



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

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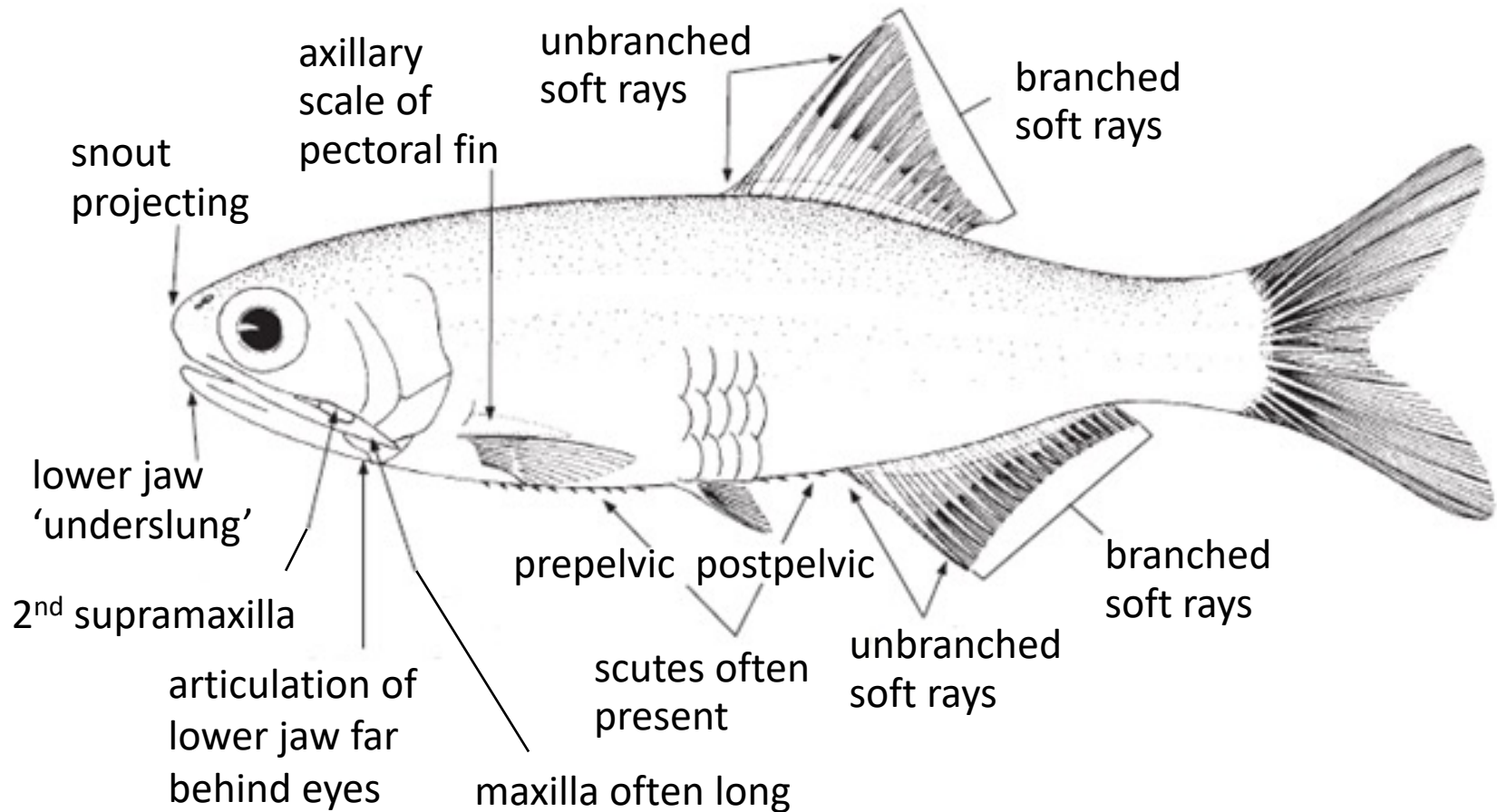


Adults

Reference:

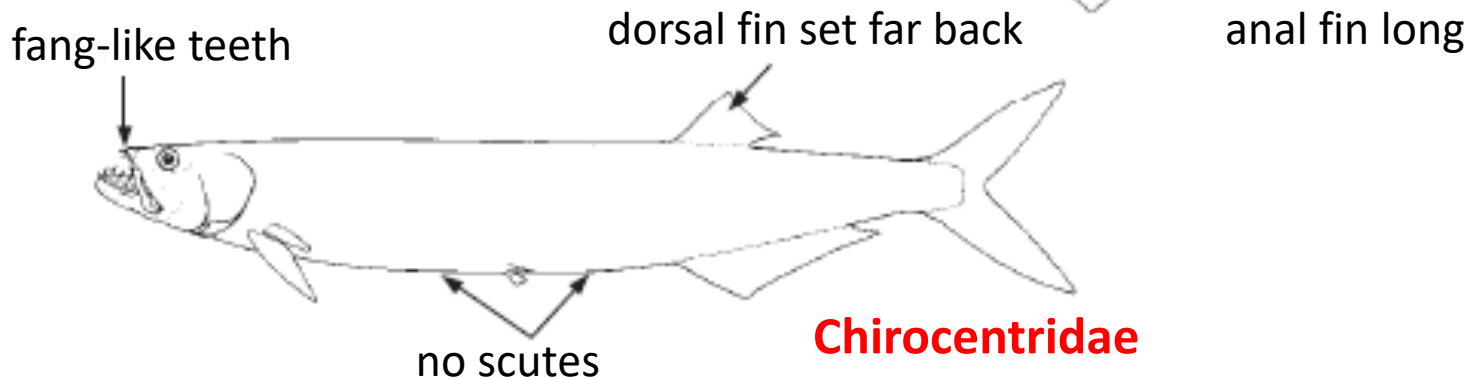
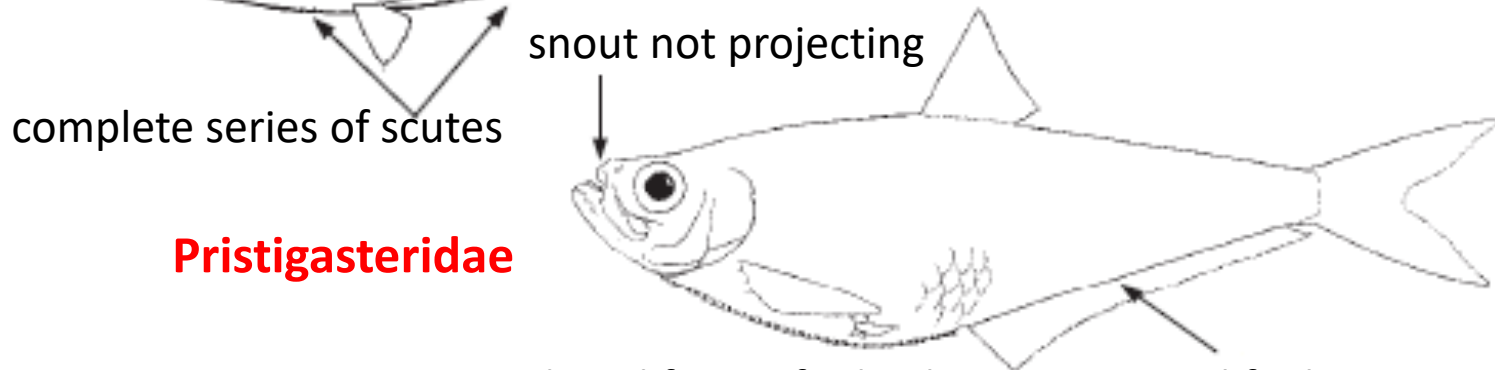
Wongratana, T., T. A. Munroe and M. S. Nizinski (1998).
Engraulidae. Pages 1698-1753 *in* Carpenter, K. E.
and V. H. Niem eds. The living marine resources of
the Western Central Pacific. FAO species identification
guide for fishery purposes. FAO, Rome.

Diagnostic characters of the Engraulidae fishes



-
- Dorsal fin single, short, and usually near midpoint of body (far forward in *Coilia*).
 - No adipose fin.
 - Pectoral fins set low on body.
 - Pelvic fins anterior to, equal with, or posterior to the vertical through dorsal-fin base.

Similar families to the Engraulidae in the Southeast Asian region (Clupeiformes)



Representative species of engraulid genera in the region



Coilia dussumieri



Setipinna melanochir



Thryssa dussumieri



Lycothrissa crocodilus



Encrasicholina heteroloba



Stolephorus commersonii

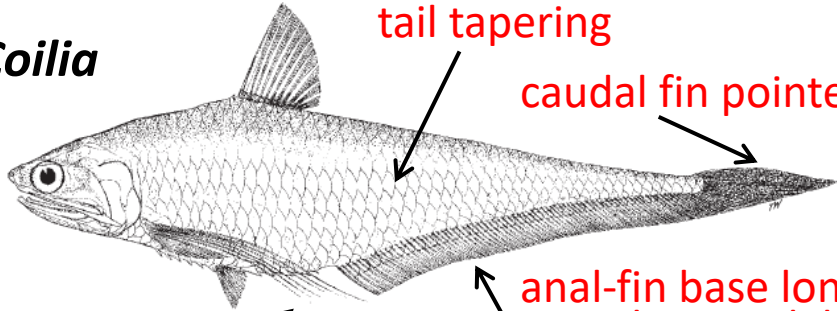


Engraulis japonicus

Seven genera of the Engraulidae in the Southeast Asian region



Coilia



tail tapering

caudal fin pointed

anal-fin base long, joined to caudal fin

elongate, free pectoral-fin rays

teeth canine-like

Lycothrissa

upper pectoral-fin ray not extend as a filament

anal-fin base long, not joined to caudal fin

Encrasicholina

only prepelvic scutes

anal-fin base short, its origin posterior to dorsal fin

Setipinna

upper pectoral-fin ray a filament

Stolephorus

only prepelvic scutes

anal-fin base short, its origin anterior to dorsal-fin end

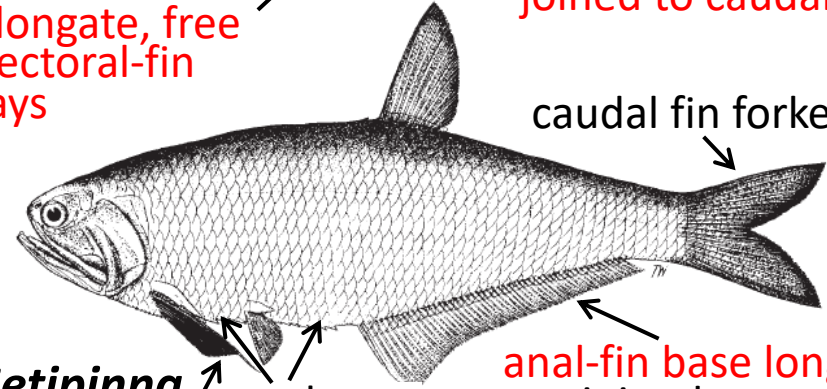
Thryssa

upper pectoral-fin ray not extend as a filament

Engraulis

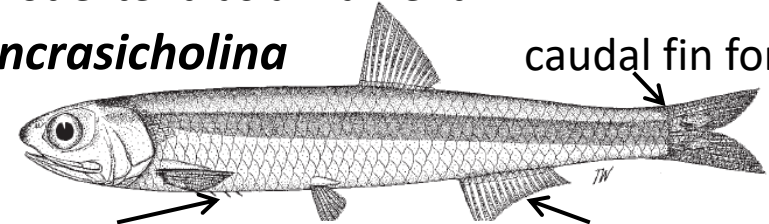
no scutes

anal-fin base short, its origin posterior to dorsal fin

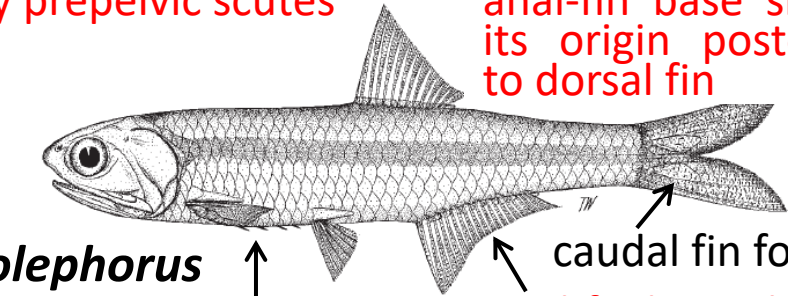


caudal fin forked

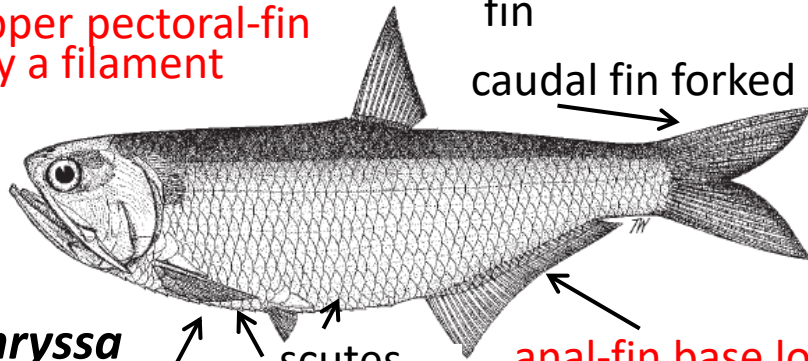
anal-fin base long, not joined to caudal fin



caudal fin forked

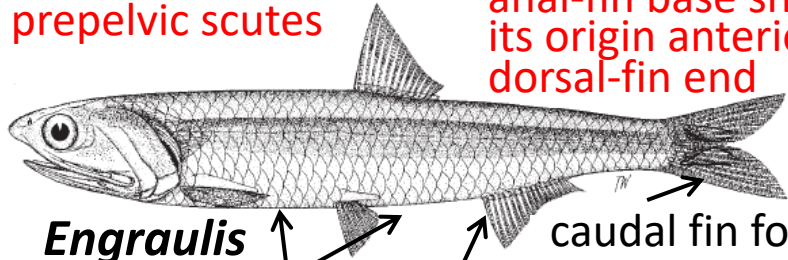


caudal fin forked



caudal fin forked

anal-fin base long, not joined to caudal fin



caudal fin forked

Genera and species of the Engraulidae in the Southeast Asian region

No.	Genus	Species
1	<i>Coilia</i>	8
2	<i>Encrasicholina</i>	4
3	<i>Engraulis</i>	1
4	<i>Lycothrissa</i>	1
5	<i>Setipinna</i>	4
6	<i>Stolephorus</i>	10
7	<i>Thryssa</i>	8

