

**Identification methods of
the Scombridae fishes and their larvae
in the Southeast Asian region**

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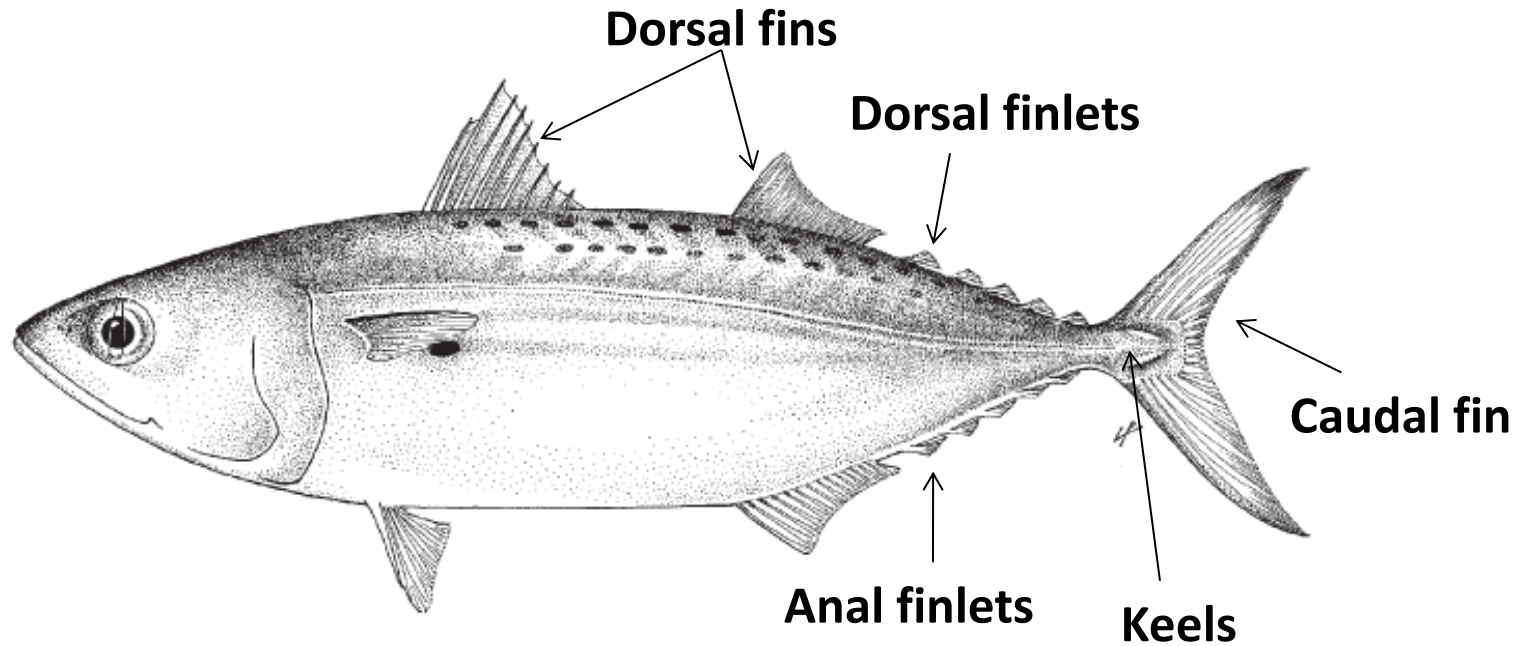
Adults

Reference:

Collette, B. B. (2001). Scombridae. Pages 3721-3756
in Carpenter, K. E. and V. H. Niem eds. The living
marine resources of the Western Central Pacific.
FAO species identification guide for fishery
purposes. FAO, Rome.



Diagnostic characters of the Scombridae fishes



- Two dorsal fins
- Five to ten dorsal and anal finlets
- Caudal fin deeply forked
- Two small keels on each side of caudal peduncle

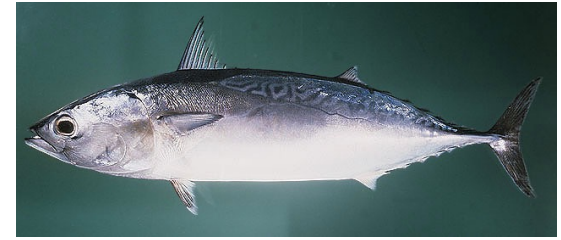
Representative species of scombrid genera in the region



Rastrelliger brachysoma



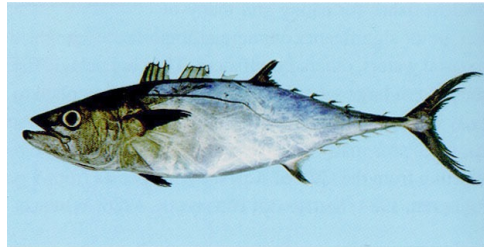
Scomberomorus commerson



Auxis thazard



Scomber australasicus



Gymnosarda unicolor



Euthynnus affinis



Acanthocybium solandri



Sarda orientalis



Katsuwonus pelamis



Grammatorcynus bilineatus



Thunnus tonggol

Genera and species of the Scombridae in the Southeast Asian region

No.	Tribe	Genus	Species
1	Scombrini	<i>Rastrelliger</i>	3
2		<i>Scomber</i>	2
3	Scomberomorini	<i>Acanthocybium</i>	1
4		<i>Grammatorcynus</i>	1
5		<i>Scomberomorus</i>	5
6	Sardini	<i>Gymnosarda</i>	1
7		<i>Sarda</i>	1
8	Thunnini	<i>Auxis</i>	2
9		<i>Euthynnus</i>	1
10		<i>Katsuwonus</i>	1
11		<i>Thunnus</i>	4

Total **22** species



Genera and species of the Scombridae in Myanmar, Thailand, Cambodia and Viet Nam

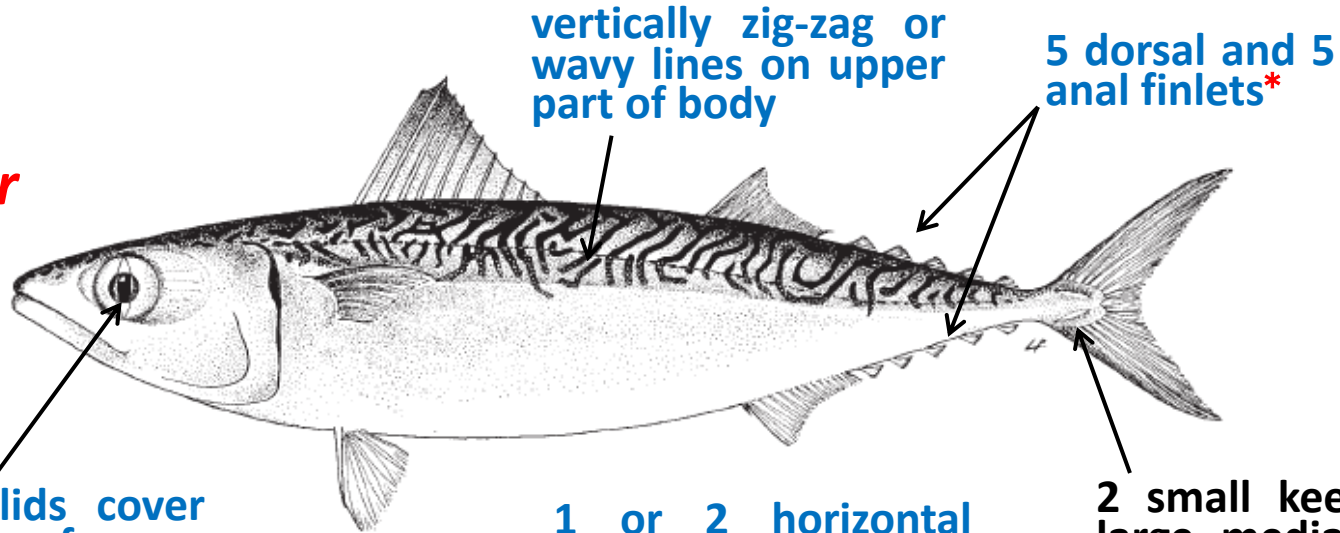
Genus	Myan	Thai	Camb	Viet
<i>Acanthocybium</i>	0	0	0	0
<i>Auxis</i>	2	2	2	2
<i>Euthynnus</i>	1	0	1	1
<i>Grammatorcynus</i>	1	0	0	0
<i>Gymnosarda</i>	0	0	0	0
<i>Katsuwonus</i>	1	0	0	1
<i>Rastrelliger</i>	3	3	3	2
<i>Sarda</i>	0	0	0	0
<i>Scomber</i>	0	0	0	0
<i>Scomberomorus</i>	4	3	3	4
<i>Thunnus</i>	1	0	0	4
Total	13	8	9	14

Myan : Myanmar ; Thai : Thailand (the Gulf of Thailand) ; Camb : Cambodia ; Viet : Viet Nam

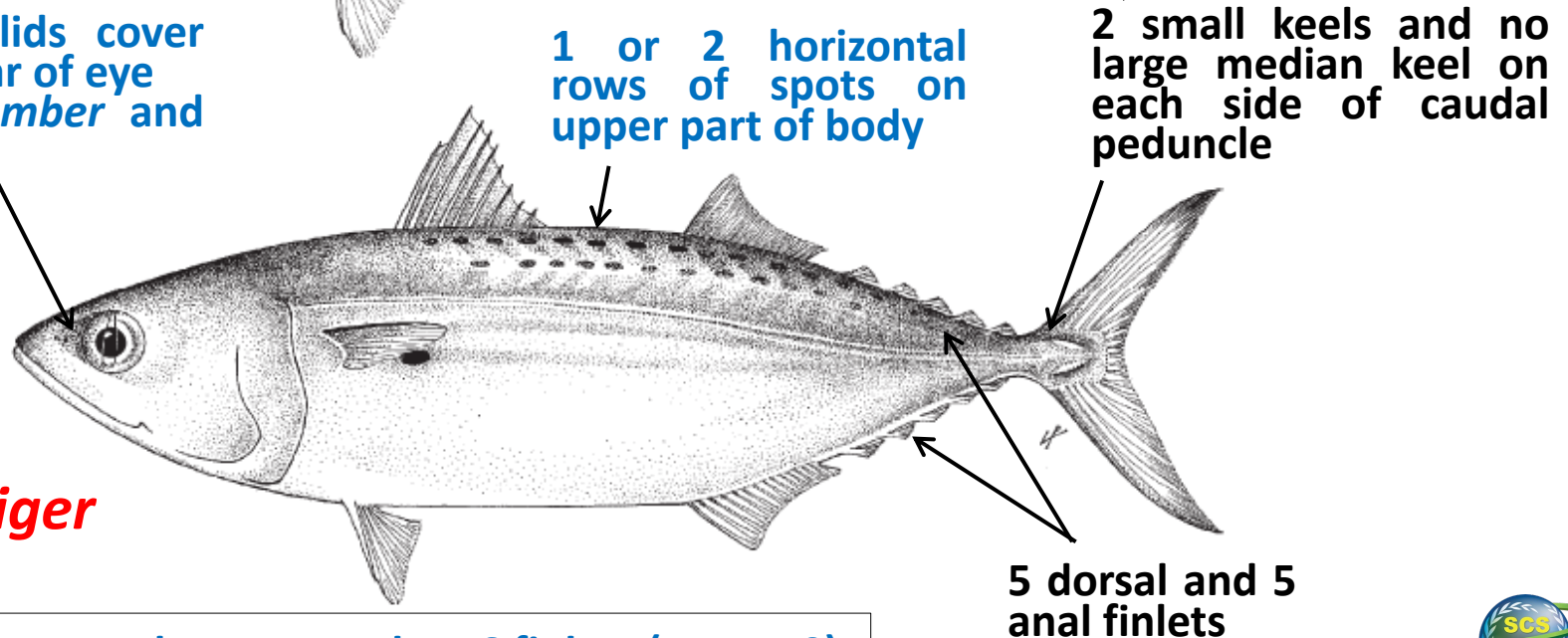


Eleven genera of the Scombridae in the Southeast Asian region (1/5)

Scomber



Rastrelliger

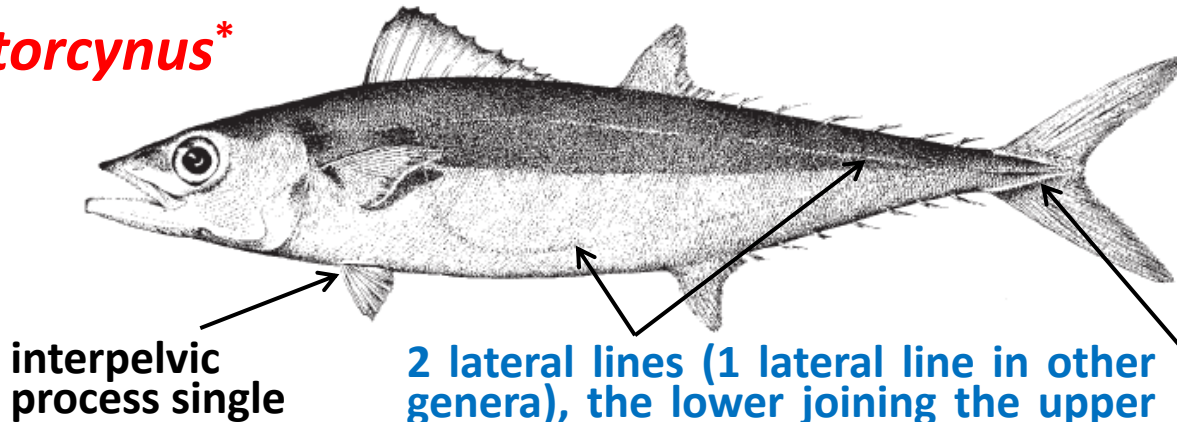


* Other 9 genera have more than 6 finlets (up to 10)

