

FISHES OF THE FAMILY SCARIDAE FROM TAIWAN¹

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Kwang-Tsao Shao and Lih-Wen Chen (1989) Fishes of the family Scaridae from Taiwan. *Bull. Inst. Zool., Academia Sinica* 28(1): 15-39. This is a brief report of the recent revision on the scarid fishes of Taiwan, which includes two genera and three species in subfamily Sparisomatinae, and four genera and twenty three species in subfamily Scarinae. Among them, the following eight species including *Bolbometopon muricatum* (Valenciennes), *Hipposcarus longiceps* (Valenciennes), *Scarus atropectoralis* Schultz, *S. bowersi* (Snyder), *S. dimidiatus* Bleeker, *S. oedema* (Snyder), *S. rivulatus* Valenciennes, and *S. schlegeli* (Bleeker) are the new records for Taiwan. Keys, diagnostic characters, synonyms and color photographs of fresh specimens illustrating the different color phases of above species are provided.

Key words: Faunistic study, Formosan scarid fishes, New records, Fish taxonomy.

The parrotfishes (Family Scaridae) belonging to Suborder Labroidei are mostly living in the coral reef area and distributed widely in the tropical Indo-Pacific Ocean. Because of their larger body size they are known to be economical species and mostly caught by spearfishing.

Parrotfishes are characterized by having fused teeth to form beak-like dental plates. Other unique characters which warrant Scaridae is one monophyletic family is their lack of true stomach and their herbivorous habit. Choat and Randall (1986) also suggested that they are natural group since they are taxonomically and ecologically similar to each other. However, the scarids is one of the most difficult species of fish to identify, especially the genus *Scarus* which have similar body proportion and similar meristic counts: 9 flexible spines and 10

soft rays of dorsal; 3 flexible spines and 9 rays of anal, 22-24 scales in lateral line; pectoral fin with 11-15 rays (include two unbranched rays). Although the numbers of gill raker show considerable variation both intraspecifically and interspecifically, this character may vary with size of individual. Fortunately, the number of pectoral rays, median predorsal scales and the pattern of scales and its number of rows on the cheek have diagnostic value. However, any count of these characters is usually shared by many species. The shape of the caudal fin may also be useful but this often changes markedly with age. The color pattern is very important in distinguishing species of scarids but should be used with caution and sometimes limited. This is because that most scarids are dichromatic and change color with growth on sex reversal. Color patterns are usually different among juvenile, initial phase (including female

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and male), terminal phase of male. Because of color polymorphism, the duplication of scientific names for a species were very common in early literatures (Smith 1956, 1959; Schultz 1958, 1969). The classification system of the Scaridae were revised and well-established until recently. According to Bruce and Randall (1985) two subfamilies of Scaridae: Sparisomatinae which includes genera *Leptoscarus* and *Calotomus* and Scarinae includes genera *Bolbometopon*, *Cetoscarus*, *Hipposcarus*, and *Scarus* in Taiwan. The former subfamily mainly inhabit in non-reef environments such as sea grass beds and the latter subfamily mostly live in coral reef.

In the district of Taiwan alone, the earliest report on the species of this group was dated back in 1902 when Jordan and Evermann mentioned only one species *Scarus lacerta* (C. and V.) which is probably *S. ghobban*. Jordan and Richardson (1909) recorded 4 species from Taiwan, *Leptoscarus vaigiensis*, *Cryptotomus spinidens* (= *Calotomus carolinus*), *Callyodon dussumieri* (= *Scarus ghobban*), and *C. dubius*. De Beaufort (1940) added 2 species, *Callyodon forsteni* and *C. unchipunctatus* (= *S. niger*). The first record of scarids by local fish taxonomist in Taiwan was Liang (1951) who listed *Pseudoscarus capistratoides* (misidentification of *Scarus pyrrhurus*) in the collections, while *S. capistratoides* is recognized as an Indian Ocean species (Randall and Bruce 1983). Chen (1953) listed 7 species, but only *Callyodon margaritus* (Carter) (= *Scarus sordidus*), was newly added. In 1956, Fowler recorded 8 species from Taiwan, but none of them are new additions. Later in 1969, Chen listed 11 species compiled from earlier literatures, among them 4 species are new records: *Scarops rubroviolaceus*, *Chlorurus bicolor* (= *Cetoscarus bicolor*), *Scarus microrhinos* (= *S. gibbus*), *S. vermiculatus* (= *S. frenatus*). Shen (1984a) listed 12 species for fauna