Total
36 species



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

Genus	Mya	Mal 1	Mal 2	Thai	Cam	Vie
<i>Coilia</i>	2	2	2	2	1	3
<i>Setipinna</i>	2	1	2	2	1	0
<i>Thryssa</i>	6	5	5	5	5	3
<i>Lycothrissa</i>	1	1	1	1	1	1
<i>Engraulis</i>	0	0	0	0	0	0
<i>Encrasicholina</i>	3	3	3	3	3	3
<i>Stolephorus</i>	5	2	8	8	8	4
Total	19	14	21	21	19	14

Mya : Myanmar ; Mal 1 : west coast of Peninsula Malay ; Mal 2 : east coast of Peninsula Malay ; Thai : Thailand (the Gulf of Thailand) ; Cam : Cambodia ; Vie : Viet Nam



Species of the engraulid *Coilia* * in Myanmar, Malaysia, Thailand, Cambodia and Viet Nam

Species	Mya	Mal 1	Mal 2	Thai	Cam	Vie
<i>C. borneensis</i>						
<i>C. coomansi</i>						
<i>C. grayii</i>						○
<i>C. dussumieri</i>	●	●	●	●		
<i>C. lindmani</i>			○	○	○	○
<i>C. macrognathos</i>						
<i>C. neglecta</i>	○	○				
<i>C. rebentischii</i>						○
Total	2	2	2	2	1	3

* Habitat in the low salinity area

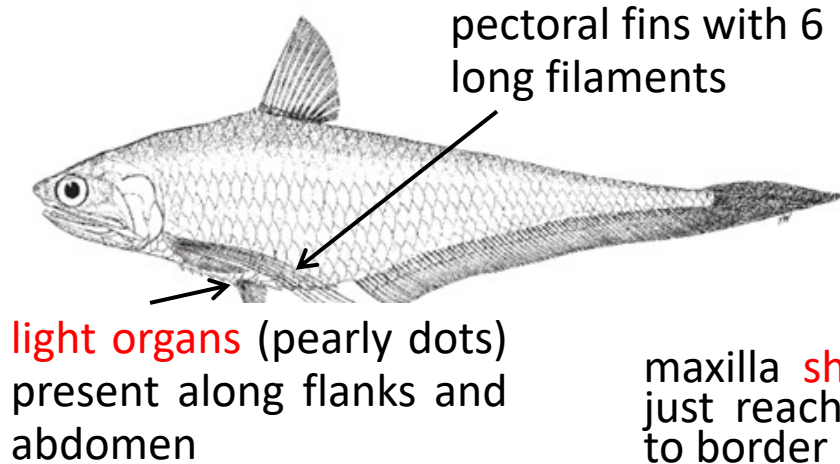
● Marketed species

C. borneensis, *C. coomansi*: only in Indonesia; *C. rebentischii*: only in Borneo

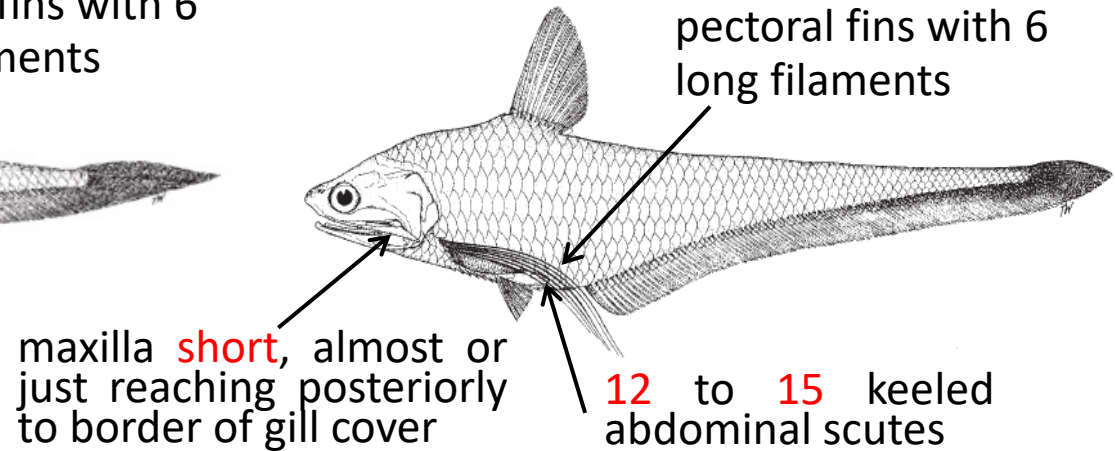
Mya : Myanmar ; Mal 1: Malaysia (west coast of the Peninsula); Mal 2: Malaysia (east coast of the Peninsula); Thai : Thailand (the Gulf of Thailand) ; Camb : Cambodia ; Viet : Viet Nam

Seven species of the *Coilia* in the Southeast Asian region (1/2)

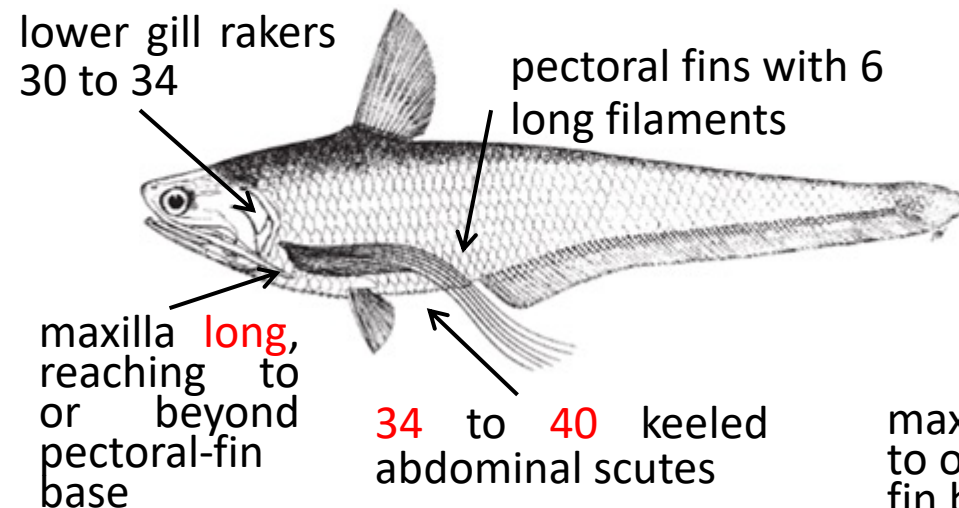
C. dussumieri



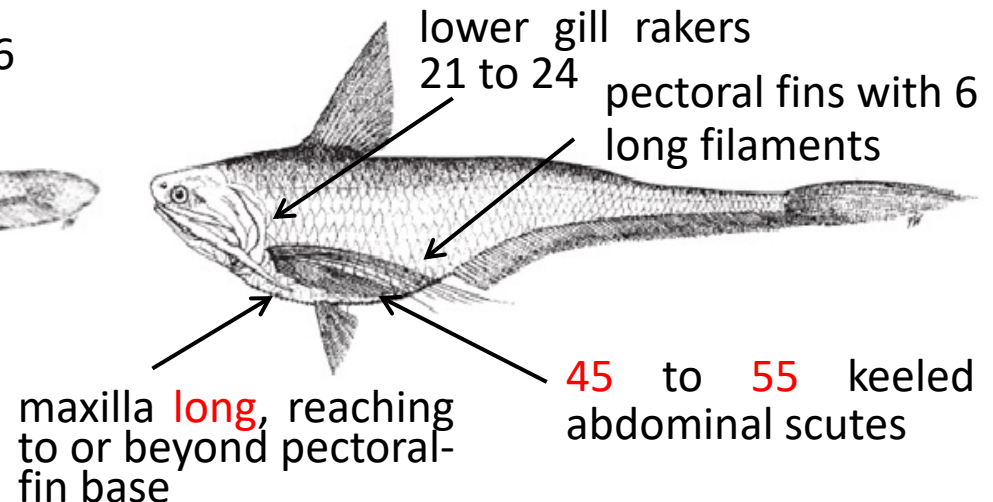
C. neglecta



C. lindmani



C. macrognathos

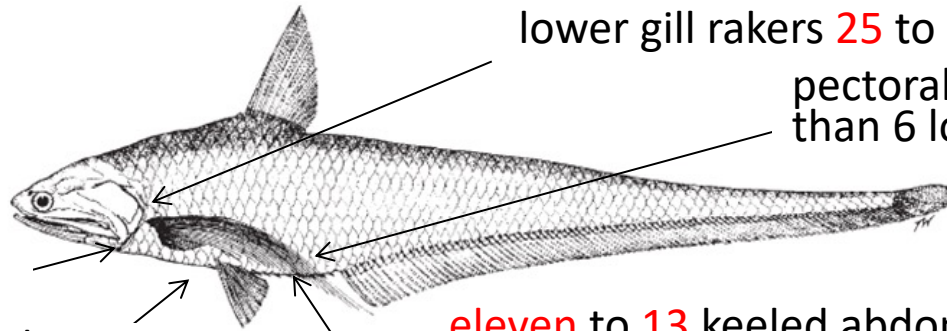


Seven species of the *Coilia* in the Southeast Asian region (2/2)



C. rebentischii

maxilla **short**
one prepelvic scute
(sometimes absent)



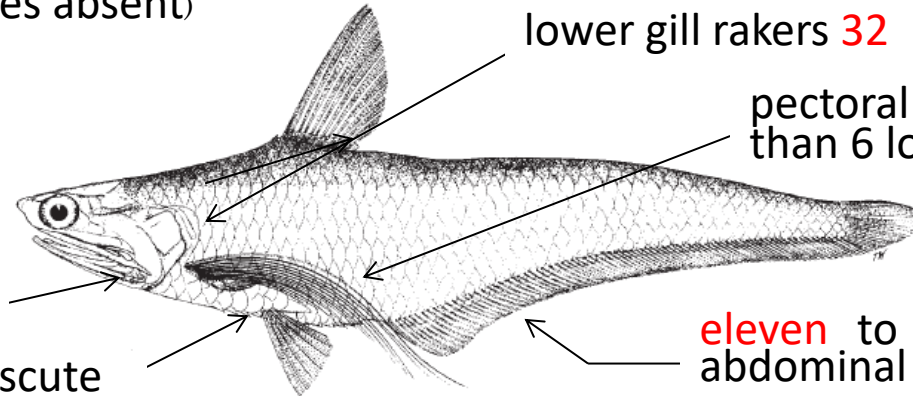
lower gill rakers **25 to 27**

pectoral fins with more
than 6 long filaments

eleven to 13 keeled abdominal scutes

C. borneensis

maxilla **short**
four or **5** prepelvic scute



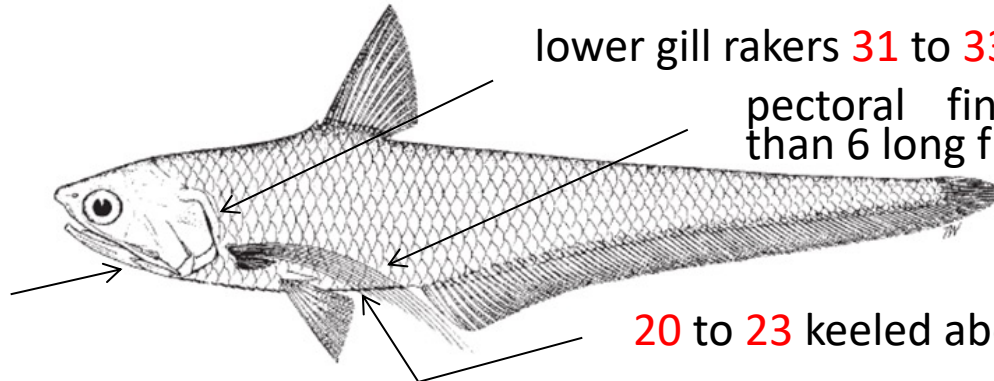
lower gill rakers **32**

pectoral fins with more
than 6 long filaments

eleven to 13 keeled
abdominal scutes

C. coomansi

maxilla **short**



lower gill rakers **31 to 33**

pectoral fins with more
than 6 long filaments

20 to 23 keeled abdominal scutes

Species of the engraulid *Setipinna** in Myanmar, Malaysia, Thailand, Cambodia and Viet Nam

