2. SYSTEMATIC CATALOGUE

2.1 Diagnostic Features of the Family SILLAGINIDAE

FAO Names: En - Sillagos, Sand Smelts and Whitings; **Fr** - Sillaginidés; **Sp** - Sillagínidos.

Diagnostic Features: Elongate, only slightly compressed, head tapering, with terminal mouth; lower part of the cheek separated by a deep channel and bent inward to almost meet that of the other side. Body covered with small or moderate sized ctenoid scales, those of the cheek cycloid or ctenoid; lateral-line scales 50 to 141, with simple pores and continuing on to the tail. Mouth with a band of brush-like teeth; with canine teeth in the upper jaw in ***Sillaginopsis*** only; vomer with a small curved patch of teeth, none on palatine bones on roof of mouth; upper jaw covered by a large lachrymal or preorbital bone bearing *a* raised dome that greatly enlarges the sensory system of the snout region; lower jaw with a pair of small pores behind which is a median pit containing a pore on each side; operculum with a short sharp spine; head elongate, with a greatly developed sensory canal system above and laterally, and the entire ventral surface of the head is occupied by the lower preopercular sensory system. This development of the cranial sensory system is characteristic of the family; the otolith is large and the base of the skull is enlarged, suggesting the reception of sound is important. Two dorsal fins, the first consisting of X to XIII slender spines, the second long with I slender leading spine and 16 to 27 soft rays; anal fin long with II small slender spines and 14 to 26 soft rays; caudal fin emarginate; unpaired fins with the membranes scaly; pelvic fins with I spine and 5 rays, the first ray usually with one or two small projecting filaments that are often in contact with the bottom as the fish swims in search of food, and in ***Sillaginopodys,*** the first ray is thickened and used as a sled to maintain contact with the substrate. The swimbladder is either absent, poorly developed, or highly complex with anterior and lateral extensions that project well into the caudal region; a unique duct-like process from the ventral surface of the swimbladder to just before the urogenital opening is present in most species. The vertebrae are modified where they contact the posterior extension of the swimbladder in many species; the vertebrae number 32 to 44; the vertebral number, divided into abdominal, modified or haemal, and caudal categories is useful for identification of some species (Table 2).

2.2 Illustrated Key to Genera and Species

2.2.1 Key to Genera

1a. Snout and head depressed; second dorsal-fin spine elongate; eyes small and almost covered by skin; swimbladder minute or absent (Fig. 8) ..... ***Sillaginopsis***

1b. Snout and head not depressed; second dorsal-fin spine not elongate; eyes normal; swimbladder present ..... -> **2**

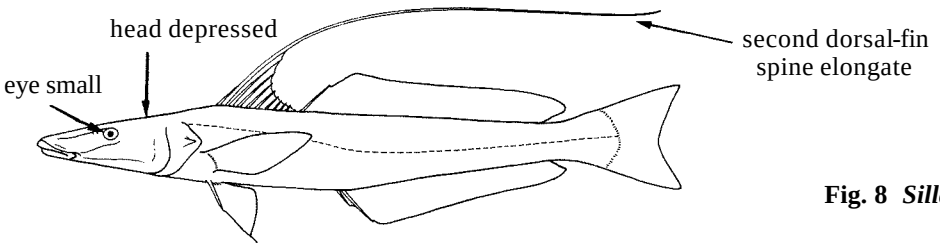


Fig. 8 ***Sillaginopsis***

2a. Lateral-line scales 50 to 84 (Fig. 9) ..... ***Sillago***

2b. Lateral-line scales 129 to 147 (Fig. 10) ..... ***Sillaginodes***

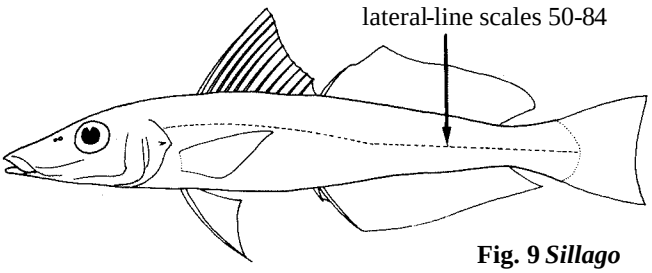


Fig. 9 ***Sillago***

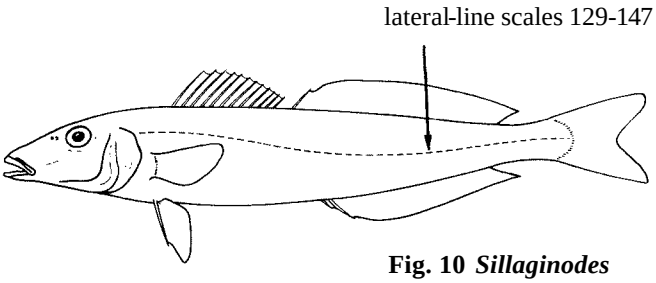


Fig. 10 ***Sillaginodes***

Table 2: **Frequency distribution of abdominal and caudal vertebrae for species of the family Sillaginidae**

	Vertebrae Numbers																														
Abdominal	12	12	12	13	13	13	13	13	14	14	14	14	14	15	15	15	15	15	15	15	16	16	16	16	17	20	21	21	21	22	22	23
Caudal	21	22	23	19	20	21	22	25	18	19	20	21	22	18	19	20	22	23	25	27	21	22	23	24	20	23	21	22	23	21	22	21
S. aeolus						4					26																					
S. analis					1					81	2																					
S. arabica																		1	1			1	18									
S. asiatica						1					34																					
S. attenuata																	1															
S. bassensis	1	3			1	79	4				3																					
S. boutani								1																								
S. burrus							2				5	99	3																			
S. chondropus			4				8																									
S. ciliata					1				3	167	1			3	2																	
S. flindersi				2	128	7																										
S. ingenuua					7	1																										
S. intermedius											1																					
S. japonica												16																				
S. lutea					8	310	13																									
S. macrolepis											1																					
S. maculata						2	7				1	139	11			4																
S. microps						2																										
S. panijus																				1												
S. parvisquamis																										1	2	16	11	23	30	1
S. punctata																							3	1								
S. robusta					66																				2							
S. schomburgkii																					72											
S. sihama											225																					
S. vincenti											18	1																				
S. vittata				1	23	1																										