list of Taiwan, only 10 species are valid, *Calotomus sandwicensis* is female phase of *C. carolinus* and *Scarus dubius* is a doubtful species. Later in the same year, he listed several doubtful or misidentified species in his illustration books (Shen 1984b). For example, *S. lunula* is the misidentification of terminal male of *S. rubroviolaceus*, and *S. lepidus* should be corrected as *S. globiceps*, *S. venosus* as *S. psittacus*, *S. scaber* as *S. dimidiatus*, *S. chlorodon* as *S. prasiognathos*, *S. sordidus* as *S. rivulatus*, *S. aeruginosus* is a doubtful species since the photograph is unclear, and *Leptoscarus vaigiensis* is probably the female of *Calotomus spinidens*. Recently, the 6 genera and 22 species listed by Chen and Yu (1986) should be reduced to 4 genera and 15 species, the rest of 7 species are either or synonymous and improper inclusion: *Hipposcarus hard* is *Hipposcarus longiceps*; *Ypsiscarus ovifrons* should be corrected as *Scarus ovifrons*; *S. dubius* is endemic Hawaiian species, and *S. formosus* is its junior synonyms (Randall and Choat 1980); the authors also arbitrarily include *S. capistratoides* in the fish list, as our point of view, only its similar species *S. pyrrhurus* which really exists in Taiwan; *S. scaber* should be *S. dimidiatus*; here, *S. ferrugineus* should be *S. globiceps* since *S. aeruginosus* was once mistakenly listed as synonym of *S. ferrugineus* by Schultz (1958) and more, the distribution of *S. ferrugineus* is limited to Red Sea region (Randall and Bruce 1983; Randall and Ormond 1978); *Calotomus spinidens* should be corrected as *C. carolinus*; *Calotomus japonicus* may be the misidentification of *C. spinidens*. Furthermore, many specimens or literatures of above listed species are not available. Consequently, many of their actual distribution in Taiwan are very uncertain. Only three species of *Calotomus carolinus*, *C. spinidens*, and *Leptoscarus vaigiensis* which recorded in Taiwan by Bruce and Randall (1985) have the catalogue numbers of specimens.

From the results of present study, we have recognized a total number of 2 subfamilies, 6 genera and 26 species of scarids in Taiwan. Among these species, eight species namely *Bolbometopon muricatum*, *Hipposcarus longiceps*, *Scarus atropectoralis*, *S. bowersi*, *S. dimidiatus*, *S. oedema*, *S. rivulatus*, and *S. schlegeli* are the new records.

MATERIALS AND METHODS

All of the fish specimens used in this studies were collected by SCUBA diving or bought from fish markets at Hsiaoliuchiu, Orchid island, Chinwashin, Houpihu, and Hengchun. These fishes sold in the fish market were usually collected at local reef area by spearfishing or hand net in night diving since they only live in coral reef area. The counts of the scales in check and median predorsal scales follow the methods of Choat and Randall (1986). Length measurements are standard length (SL), taken from the tip of the snout to base of caudal fin. The description of color pattern of living or fresh material belonging to sex dimorphism was emphasized in the initial phase (IP) and terminal phase (TP). The term IP refers to adult primary male and females and TP refers to secondary males. The monomorphism species only termed adult when they attend adult size. The various body proportions of IP present in parenthesis after the ratios of TP. The species accounts are presented alphabetically by genus and species.

Specimens are mostly deposited in the Museum of Institute of Zoology, Academia Sinica (ASIZP).

RESULTS AND REMARKS

SYSTEMATIC ACCOUNTS

Key to subfamilies, genera and species of full grown Scaridae in Taiwan.