Species	Mya	Mal 1	Mal 2	Thai	Cam	Vie
<i>S. breviceps</i>	○	○				
<i>S. melanochir</i>			●	●		
<i>S. taty</i>	●		●	●	●	
<i>S. tenuifilis</i>						
Total	2	1	2	2	1	0

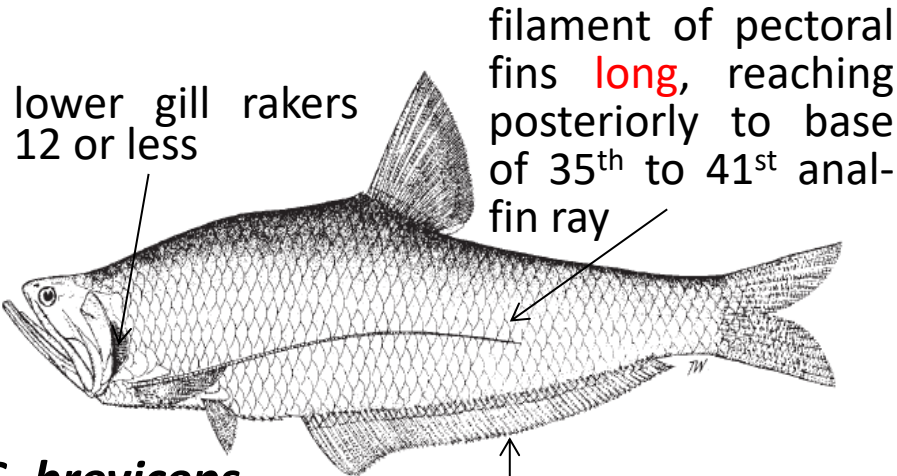
* Habitat in the low salinity area

● Marketed species

S. tenuifilis: only in Borneo, Philippine

Mya : Myanmar ; Mal 1: Malaysia (west coast of the Peninsula); Mal 2: Malaysia (east coast of the Peninsula); Thai : Thailand (the Gulf of Thailand) ; Camb : Cambodia ; Viet : Viet Nam

Four species of the *Setipinna* in the Southeast Asian region

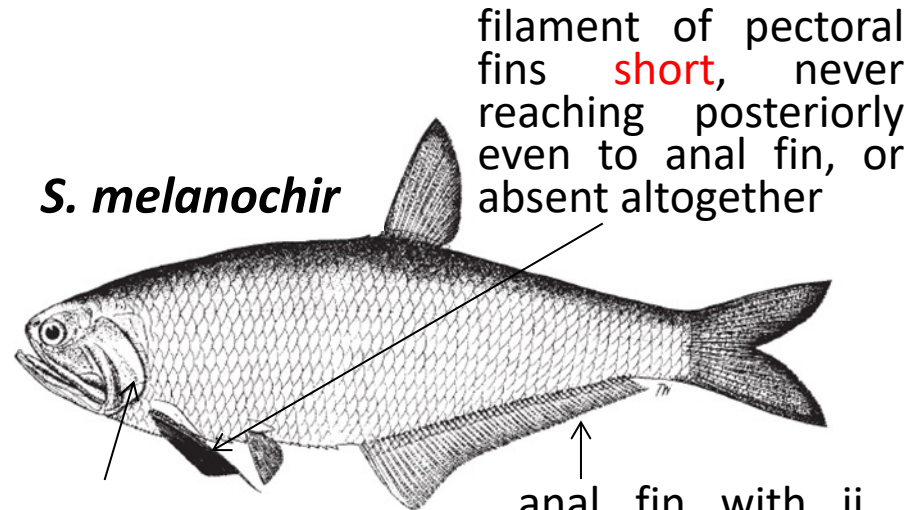


S. breviceps

lower gill rakers
12 or less

filament of pectoral fins **long**, reaching posteriorly to base of 35th to 41st anal-fin ray

anal fin with iii unbranched and 56 to 61 branched rays

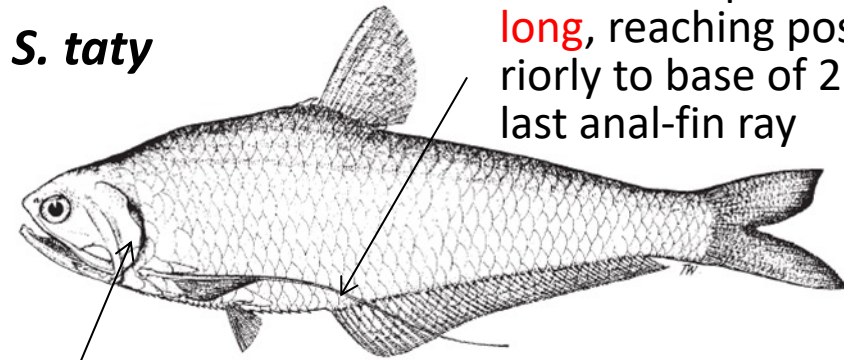


S. melanochir

filament of pectoral fins **short**, never reaching posteriorly even to anal fin, or absent altogether

lower gill rakers
12 or less

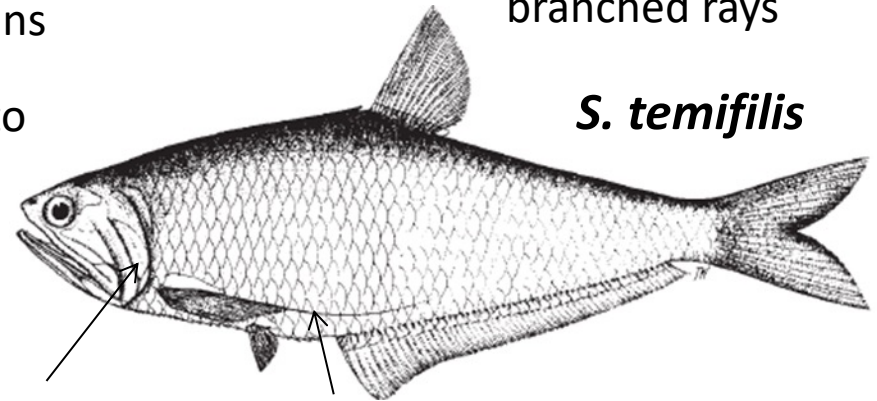
anal fin with ii unbranched and 45 to 50 branched rays



S. taty

filament of pectoral fins **long**, reaching posteriorly to base of 23rd to last anal-fin ray

lower gill rakers
13 or less



S. temifilis

lower gill rakers
13 or less

filament of pectoral fins only **moderately long**, reaching posteriorly only base of first to 31st anal-fin ray



Species of the engraulid *Thryssa* * in Myanmar, Malaysia, Thailand, Cambodia and Viet Nam

Species	Mya	Mal 1	Mal 2	Thai	Cam	Vie
<i>T. baelama</i>	●					
<i>T. dussumieri</i>	○		○	○	○	○
<i>T. encrasicholoides</i>						
<i>T. hamiltonii</i>	●	●	●	●	●	●
<i>T. kammalensis</i>		○	○	○	○	
<i>T. mystax</i>	●	●	●	●	●	
<i>T. setirostris</i>	●	●	●	●	●	●
<i>T. spinidens</i>	○	○				
Total	6	5	5	5	5	3

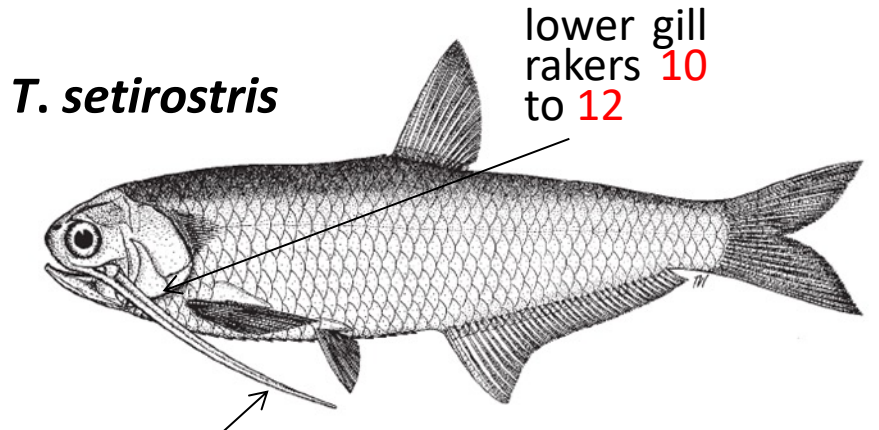
* Habitat in the low salinity area

● Marketed species

T. encrasicholoides: only in Indonesia, Philippine

Mya : Myanmar ; Mal 1: Malaysia (west coast of the Peninsula); Mal 2: Malaysia (east coast of the Peninsula); Thai : Thailand (the Gulf of Thailand) ; Camb : Cambodia ; Viet : Viet Nam

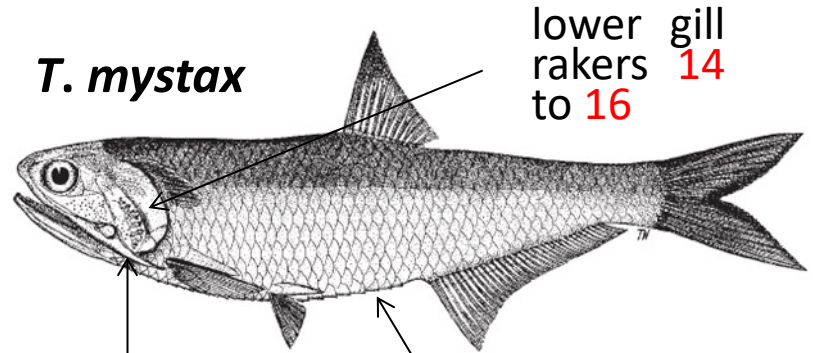
Seven species of the *Thryssa* in the Southeast Asian region (1/2)



T. setirostris

lower gill rakers 10 to 12

maxilla **very long** (increasing with growth), reaching at least to base of first pectoral-fin ray, **usually to pelvic-fin base, or even to anal-fin origin**

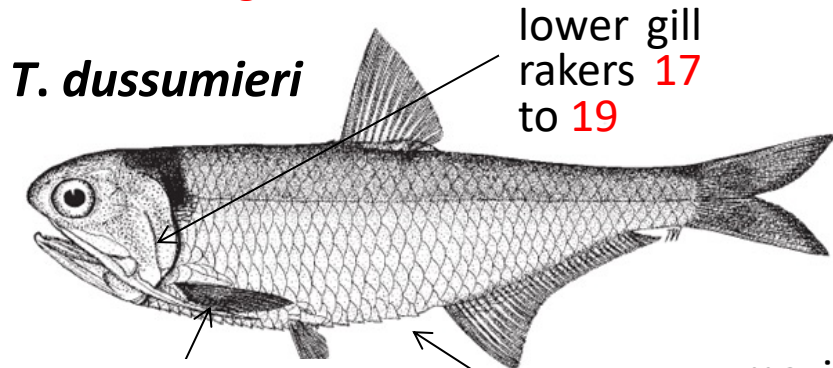


T. mystax

lower gill rakers 14 to 16

maxilla **very long**, reaching at least to base of first pectoral-fin ray

keeled scutes on abdomen 25 to 32 (usually 28 to 30)

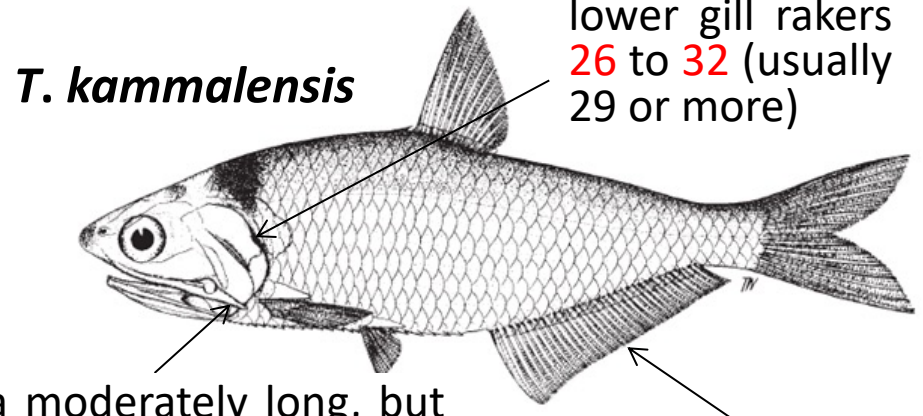


T. dussumieri

lower gill rakers 17 to 19

maxilla **very long**, reaching at least to base of first pectoral-fin ray

keeled scutes on abdomen 21 to 24 (usually 22 or 23)