2.2.2 Key to the Genera and Species from the Indo-west Pacific Region Excluding Australia and New Guinea

1a. Snout and head greatly depressed; second dorsal-fin spine very elongate; eyes small, 3 to 11% of head length, and almost covered by adipose tissue (Fig. 11); swimbladder vestigial or absent ..... ***Sillaginopsis panijus***

1b. Snout and head not depressed; second dorsal-fin spine not elongate; eyes normal, 17 to 30% of head length; swimbladder present (Fig. 12) ..... ***(Sillago)*** -> **2**

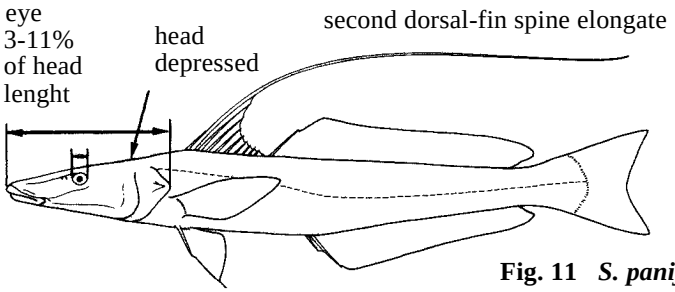


Fig. 11 ***S. panijus***

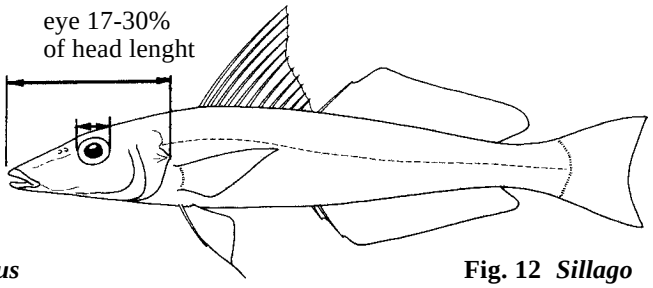


Fig. 12 ***Sillago***

2a. Pelvic fin with the spine inconspicuous and almost hidden by the much thickened club-like first pelvic-fin ray (Fig. 13); swimbladder without postcoelomic projections into the tail section; vertebral column without modified haemal spines overlying the posterior extensions of the swimbladder (no haemal funnel) ..... ***Sillago chondropus***

2b. Pelvic fin without a thickened club-like first ray; swimbladder with 1 or 2 postcoelomic extensions; vertebral column with some modified haemal spines overlying the posterior part of the swimbladder (haemal funnel present) ..... —> **3**

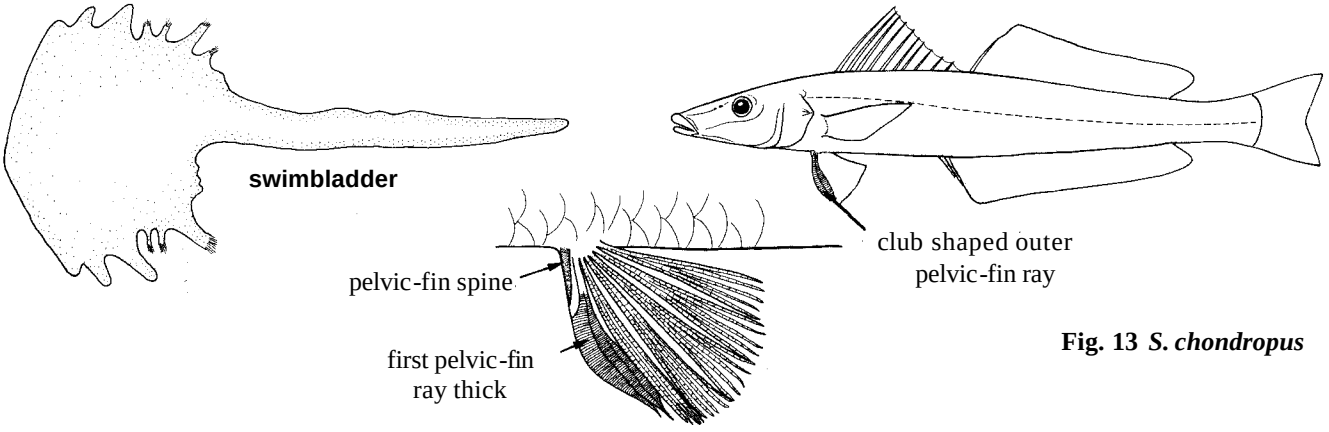


Fig. 13 ***S. chondropus***

3a. Base of pectoral fin with a conspicuous dark brown, black or blue-black blotch or spot; body with irregular dark blotches; dorsal-fin rays 18 to 20; anal-fin rays 17 to 19 (Fig. 14) ..... ***Sillago aeolus***

3b. Base of pectoral fin without a dark brown or blackish blotch, or spot ..... -> **4**

