

STUDY ON SOLE FISHES (FAMILY SOLEIDAE) FROM TAIWAN

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Shih-Chieh Shen and Chian-Hsing Lee (1980). Study on sole Fishes (family soleidae) from Taiwan. *Bull. Inst. Zool., Academia Sinica* 20(2): 29-39 (1980). In the present revision of the sole fishes from the surrounding waters of Taiwan, fourteen species belonging to eight genera, in which one doubtful species is included, are recognized. They are: *Aseraggodes kobensis*, *A. kaianus*, *A. melanospilus*, *Pardachirus pavoninus*, *Solea ovata*, *Soleichthys heterorhinos*, *Soleichthys* sp., *Synaptura orientalis*, *S. annularis*, *Zebrias japonicus*, *Z. zebra*, *Z. crossolepis*, *Z. quagga*, *Aesopia cornuta*. Among them, *A. kaianus*, *S. ovata*, *S. heterorhinos*, *Z. crossolepis* are new records from Taiwan. A specimen of *Soleichthys* sp. from Ma-kung Bay possibly is the first record of a reversal sole fish in the world. A key to genera and species, diagnosis, and figures of each species are presented.

The would-wide sole fishes of family Soleidae distribute from tropical to temperate waters. Chen and Weng⁽⁶⁾ reviewed the Taiwan sole fishes and recorded nine species. They included *Aseraggodes kobensis* (Steindachner), *Liachirus melanospilus* (Bleeker), *Pardachirus pavoninus* (Lacépède), *Synaptura orientalis* (Bloch and Schneider), *S. nebulosa* Chen and Weng, *Zebrias japonicus* (Bleeker), *Z. quagga* (Kaup), *Z. zebra* (Bloch) and *Aesopia cornuta* Kaup. We consider that new species, *S. nebulosa* erected by those authors is a synonymized taxon of *Brachirus annularis* Fowler, 1933. Thenceforward, Chen⁽⁷⁾ added *Heteromycteris japonicus* (Temminck and Schlegel) and *Zebrias fasciatus* (Basilewsky) to this list. We consider *Z. fasciatus* a synonym of *Z. zebra* and the specimens of *H. japonicus* mentioned in Chen had been checked that it was misidentified, actually, it should be *A. melanospilus*. In the present, we add four more species *Aseraggodes kaianus* (Günther), *Solea ovata* Richardson, *Zebrias crossolepis* Cheng and *Soleichthys heterorhinos* Bleeker, and one doubtful species, *Soleichthys* sp. Therefore, a

total of fourteen species including one reversal species, are present in the waters of Taiwan.

MATERIALS AND METHODS

The materials used for this study collected by trawling net and ichthyocide carried out from coastal waters of Taiwan and its adjacent islands. All specimens were deposited in the Museum of Department of Zoology, National Taiwan University (NTUM). Loaning specimens from the following institutes had been examined: The Institute of Zoology, Academia Sinica (IZASP); Department of Biology, Tunghai University (THUP).

Counts and measurements followed to those of Ochiai⁽²¹⁾.

Key to Genera and Species of the Soleidae from Taiwan

1. Pectoral fins absent.....2
Pectoral fins present.....5
2. Each ray of the dorsal and anal fins with an open pore near its base; pelvic fin of eyed side with a long base joined to genital