T. kammalensis

lower gill rakers 26 to 32 (usually 29 or more)

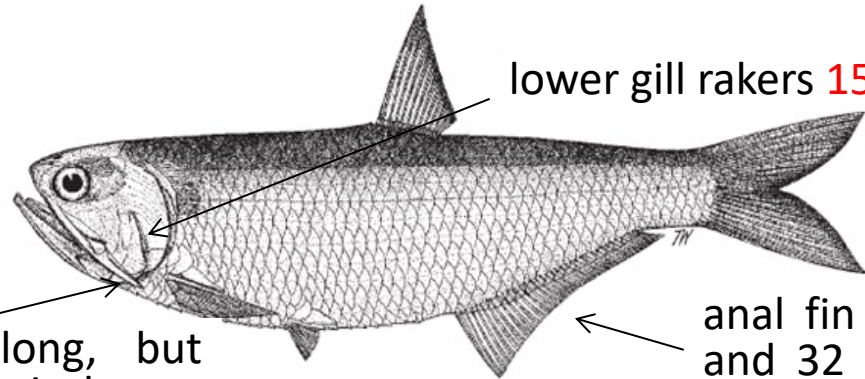
maxilla moderately long, but only reaching posteriorly to border of gill cover or projecting slightly posterior to this point

anal fin usually with iii unbranched and 30 to 33 branched fin rays

Seven species of the *Thryssa* in the Southeast Asian region (2/2)



T. hamiltonii

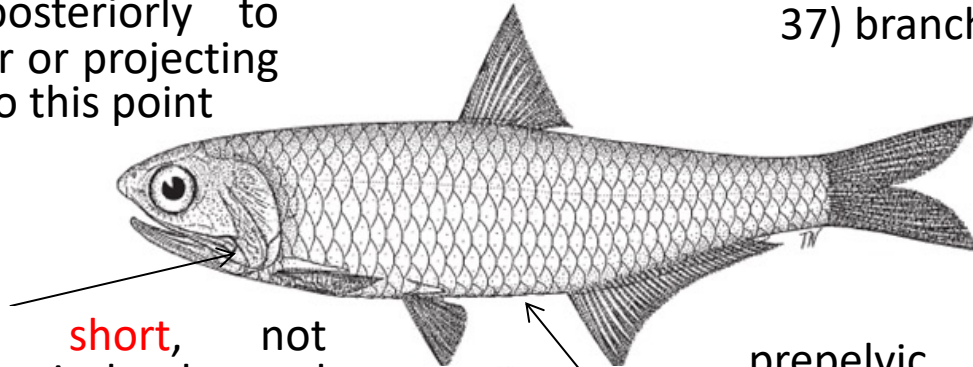


lower gill rakers **15 or less**

maxilla moderately long, but only reaching posteriorly to border of gill cover or projecting slightly posterior to this point

anal fin with **iii** unbranched and 32 to 39 (mostly 35 to 37) branched fin rays

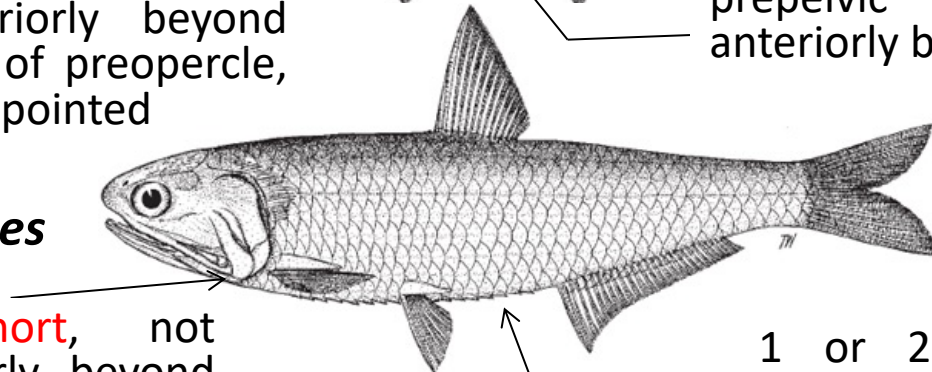
T. baelama



maxilla **very short**, not extending posteriorly beyond posterior border of preopercle, and tip of maxilla pointed

prepelvic scutes ending anteriorly below pectoral fin

T. encrasicholoides



maxilla **very short**, not extending posteriorly beyond posterior border of preopercle, and tip of maxilla more blunt

1 or 2 prepelvic scutes immediately behind isthmus



Species of the engraulid *Engraulis* and *Lycothrissa** in Myanmar, Malaysia, Thailand, Cambodia and Viet Nam

Species	Mya	Mal 1	Mal 2	Thai	Cam	Vie
<i>E. japonicus</i>						
<i>L. crocodilus</i> *	○	○	○	○	○	○

* Habitat in the fresh water and low salinity area

E. japonicus: only in Philippine

Mya : Myanmar ; Mal 1: Malaysia (west coast of the Peninsula); Mal 2: Malaysia (east coast of the Peninsula); Thai : Thailand (the Gulf of Thailand) ; Camb : Cambodia ; Viet : Viet Nam

Species of the engraulid *Encrasicholina* in Myanmar, Malaysia, Thailand, Cambodia and Viet Nam

Species	Mya	Mal 1	Mal 2	Thai	Cam	Vie
<i>E. devisi</i>	●	●	●	●	●	●
<i>E. heteroloba</i>	●	●	●	●	●	●
<i>E. oligobranchus</i>						
<i>E. punctifer</i>	●	●	●	●	●	●
Total	3	3	3	3	3	3

● Marketed species

E. oligobranchus: only in Philippine

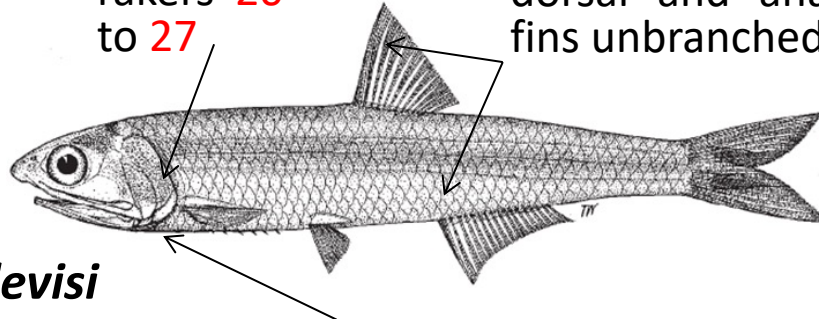
Mya : Myanmar ; Mal 1: Malaysia (west coast of the Peninsula); Mal 2: Malaysia (east coast of the Peninsula); Thai : Thailand (the Gulf of Thailand) ; Camb : Cambodia ; Viet : Viet Nam

Four species of the *Encrasicholina* in the Southeast Asian region



lower gill rakers 20 to 27

first 3 rays of dorsal and anal fins unbranched

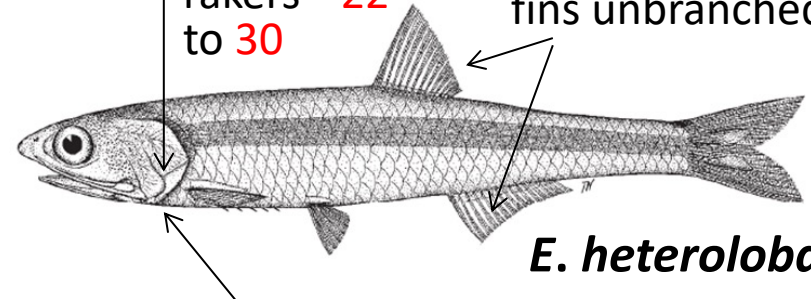


E. devisi

maxilla tip more or less pointed, projecting posteriorly beyond 2nd supramaxilla

lower gill rakers 22 to 30

first 2 rays of dorsal and anal fins unbranched

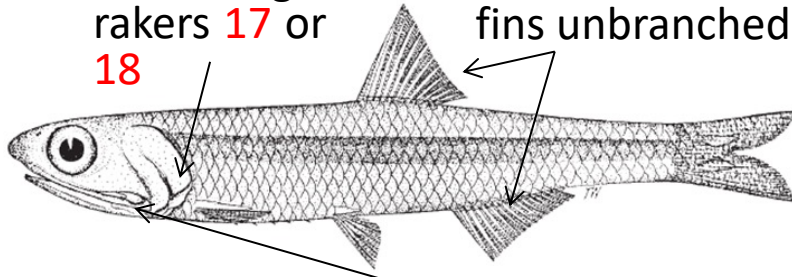


E. heteroloba

maxilla tip more or less pointed, projecting posteriorly beyond 2nd supramaxilla

lower gill rakers 17 or 18

first 3 rays of dorsal and anal fins unbranched

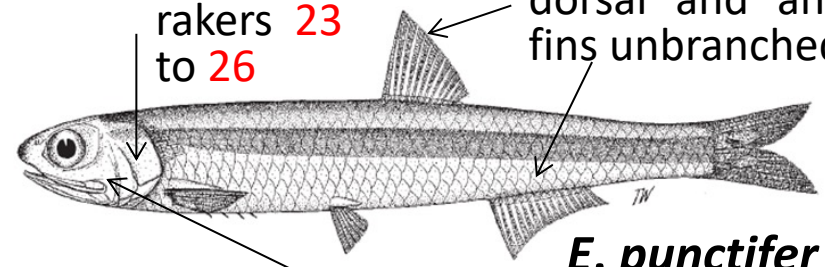


E. oligobranchus

maxilla tip more or less pointed, projecting posteriorly beyond 2nd supramaxilla

lower gill rakers 23 to 26

first 3 rays of dorsal and anal fins unbranched



E. punctifer

maxilla tip blunt, scarcely projecting posteriorly beyond 2nd supramaxilla

Species of the engraulid *Stolephorus* in Myanmar, Malaysia, Thailand, Cambodia and Viet Nam



Species	Mya	Mal 1	Mal 2	Thai	Cam	Vie
<i>S. andhraensis</i>						
<i>S. baganensis</i>			○	○	○	
<i>S. chinensis</i>			○	○	○	○
<i>S. commersonii</i>	●	●	●	●	●	●
<i>S. dubiosus</i>	○		○	○	○	
<i>S. indicus</i>	●	●	●	●	●	●
<i>S. insularis</i>	○		○	○	○	○
<i>S. ronquilloi</i>						
<i>S. tri</i>			●	●	●	
<i>S. waitei</i>	●		●	●	●	
Total	5	2	8	8	8	4

● Marketed species

S. andhraensis: only in Borneo, Java; *S. ronquilloi*: only in Philippine

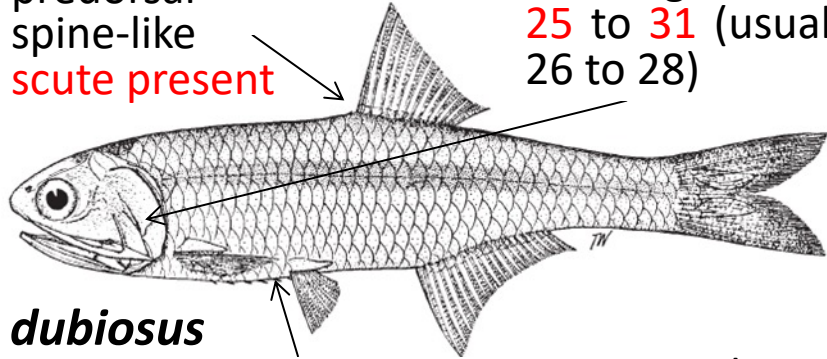
Mya : Myanmar ; Mal 1: Malaysia (west coast of the Peninsula); Mal 2: Malaysia (east coast of the Peninsula); Thai : Thailand (the Gulf of Thailand) ; Camb : Cambodia ; Viet : Viet Nam

Ten species of the *Stolephorus* in the Southeast Asian region (1/3)



predorsal spine-like scute present

lower gill rakers 25 to 31 (usually 26 to 28)