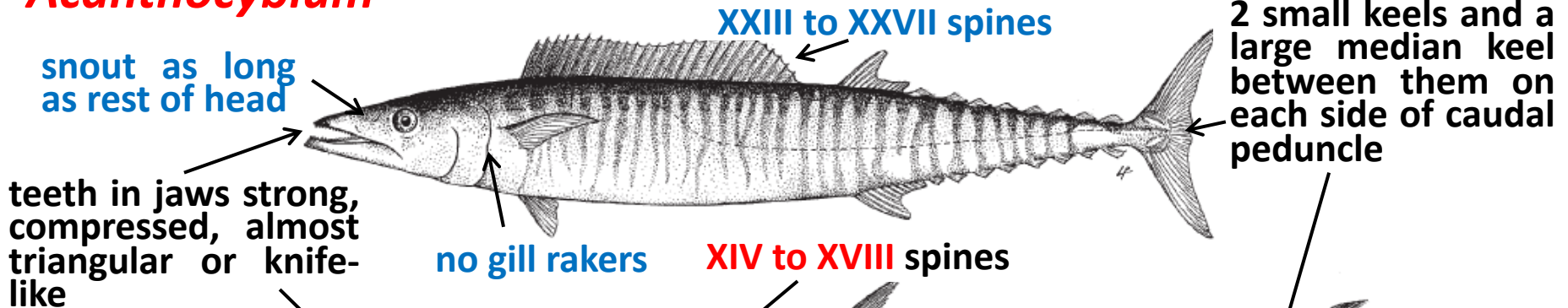
Eleven genera of the Scombridae in the Southeast Asian region (2/5)

* Single species
in the region

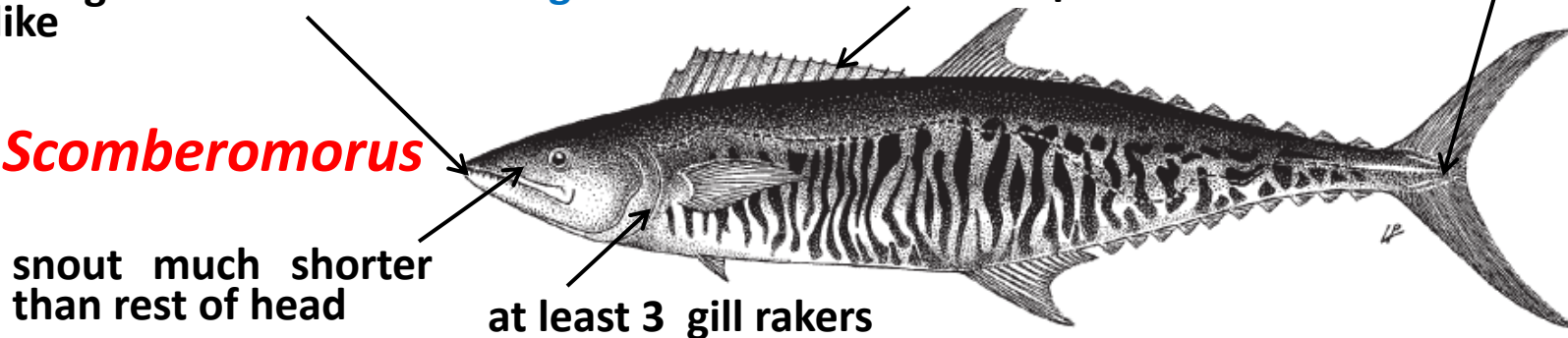
*Grammatorcynus**



*Acanthocybium**

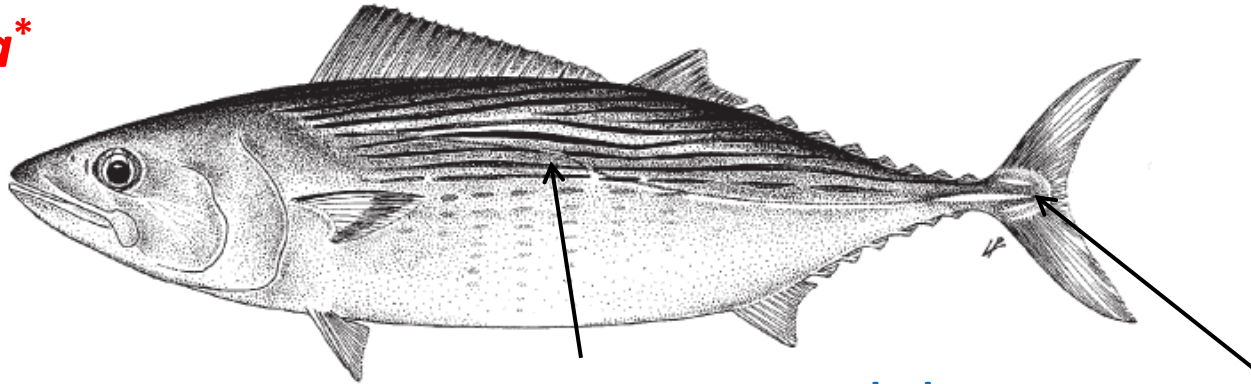


Scomberomorus



Eleven genera of the Scombridae in the Southeast Asian region (3/5)

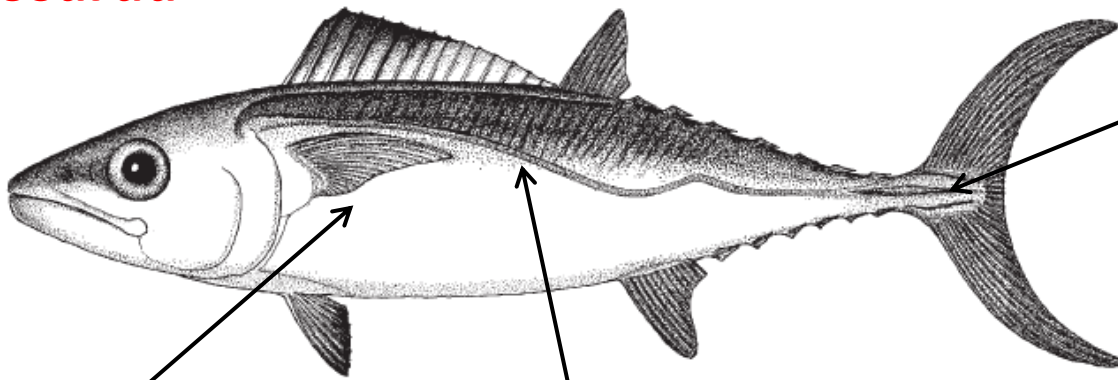
*Sarda**



5 to 11 narrow, dark
longitudinal stripes on
upper part of body

2 small keels and a
large median keel
between them on
each side of caudal
peduncle

*Gymnosarda**



pectoral fin
25 to 28 rays

body without a prominent
pattern of stripes or spots

Eleven genera of the Scombridae in the Southeast Asian region (4/5)

Auxis

1st and 2nd dorsal fins
widely separated, 1st
dorsal-fin spines X to XII

interpelvic process
single and large,
longer than longest
pelvic-fin rays

oblique lines
distinct on upper
part of body

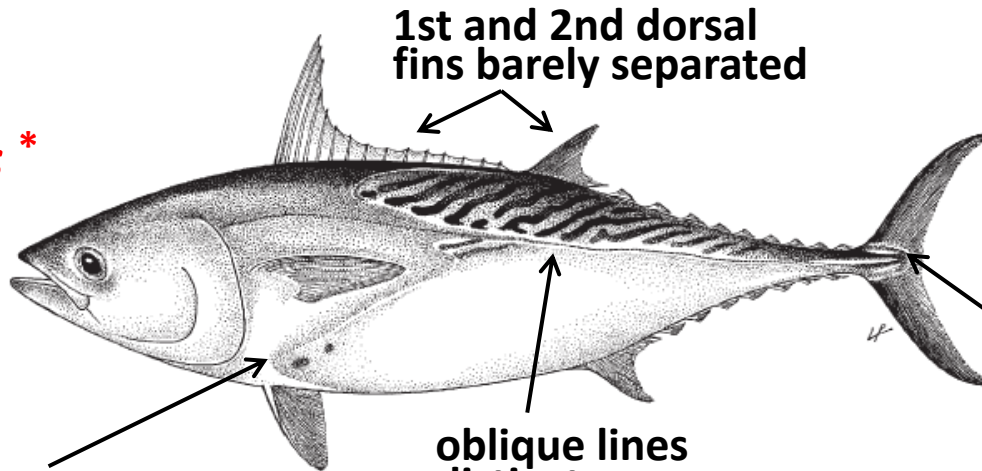
2 small keels and a
large median keel
between them on
each side of caudal
peduncle

Katsuwonus*

4 to 6 prominent dark
longitudinal stripes on
belly

Eleven genera of the Scombridae in the Southeast Asian region (5/5)

*Euthynnus**



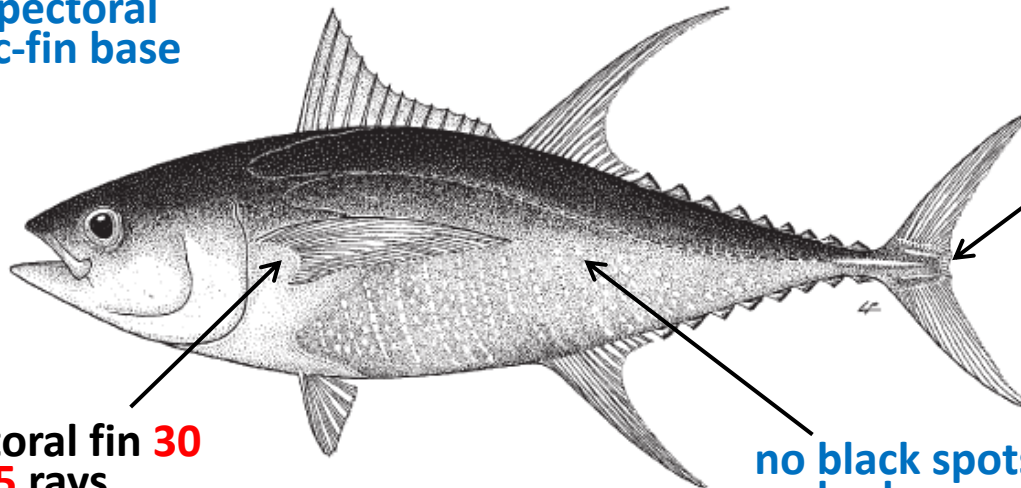
1st and 2nd dorsal
fins barely separated

several black spots
usually present
between pectoral
and pelvic-fin base

oblique lines
distinct on upper
part of body

2 small keels and a
large median keel
between them on
each side of caudal
peduncle

Thunnus



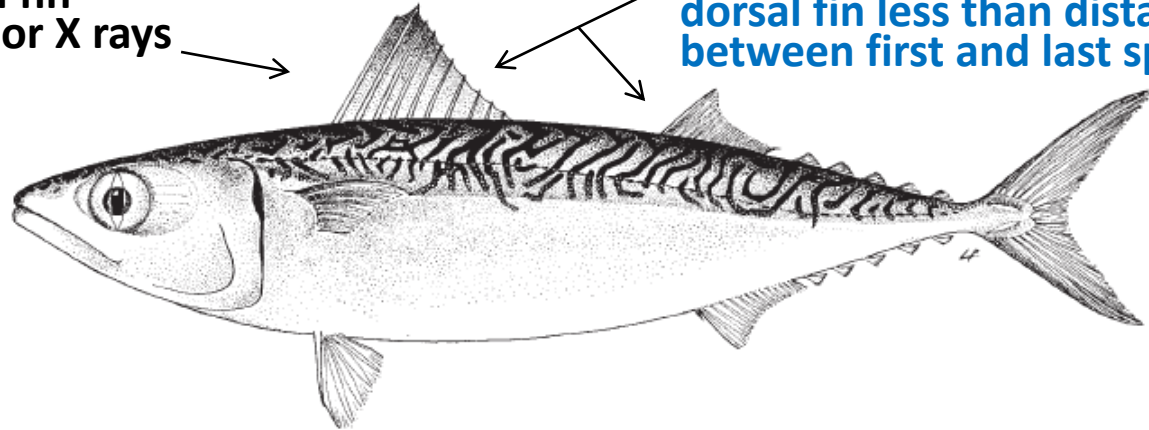
pectoral fin 30
to 35 rays

no black spots
on body

Two species of the Genus *Scomber* in the Southeast Asian region

1st dorsal fin
spines IX or X rays

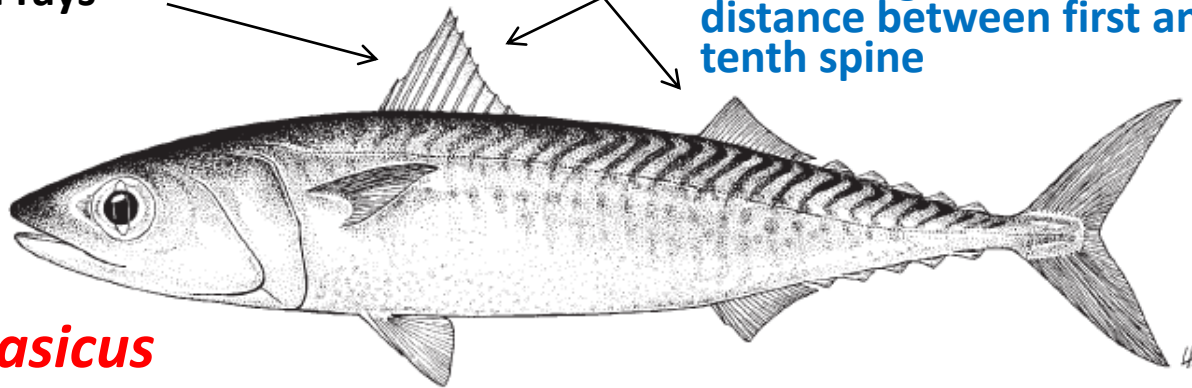
distance from last dorsal-
fin spine to origin of second
dorsal fin less than distance
between first and last spine



S. japonicus

1st dorsal fin spines
X to XIII rays

distance from tenth dorsal-fin
spine to origin of second
dorsal fin greater than
distance between first and
tenth spine

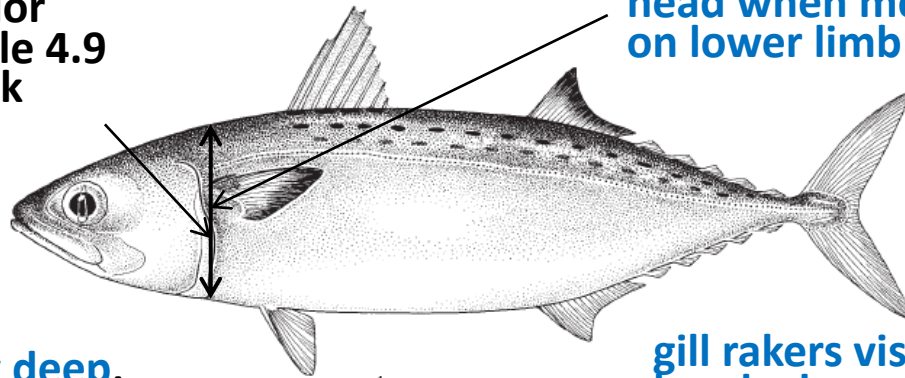


S. australasicus

Three species of the Genus *Rastrelliger* in the Southeast Asian region

body slender, its depth at posterior margin of opercle 4.9 to 6 times in fork length