- papilla or anal fin (*Pardachirus*); D. 70, A. 53, C. 18; scales on eye side with weakly ctenoid, its ctenii area 15.8-22.3% of the total scale length.....*P. pavoninus* (Fig. 1)
- Rays of the dorsal and anal fins without basal pores; pelvic fin of eyed side with a short base, separated from genital papilla and anal fin (*Aseraggodes*).....3
3. Scales cycloid on both sides; D. 63-66, A. 47-49, C. 18; vertebrae 34-35.....*A. melanospilus* (Fig. 2)
- Scales ctenoid on both sides4
4. Body with dark brown blotches; D. 70-78, A. 51-55, C. 18, vertebrae 34-25.....*A. kobensis* (Fig. 3)
- Body with dark brown reticular marks; D. 68, A. 48, C. 18, vertebrae 36*A. kaianus* (Fig. 4)
5. Caudal fin separated from dorsal and anal fins6
- Caudal fin confluent with dorsal and anal fins8
6. Eyes separated; opercular membrane not joined to pectoral fins; anterior nasal tube on eyed side short, reaching in front of lower eye (*Solea*); D. 59-63, A. 46-48, C. 20, vertebrae 32-33.....*S. ovata* (Fig. 5)
- Eyes contiguous; opercular membrane on both sides, joined to the upper rays of pectoral fins; anterior nasal on eyed side tube long, reaching behind middle of lower eye (*Soleichthys*)7
7. Eyes on right side; longest pectoral ray of eyed side 31.7-46.2% of H.L.; D. 92-103, A. 77-84, vertebrae 50-52.....*S. heterorhinos* (Fig. 6-8)
- Eyes on left side; longest pectoral ray of eyed side 63.9% of H.L.: S. 84, A. 69, vertebrae 45*Soleichthys* sp. (Fig. 9)
8. Body without cross bars (*Synaptura*).....9
- Body with cross bars10
9. Body ovate, depth less than 2.0 in S.L.; pectoral fin rays branched, except upper one or two rays; without patches, but in dots form; number of radii on scale 9-11*S. orientalis* (Fig. 10)
- Body elongate, depth more than 2.5 in S.L.; pectoral fin rays unbranched; with distinguished annular patches; number of radii on scale 4-6.....*S. annularis* (Fig. 11)
10. First ray of dorsal fin not modified; scales ctenii area 29-58% of total scale 5-11 (*Zebrias*).....11
- First ray of dorsal fin enlarged; with small marginal, less than 18% of total scale length; number of radii on scale 15-24 (*Aesopia*); D. 69-78, A. 57-64, C. 15-16, vertebrae 46-48*A. cornuta* (Fig. 12)
11. The posterior rays of dorsal and anal fins fully connected to caudal fin12
- The posterior rays of dorsal and anal fins connected to the basal half of caudal fin....13
12. Eyes contiguous, not separated by scales, and each eye with dark brown tentacle...*Z. quagga* (Fig. 13)
- Eyes separated by scales, without tentacle*Z. zebra* (Fig. 14)
13. Longest ray of right pectoral fin 15.7-20.8% of H.L.; caudal fin with whitish spots...*Z. crossolepis* (Fig. 15)
- Longest ray of right pectoral fin 40-63% of H.L.; caudal fin without whitish spots*Z. japonicus* (Fig. 16)

Pardachirus pavoninus (Lacépède)

Table 1, Fig. 1

Achirus pavoninus Lacépède, 1807: 658, 661. (type locality: unknown)

Pardachirus pavoninus Günther, 1862: 479; Fowler, 1928: 94; Weber and De Beaufort, 1929: 165-166, Fig. 46; Ochiai, 1963: 35-38, pl. 4; Chen and Weng, 1965: 35-36, Fig. 50; Chen, 1969: 220-221.

Specimen examined: 1 specimen, THUP 00355, 206.0 mm SL, collected in February 1960 from Tung-kong.

Diagnosis: Caudal fin separated from dorsal and anal fins; each ray of dorsal and anal fins

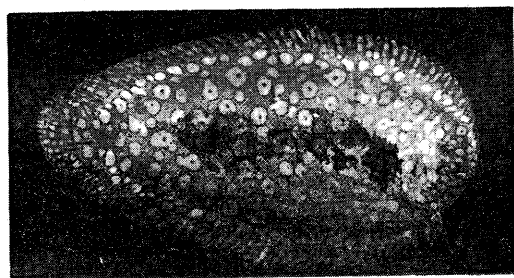


Fig. 1. *Pardachirus pavoninus* (Lacépède), 206.0 mm SL, THUP 00355.

TABLE 1
Meristic counts and measurements of scales of the sole fishes (Soleidae) from Taiwan.

Species	Dorsal rays	Anal rays	Pectoral rays	Pelvic rays	Caudal rays
1. <i>Pardachirus pavoninus</i>	70	53	absent	5/5	18
2. <i>Aseraggodes melanospilus</i>	63-66	47-49	absent	5-6/5-6	18
3. <i>Aseraggodes kobensis</i>	70-78	51-55	absent	5/5	18
4. <i>Aseraggodes kaianus</i>	68	48	absent	5/5	18
5. <i>Solea ovata</i>	59-63	46-48	7-8/4-5	4-5/5-6	20
6. <i>Soleichthys heterorhinos</i>	94-103	78-84	9-12/7-11	4-5/4-5	18
7. <i>Soleichthys</i> sp.	84	70	9/8	5/6	18
8. <i>Synaptura orientalis</i>	61	44-45	6-7/4-7	5/5	18
9. <i>Synaptura annularis</i>	70-71	57-59	6-7/6-7	5/5	18
10. <i>Aesopia cornuta</i>	69-78	57-64	11-15/11-15	4/4	15-16
11. <i>Zebrias quagga</i>	63-75	53-61	5-7/6-8	4/4	18
12. <i>Zebrias zebra</i>	69-97	56-85	8-10/8-10	4/4	16-18
13. <i>Zebrias crossolepis</i>	65-76	54-63	8-11/10-11	4-5/4-5	18
14. <i>Zebrias japonicus</i>	71-81	58-65	6-9/6-8	5/5	18