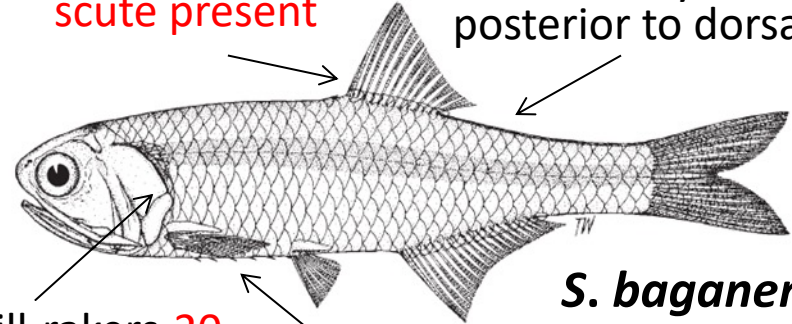


S. dubiosus

spine on pelvic scute present

predorsal spine-like scute present

double pigment line on dorsum only in region posterior to dorsal fin



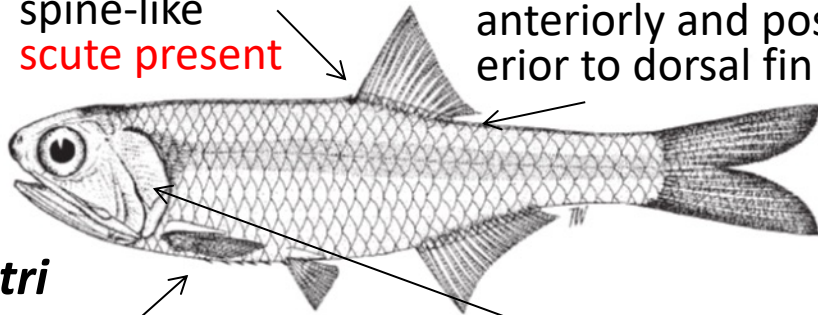
S. baganensis

lower gill rakers 20 to 23 (rarely 18-19, 24)

spine on pelvic scute present

predorsal spine-like scute present

double pigment line on dorsum both anteriorly and posterior to dorsal fin



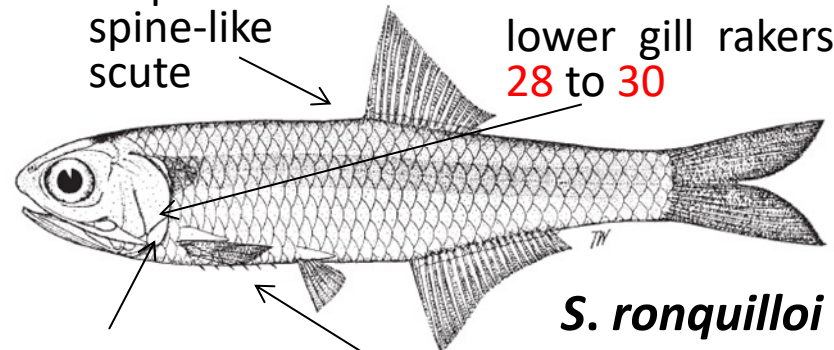
S. tri

spine on pelvic scute present

lower gill rakers 19 to 22 (rarely 18)

no predorsal spine-like scute

lower gill rakers 28 to 30

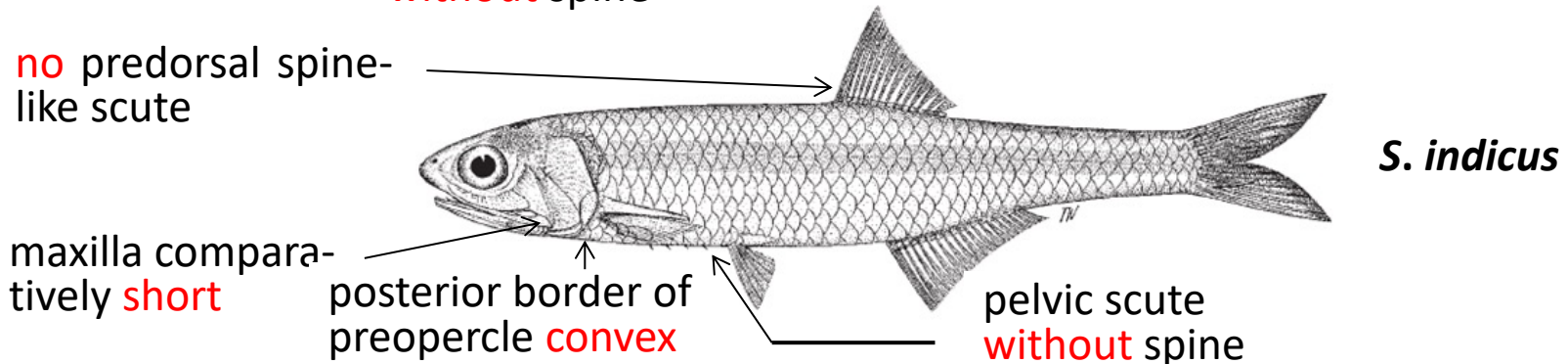
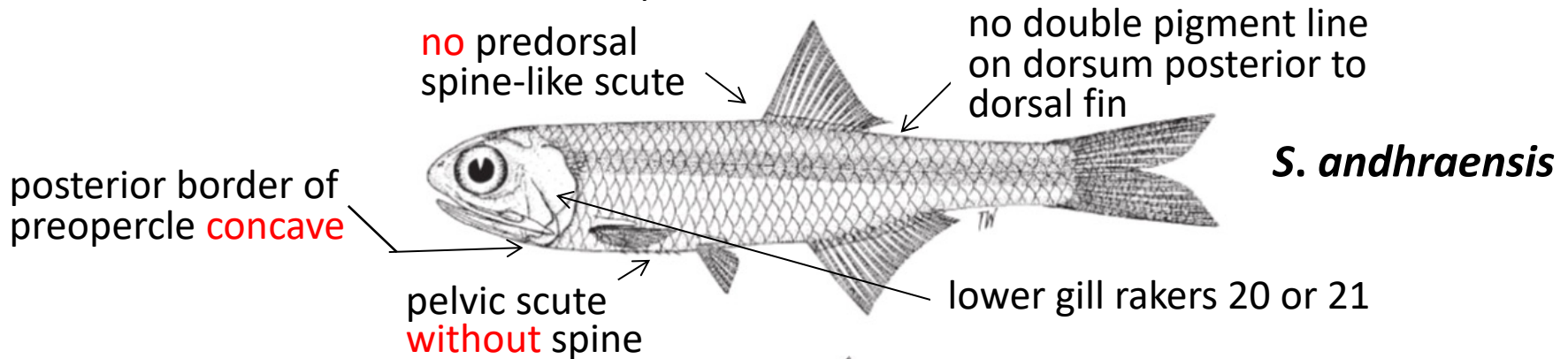
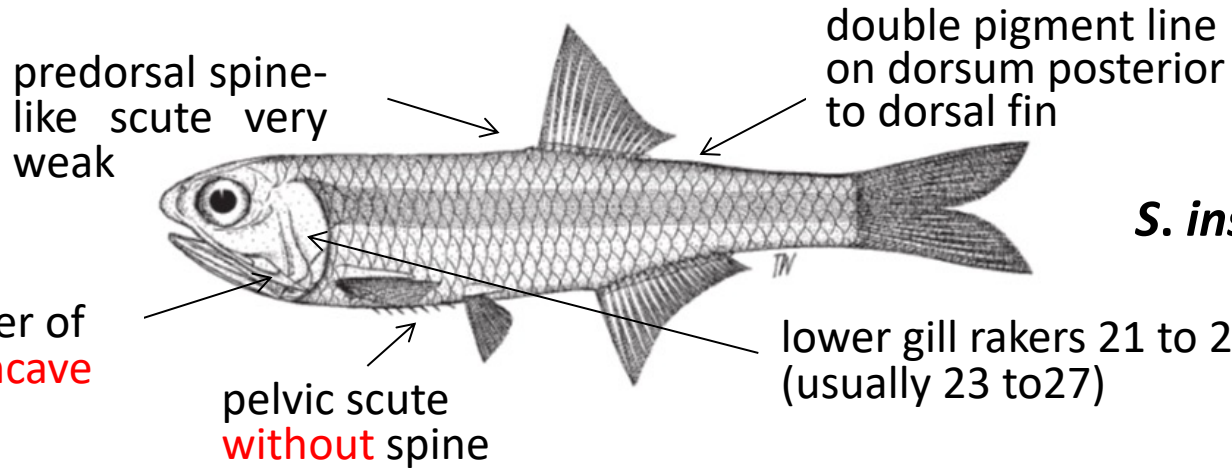


S. ronquilloi

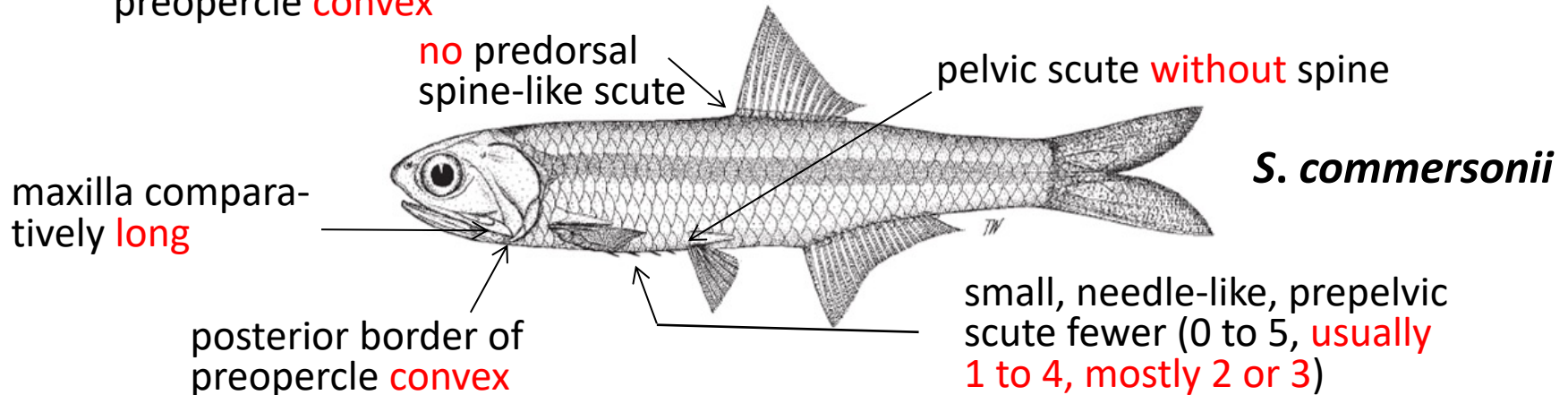
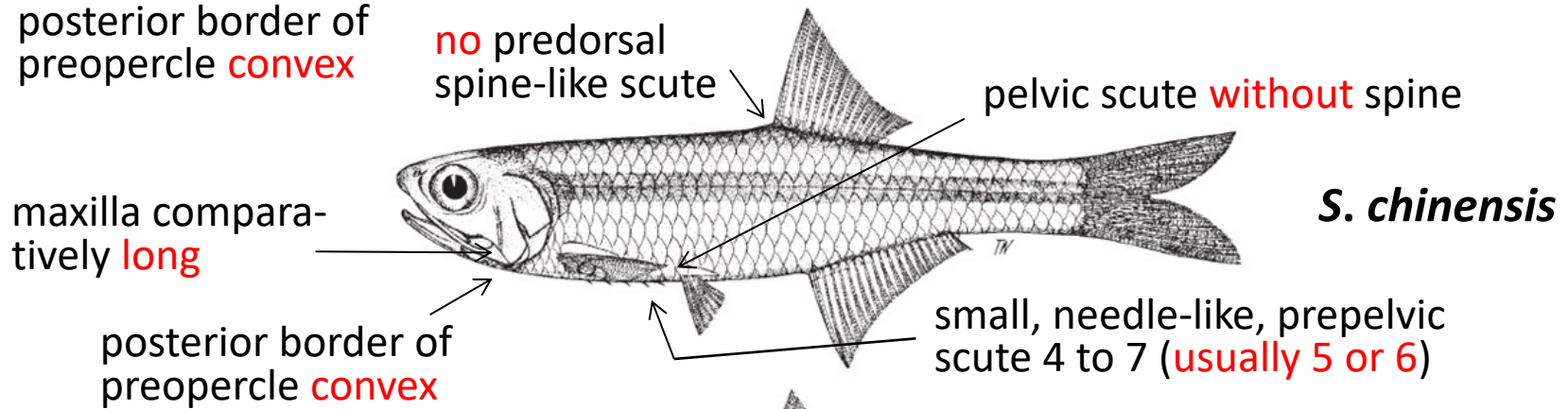
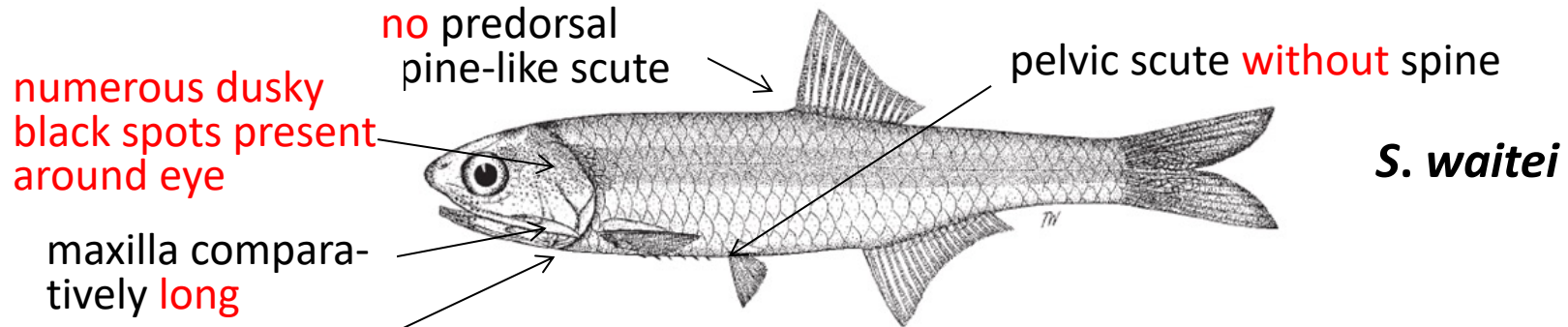
posterior border of preopercle concave

pelvic scute without spine

Ten species of the *Stolephorus* in the Southeast Asian region (2/3)