R. faughni



gill rakers not visible from side of head when mouth is open, 21 to 26 on lower limb of 1st gill arch

body moderately deep, its depth at posterior margin of opercle 3.7 to 4.3 times in fork length

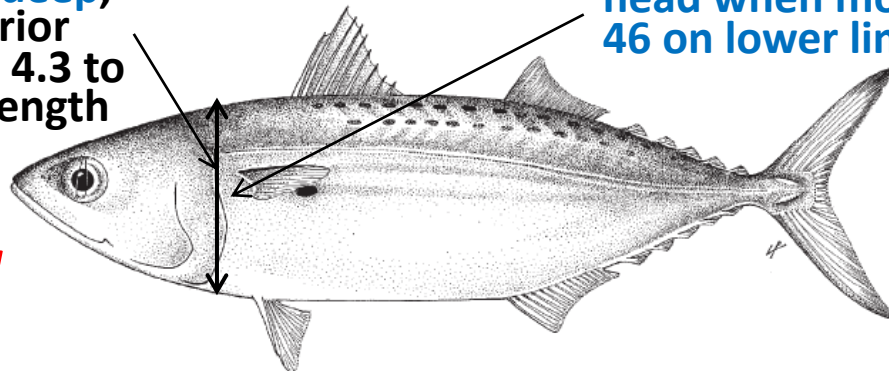
R. brachysoma



gill rakers visible from side of head when mouth is open, 30 to 48 on lower limb of 1st gill arch

body moderately deep, its depth at posterior margin of opercle 4.3 to 5.2 times in fork length

R. kanagurta



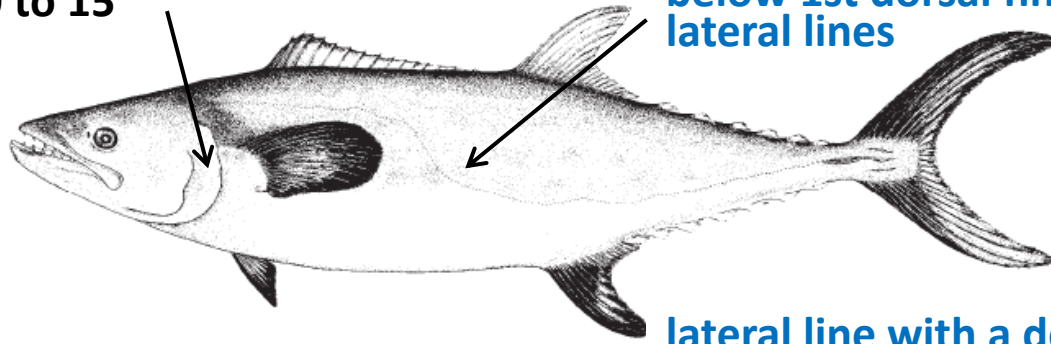
gill rakers visible from side of head when mouth is open, 30 to 46 on lower limb of 1st gill arch

Five species of the Genus *Scomberomorus* in the Southeast Asian region (1/2)

total gill rakers on 1st
gill arch 10 to 15

lateral line with a deep dip
below 1st dorsal fin spines
lateral lines

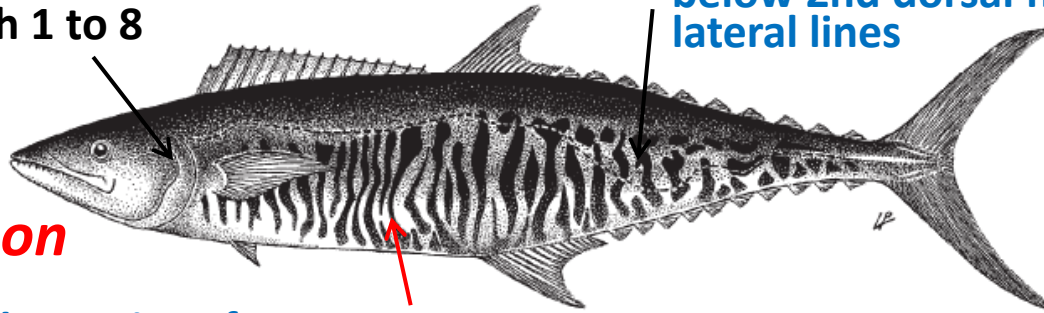
S. sinensis



total gill rakers on
1st gill arch 1 to 8

lateral line with a deep dip
below 2nd dorsal fin spines
lateral lines

S. commerson

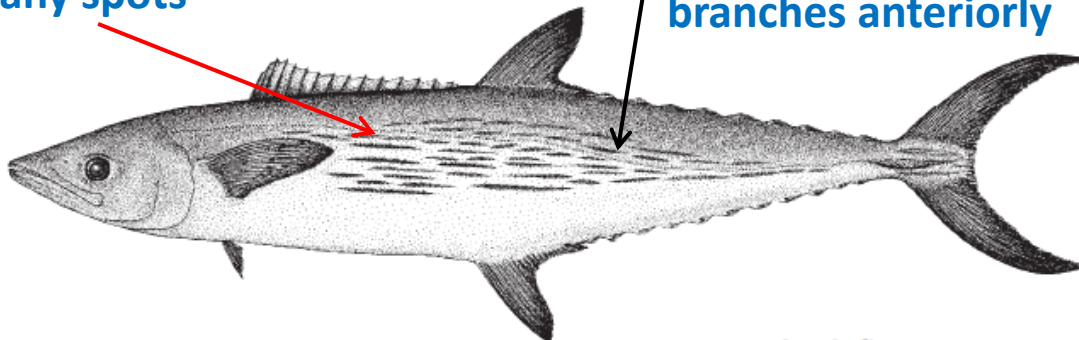


body with a series of
short straight stripes
and few if any spots

body with
vertical stripes

lateral line descending gradually
backward without auxillary
branches anteriorly

S. lineolatus



Five species of the Genus *Scomberomorus* in the Southeast Asian region (2/2)

dorsal-fin spines XV to XVIII
(usually XVI or more)

lateral line descending gradually
backward with many small
auxillary branches anteriorly

S. guttatus

intestine with 2 loops
and 3 limbs

body with
many spots

dorsal-fin spines XIV to
XVII (usually XIV or XV)

lateral line descending gradually
backward with many small auxillary
branches anteriorly

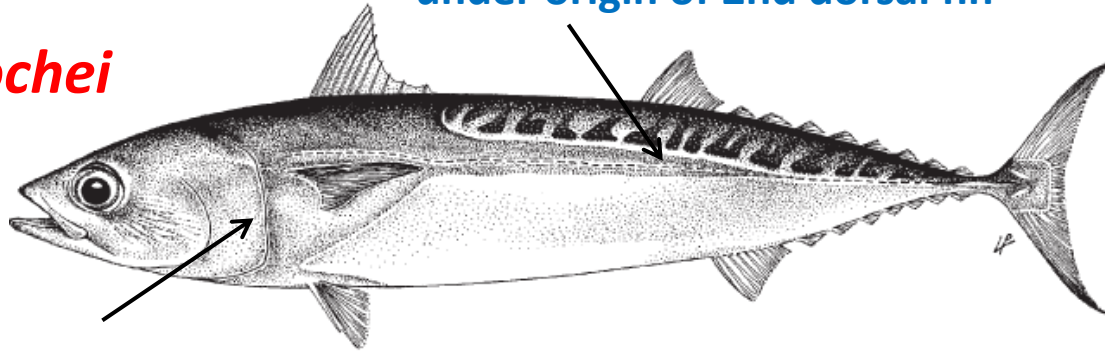
S. koreanus

intestine with 4
loops and 5 limbs

Two species of the Genus *Auxis* in the Southeast Asian region

posterior extension of corselet
wide, usually 10 to 15 scales wide
under origin of 2nd dorsal fin

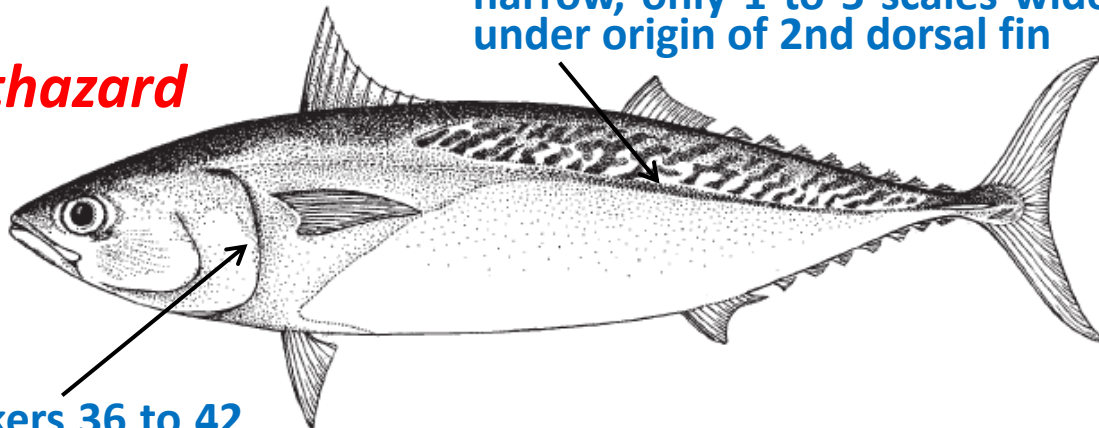
A. rochei rochei



gill rakers 43 to 48
on 1st gill arch

posterior extension of corselet
narrow, only 1 to 5 scales wide
under origin of 2nd dorsal fin

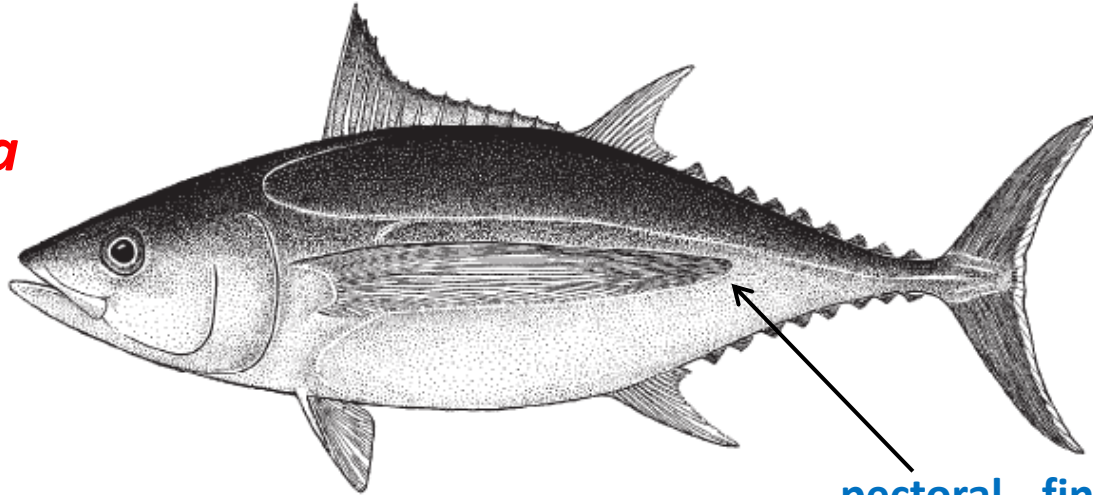
A. thazard thazard



gill rakers 36 to 42
on 1st gill arch

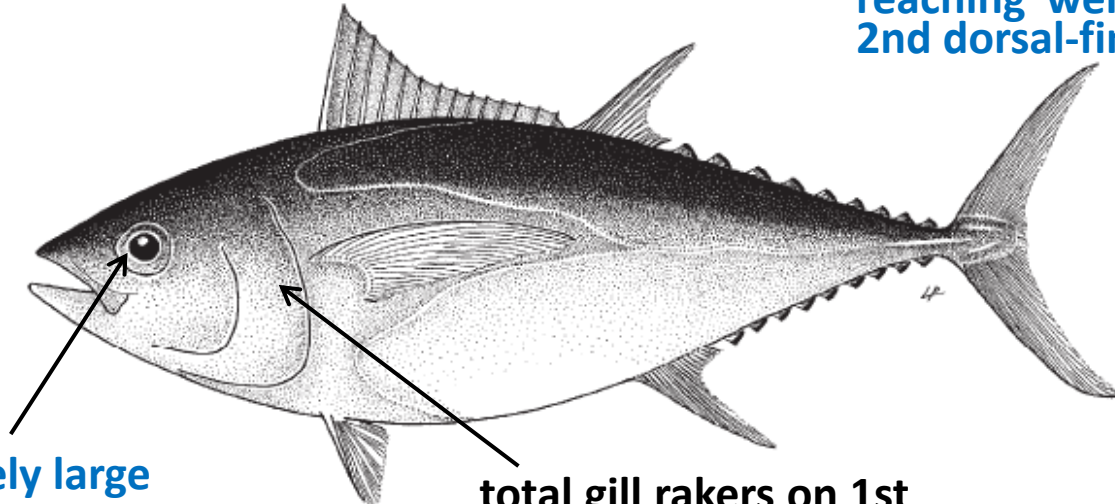
Four species of the Genus *Thunnus* in the Southeast Asian region (1/2)

T. alalunga



pectoral fins very long,
reaching well past end of
2nd dorsal-fin base

T. obesus

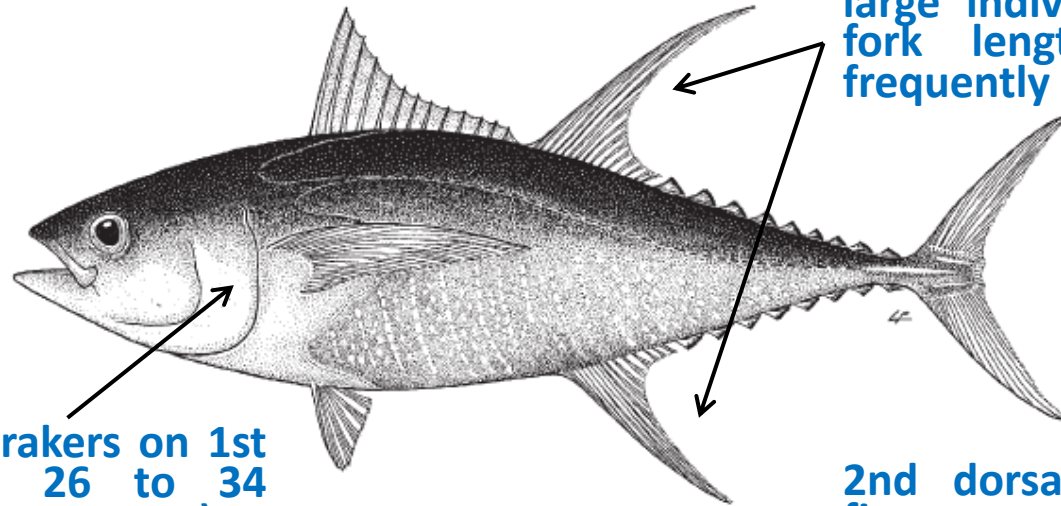


eye relatively large

total gill rakers on 1st
gill arch 23 to 31

Four species of the Genus *Thunnus* in the Southeast Asian region (2/2)