1. Horizontal rows of scales on cheek 1; pectoral rays 13; upper jaw enclosed by lower jaw when mouth closed (Subfamily: Sparisomatinae).....2
Horizontal rows of scales on cheek 2-3; pectoral rays 13-16; lower jaw enclosed by upper when mouth closed (Subfamily: Scarinae).....4
2. Teeth in jaws fused to form dental plates; upper jaw enclosed by lower jaw when mouth closed (Genus: *Leptoscarus*)....*Leptoscarus vaigiensis*
Teeth in jaws incisiform, not in dental plate; jaws opposing when mouth closed (Genus: *Calotomus*)3
3. Incisiform teeth of upper jaw in 3-6 oblique imbricate rows; caudal fin rounded in young, becoming truncate to emarginate in adults; a posterior white margin on caudal fin.....*Calotomus carolinus*
Incisiform teeth of upper jaw in a single row; caudal fin rounded in all stages; no posterior white margin on caudal fin
.....*Calotomus spinidens*
4. External surface of dental plates granular with individual teeth visible on dental plates5
External surface of dental plates relatively smooth.....6
5. Dorsal profile of head with a hump anterodorsal to eye; profile of snout steep, nearly vertical in large adults; median predorsal scales 3; pectoral rays 15; adults dull green to dark blue-green (Genus: *Bolbometopon*).....*Bolbometopon muricatum*
Dorsal profile of head evenly convex; profile of snout raising obliquely; median predorsal scales 5-6; pectoral rays 14; IP reddish, pale on back; the scales on body side edged and spotted with black bars; TP green, head and anterior body with orange

- spots, scales edged with orange (Genus: *Cetoscarus*)
 *Cetoscarus bicolor*
6. Dental plates narrow; head pointed, with a distinctly angular snout; eye near dorsal profile; cheek scales small, in a nearly isolated triangle patch (Genus: *Hipposcarus*)
 *Hipposcarus longiceps*
 Dental plates not narrow; head not pointed; eye not near dorsal profile; cheek scales not small and not in isolated patch (Genus: *Scarus*)..7
7. Dorsal profile of head rising steeply from mouth to level of eye, then curving abruptly to nearly straight for remaining profile of head; median predorsal scales 6; IP reddish, body scales edged with black and short blackish markings; TP green dorsally, shading to yellowish on sides and blue-green ventrally; upper lip narrowly salmon with a broad blue-green band above; lower with lip broadly blue-green margin; chin salmon crossed by a blue-green band which joins that of lip and passes to below orbit.....
 *Scarus rubroviolaceus*
 Snout not shaped as above; color not as above.....8
8. Pectoral rays usually 16; cheek scales in 3 rows; dorsal profile strongly convex (small individuals) to very steep from mouth to above level of eye (large individuals); adults green to blue-green, body scales edged with orange; ventral part of head pale with an irregular bright blue-green band from corner of mouth across cheek to operculum.....
 *Scarus gibbus*
 Pectoral rays 13-15; cheek scales in 2 or 3 rows; dorsal profile of head not as above; color not as above..9
9. Median predorsal scales 4 or less...10
 Median predorsal scales 5-7.....17
10. Pectoral rays usually 14.....11
 Pectoral rays usually 15.....16
11. Lips cover half or more of dental plates12
 Lips cover less half of dental plates15
12. Scales rows on cheek 2.....13
 Scales rows on cheek 3.....14
13. Caudal fin of IP slightly emarginate with which posteriorly margin; body brown to reddish brown with a large dark brown spot antero-basally on first interspinous membrane of dorsal fin; TP with 3 green stripes running through entire abdomen; head with 3 blue-green bands extending posteriorly from eye, the lowermost passing forward submarginally onto upper lip.....
 *Scarus psittacus*
 Caudal fin of IP slightly rounded; body purplish to olivaceous brown, edges of scales orangish, with 5 curved pale bars on body; TP dark green, sometimes suffused with purple, edges of scales orange-red to salmon; a squarish spot of bright yellow on the base between 3rd and 4th dorsal ray..... *Scarus schlegeli*
14. The interorbital space convex increasing with size; IP yellowish brown, scales edged with orange, blue-green radiating bars around eye, posterior margin of caudal fin whitish with blue-green marking submarginally, dorsal and anal fins pale orange with blue-green distal and base bands; TP blue-green, scales edged orange, blue-green marking pattern around eye and median fins as IP, caudal peduncle bright yellow.....
 *Scarus festivus*
 The interorbital space not convex; IP brown to brownish grey with 2 or 3 whitish stripes on abdomen; TP green with an orangish bar on each scale except abdomen where the