Species	Vertebrae	Lateral-line scales	Ctenii area		No. radii on scale
			Total scale length		
			Range	Mean	
1. <i>Pardachirus pavoninus</i>	38	80	15.8-22.3%	18.5%	28-35
2. <i>Aseraggodes melanospilus</i>	33-34	65-77	0		27-35
3. <i>Aseraggodes kobensis</i>	34-35	69-77	26.8-31.8%	30.1%	24-34
4. <i>Aseraggodes kaianus</i>	36	63	28.4-34.0%	30.9%	29-33
5. <i>Solea ovata</i>	32-33	93-108	40.1-44.1%	41.6%	9-13
6. <i>Soleichthys heterorhinos</i>	50-52	105-128	30.6-37.4%	33.8%	4-6
7. <i>Soleichthys</i> sp.	45	120	34.8-39.7%	37.8%	3-6
8. <i>Synaptura orientalis</i>	33	76-80	33.5-40.4%	36.5%	9-11
9. <i>Synaptura annularis</i>	42	85-89	36.6-41.1%	37.8%	4-6
10. <i>Aesopia cornuta</i>	46-48	88-96	less than 18%		15-24
11. <i>Zebrias quagga</i>	41-44	85-99	32.6-41.2%	36.9%	5-7
12. <i>Zebrias zebra</i>	45-54	87-138	29.3-47.8%	37.5%	5-7
13. <i>Zebrias crossolepis</i>	43-45	61-80	44.3-45.3%	50.7%	7-1
14. <i>Zebrias japonicus</i>	48-44	80-100	37.0-40.0%	40.0%	16-10

with an open pore near its base; eyes on right side; interorbital with scales; ocular pelvic fin with a long base and attached to genital papilla or anal fin; anterior nasal tube simple and short not reaching to anterior border of lower eye.

Colour in formalin: Densely spotted on head; body and fins on ocular side also with spots of various sizes and shapes, bordered by a dark rim and some with a blackish spot in center.

Aseraggodes melanospilus (Bleeker)

Table 1, Fig. 2

Achirus melanospilus Bleeker, 1854: 257 (type locality: Celebes); 1866-72, pl. 244, Fig. 1.

Liachirus nitidus Günther, 1862: 479; Oshima, 1927: 196.

Liachirus melanospilus Weber and De Beaufort, 1929: 158-159, Fig. 42; Ochiai, 1963: 23-25, pl. 9; Chen and Weng, 1965: 33-35, Fig. 49.

Aseraggodes melanospilus Matsubara, 1955: 1281; Chen, 1969: 220-221, Fig. 199.

Specimens examined: 10 specimens, NTUM 05120(2), 78-81.0 mm SL, May 20, 1979, from Ma-kung; NTUM 05164(2), 62.5-75.0 mm SL, Oct. 23, 1978, from Kao-hsiung; NTUM 05199(2), 70-77.0 mm SL, Mar. 17, 1979, from Kao-hsiung; NTUM 05200, 69.5 mm SL, July 15, 1978, from Kao-hsiung; NTUM 05201(2), 98-105.0 mm SL, Sept. 20, 1978, from Kao-hsiung; NTUM 05203, 92.5 mm SL, Mar. 19, 1978, from Kao-hsiung.

Diagnosis: Eyes on right side, separated by scales; caudal fin free from dorsal and anal fins; anterior nasal tube simple and short, reaching to anterior rim of lower eye; posterior nostril without a tube; scales cycloid on both sides and lateral-line.

Colour in formalin: Eyed side of body yellowish brown, with scattered black dots and dark brown blotches.

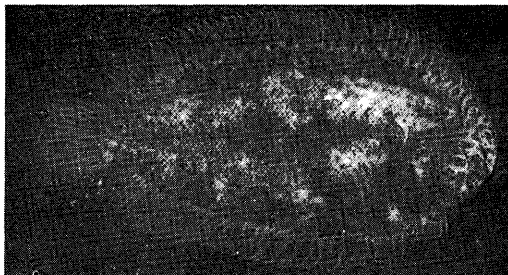


Fig. 2. *Aseraggodes melanospilus* (Bleeker). 75.0 mm SL, NTUM 05164.

Aseraggodes kobensis (Steindachner)

Table 1, Fig. 3

Solea (Achirus) kobensis Steindachner, 1896: 218 (type locality: Kobe, Japan).

Aseraggodes kobensis Jordan and Starks, 1906: 230, Fig. 24; Ochiai, 1963: 30-32, pl. 3; Chen and Weng, 1965: 32-33, Fig. 48; Shen, 1967: 201, Figs. 110-113; Chen, 1969: 220-221.