T. albacares

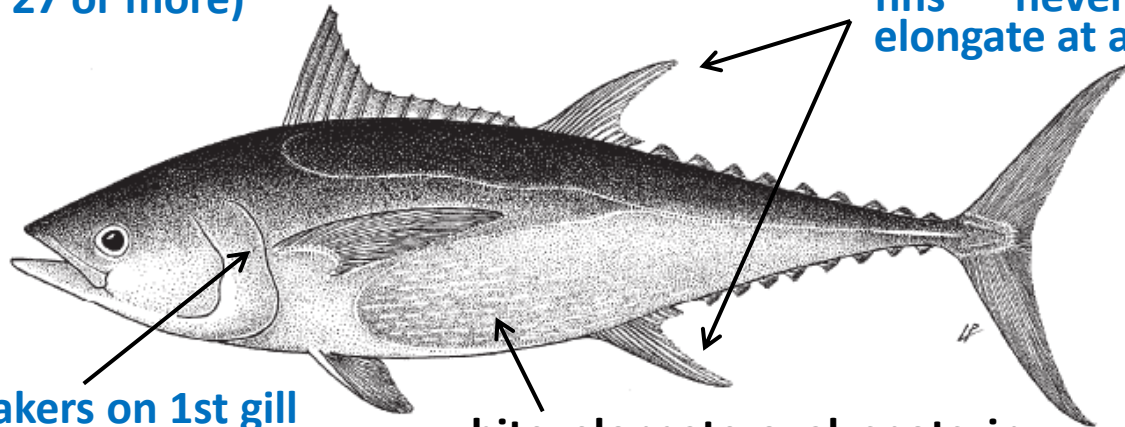


2nd dorsal and anal fins of large individuals (120 cm fork length or longer) frequently elongate

total gill rakers on 1st gill arch 26 to 34 (usually 27 or more)

2nd dorsal and anal fins never greatly elongate at all size

T. tonggol



total gill rakers on 1st gill arch 19 to 27 (usually 26 or fewer)

white elongate-oval spots in horizontally oriented rows present on belly

Larvae

References:

- Okiyama, M. ed. (2013). An atlas of early stage fishes in Japan. Second edition. Tokai University Press, Hatano, 1639pp. (in Japanese).
- Richards, W. J. and G. P. Jenkins. (2000). Scombridae. Pages 693-700 *in* Leis, J. M. and B. M. Carson-Ewart eds. The larvae Of Indo-Pacific coastal fishes. An identification guide to marine fish larvae. Brill, Leiden.



Meristic characters of Southeast Asian scombrid genera

Genus	1st D	2nd D	D finlets	A	A finlets	P ₁	V
1 <i>Scomber</i>	9-13	12	5	12	5	18-21	31
2 <i>Rastrelliger</i>	8-9	12	5	12	5	19-20	31
3 <i>Gymnosarda</i>	13-15	12-14	6-7	12-13	6	25-28	38
4 <i>Sarda</i>	17-19	13-18	7	14-17	6	23-27	44-46
5 <i>Acanthocybium</i>	23-27	12-16	8-9	12-14	9	22-26	62-64
6 <i>Grammatorcynus</i> *	9-13	10-12	6-8	11-13	5-7	21-25	31
7 <i>Scomberomorus</i> *	13-22	15-25	6-11	16-29	5-12	20-26	41-56
8 <i>Auxis</i>	10-12	10-12	8	11-14	7	23-25	39
9 <i>Euthynnus</i>	10-15	11-13	8-10	13-14	6-8	25-29	39
10 <i>Katsuwonus</i>	14-16	14-16	7-9	14-16	6-8	26-27	41
11 <i>Thunnus</i> *	11-14	12-16	7-10	11-16	7-10	30-36	39

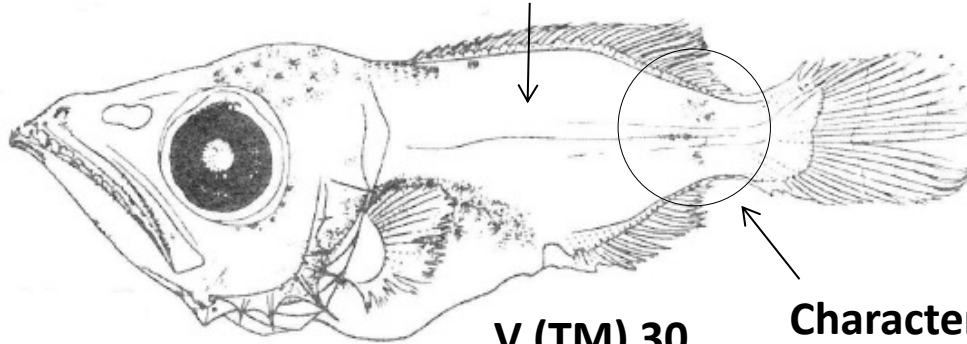
1, 2 : Scombrini ; 3, 4 : Sardini ; 5-7 : Scomberomorini ; 8-11 : Thunnini

*** including the Indo-Pacific species out of the Southeast Asian region.**



Similar larvae to the Scombridae

Outline of trunk and anterior tail rectangular



Scombrolabracidae

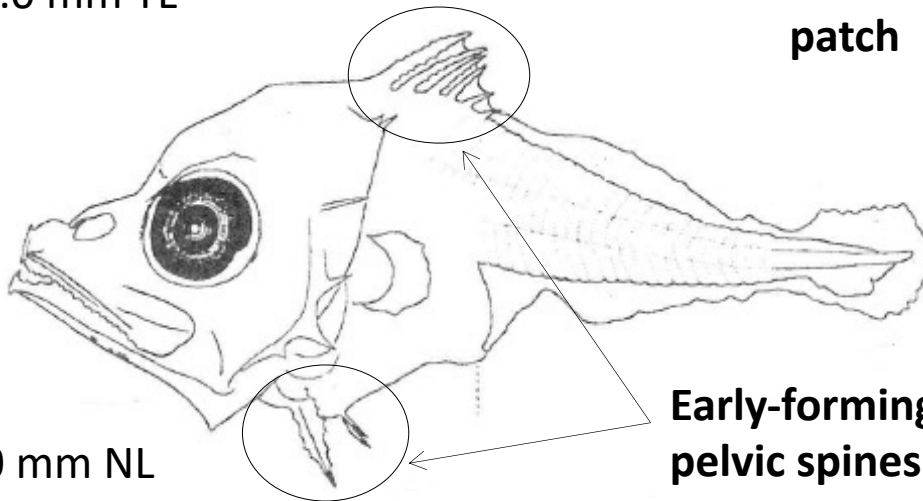
Scombrolabrax heterolepis

Nishikawa (1988, 2013)

6.0 mm TL

V (TM) 30

Characteristic
midlateral pigment
patch



Gempylidae

Nealotus tripes

Nishikawa (1987)

4.0 mm NL

Early-forming dorsal and
pelvic spines well
serrated

Preflexion larvae (V 31) of *Rastrelliger* and *Scomber* are similar to those of Ambassidae (24), Nemipteridae (23-24), Sparidae (24), Terapontidae (25), Pinguipedidae (29-34) and some myctophids (no head spines and head compressed) .



Key to species (genus) of the Scombridae larvae (ca 10 mm BL >) in the Southeast Asian region (1 / 3)

- 1 a No preopercular spines. Round head and mouth relatively small.
Ventral margin of tail pigmented. V (TM) 31. ***Scomber, Rastrelliger***
- 1 b Preopercular spines present. **2**
- 2 a Snout and head round. Preopercular spines small and supraorbital ridge
not distinct. Five to 6 large pigment patches present on dorsolateral
body in flexion to juvenile stages. V (TM) 31.
. ***Grammatorcynus bilineatus***
- 2 b Head, eyes and mouth relatively large. Spines on preopercle, post-
temporal well-developed. V (TM) more than 32. **3**
- 3 a A supraoccipital spine present. **4**
- 3 b Supraoccipital spine absent. **5**
- 4 a Snout large and its length about 2 times of eye diameter. Mouth large.
Supraoccipital spine distinct. V (TM) more than 46.
. ***Scomberomorus***
- 4b Snout moderately large and its length 1.5 times of eye diameter.
Supraoccipital spine small. V (TM) 44-45. ***Sarda orientalis***



Key to species (genus) of the Scombridae larvae (ca 10 mm BL >) in the Southeast Asian region (2 / 3)

- 5 a Body elongate and anus position beyond half body. Snout very elongate and mouth large. V (TM) 62-64. ▪▪ ***Acanthocybium solandri***
- 5 b Body moderate and tail tapering. Gut compact and anus anterior to half body. Snout and mouth varied (small to large). V (TM) 40-42.
..... 6
- 6 a Snout elongate. Tip of upper jaw well projecting. Pigment appears densely on branchiostegal membrane and opercular portion. No pigment appears on tail. ***Gymnosarda unicolor***
- 6 b Snout not elongate. Pigment on body poor. 7
- 7 a Inner pigment appears at anterior margin of forebrain. 8
- 7 b No inner pigment appears at anterior margin of forebrain. 10
- 8 a Pigment present on isthmus and preanus. Pigment spots appear on ventral midline of tail. ***Euthynnus affinis***
- 8 b No pigment present on isthmus and preanus. 9



Key to species (genus) of the Scombridae larvae (ca 10 mm BL >) in the Southeast Asian region (3 / 3)

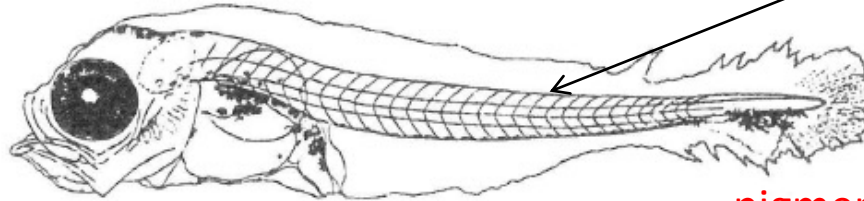
- 9 a Anterior tip of lower jaw pigmented (3 mm NL <). Pigment on spinous dorsal fin begin to appear in 8-mm BL. *Katsuwonus pelamis*
- 9 b Anterior tip of lower jaw unpigmented (at least ca 8 mm NL >). Pigment on spinous dorsal fin begin to appear in 5-mm BL. *Thunnus tonggol*
- 10 a Pigment present on isthmus and preanus. *Auxis*
- 10 b No pigment on isthmus and preanus. 11
- 11 a One to two small melanophores present on ventral midline of caudal peduncle. *Thunnus obesus*
- 11 b No melanophores present on lateral body. 13
- 12 a Lower jaw tip unpigmented (ca 8-mm BL >). *Thunnus alalunga*
- 12 b Lower jaw tip pigmented. *Thunnus albacares*



((length of dorsal-fin base
from 1st to 9th spines) / (SL)
X 100) >12 (for more than
15-mm SL specimens)

Scomber japonicus

a 3.8 mm NL

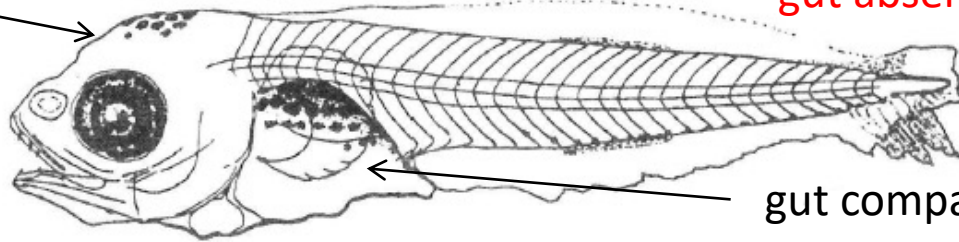


V (TM) 31

pigment on preanus and ventral
gut absent or very small

head and
snout round

b 6.3 mm NL

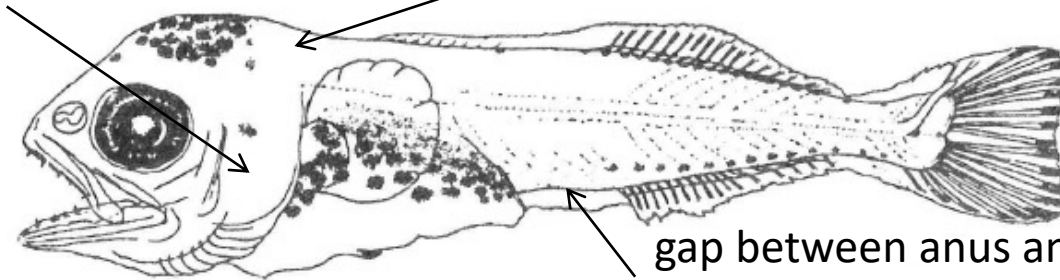


gut compact

no inner pigment at nape (ca 8 mm >)

no preopercle
spines

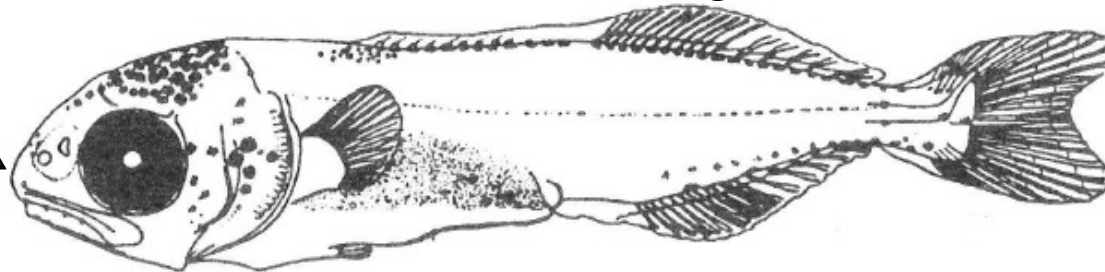
c 8.4 mm SL



gap between anus and anal-fin
origin wide

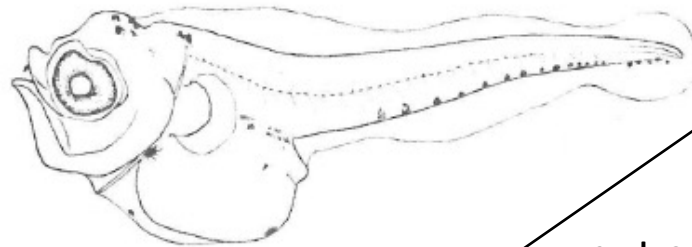
upper jaw tip
slightly projecting

d 10.4 mm SL



((length of dorsal-fin base from 1st to 9th spines) / (SL X 100) <12 (for more than 15-mm SL specimens)