Ten species of the *Stolephorus* in the Southeast Asian region (3/3)





Larvae

References:

- Okiyama, M. ed. (2013). An atlas of early stage fishes in Japan. Second edition. Tokai University Press, Hatano, 1639pp. (in Japanese).
- Leis, J. M. and B. M. Carson-Ewart. eds. (2000) The larvae of Indo-Pacific coastal fishes. An identification guide to marine fish larvae. Brill, Leiden, 850pp.
- McGowan, M. F. and F. H. Berry. (1984). Clupeiformes: development and relationships. Pages 108-126. *in* Moser, H. G., W. J. Richards, D. M. Cohen, M. P. Fahay, A. W. Kendall, Jr. and S. L. Richardson. eds. Ontogeny and systematics of fishes. Amer. Soc. Ichthyol. Herpetol., Sp. Publ., No. 1



Meristic characters of **Indo-Pacific** engraulid genera

Genus	D	A	P ₁	P ₂	C	V
Coilinae						
1 <i>Coilia</i> *	13-17	62-117	11-29	6-10	19	14-21+46-61=60-76
2 <i>Setipinna</i> *	13-15	48-64	11-15	7	19	15-18+31-37=46-54
3 <i>Thryssa</i> *	11-17	26-49	10-14	7	19	12-21+22-28=39-46
4 <i>Lycothrissa</i> *	10-13	47-51		6-7		
Engraulinae						
5 <i>Encrasicholina</i>	11-16	14-21	12-17	7	19	21-25+17-21=41-44
6 <i>Engraulis</i>	13-17	14-22	15-18	7	19	43-47
7 <i>Stolephorus</i>	13-18	17-25	11-17	7	19	18-23+18-21=38-43

* low salinity species

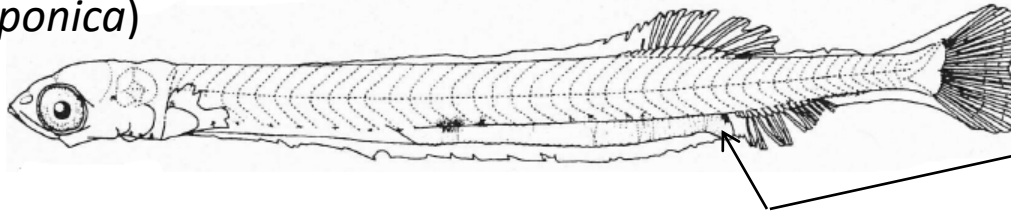
Similar larvae to the Engraulidae (1/3)



Engraulidae

(*Engraulis japonica*)

10.1 mm TL



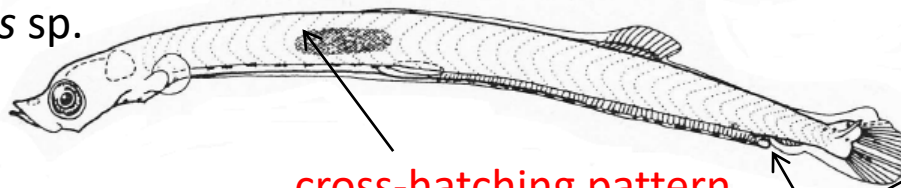
A 14-117 ; V 38-76

gut relatively **short** and anus under or just posterior to dorsal fin (except *Coilia**)

Clupeidae

Herklotsichthys sp.

12.1 mm BL



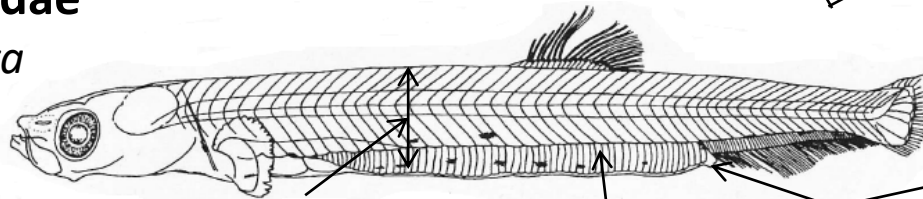
A 9-28 ; V 40-57

gut **long** and anus posterior to dorsal fin

Pristigasteridae

Ilisha elongata

17.0 mm TL



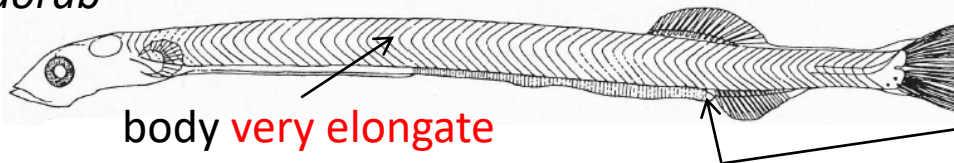
A 34-93 ; V 41-62

gut moderately long and anus posterior to dorsal fin

Chirocentridae

Chirocentrus dorab

20.5 mm TL



A 29-37 ; V 69-75

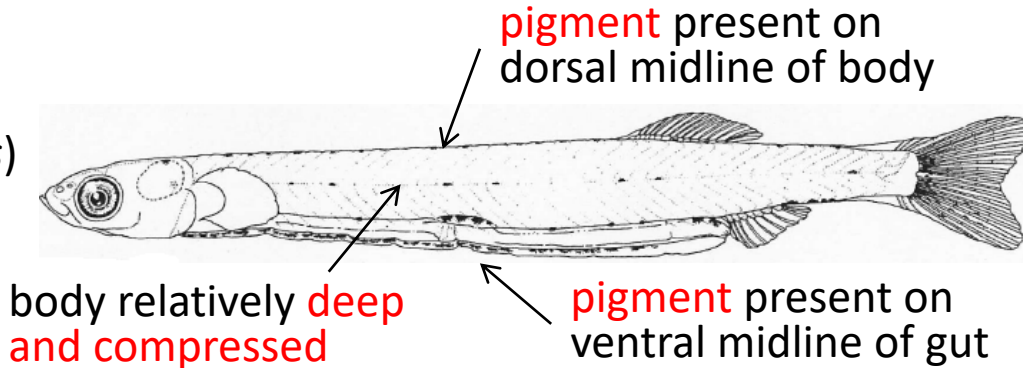
gut **long** and anus under dorsal fin

* *Coilia* : dorsal fin anteriorly far from anus.

These four clupeiform family larvae share 1) **cross-hatching pattern of muscle fibers** (except clupeid *Spratelloides*) and 2) **striated hindgut**.

Similar larvae to the Engraulidae (2/3)

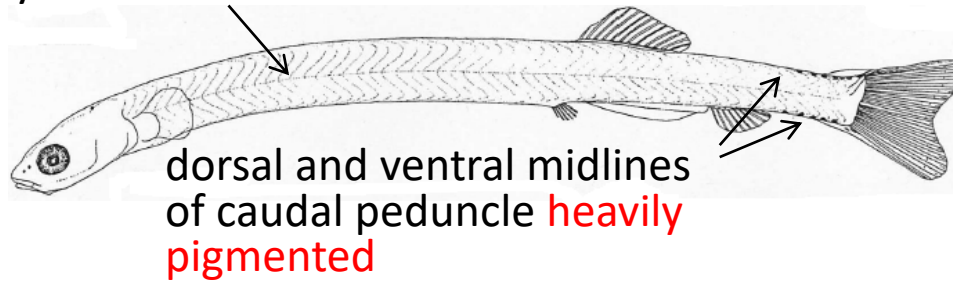
Chanidae
(*Chanos chanos*)
13.6 mm SL



A 8-11 ; V 40-46
no cross-hatching pattern and hindgut smooth

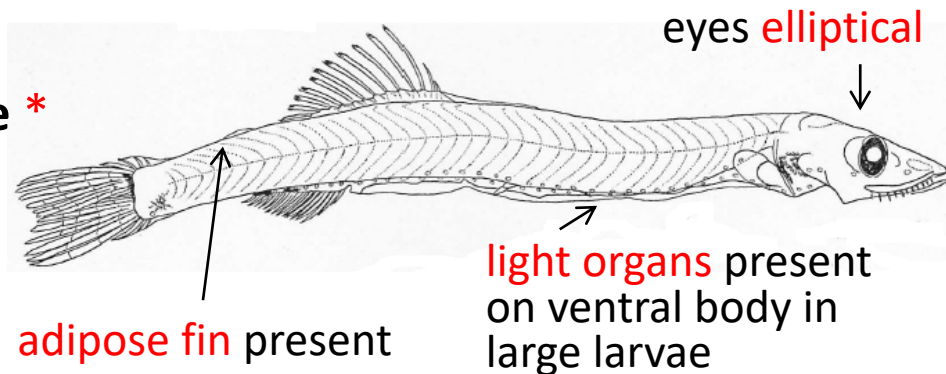
body round in cross-section

Gonorynchidae
(*Gonorynchus abbreviatus*)
18.3 mm TL



A 7-9 ; V 54-56
no cross-hatching pattern and hindgut striated

Phosichthyidae *
(*Vinciguerria nimbaria*)
13.5 mm SL



A 12-15 ; V 38-44
no cross-hatching pattern and hindgut smooth

* Deep-sea fish

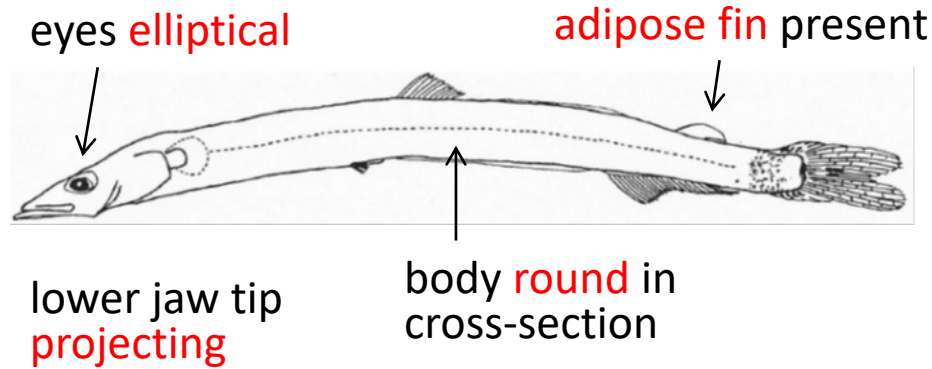
Similar larvae to the Engraulidae (3/3)



Notosudidae *

(*Scopelosaurus smithii*)

26.0 mm SL



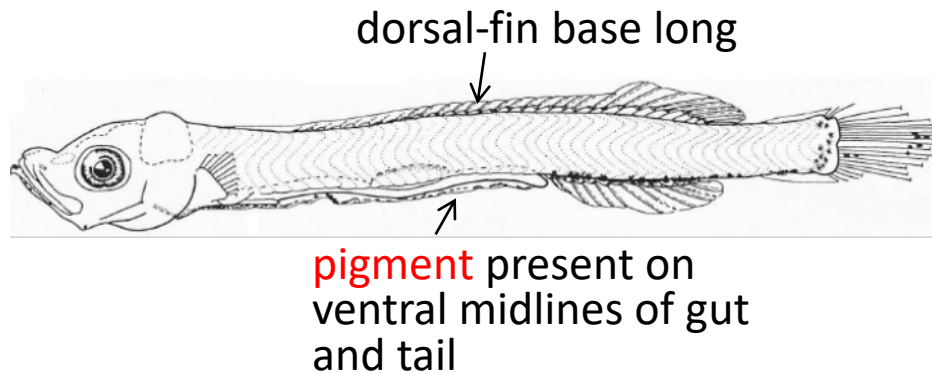
V around 55

no cross-hatching pattern and hindgut smooth

Ammodytidae

(*Bleekeria viridianguilla*)