Specimens examined: 8 specimens, NTUM 05165(3), 78.0-83.5 mm SL, Oct. 23, 1978, from Kao-hsiung; NTUM 05192, 60.5 mm SL, Dec. 31, 1978, from Tai-nan; NTUM 05195, 85.5 mm

SL, Dec. 3, 1978, from Kao-hsiung; NTUM 05197, 71.0 mm SL, Dec. 17, 1978, from Ta-chi; NTUM 05211(2), 63.5-64.0 mm SL, Aug. 9, 1971, from Ma-kung.

Diagnosis: Eyes on right side, separated by scales; dorsal and anal fins free from caudal fin; anterior nasal tube simple and short, reaching to anterior rim of lower eye; posterior nostril with a very short tube; scales on both sides ctenoid, except lateral-line scales cycloid.

Colour in formalin: Eyed side of body brownish, with blackish spots on head, body and fins.



Fig. 3. *Aseraggodes kobensis* (Steindachner), 78.0 mm SL, NTUM 05165.

Aseraggodes kaianus (Günther)

Table 1, Fig. 4

Solea kaianus Günther, 1880: 49, pl. 21, Fig. c (type locality: Ki-Island, Japan).

Aseraggodes kaianus Weber and De Beaufort, 1929: 155; Ochiai, 1963: 32-34, pl. 10.

Specimen examined: 1 specimen, NTUM 05174, 95.2 mm SL, Sept. 18, 1968, from Kao-hsiung.

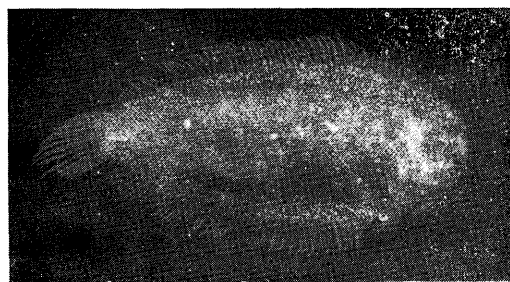


Fig. 4. *Aseraggodes kaianus* (Günther), 95.2 mm SL, NTUM 05174.

Diagnosis: Eyes on right side, separated by scales; caudal fin free from dorsal and anal fins; anterior nasal tube simple and short, not reaching to posterior nostril with a very short tube; scales on both sides ctenoid except lateral-line scales cycloid.

Colour in formalin: Eyed side of body with brownish; with reticulated dark brown on fins.

***Solea ovata* Richardson**

Table 1, Fig. 5

Solea ovata Richardson, 1845: 279 (type locality: Canton, China); Günther, 1862: 472; Shen, 1967: 198-200, Figs. 93-96.

Solea humilis Günther, 1862: 471; Weber and De Beaufort, 1929: 148.

Specimens examined: 8 specimens, NTUM 05166, 84.0 mm SL, Sept. 26, 1978, from Kao-hsiung; NTUM 05167, 72.0 mm SL, Dec. 31, 1978, from Tainan; NTUM 05168(6), 60.5-71.8 mm SL, Feb. 15, 1968, from Lu-Kong.

Diagnosis: Eyes on right side, separated by scales; caudal fin free from dorsal and anal fins; mouth curved, cleft reaching to below anterior half of lower eye; anterior nasal tube simple and short, reaching to anterior rim of lower eye opercular membrane not joined to the upper rays of pectoral fins; pectoral rays of eyed side 44.7-47.7%, blind side 29.5-37.5%, both of H.L.; scales on both side ctenoid, except lateral-line scales cycloid.

Colour in formalin: Eyed side of body olive-brown, speckled with black dots, with five round blackish spots along the base of dorsal

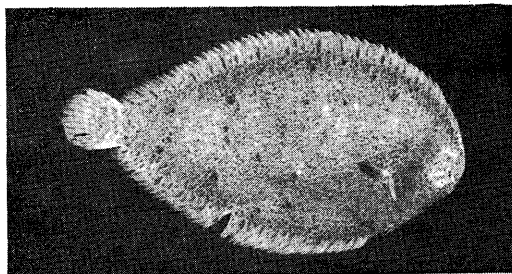


Fig. 5. *Solea ovata* Richardson, 72.0 mm SL. NTUM 05167.

and four along the base of anal; deep black on outer two-thirds of pectoral fin rays.

***Soleichthys heterorhinos* Bleeker**

Table 1, Fig. 6-8

Solea heterorhinos Bleeker, 1856: 64 (type locality: Amboina); Marshall, 1965: 462, pl. 61.