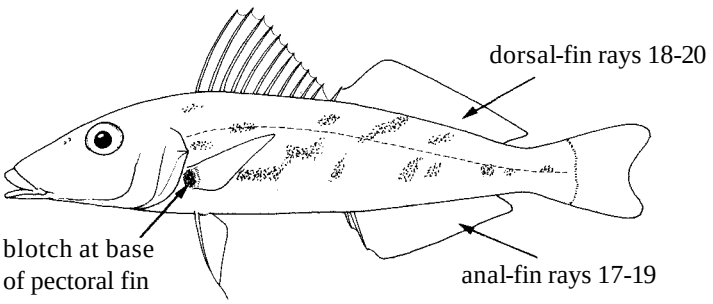


Fig. 14 ***S. aeolus***

4a. Sides of body just below lateral line with a longitudinal row of dusky black spots, and a series of saddle-like black blotches; swimbladder with 2 posterior extensions (Fig. 15) ..... ***S. intermedius***

4b. No longitudinal row of dusky black spots along sides below lateral line ..... -> **5**

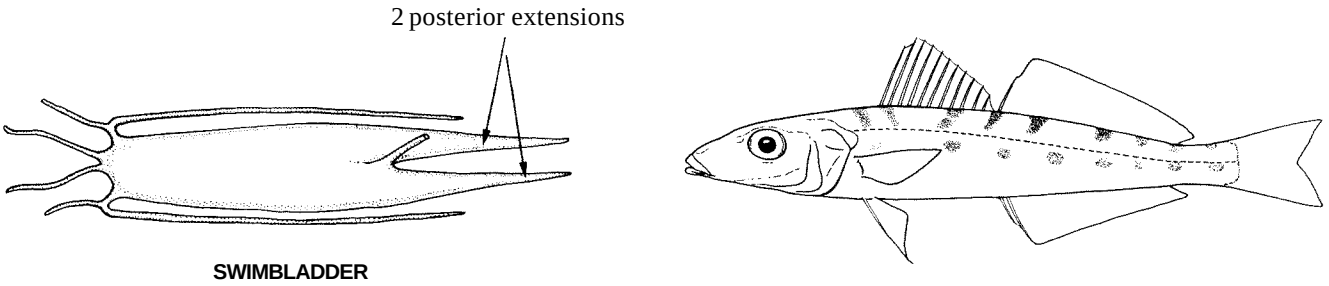


Fig. 15 ***S. intermedius***

5a. Lateral-line scales 61 or less; 19 to 21 anal-fin rays (Fig. 16) ..... ***S. macrolepis***

5b. Lateral-line scales 64 or more ..... -> **6**

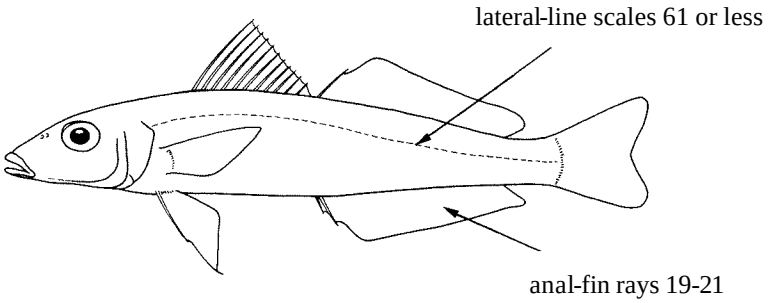


Fig. 16 ***S. macrolepis***

6a. Dorsal-fin spines normally XII to XIII ..... -> **7**

6b. Dorsal-fin spines XI ..... -> **9**

7a. Anal-fin rays 18 to 20 (Fig. 17) ..... ***S.attenuata***

7b. Anal-fin rays 22 or more ..... -> **8**

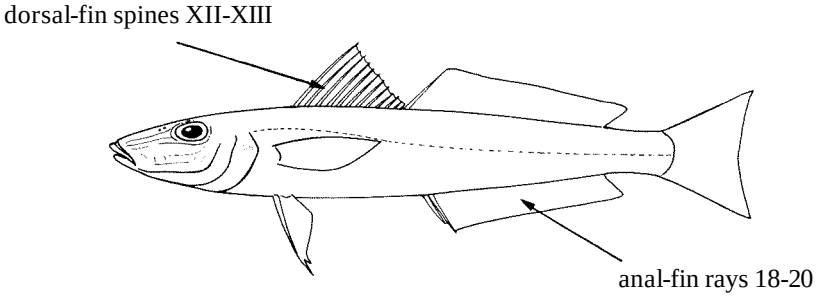
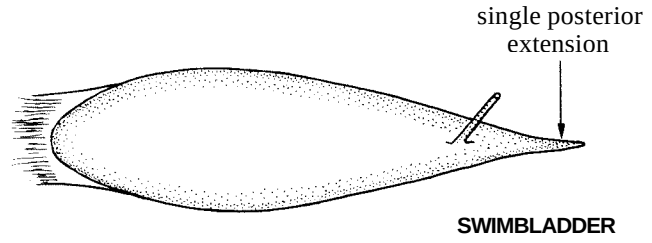


Fig. 17 ***S. attenuata***

8a. Snout short, 31 to 38% of head length; posterior extension of swimbladder single (Fig. 18) (Arabian Gulf) ..... **S. *arabica***

8b. Snout long, 38 to 43% of head length; swimbladder with 2 posterior extensions (Fig. 19) (Taiwan to Japan) ..... **S. *parvisquamis***



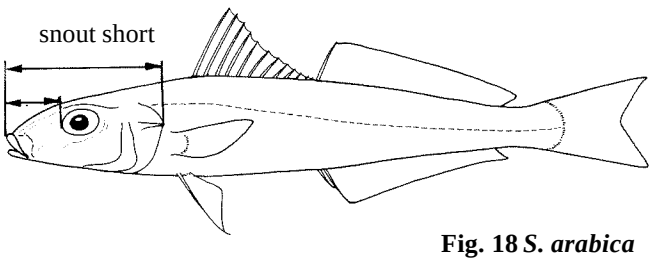
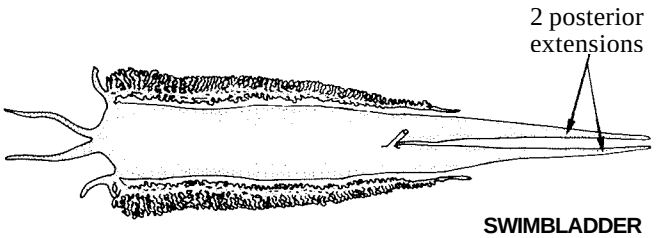