9.9 mm BL



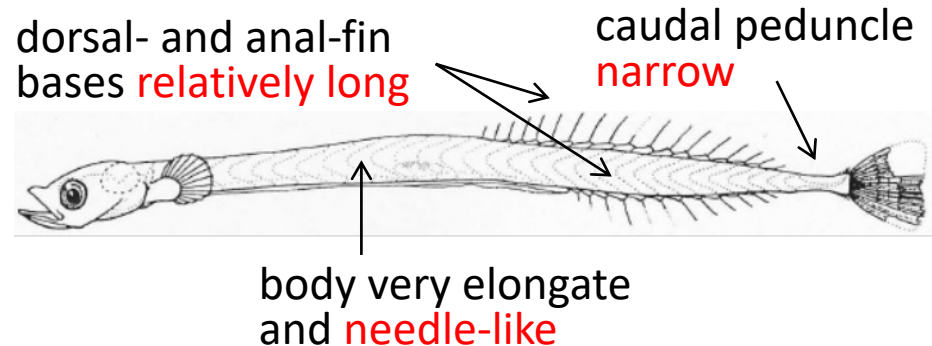
V 50-56

no cross-hatching pattern and hindgut smooth

Schindleriidae

(*Schindleria praematura*)

11.2 mm BL



V 31-44

no cross-hatching pattern and hindgut smooth

* Deep-sea fish

Key to genus of the Engraulidae larvae in the Southeast Asian region



- 1a Dorsal-fin base present at midpoint of body, and its end remarkably anterior to anus. Total myomeres more than 70. ***Coilia***
- 1b Dorsal-fin base present near midpoint of body or posterior to it, and its end over origin of anal fin or posterior to the origin. Total myomeres less than 70. **2**
- 2a Anal-fin rays more than 30, and its base more than 1.5 times of dorsal-fin base **3**
- 2b Anal-fin rays less than 30, and its base less than 1.5 times of dorsal-fin base **4**
- 3a Head depressed (until early postflexion stage). Anal-fin rays more than 47. ***Setipinna***
- 3b Head not depressed. Anal-fin rays less than 49. ***Thryssa***
- 4a Origin of anal fin just under end of dorsal fin. **5**
- 4b Origin of anal fin distinctly anterior to end of dorsal fin.
. ***Stolephorus***
- 5a Total vertebrae 40-45 ***Encrasicholina* ***
- 5b Total vertebrae 44-47 ***Engraulis***

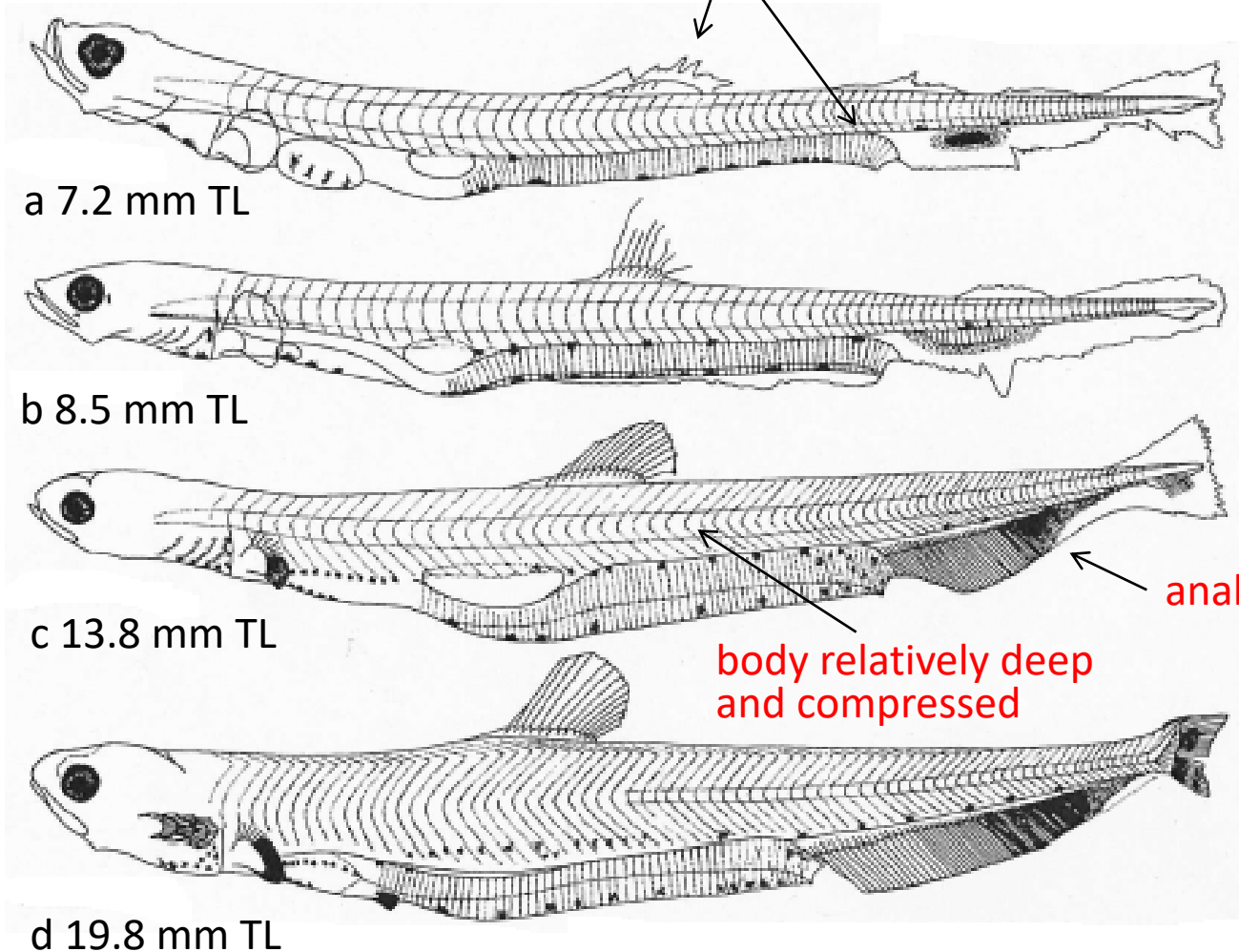
* Some *Encrasicholina* larvae have the *Stolephorus*-type arrangement of dorsal and anal fins. Riverine and lacustrine species of *Lycotryssa* is excluded in the above key.

Larvae of *Coilia nasus* *



D 13
A 81-97
P₁ 17-18
P₂ 7
V 77-78

dorsal-fin base present at body midpoint and anteriorly far from anus



anal-fin base long

body relatively deep and compressed

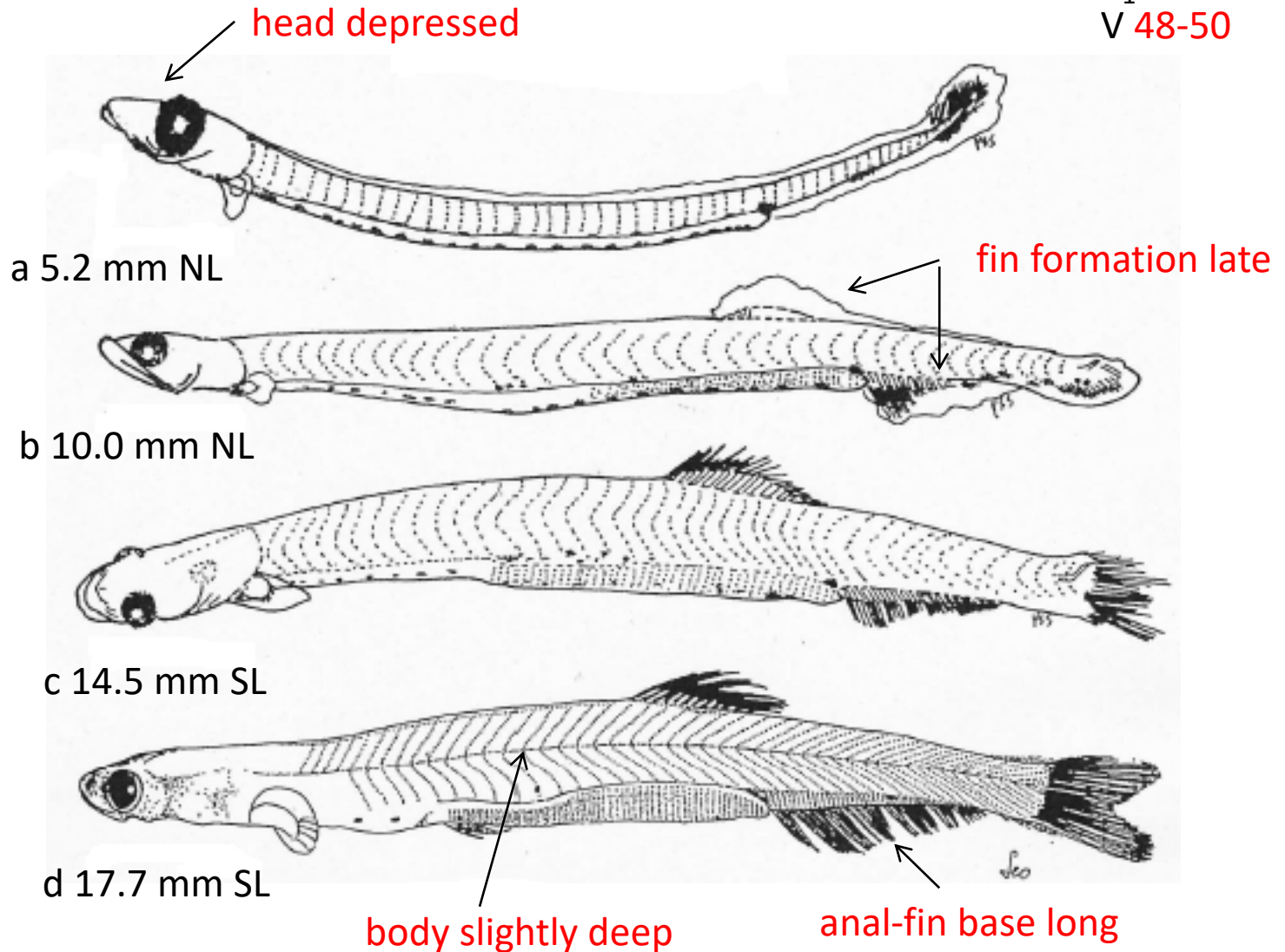
* Endemic species in Japan

Takita (1967)

Larvae of *Setipinna tenuifilis*



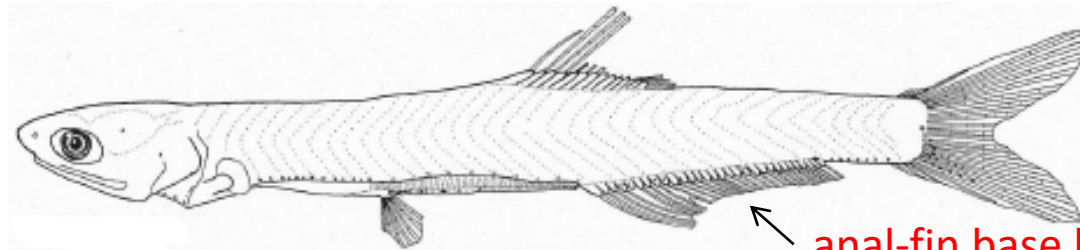
D 15
A 49-59
P₁ 11-13
V 48-50



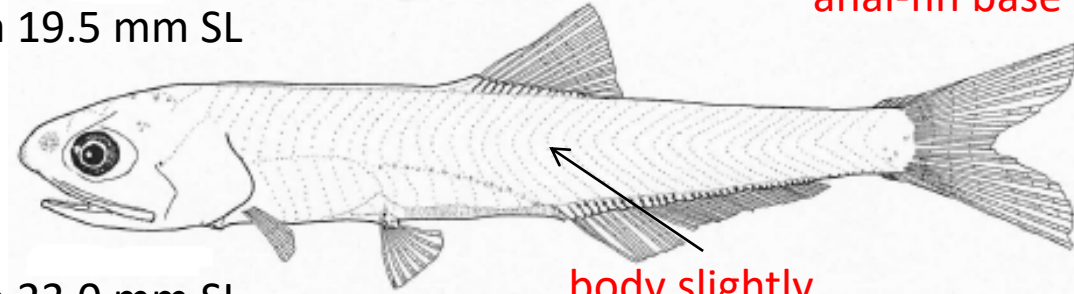
Two species larvae of *Thryssa*

T. baelama

Noichi (2013)



a 19.5 mm SL



b 23.0 mm SL

body slightly
compressed

D 14-15

A 30-33

P₁ 16

P₂ 7

V

T. hamiltoni

Kanou et. al. (2002)



