ms. Annie Lim Pek Khiok is a Senior Laboratory Assistant of Regional Fisheries Biosecurity Centre, Kuching, Sarawak. She is a member of IUCN Shark Specialist Group for Southeast Asian Region and an author and co-authored of five books and four scientific papers on biology, taxonomy and management of elasmobranch.

Mr. Fahmi is a Senior Researcher of Research Centre for Oceanography, Indonesian Institute of Science (LIPI), Jakarta. He is a member of IUCN Shark Specialist Group for Southeast Asian Region and one of key researcher on elasmobranch in Indonesia. He is also an author and co-authored of many books and papers on chondrichthyans published in Indonesia and Australia.

Mr. Dharmadi is a Senior Researcher of Research Centre for Fisheries Management and Conservation (RFMC) Jakarta, Indonesia. He is a member of IUCN Shark Specialist Group for Southeast Asian Region and an author and co-authored of many books and papers on chondrichthyans mostly published in Indonesia and Australia. He is a well known chondrichthyans taxonomist in Indonesia.

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Ms. Annie Lim Pek Khiok is a Senior Laboratory Assistant of Regional Fisheries Biosecurity Centre, Kuching, Sarawak. She is a member of IUCN Shark Specialist Group for Southeast Asian Region and an author and co-authored of five books and four scientific papers on biology, taxonomy and management of elasmobranch.

Mr. Fahmi is a Senior Researcher of Research Centre for Oceanography, Indonesian Institute of Science (LIPI), Jakarta. He is a member of IUCN Shark Specialist Group for Southeast Asian Region and one of key researcher on elasmobranch in Indonesia. He is also an author and co-authored of many books and papers on chondrichthyans published in Indonesia and Australia.

Mr. Dharmadi is a Senior Researcher of Research Centre for Fisheries Management and Conservation (RFMC) Jakarta, Indonesia. He is a member of IUCN Shark Specialist Group for Southeast Asian Region and an author and co-authored of many books and papers on chondrichthyans mostly published in Indonesia and Australia. He is a well known chondrichthyans taxonomist in Indonesia.

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