- greenish area is arranged in 3 stripes, and anterodorsally where the green is broken into small spots; salmon pink stripe edged in blue-green passing from snout tip through eye, and blue-green lines radiating dorsally from orbit; blackish spot at or near base of fourth dorsal spine..*Scarus globiceps*
15. Scale rows on cheek 3; a hump abruptly rising from the top of eye; body uniformly dull brown green, paler posteriorly; dental plates white; caudal fin truncate.....
.....*Scarus oedema*
Scale rows on cheek 2; on hump above eye; IP uniform dark brown, caudal fin red with a narrow black posterior margin; TP body puplish anteriorly, greenish yellow angular patch in middle, and blue-green posteriorly, each scale with an orange mark.....*Scarus pyrrhurus*
16. The color of dental plates pale yellow; body blue-green edged with narrow orange bars; a triangular orange area behind eye, about the level of eye extending to about 5th dorsal spine horizontally; caudal fin pale orange brown.....*Scarus bowersi*
The color of dental plates reddish white in IP, dark green in TP; IP brown, sometimes with two rows of small whitish spots on side, becoming red around mouth; TP body blue-green, the broad central region of body mainly yellow, becoming green ventrally, caudal fin blue-green with irregular pale streaks ..
.....*Scarus sordidus*
17. Pectoral rays usually 1518
Pectoral rays usually 14 (rarly 15)..21
18. Dental plates green.....19
Dental plates not green20
19. Scale rows on cheek 2; caudal fin emarginate; no interrupted hump on snout; IP dark reddish on body, usually with numerous small whitish or blue spots, head brownish orange-red with a few dark green dots and a narrow dark green band passing from chin almost to orbit; TP body dark blue-green, scales edged with dull orange; cheek and operculum below eye bright blue-green band from front of snout to eye.....
.....*Scarus prasiognathos*
Scale rows on cheek 3; caudal fin rounded to truncate; a interrupted hump on snout increasing with size; IP body blue grey, scales edged with orange, without any spots, head green grey, operculum orangish; fins orange with distal blue band; TP blue-green on body, scales margined black, head blue-green darker above and yellowish on chin, fins as IP except the anterior part of dorsal fin and pectoral fin yellowish.....*Scarus ovifrons*
20. Body and head uniform bright red with 5 dark broadly bars on body side*Scarus atropectoralis*
IP yellow, centers of scales blue, often with five blue bars on body; TP green, scales broadly edged with salmon pink; blue-green horizontal bands through upper and lower edges of eye and on extending posteriorly from middle of orbit, intervening bands pale salmon
.....*Scarus ghobban*
21. Median predorsal scales usually 7...22
Median predorsal scales usually 6...23
22. A green spot rimmed blue behind upper margin of operculum; IP brown, scales on anterior body with several black bars, median fins margined with blue band; TP dull blue-green, scales edged with brown, the lobes of emarginated caudal fin slightly prolonged.....*Scarus niger*
Without any green spot behind upper margin of operculum; IP reddish