Soleichthys heterorhinos Bleeker, 1860: 14; Ochiai, 1963: 46-49, pl. 11.

Solea heterorhina Günther, 1862: 466; Weber and De Beaufort, 1929: 148, Fig. 38.

Specimens examined: 6 specimens, NTUM 05175, 91.0 mm SL, March 29, 1979, from Ma-Kuang; NTUM 05176, 95.0 mm SL, April 2, 1973, from Hou-pi-huo; NTUM 05177, 92.5 mm

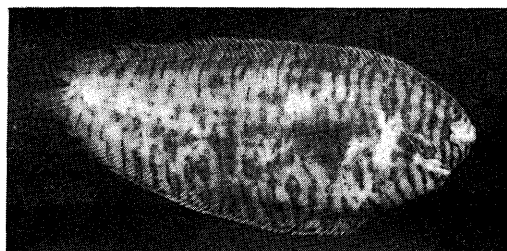


Fig. 6. *Soleichthys heterorhinos* Bleeker, 91.0 mm SL, NTUM 05175.



Fig. 7. *Soleichthys heterorhinos* Bleeker, 95.0 mm SL, NTUM 05176.



Fig. 8. *Soleichthys heterorhinos* Bleeker, 92.5 mm SL, NTUM 05177.

SL, Nov. 30, 1970, from Fan-shu-liao; IZASP 054794(3), 31.6–80.3 mm SL, July, 1975, from Maupitou.

Diagnosis: Eyes on right side, contiguous: interorbital with scales; caudal fin free from dorsal and anal fins; opercular membrane joined to upper rays of pectoral fins; pectoral fin rays unbranched, its longest ray on eyed side 31.7–46.2% of H.L.; anterior nasal tube simple or bifid and long, reaching to middle of lower eye; scales on both sides ctenoid except lateral-line scales cycloid.

Colour in formalin: Eyed side of body brownish, with many dark wavy bars or irregular cross bands, blotches and spots; black on outer rays of caudal fin. Colour also varies in different sizes and localities.

Soleichthys sp.

Table 1, Fig. 9

Specimen examined: 1 specimen, NTUM 05172, 105 mm SL (124 mm TL), caught by small trawing net at a depth 20–30 meters off Ma-kung Bay of Peng-hu Islands on May 20, 1979.

Diagnosis: Eyes on left side, contiguous; interorbital well convex, and cover small scales; caudal fin free from dorsal and anal fins; mouth curved, cleft reaching to below anterior rim of lower eye; anterior nasal tube simple and long, reaching to middle of lower eye; opercular membrane jointed to upper rays of pectoral fins; pectoral fin rays unbranched, its longest ray on eyed side 63.9% of H.L.; pelvic fins short base, separated from genital papilla and anal fin; scales on both sides ctenoid, except lateral-line scales cycloid.

Colour in formalin: Eyed side of body brownish, with irregular dark brown blotches and indistinct bands, extending on dorsal and anal fins; caudal fin black, its margin yellowish.

Remarks: The present species is quite clear an anomalistic specimen, its eyes and colour were placed on left side of the body, which is closely related to *Soleichthys heterorhinos* at least in having a long nasal tube on the ocular side and caudal fin free from dorsal

and anal fins, but differs from the latter in having less rays on dorsal and anal fins, less number of vertebrae, longer pectoral fin rays on eyed side, and wider interorbital space.

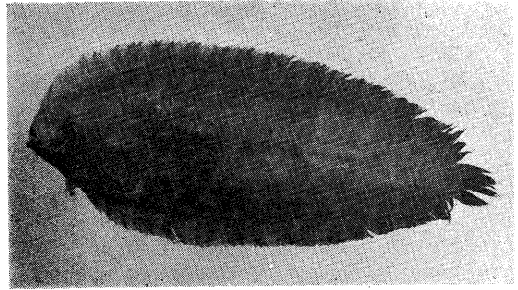


Fig. 9. *Soleichthys* sp. 105.0 mm SL, NTUM 05172.

Synaptura orientalis (Bloch and Schneider)

Table 1, Fig. 10

Pleuronectes orientalis Bloch and Schneider, 1801: 157 (type locality: unknown).

Synaptura orientalis Günther, 1862: 484; Weber and De Beaufort, 1929: 175; Chen and Weng, 1965: 37–38, Fig. 51; Shen, 1967: 205–207, Figs. 149–152.

Euryglossa orientalis Kaup, 2858: 99.

Brachirus orientalis Munro, 1955: 263, Pl. 50, Fig. 762.

Specimens examined: 5 specimens, THUP 00911, 121.0 mm SL, May 1960, from Lu-kong; THUP 02083(4), 106–136 mm SLM September 1963, from Kaohsiung.