a 15.2 mm SL

body slightly
compressed



b 22.2 mm SL

anal-fin base long

D 13-14

A 35-45

P₁ 16

P₂ 7

M 44-46

Larvae of *Engraulis japonica* *

D 14-16
A 15-18
P₁ 16-17
P₂ 7
M 45-47



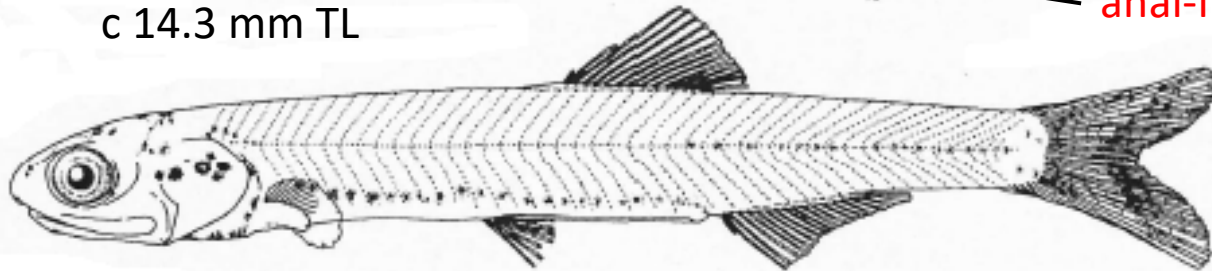
a 5.7 mm TL



b 10.1 mm TL



c 14.3 mm TL



d 32.3 mm TL

origin of anal fin
just under end of
dorsal fin

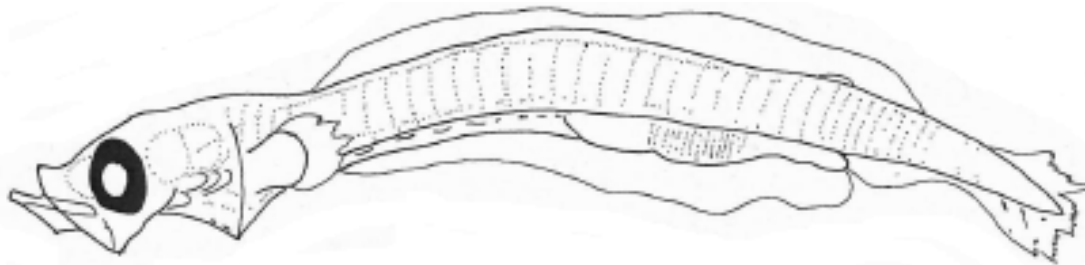
anal-fin base short

* Adults only in Philippine

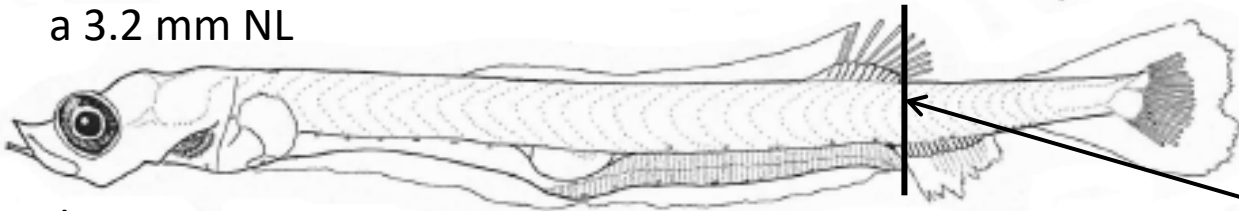
by Tsumoto, K.

Larvae of *Encrasicholina punctifer*

D 12-14
 A 12-15
 P₁ 16
 P₂ 7
 M 44

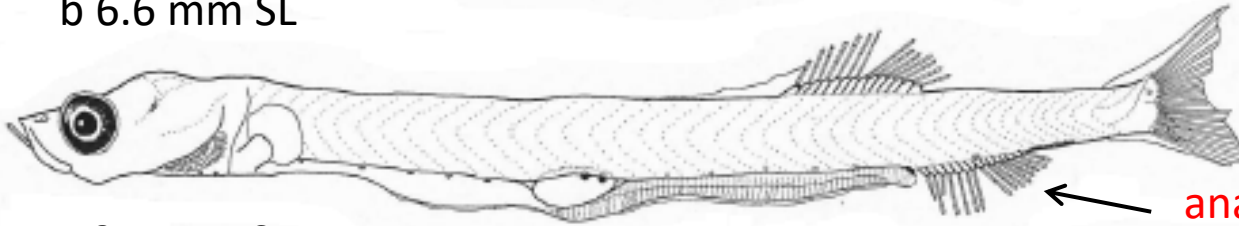


a 3.2 mm NL



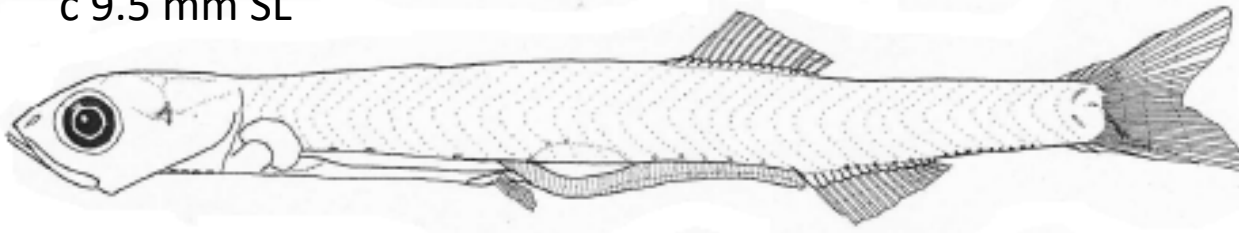
b 6.6 mm SL

origin of anal fin
 just under end of
 dorsal fin



c 9.5 mm SL

anal-fin base short

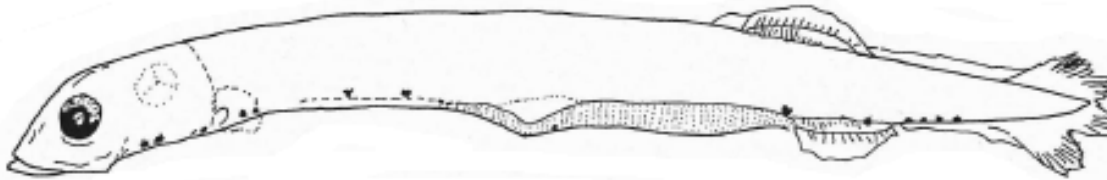


d 13.9 mm SL

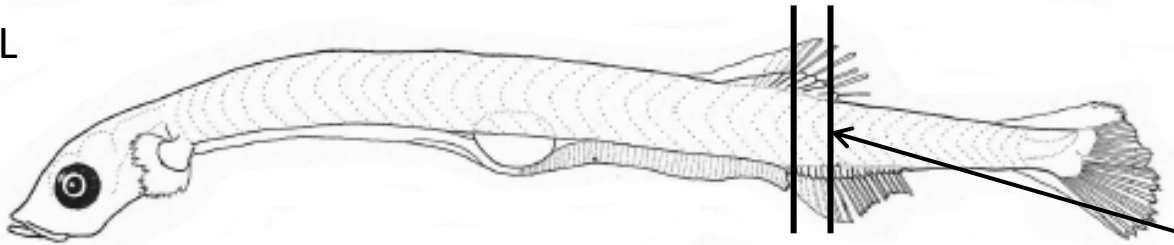
Larvae of *Encrasicholina heteroloba*

D 15
 A 16-18
 P₁ 16
 P₂ 7
 M 43

a 6.8 mm NL

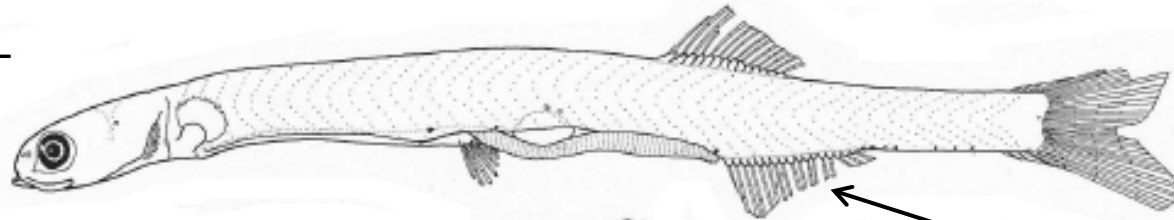


b 8.4 mm SL



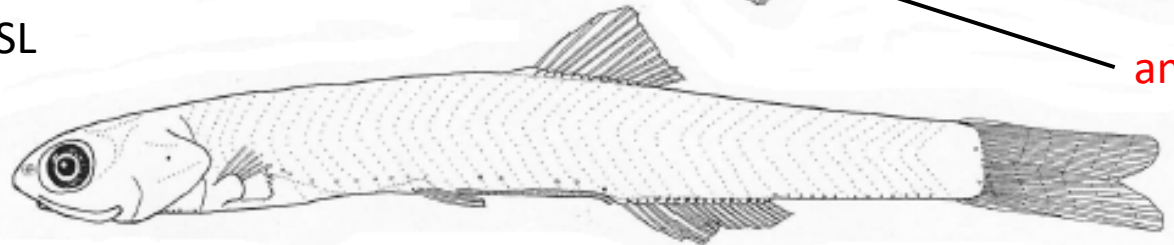
origin of anal fin
 just anterior to
 end of dorsal fin

c 19.4 mm SL



anal-fin base short

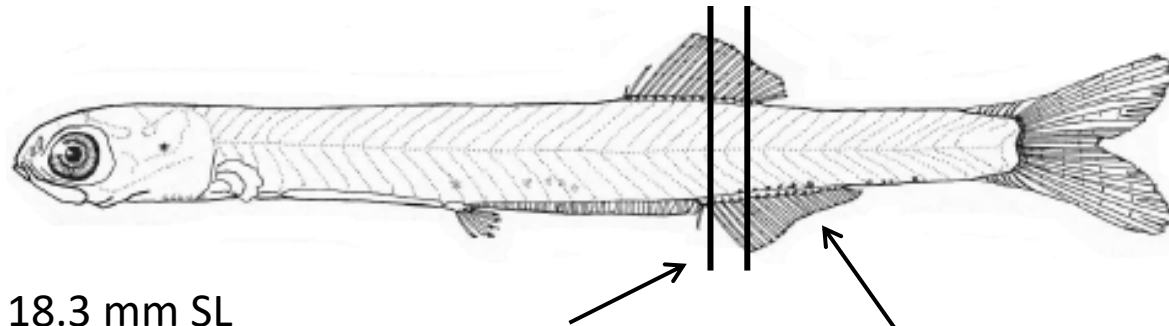
d 31.1 mm SL



Two species larvae of *Stolephorus*

S. indicus
Fujitai and
Kinoshita
(2008)

a 18.3 mm SL



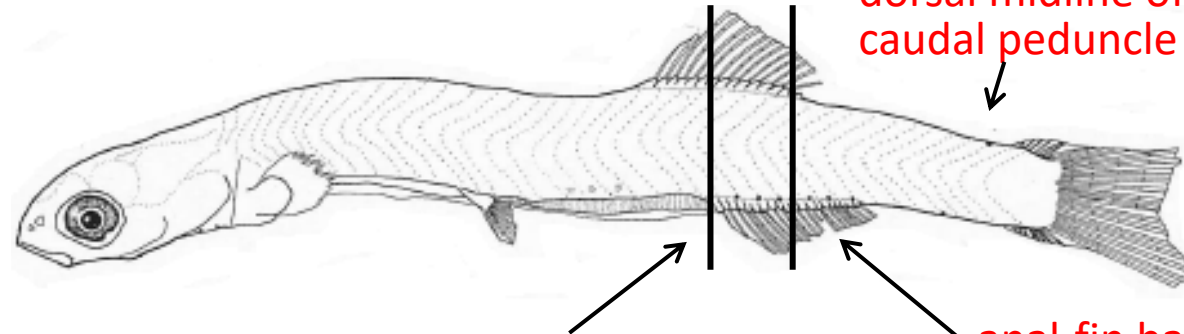
distance between anal-fin origin and dorsal-fin end narrow

anal-fin base short

D 16
A 18-21
P₂ 7
V 39-44

S. commersonii
Noichi (2013)

a 15.4 mm SL



distance between anal-fin origin and dorsal-fin end wide

anal-fin base short

pigment spot on dorsal midline of caudal peduncle

D 16
A 20-22
P₁ 14
P₂ 7
V 39



Dorsal- and anal-fin rays of *Encrasicholina* and *Stolephorus* in the Southeast Asian region

Species	D	A	Species	D	A
<i>Encrasicholina</i>	12-16	14-21	<i>Stolephorus</i>	14-18	17-24
<i>E. devisi</i>	13-16	17-21	<i>S. andhraensis</i>	15-17	19-23
<i>E. heteroloba</i>	13-15	15-19	<i>S. baganensis</i>	14-16	20-23
<i>E. oligobranchus</i>	14-16	18	<i>S. chinensis</i>	16-18	20-23
<i>E. punctifer</i>	12-16	14-17	<i>S. commersonii</i>	15-17	20-23
			<i>S. dubiosus</i>	14-16	19-24
			<i>S. indicus</i>	14-17	17-22
			<i>S. insularis</i>	14-17	19-23
			<i>S. ronquilloi</i>	15-17	19-22
			<i>S. tri</i>	14-15	19-22
			<i>S. waitei</i>	15-17	19-24

Species in red color : marketed species
McGowan and Berry (1984)

Thank you for your attention



Boiled CHIRIMEN (whitebait simply scalded)

Photo : Katsuo-bune Co., Ltd.