Fig. 18 *S. arabica*



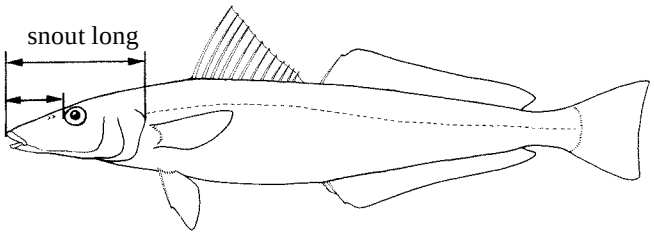


Fig. 19 *S. parvisquamis*

9a. Anal-fin rays 17 to 19 ..... -> **10**

9b. Anal-fin rays 21 or more ..... -> **12**

10a. Dorsal-fin rays 19; anal-fin rays 19; eye 14 to 16% of head length (Fig. 20) ..... ***S. microps***

10b. Dorsal-fin rays 17 or 18; anal-fin rays 17 ..... -> **11**

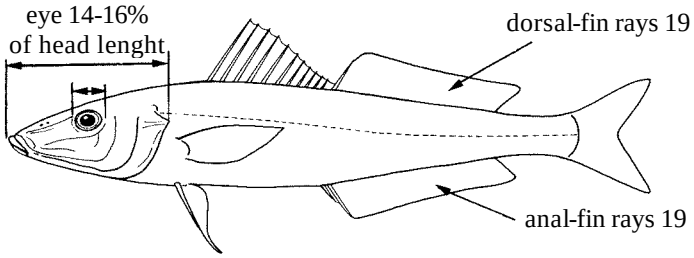


Fig. 20 *S. microps*

11a. Dorsal-fin rays 17 or 18; eye 28 to 29% of head length; upper-cheek scales cycloid (Fig. 21) ..... **S. *argentifasciata***

11b. Dorsal-fin rays 17; eye 19 to 23% of head length; upper-cheek scales ctenoid (Fig. 22) ..... **S. *ingenuua***

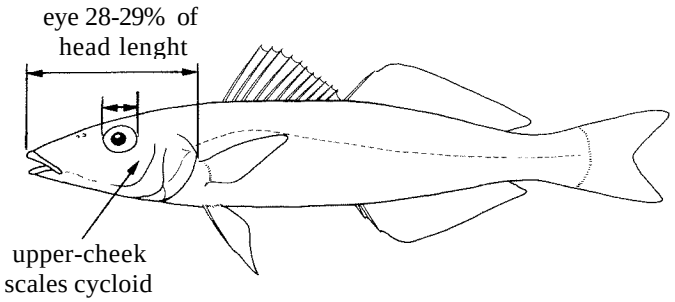


Fig. 21 *S. argentifasciata*

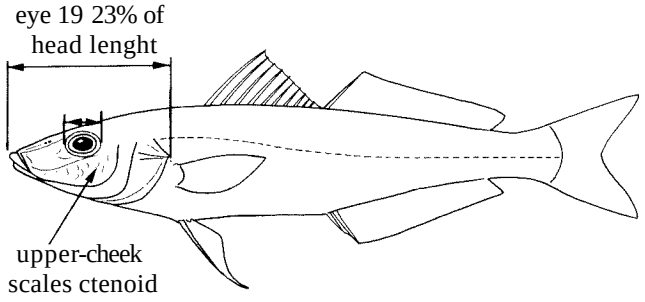


Fig. 22 *S. ingenuua*

12a. Total vertebrae 38; lateral-line scales 76 to 80 (Fig. 23) ..... ***S. boutani***

12b. Total vertebrae 35 or less; lateral-line scales usually less than 74 ..... -> **13**

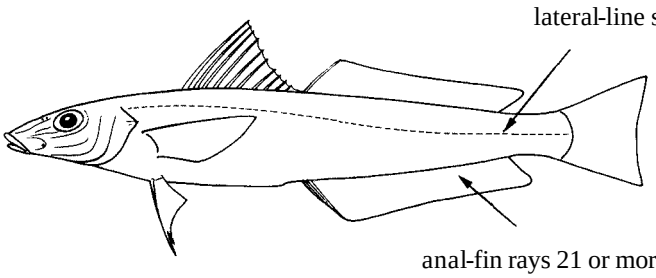
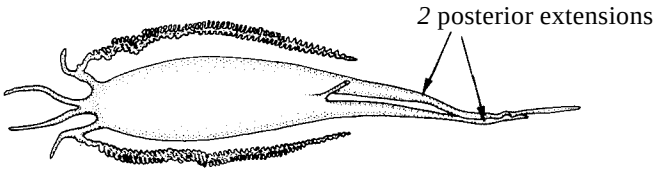


Fig 23 S. *boutani*

13a. Swimbladder with 2 posterior extensions (Fig. 24) ..... ***S. sihama***

13b. Swimbladder with a single extension ..... -> **14**



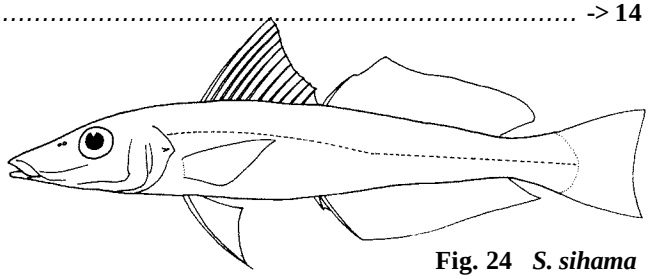
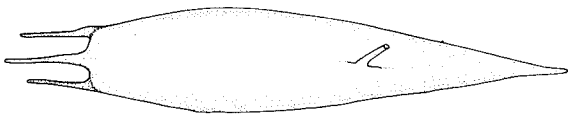