Diagnosis: Eyes on right side, separated by scales; caudal fin confluent with dorsal and anal fins; body oval, depth less than 2.0 in SL; opercular membrane not joined to pectoral fin; pectoral fins well developed, branched, except upper one or two rays, its longest ray 36.8–41.2% on eyed side, blind side 25.4–28.2%, both of H.L.; anterior nasal tube simple and short, reaching to posterior nostril pore; posterior nostril with a very short tube; scales on both sides ctenoid, except lateral-line scales cycloid.

Colour in formalin: Eyed side of body grey or brown, with cloudy indistinct patches, extending on dorsal and anal fins; pectoral fin rays dark brown.

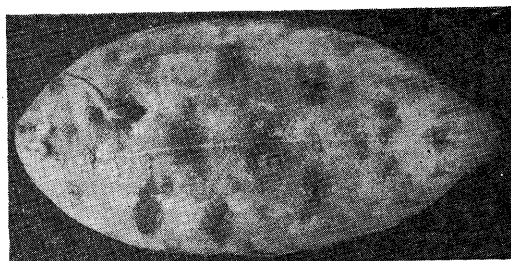


Fig. 10. *Synaptura orientalis* (Bloch and Schneider), 136.0 mm (SL) THUP 02083.

Synaptura annularis (Fowler)

Table 1, Fig. 11

Brachirus annularis Fowler, 1933: 346, Fig. 99 (type locality; China Sea, vicinity of Formosa).

Synaptura nebulosa Chen and Weng, 1965: 38-39, Fig. 52 (Tung-kong); Chen, 1969: 220-221, Fig. 198.

Specimens examined: 2 specimens, NTUM 05173, 139.0 mm SL, March 11, 1975, from Tung-kong; THUP 02768, 137 mm SL, March 1965, from Tung-kong.

Diagnosis: Eyes on right side, separated by scales; caudal fin confluent with dorsal and anal fins; body elongate, depth more than 2.5 in SL; opercular membrane joined to upper rays of pectoral fins; pectoral fin rays unbranched and not developed, its longest ray 12.5% of H.L.; anterior nasal tube simple and short, reaching to in front of lower eye; posterior nostril with a very short tube; scales on both sides ctenoid, except lateral-line scales cycloid.

Colour in formalin: Eyed side of body pale brown with five distinguished large annular



Fig. 11. *Synaptura annularis* (Fowler), 139.0 mm SL, NTUM 05173.

patches, 5-6 small annular blotches, and 6 dark brown spots on body and head; all fins blackish.

Aesopia cornuta Kaup

Table 1, Fig. 12

Aesopia cornuta Kaup, 1858: 95 (type locality; British India); Günther, 1862: 487; Ochiai, 1963: 61-64, pl. 13; Chen and Weng, 1965: 44-45, Fig. 56; Shen, 1967: 204-205, Figs. 102-105.

Specimens examined: 10 specimens, NTUM 05155(2), 143-149.0 mm SL, Nov. 2, 1977, from Kao-hsiung; NTUM 05156(3), 98.5-118.0 mm SL, Dec. 23, 1972, from Nan-fan-ao; NTUM 05179, 155 mm SL, Jan. 25, from Ta-chi; NTUM 05180, 131.0 mm SL, Apr. 23, 1978, from Ta-chi; NTUM 05181, 130.0 mm SL, March 11, 1975, from Tung-kong; NTUM 05183, 79.2 mm SL, Oct. 29, 1977, from Ta-chi; NTUM 05184, 106.0 mm SL, Nov. 2, 1977, from Kao-hsiung.

Diagnosis: Eyes on right side, contiguous; interorbital without scales; caudal fin fully connected to dorsal and anal fins; first ray of dorsal fin enlarged; opercular membrane joined to upper rays of pectoral fins; pectoral rays unbranched, its longest ray of eyed side 12-16% of H.L.; scales on both sides weakly ctenoid, except lateral-line scales cycloid.

Colour in formalin: Eyes side of body light brown, with cross-bands somewhat irregularly, some with 12 paired dark brown bands, some with 24 simple wide bands; caudal fin black with whitish spots.

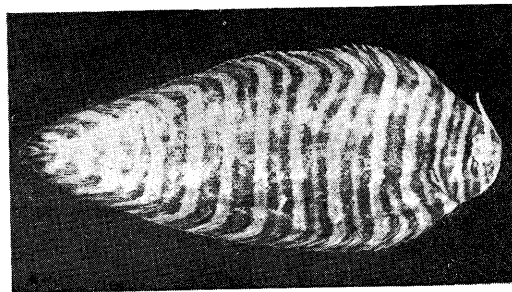


Fig. 12. *Aesopia cornuta* Kaup, 143.0 mm SL, NTUM 05155.