Scomber australasicus

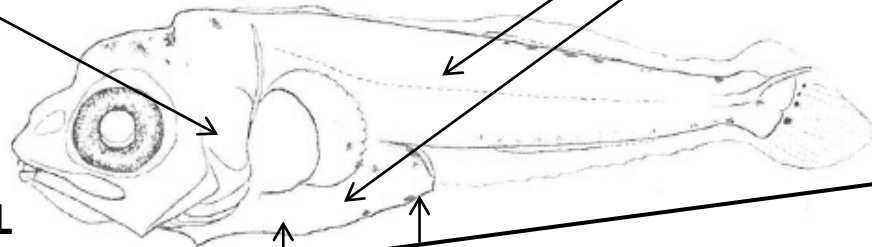


a 3.8 mm NL

V (TM) 31

no preopercle spines

gut compact

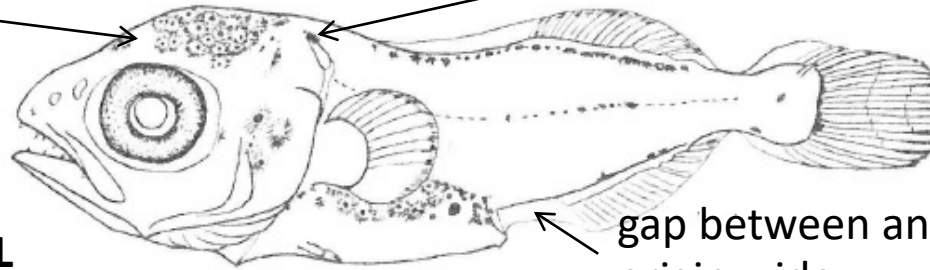


b 5.1 mm SL

pigment on preanus and ventral gut absent or very small

inner pigment at nape (ca 8 mm>)

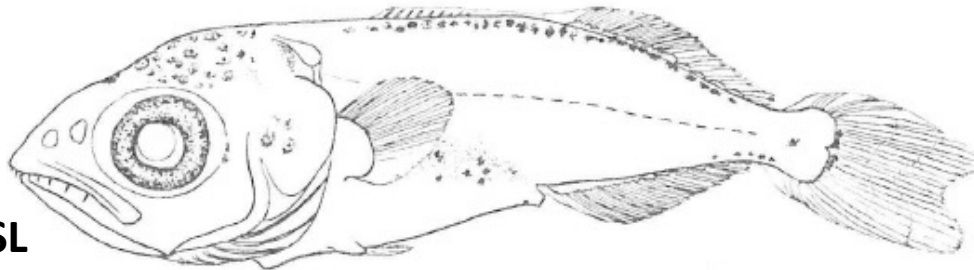
head and snout round



c 7.1 mm SL

gap between anus and anal-fin origin wide

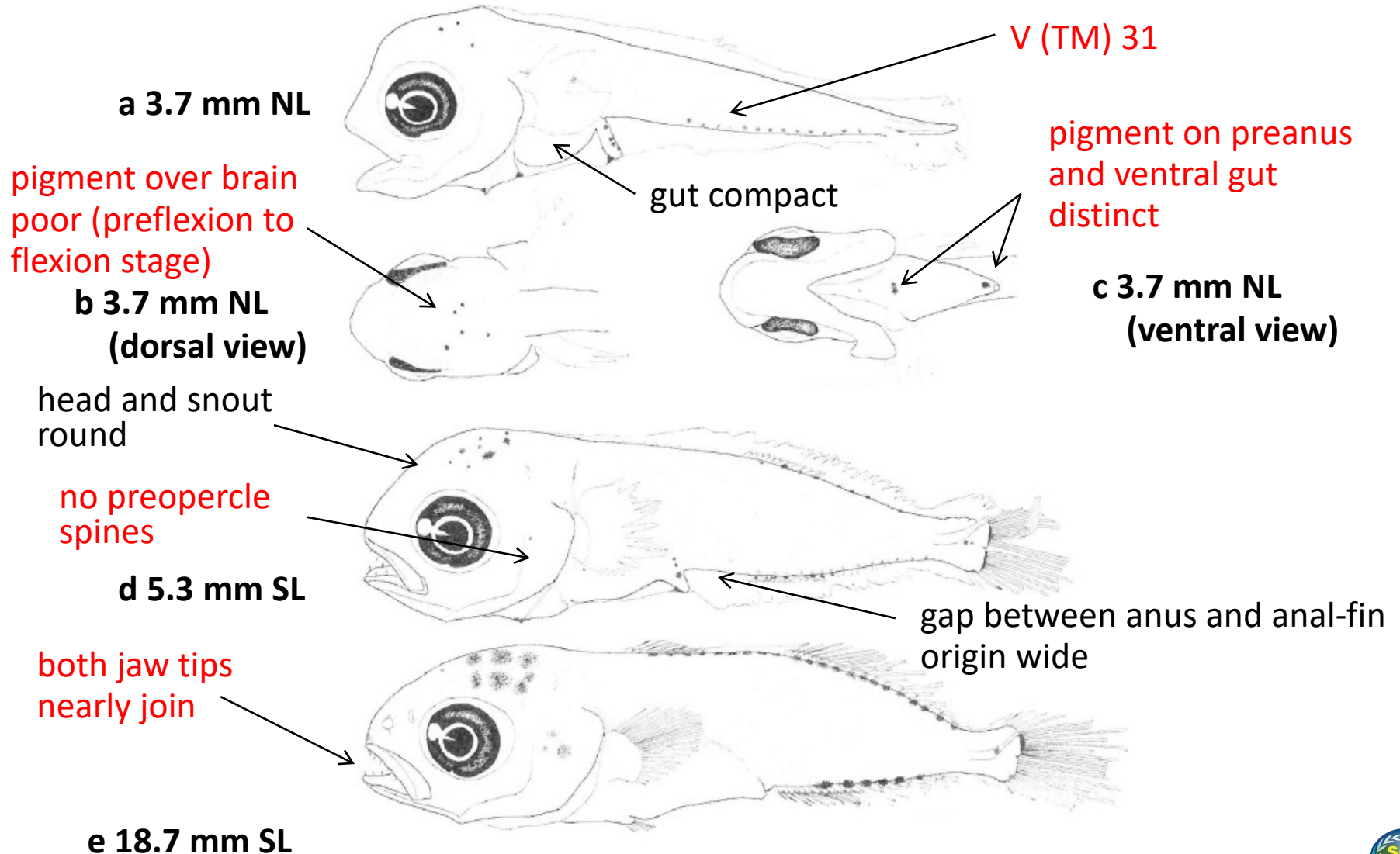
upper jaw tip slightly projecting



d 9.2 mm SL

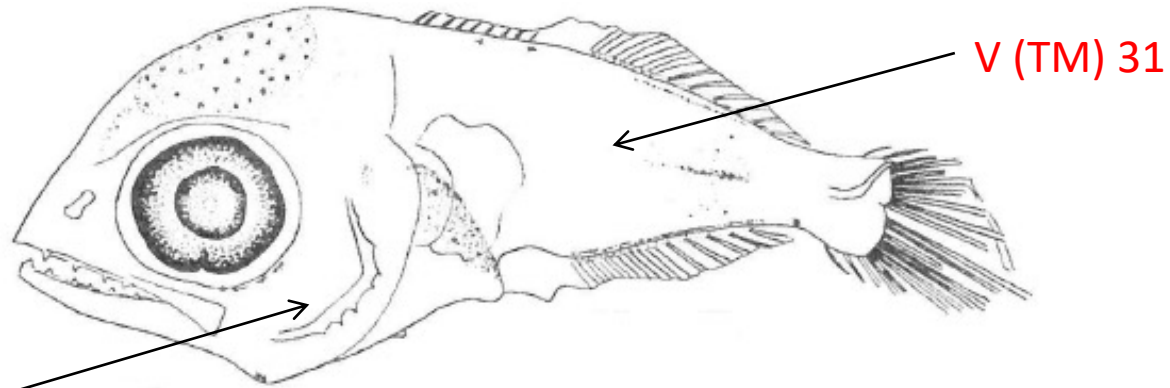


Rastrelliger kanagurta (tentative)