Fig. 24 *S. sihama*

14a. Three scales between lateral line and origin of dorsal fin (Fig. 25) ..... ***S. japonica***

14b. Four or more scales between lateral line and origin of dorsal fin ..... -> **15**



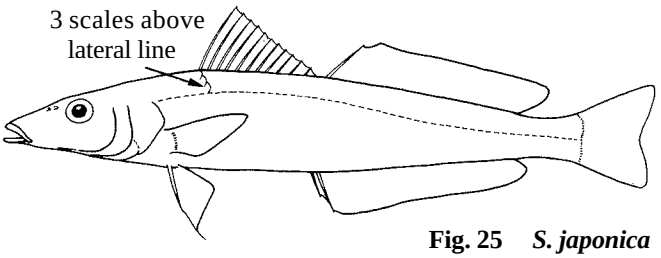


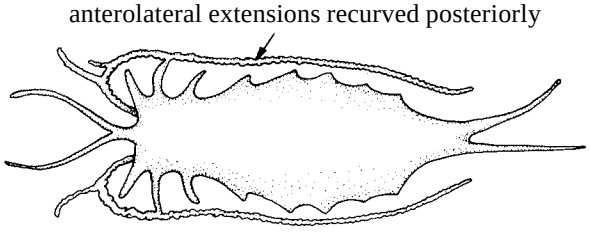
Fig. 25 *S. japonica*

15a. Swimbladder with anterolateral extensions recurved posteriorly (Figs 26, 28) ..... -> **16**

15b. Swimbladder without recurved extensions ..... -> **18**

16a. Swimbladder with long anterolateral extensions as in Fig. 26; lateral-line scales 68 to 70 (India ..... ***S. indica***

16b. Swimbladder with lateral extensions shorter than half length of swimbladder; lateral-line scales 64 to 70 ..... -> **17**



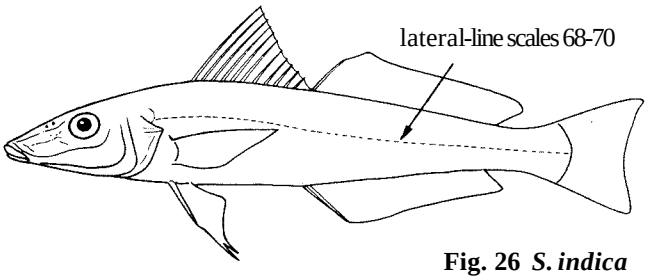


Fig. 26 *S. indica*

17a. Membrane of second dorsal fin with a more or less continuous grey stripe formed of minute black dots, running parallel to and closer to anterior edge of each ray (Fig. 27) (India) ..... **S. *soringa***

17b. Membrane of second dorsal fin without a more or less continuous grey stripe, but with the margin of the second dorsal fin finely spotted with brown or black (Fig. 28) (Thailand and Taiwan) ..... **S. *asiatica***

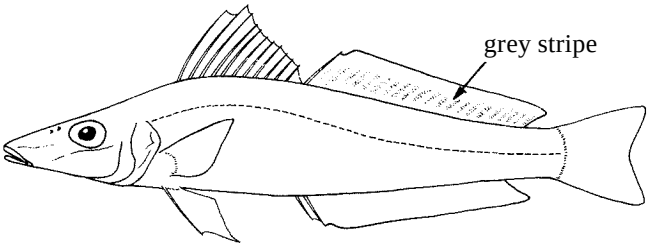


Fig. 27 *S. soringa*

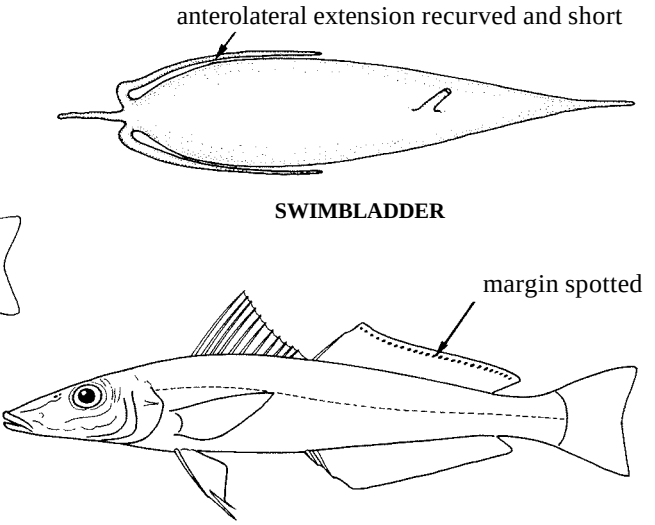
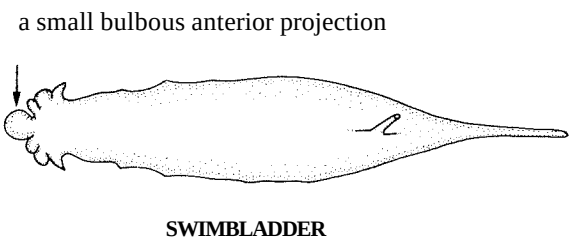
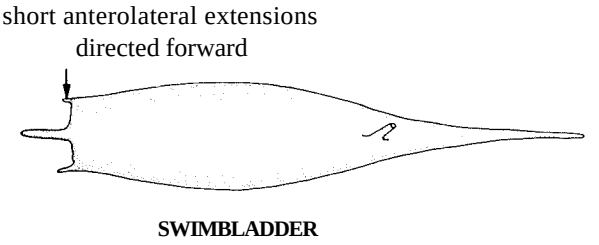