Zebrias quagga (Kaup)

Table 1, Fig. 13

Aesopia cornuta Kaup, 1858: 98 (type locality: Bombay).

Synaptura quagga Günther, 1862: 485; Weber and De Beaufort, 1929: 173.

Zebrias quagga Hubbs, 1915: 493; Munro, 1955: 263, Fig. 763; Chen and Weng, 1965: 42-44, Fig. 55; Shen, 1969: 19-20, Figs. 1-4.

Specimens examined: 3 specimens, NTUM 05169, 130.0 mm SL, Jan. 17, 1972, from Tung-kong; NTUM 05170, 108.0 mm SL, Jan. 31, 1968, from Tai-nan; NTUM 05171, 102.0 mm SL, Dec. 31, 1978, From Tai-nan.

Diagnosis: Eyes on right side, contiguous, and each with a short dark brown tentacle; interorbital without scales; caudal fin fully connected to dorsal and anal fins; opercular membrane joined to upper rays of pectoral fins; pectoral rays unbranched, its longest ray of eyed side 32.7-40.5% of H.L.; scales on both sides ctenoid, except lateral-line scales cycloid.

Colour in formalin: Eyed side of body light brownish, with 11 darker simple or double cross-bands, extending to dorsal and anal fins; caudal fin blackish-brown, with some whitish patches.



Fig. 13. *Zebrias quagga* (Kaup), 130.0 mm SL, NTUM 05169.

Zebrias zebra (Bloch)

Table 1, Fig. 14

Pleuronectes zebra Bloch, 1787: 27, pl. 187 (type locality; East Indies).

Synaptura zebra Günther, 1862: 484; Weber and De Beaufort, 1929: 177.

Solea fasciatus Basilewsky, 1855: 261.

Zebrias zebra Oshima, 1927; Ochiai, 1963: 54-57, pl.

11; Chen and Weng 1965: 273-275; Shen, 1967: 204-204, Figs. 106-109.

Solea ommatura Richardson, 1846: 279.

Solea zebrina Temminck and Schlegel, 1846: 185, pl. 95, Fig. 1.

Zebrias fasciatus Oshima, 1927: 197; Ochiai, 1963: 57-59, pl. 12; Chen, 1969: 220-221.

Specimens examined: 16 specimens, NTUM 05123(9), 157-238.0 mm SL, Dec. 23, 1967, from Taipei market; NTUM 05124(2), 127-152.0 mm SL, March 27, 1972, from Ta-chi; NTUM(2), 77.2-82.0 mm SL, Sept. 17, 1972, from Nan-fan-ao; NTUM 05158, 161 mm SL, Apr 2, 1979, from Ta-chi; NTUM 05159, 147.0 mm SL, Feb. 15, 1978, from Kee-lung; NTUM 05160, 110.0 mm SL, May 22, 1978, from Ta-chi.

Diagnosis: Eyes on right side, separated by scales; caudal fin fully connected to dorsal and anal fins; opercular membrane joined to upper rays of pectoral fins; pectoral rays unbranched, its longest ray of eyed side 21-97% of H.L.; scales on both sides ctenoid, except lateral-line scales cycloid.

Colour in formalin: Eyed side of body yellowish brown, with 12 paired dark brown cross-bands, or with 20-23 simple bands from caudal to head; caudal fin blackish with whitish spots.

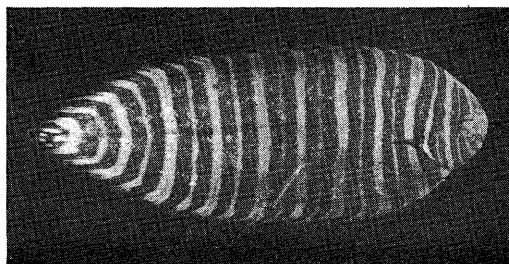


Fig. 14. *Zebrias zebra* (Bloch), 212.0 mm SL, NTUM 05123.

Zebrias zebra Cheng and Chang

Table 1, Fig. 15

Zebrias crossolepis Cheng and Chang, 1965: 277-278, Figs. 1D, 2D, 3 (type locality; Jieshi, Kwang-tung, China)

Zebrias zebra (non Bloch) Hubbs, 1915: 493.

Specimens examined: 7 specimens, NTUM 05122(2), 104–116.0 mm SL, June 28, 1980, NTUM 05161(3), 115–132.0 mm SL, Nov. 2, 1977, NTUM 05162, 119.0 mm SL, Sept. 18, 1968, NTUM 05163, 102.0 mm SL, Oct. 24, 1979, all from Kao-hsiung.