Grammatorcynus bilineatus

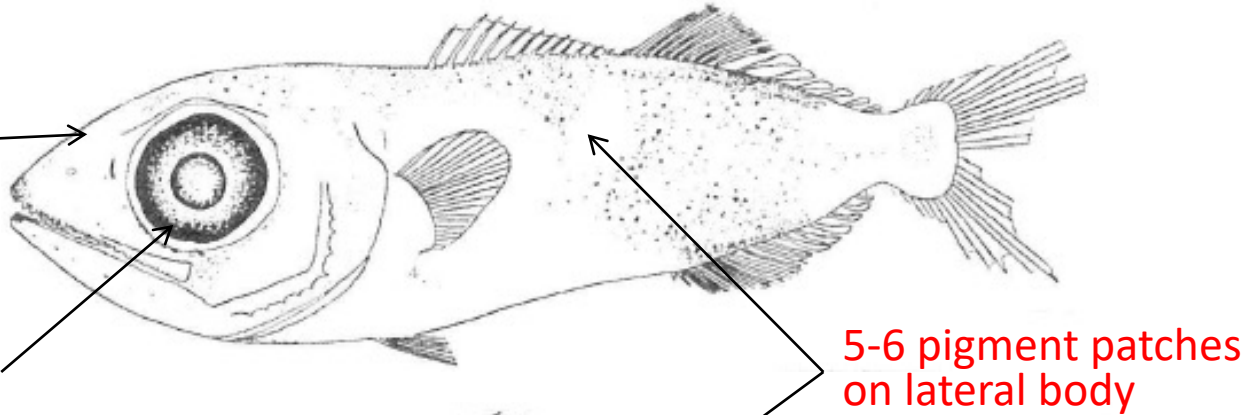
a 4.8 mm SL



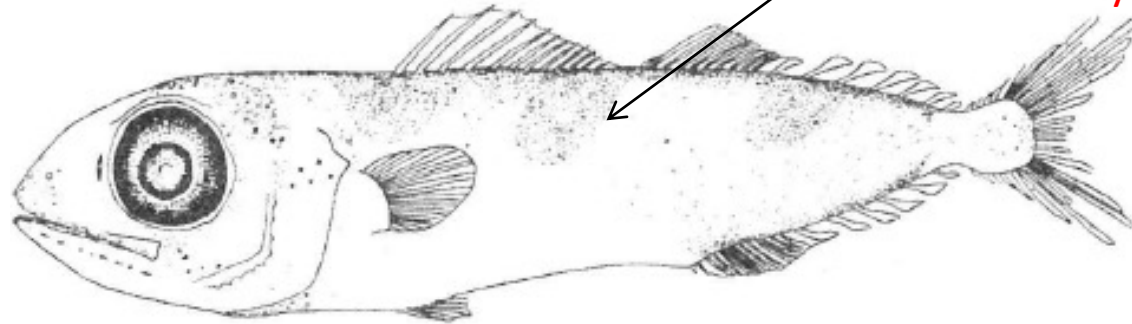
head and snout round

b 11.5 mm SL

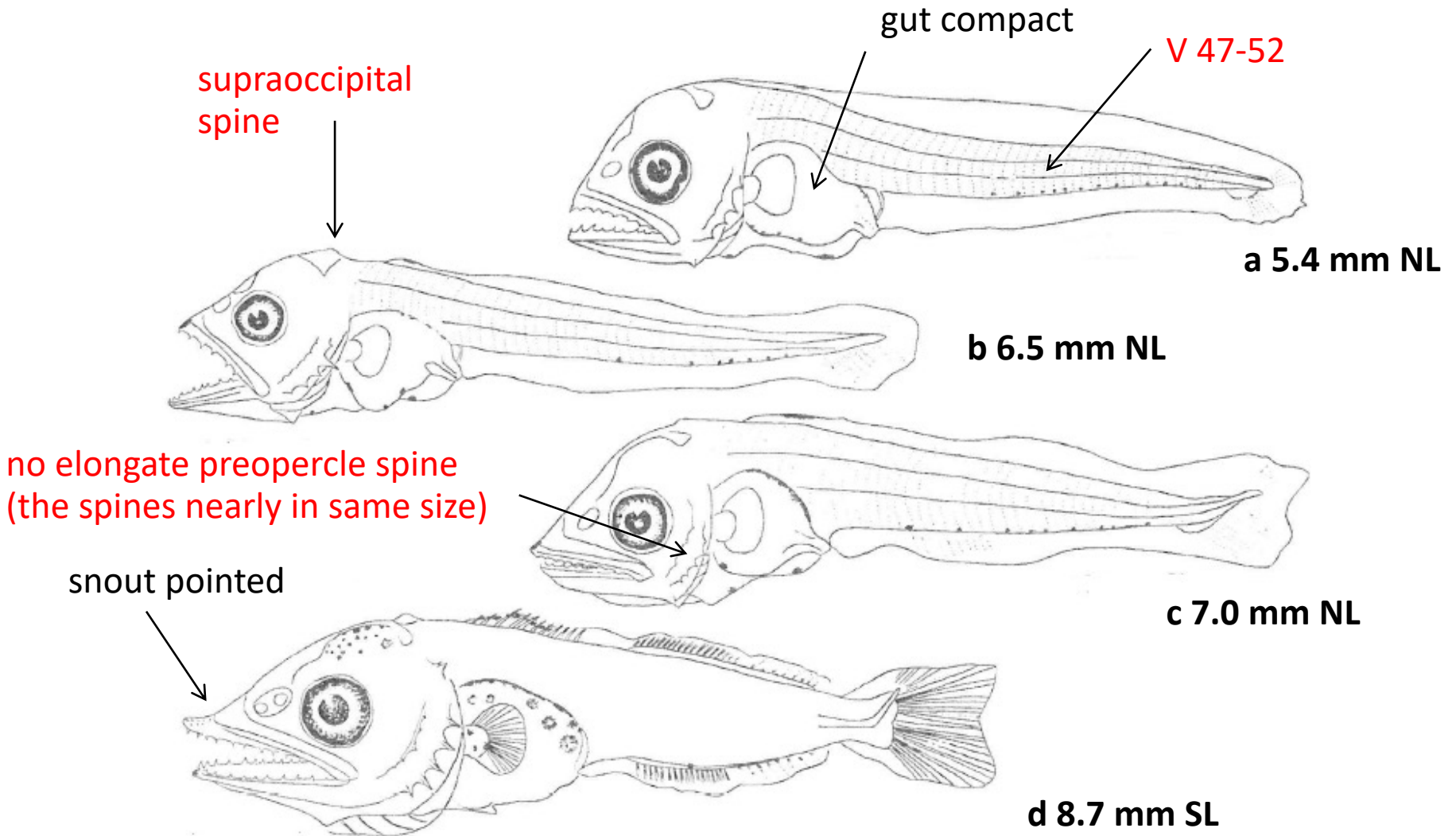
eye large



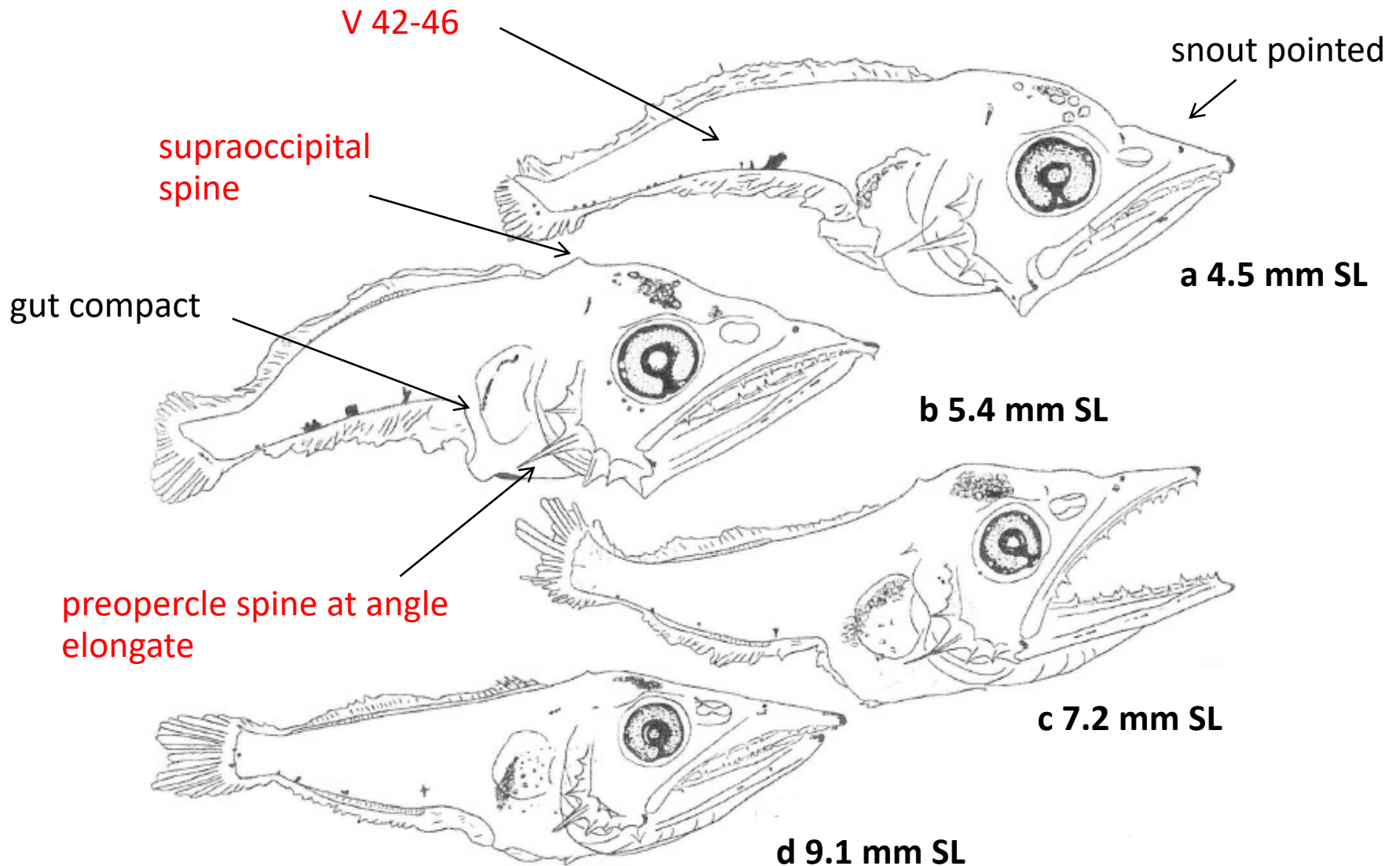
c 25.5 mm SL



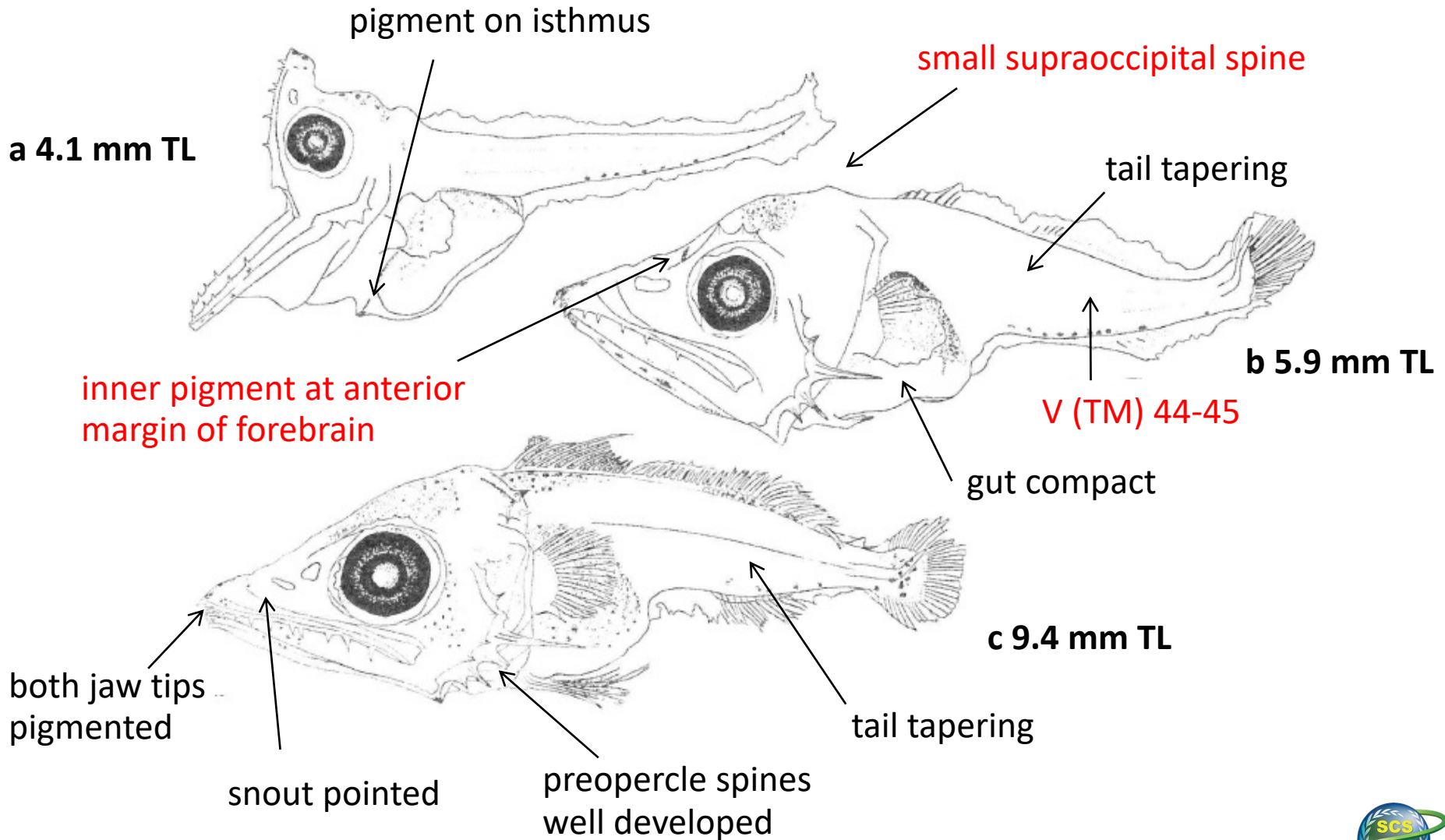
Scomberomorus guttatus



Scomberomorus commerson

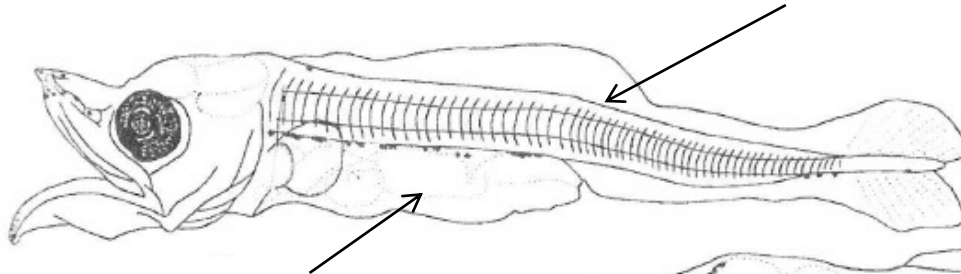


Sarda orientalis



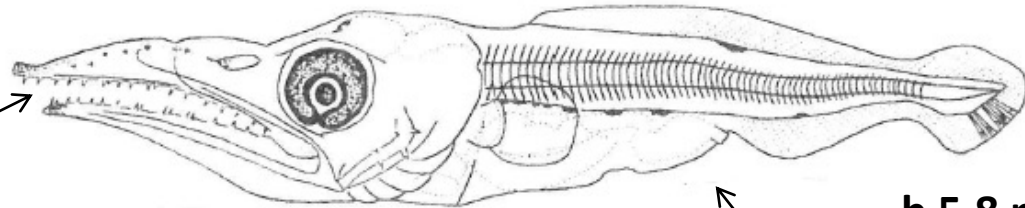
Acanthocybium solandri

V (TM) 62-64



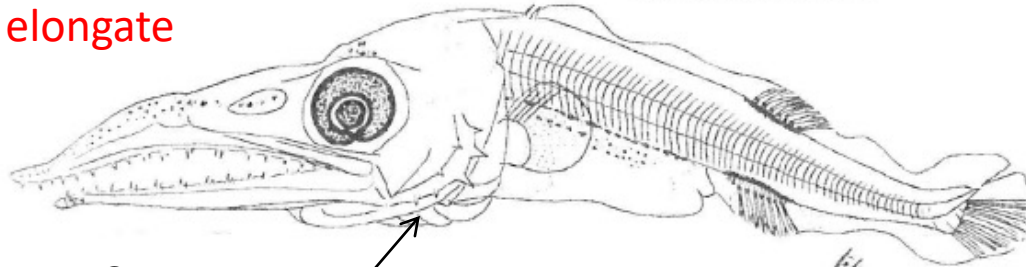
a 3.4 mm NL

gut long and anus position
beyond half body



b 5.8 mm NL

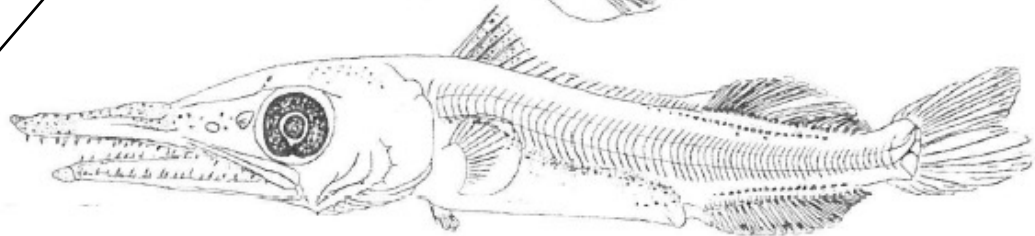
snout very elongate



c 6.8 mm SL

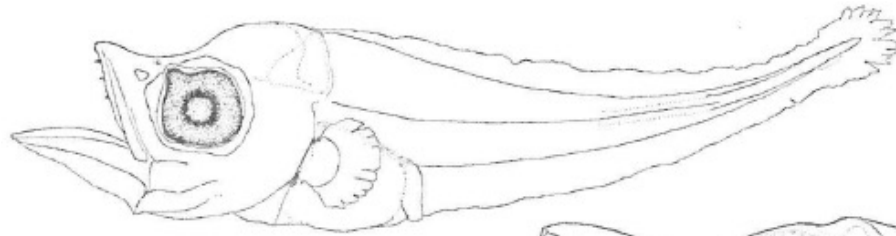
body elongate

no elongate preopercle
spine (the spines nearly
in same size)