Fig. 28 *S. asiatica*

18a. Second dorsal fin with at least 5 rows of dusky black or black-brown spots; swimbladder with a small bulbous anterior projection (Fig. 29) ..... ***S. vincenti***

18b. Second dorsal fin without dark spots, but may have the membranes tipped with a dusting of very fine black dots; swimbladder with a short median projection and short anterolateral extensions directed forward (Fig. 30) ..... ***S. lutea***





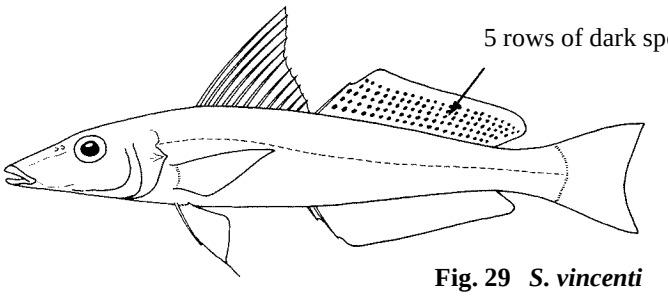


Fig. 29 *S. vincenti*

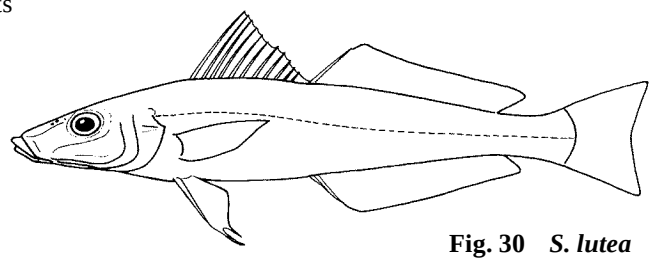


Fig. 30 *S. lutea*

2.2.3 Key to the Australian-New Guinea Genera and Species

1a. Scales very small, 129 to 147 in the lateral-line series (Fig. 31) ..... ***Sillaginodes punctata***

1b. Scales not very small, 50 to 84 in the lateral-line series (Fig. 32) ..... **(*Sillago*) -> 2**

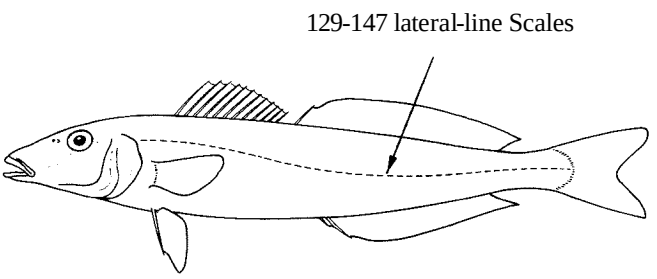


Fig. 31 ***Sillaginodes punctata***

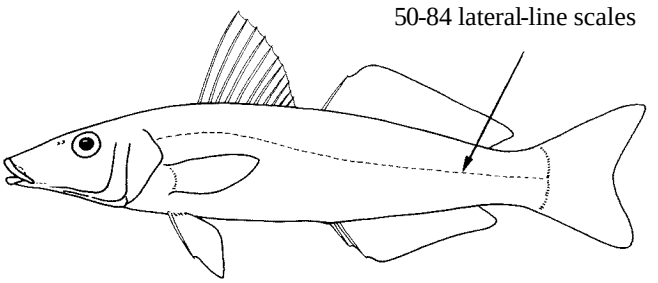


Fig. 32 ***Sillago***

2a. A dark spot or blotch on or just preceding the pectoral-fin base (Fig. 33) ..... **-> 3**

2b. No dark spots on or preceding pectoral-fin base ..... **-> 6**

3a. Body without dark blotches or bars on sides and back (Fig. 33) (juveniles up to 9.0 cm may have dark blotches in which case dissection of the swimbladder is necessary) ..... ***S. ciliata***

3b. Body coloration not uniform silvery in adults ..... **-> 4**

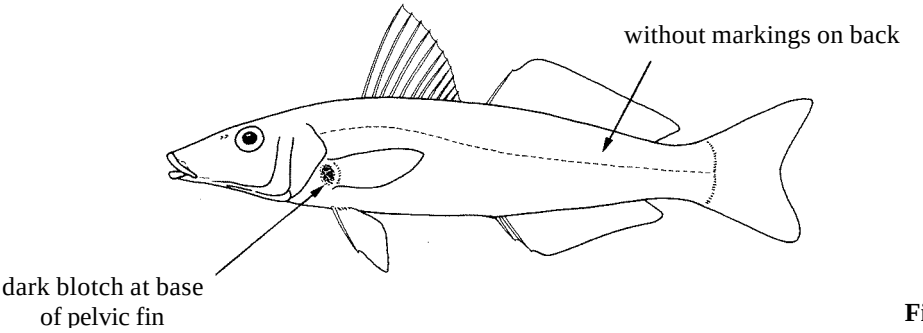


Fig. 33 ***S. ciliata***

4a. Body with 8 to 11 oblique rusty brown bars dorsally; dorsal-fin rays 17 to 19; anal-fin rays 16 to 18 (Fig. 34) ..... ***S. vittata***