Diagnosis: Eyes on right side, contiguous; interorbital mostly without scales, rarely with scales; the posterior rays of dorsal and anal fins connected to the basal half of the caudal fin; opercular membrane joined to upper rays of pectoral fins; pectoral rays unbranched, its longest ray of eyed side 15.5–20.8% of H.L.; scales on both sides strongly ctenoid, except lateral-line scales cycloid.

Colour in formalin: Eyed side of body light brownish-yellow, with 13 paired dark brown cross-bands from caudal to snout; caudal fin dark brown, with whitish spots.

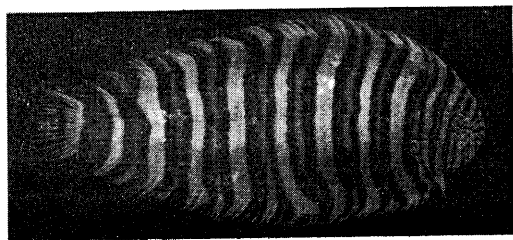


Fig. 15. *Zebrias crossolepis* Cheng and Chang, 126 mm SL, NTUM 05161.

Zebrias japonicus (Bleeker)

Table 1, Fig. 16

Aesopia japonica Bleeker, 1860: 71 (type locality: Nagasaki, Japan).

Synaptura japonica Günther, 1862: 485.

Synaptura smithii Regan, 1902: 57, pl. 6, Fig. 1.

Zebrias japonicus Jordan and Stark, 1906: 234. Chen and Weng, 1965: 41, Fig. 54; Cheng and Chang, 1965: 273, Fig. 4.

Pseudoesopia japonica Ochiai, 1963: 50, pl. 6.

Specimens examined: 11 specimens, NTUM 05124, 120.0 mm June 28, 1980, from Kao-hsiung; NTUM 05151(7), 106–130 mm SL, June 24, 1978, from Ta-chi; NTUM 05152, 111.5 mm SL, May 22, 1978, from Ta-chi; NTUM 05143, 102.0 mm SL, Nov. 5, 1978, from Ta-cho; NTUM 05154,

100.0 mm SL, Oct. 1, from Ta-chi.

Diagnosis: Eyes on right side, contiguous; interorbital with scales; the posterior rays of dorsal and anal fins connected to the basal half of the caudal fin; opercular membrane joined to upper rays of pectoral fins; pectoral rays unbranched, its longest ray on eyed side 40–63% of H.L.; anterior nasal tube simple, mostly reaching beyond anterior border of lower eye; scales on both sides ctenoid, except, lateral-line scales cycloid.

Colour in formalin: Eyed side of body brown or yellowish brown, with 9–13 pairs of dark brown cross bands; dorsal and anal fins with dark brown blotches and streaks; caudal fin brownish on basal, and blackish on its posterior third, without whitish spots.

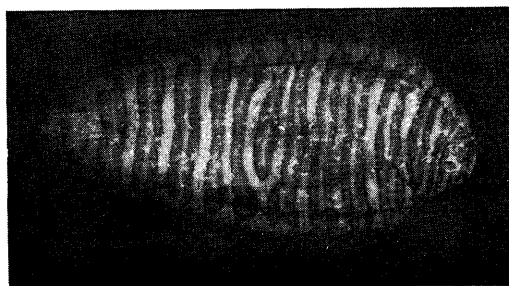


Fig. 16. *Zebrias japonicus* (Bleeker) 102.0 mm SL, NTUM 05153.

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臺灣近海產右鰾科魚類之研究

沈 世 傑 李 建 興

臺灣近海產右鰾科魚類經研究後鑑定爲 14 種分屬於 8 屬，其中除一種疑問種 *Soleichthys* sp. 外及四種新記錄，* 卡印櫛鱗鰻沙 *Aseraggodes kaianus*，* 卵圓鰻沙 *Solea ovata*，* 異鼻鰻沙 *Soleichthys heterorhinos* 及 * 縷鱗鰻沙 *Zebrias crossolepis*，其餘 9 種爲可勃櫛鱗鰻沙 *Aseraggodes kobensis*，黑點圓鱗鰻沙 *Aseraggodes melanospilus*，南鰻沙 *Pardachirus pavoninus*，孃葉子 *Synaptura orientalis*，環紋鰻沙 *Synaptura annularis*，日本斑鰻沙 *Zebrias japonicus*，斑鰻沙 *Zebrias zebra*，瓜格斑鰻沙 *Zebrias quagga*，角鰻沙 *Aesopia cornuta*。並證明該疑問種可能爲世界首次出現之反轉型鰻沙，同時提供種、屬之檢索表徵狀以及圖說。