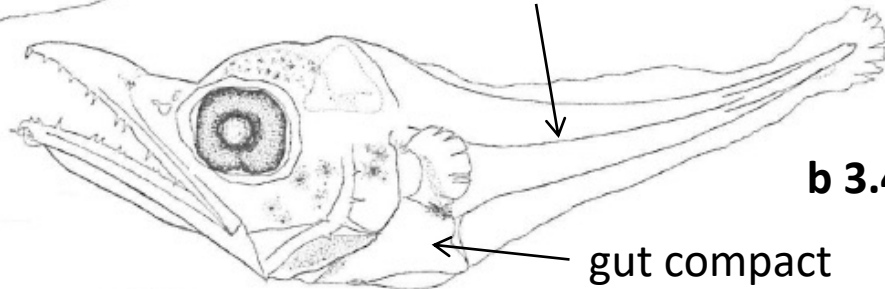
d 13.2 mm SL

Gymnosarda unicolor



a 2.5 mm NL

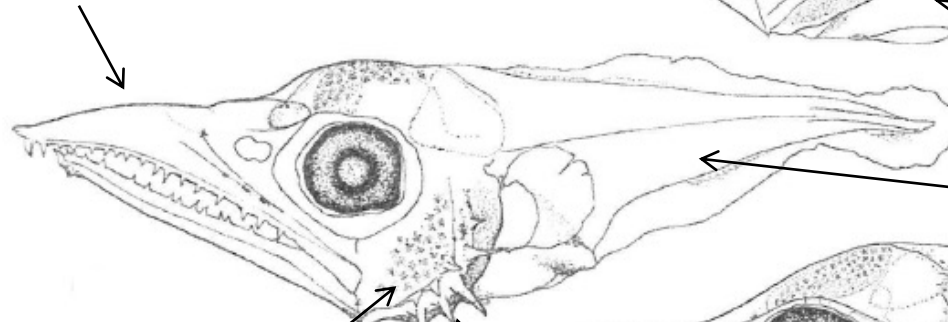
V (TM) 38



b 3.4 mm NL

gut compact

snout very elongate

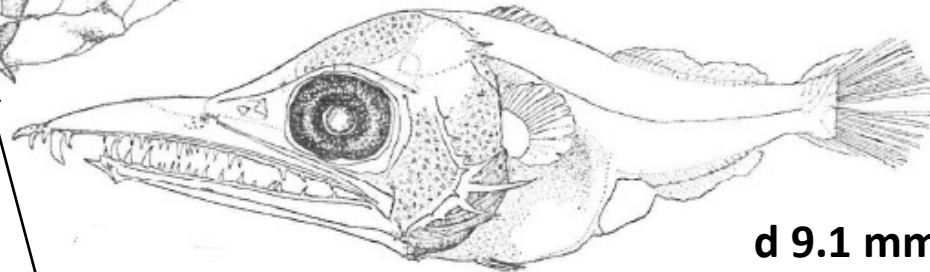


c 5.1 mm NL

tail tapering

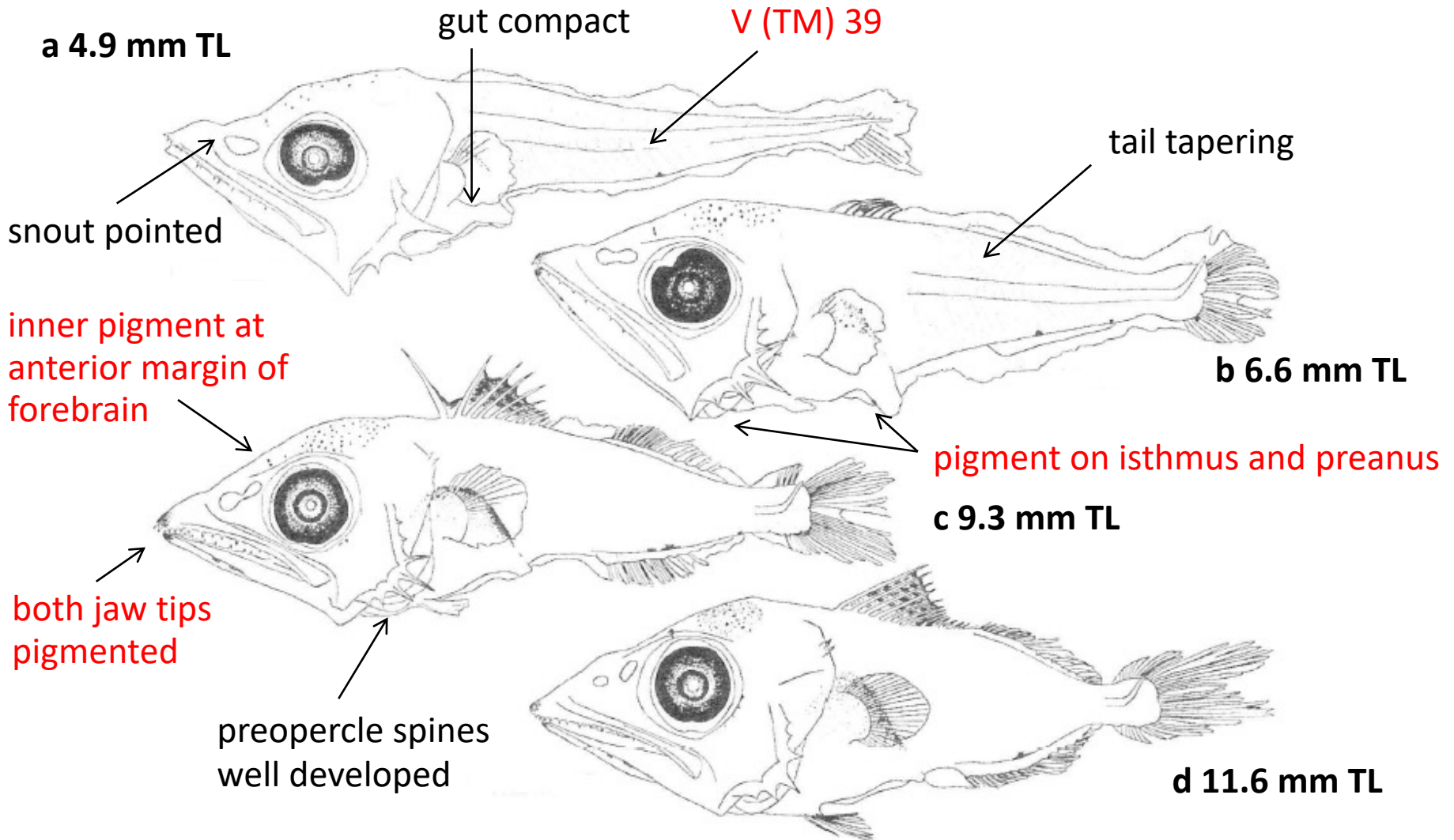
opercular portion and
branchiostegal membrane
heavily pigmented