4b. Body with dark blotches not in regular oblique bar ..... **-> 5**

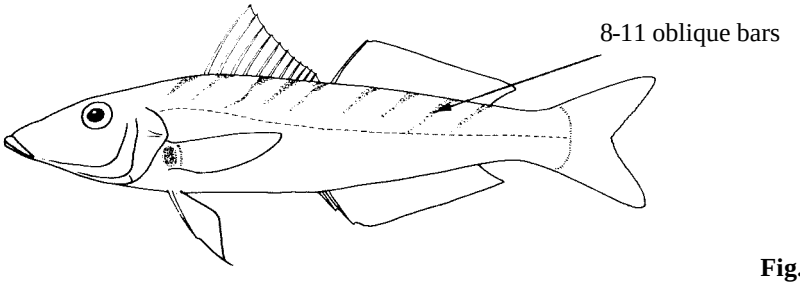


Fig. 34 ***S. vittata***

5a. Upper and lower dark blotches on sides joined posteriorly; swimbladder with complex anterolateral extensions recurved posteriorly to the vent (Fig. 35) ..... ***S. maculata***

5b. Upper and lower dark blotches separate; swimbladder without anterolateral extensions extending to the vent, but with four somewhat branched lobes on each side anteriorly (Fig. 36) ..... ***S. burrus***

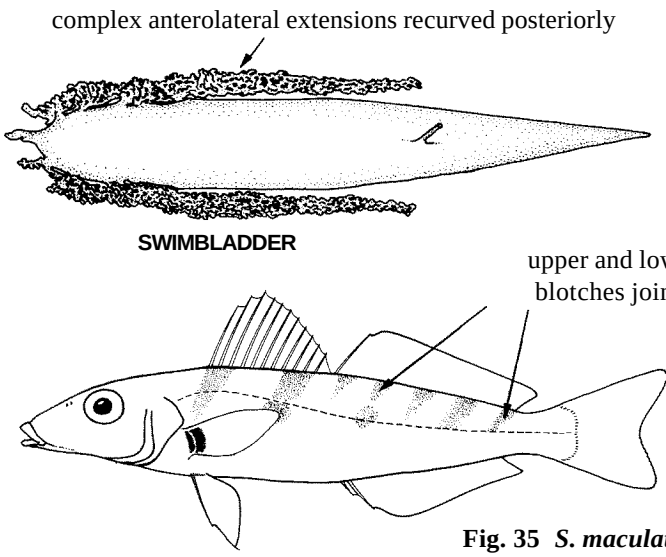


Fig. 35 ***S. maculata***

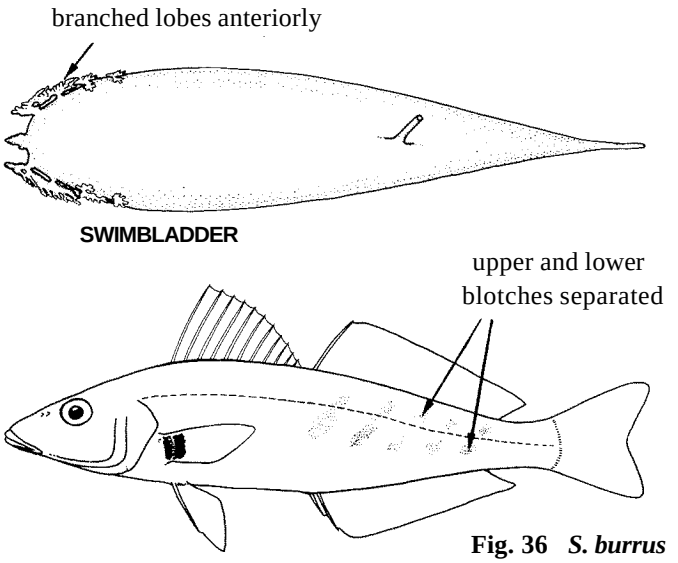


Fig. 36 ***S. burrus***

6a. Body with oblique narrow rusty brown bars of rusty-brown to orange spots ..... -> **7**

6b. No brown bars or blotches on body ..... -> **8**

7a. A longitudinal row of brown or rusty brown blotches along middle of side on or below lateral line (Fig. 37) ..... ***S. flindersi***

7b. No longitudinal row of spots on or below lateral line (Fig.38) ..... ***S. bassensis***

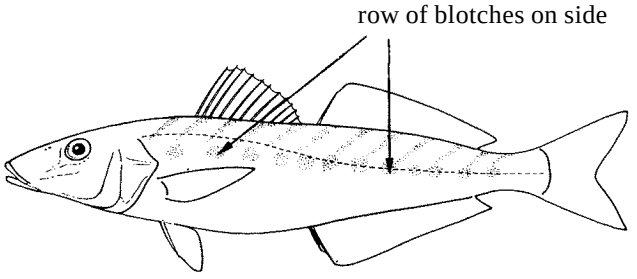


Fig. 37 ***S. flindersi***

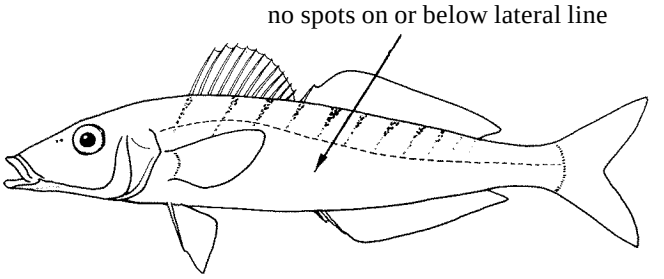


Fig. 38 ***S. bassensis***

8a. Dorsal-fin rays 20 to 23 ..... -> **9**

8b. Dorsal-fin rays 16 to 18 ..... -> **11**

9a. Anal-fin rays 17 to 20; lateral-line scales 66 to 76; vertebrae 37 (Fig. 39) ..... ***S. schomburgkii***