preopercle spines
moderately large

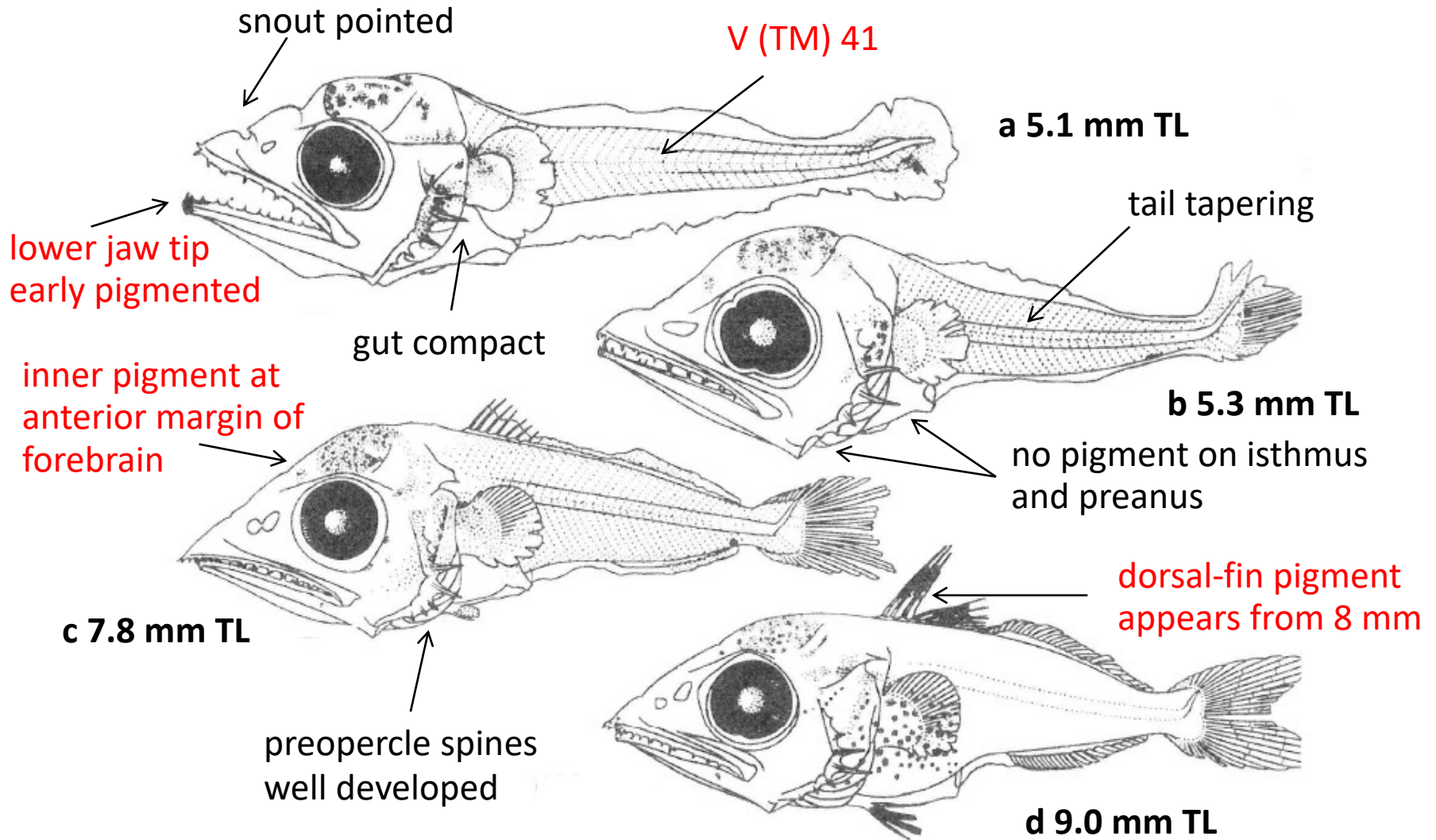


d 9.1 mm SL

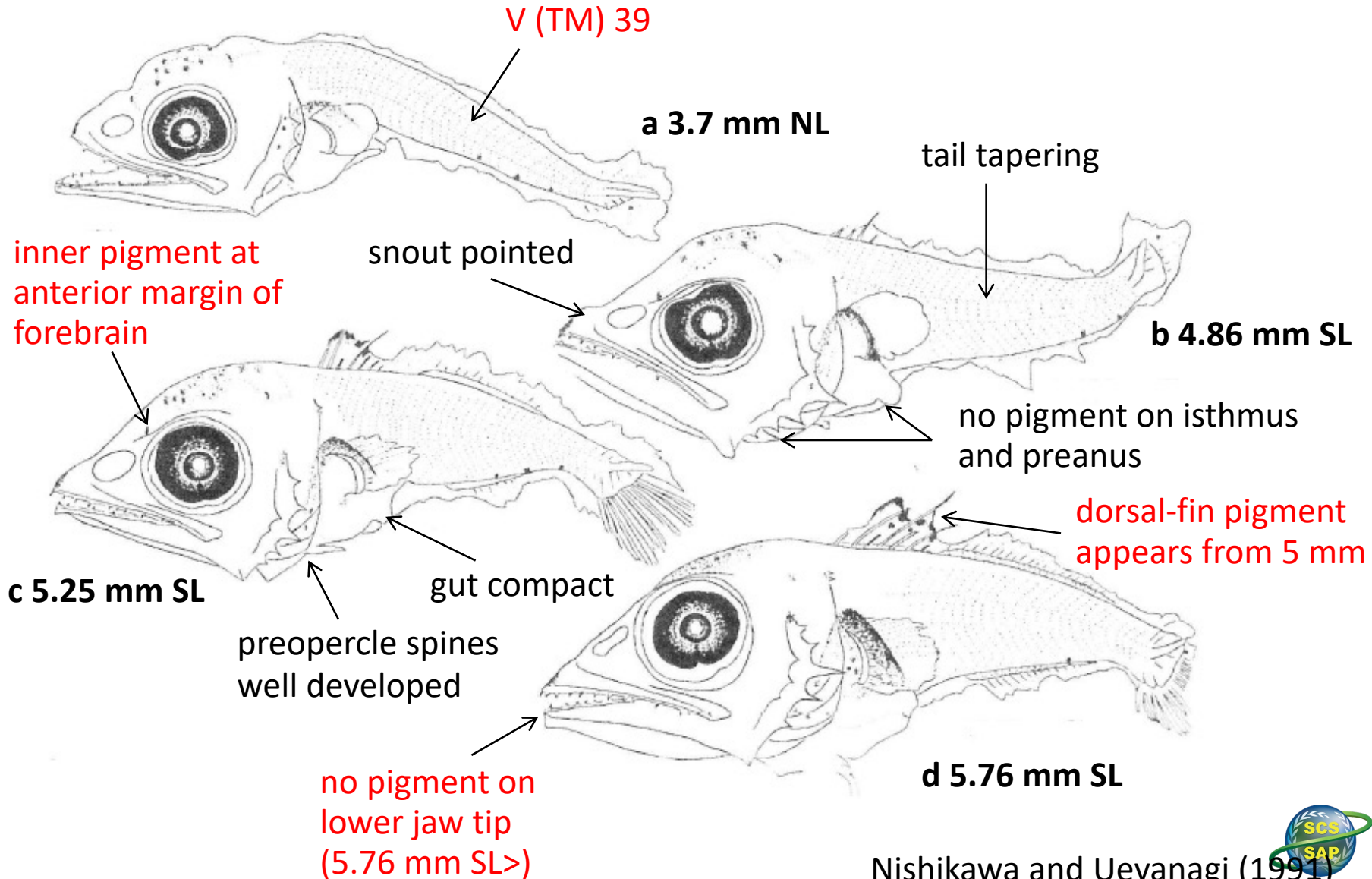
Euthynnus affinis



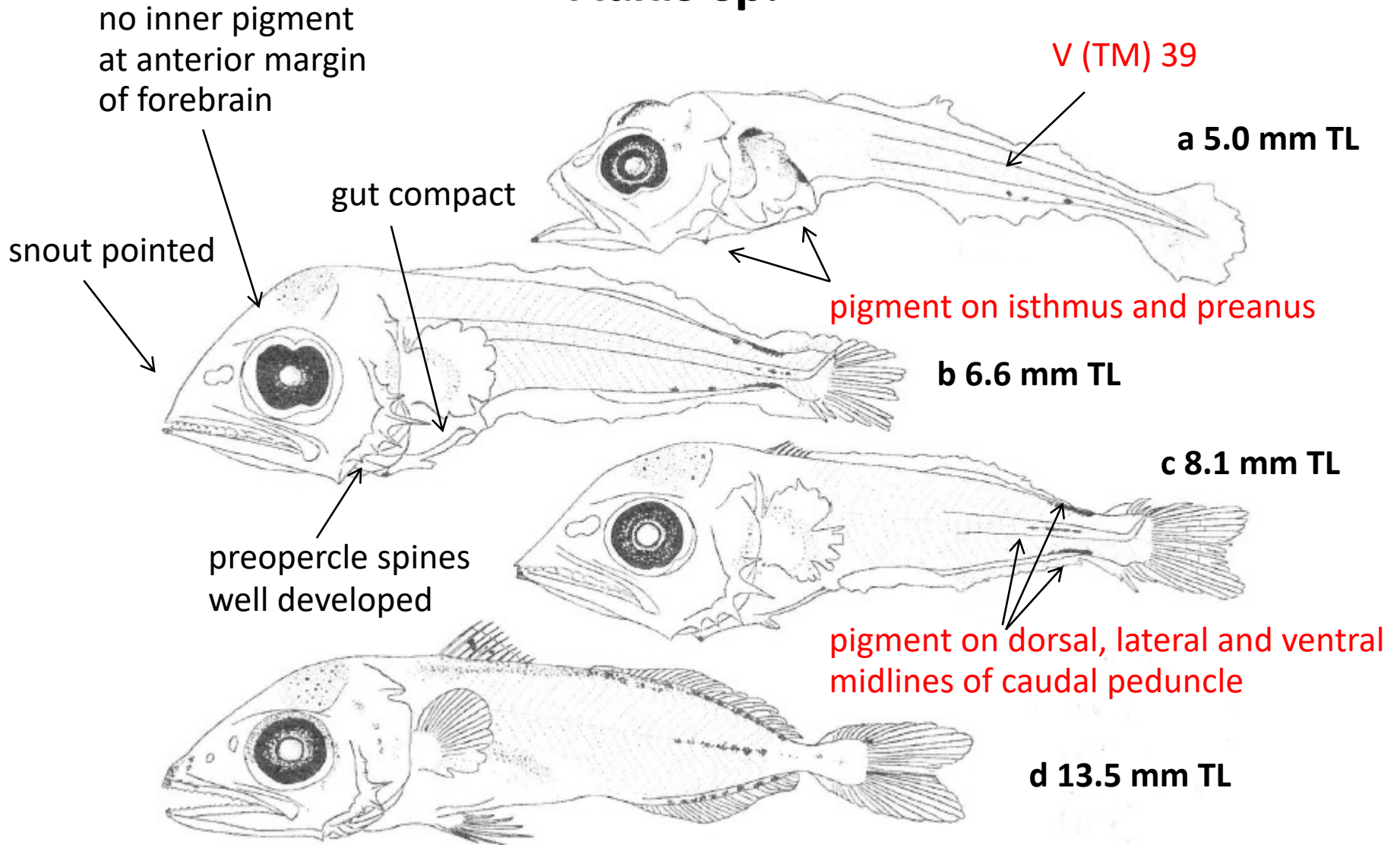
Katsuwonus pelamis



Thunnus tonggol



Auxis sp.



Richards (2006) identified larvae with pigment on lateral midline of caudal peduncle as *A. thazard*.

Thunnus obesus

✂ *T. orientalis* (bluefin tuna) very similar to this species has pigment on dorsal midline of tail too.

no inner pigment at anterior margin of forebrain

V (TM) 39

1-2 small pigment spots on ventral midline of tail

no pigment on isthmus and preanus

tail tapering

snout pointed

a 4.1 mm TL

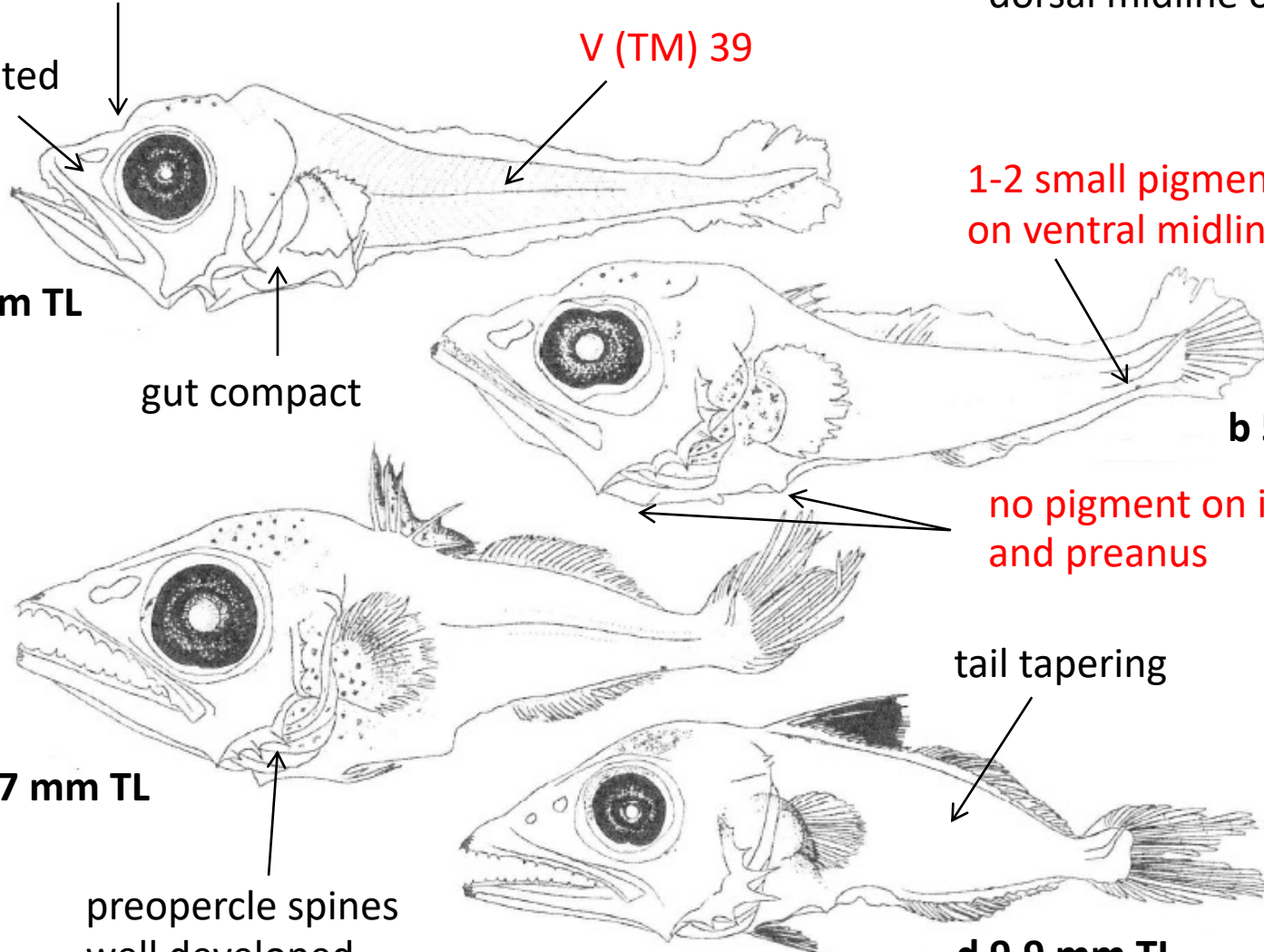
gut compact

b 5.5 mm TL

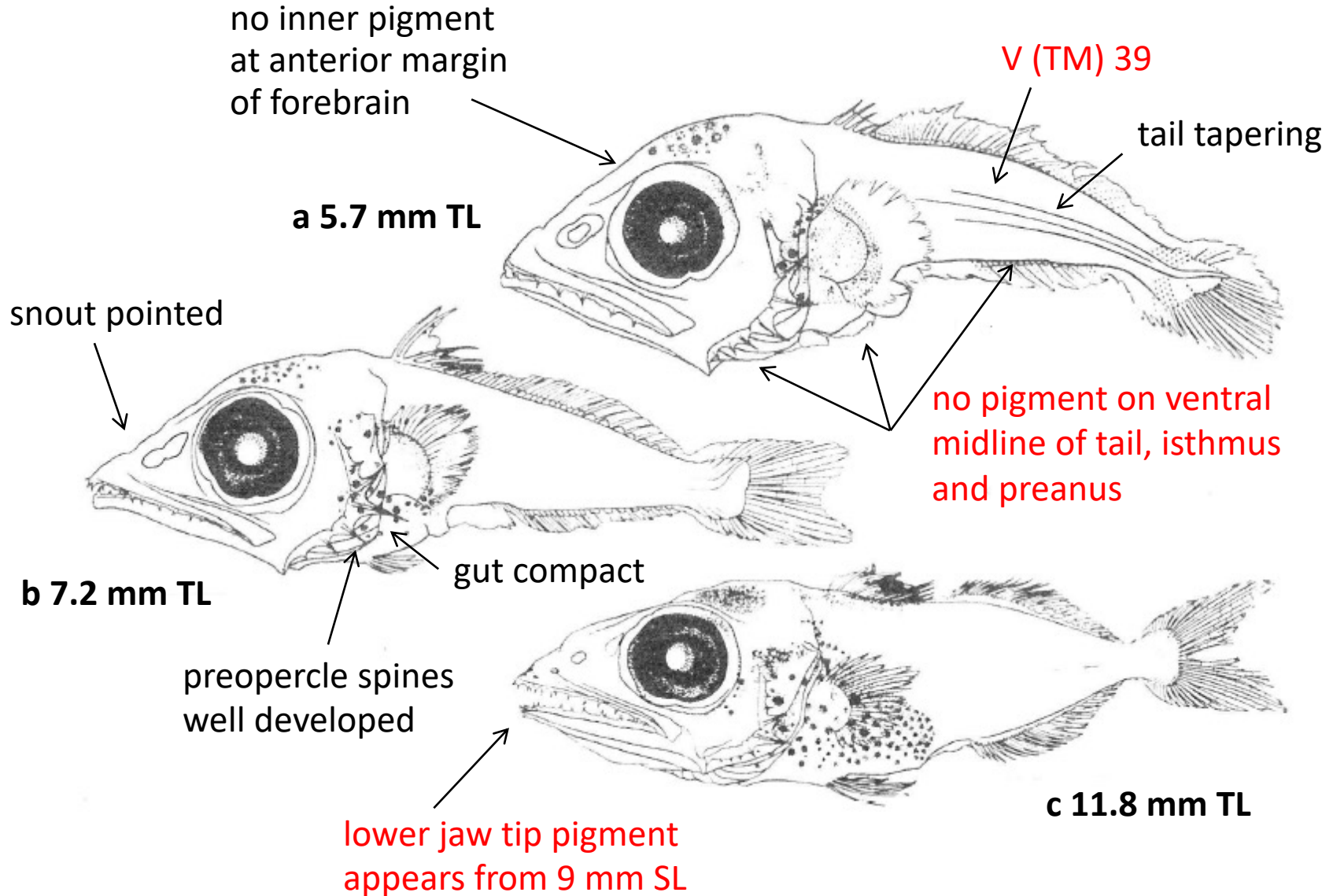
c 7.7 mm TL

preopercle spines well developed

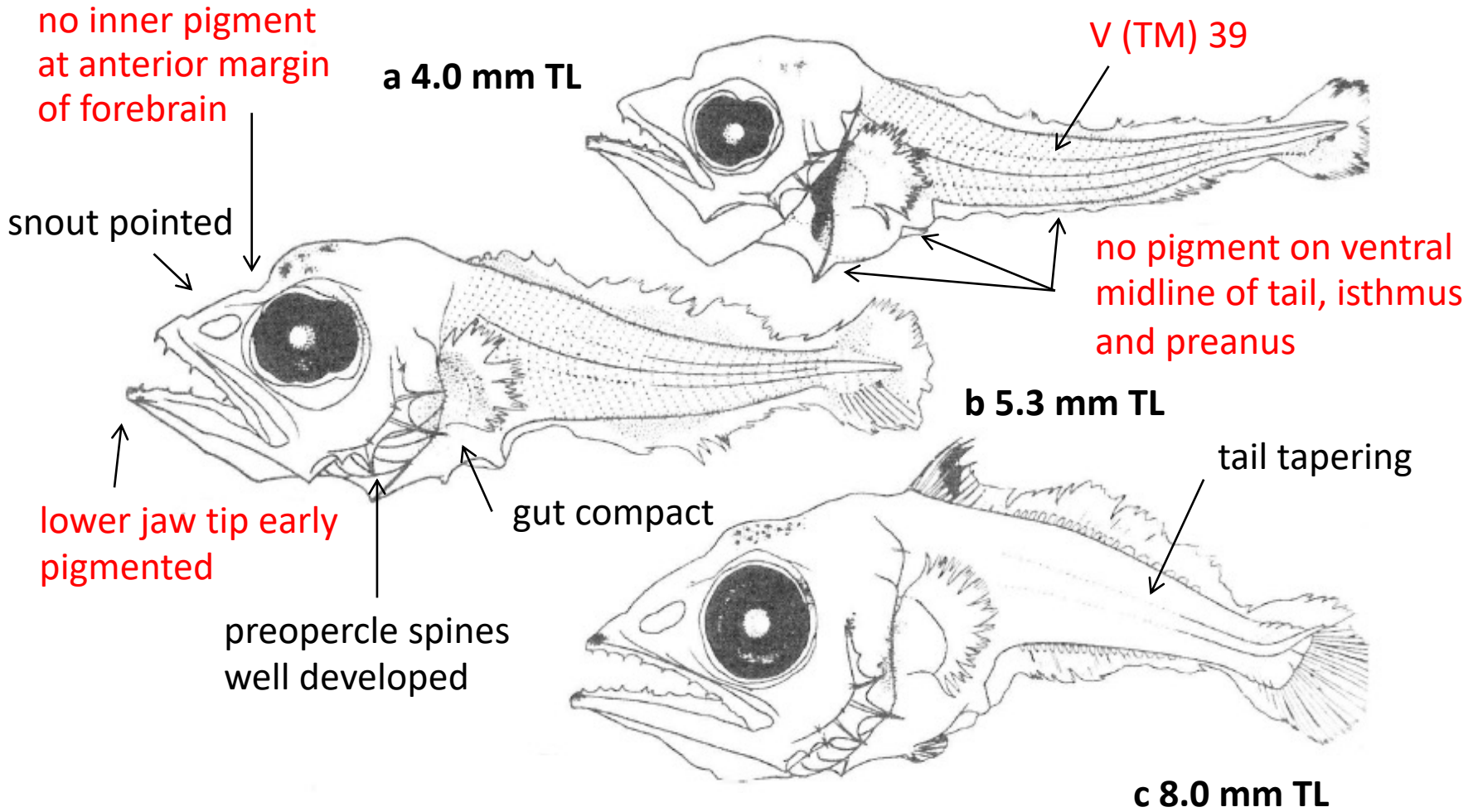
d 9.9 mm TL



Thunnus alalunga



Thunnus albacares



Thank you for your attention



***KATSUO TATAKI* (lightly roasted skipjack)**