9b. Anal-fin rays 21 to 23; vertebrae 35 or less ..... -> **10**

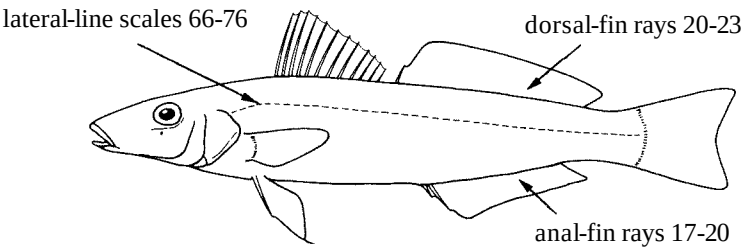


Fig. 39 ***S. schomburgkii***

10a. Swimbladder with two posterior postcoelomic extensions (Fig. 40) ..... ***S. sihama***

10b. Swimbladder with a single postcoelomic extension (Fig. 41) ..... ***S. lutea***

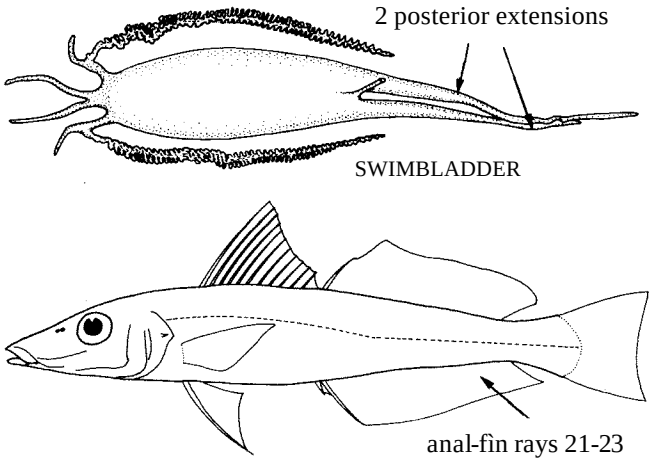


Fig. 40 ***S. sihama***

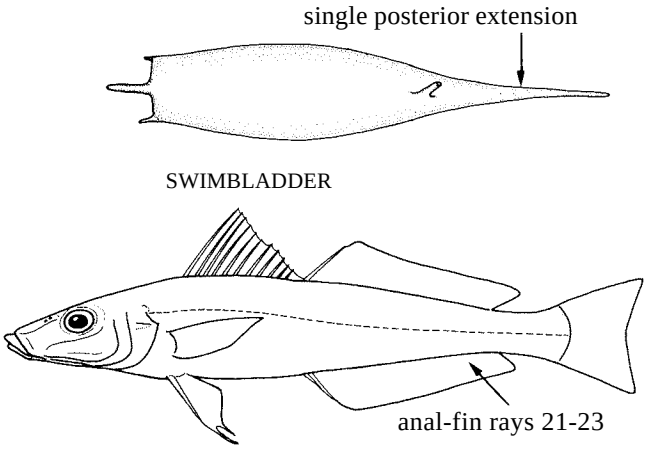
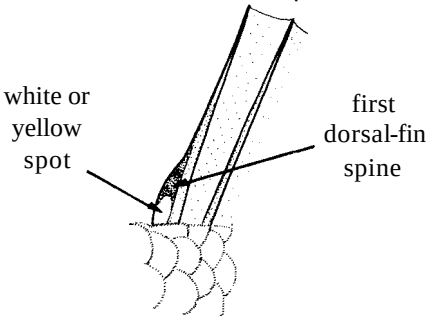


Fig. 41 ***S. lutea***

11a. Base of first dorsal-fin spine with a sharp anterior keel bearing on the lower part a white or pale yellow spot with a black spot above (Fig. 42) ..... ***S. robusta***

11 b. Base of dorsal-fin spine without a sharp anterior edge and without black spot on base ..... -> **12**



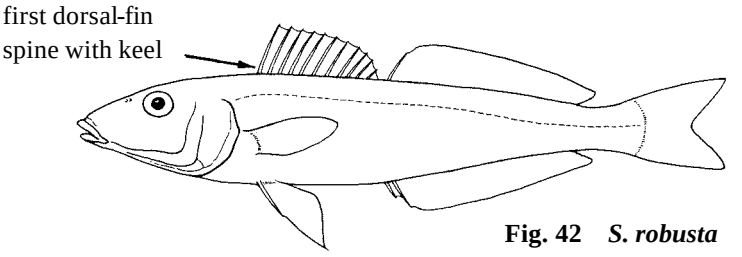


Fig. 42 ***S. robusta***

12a. Lateral-line scales 54 to 61 (Fig. 43) ..... ***S. analis***

12b. Lateral-line scales 66 to 70 (Fig.44) ..... ***S. ingenuua***

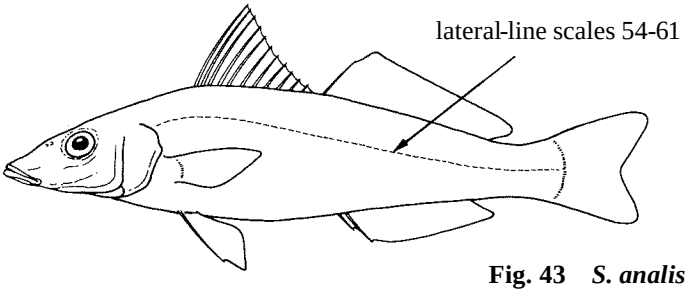


Fig. 43 ***S. analis***

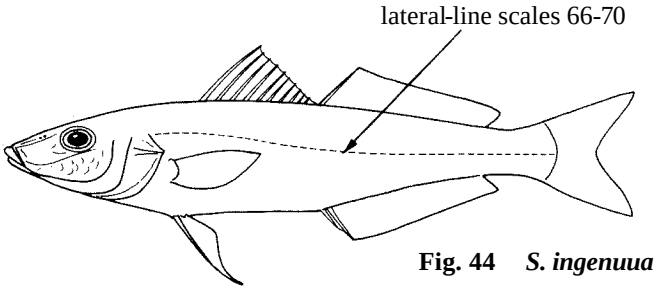


Fig. 44 ***S. ingenuua***