- brown, becoming grey over side of body with 5-7 dark brown stripes, fins red; TP green on lower half of head and body, and extending posteriorly to a vertical at base of fifth dorsal soft ray; rest of head and body green with numerous small orange spots and short irregular lines; dental plates of IP white, of TP sky-green
*Scarus frenatus*
23. Caudal fin slightly rounded (IP) to truncated (TP).....24
 Caudal fin lunated (except IP)25
24. IP yellowish, shading to whitish ventrally, with 5 slightly diagonal grey-brown bars on upper half of body; TP solid blue-green on upper head posterior to mid-interorbital space and anteriodorsal body, rest of body blue-green with orange edges on scales, diagonal purplish brown band runs from eye to end of operculum, below and adjacent, pale salmon band edged in blue-green*Scarus dimidiatus*
 IP grey to reddish brown with 2 to 3 whitish stripes on abdomen; TP reddish blue-green anteriorly and blue-green posteriorly, scales edged with orangish marks, lower head orange with irregular blue-green lines on snout, chin, cheek and radiating from eye..*Scarus rivulatus*
25. Caudal fin of both IP and TP lunate; IP with upper half of head and body dark grey, lower half pale yellowish to pinkish, with diagonal yellow bar on back beginning above pectoral fin tip; TP with head above level of lower edge of eye and anterodorsal part of body to base of eighth dorsal spine dark purplish, rest of head and body abruptly blue-green, scales of body edged with salmon pink to orange.....*Scarus oviceps*
 Caudal fin of IP truncate, while that

of TP lunate; IP olivaceous to light reddish brown with broad longitudinal blue band along side of body; TP green, scales of body edged with salmon, lips edged with salmon pink, both with wide submarginal blue-green band, tip and base of pectoral fin blue.....
*Scarus forsteni*

FAMILY SCARIDAE

Subfamily Sparisomatinae

Calotomus carolinus (Valenciennes)

Fig. 1, 2

Callyodon carolinus Valenciennes, in Cuvier and Valenciennes 1840: 291 (type locality, Caroline Islands).

Callyodon sandwicensis Valenciennes, in Cuvier and Valenciennes, 1840: 295.

Calotomus spinidens Schultz, 1958: 124-25; Masuda et al., 1975: 312.

Leptoscarus vaigiensis: Fowler and Bean, 1928: 380-81.

Calotomus carolinus Bruce and Randall, 1985: 8.

Materials: ASIZP 056329, IP, 246.9 mm SL, Jun. 11, 1988, Hengchun; ASIZP 056306, TP, 235.0 mm SL, Apr. 15, 1986, Hengchun.

Diagnosis: P. 13; median predorsal scales 4; one row of 4 or 5 scales on cheek. Head 3.18 (2.86), body depth 2.47 (2.60) in standard length. Snout 3.04 (3.34), orbit 6.17 (7.07) in head length. Dental plate with 3-6 oblique rows of imbricate teeth which may increase with the growth of fish; behind the imbricate teeth there are 1-3 canine teeth on dorsoposterior part of dental plates. Caudal fin rounded in IP, slightly double emarginate in TP. Color of TP, body brown green above and brown red below, with scales margined orange; head dark brown green, with radiating orangish bars around eyes; dorsal and anal fins dark brown-green with two parallel orange stripes, one near fin base, the other at the tip of fins; pectoral fin light

orangish green with white margin; pelvic light brown red; caudal fin brown orange with dark brown-green at outer margins and base.

Remarks: The genus *Calotomus* is distinctive among scarids by having one row cheek scales and imbricate teeth rows on dental plate.

***Calotomus spinidens* (Quoy and Gaimard)**

Scarus spinidens Quoy and Gaimard, 1824: 289 (type locality, Waigiou=waigeo) (not seen).

Cryptotomus spinidens: de Beaufort, 1940: 262-65.

Leptoscarus vaigiensis: Fowler and Bean, 1928: 380-81.

Calotomus spinidens Bruce and Randall, 1985: 15.

Diagnosis: P. 13 (occasionally 10 or 12); median predorsal scales 4; one row with 4 or 5 scales on cheek. A single row or flattened conical teeth on external face of upper jaw, the teeth isolated; second interspinous membrane of dorsal fin with an irregular dark blotch in the TP. Caudal fin rounded. Color of TP, body dark brownish gray with pale speckling, shading to white ventrally, scales of body edged with a small brownish red spot; head laterally with a yellow irregular orange-red markings; dorsal fin with a prominent black blotch on second dorsal spines and following membrane; anal fin with 2 irregular light reddish bands separated by pale bluish; pelvic fin with white and red; scaled portion of caudal fin similar to body; unscaled portion with narrow irregular vertical light and dark bars.

Remarks: *Calotomus spinidens* firstly recorded in Taiwan by Jordan and Richardson (1909). In de Beaufort (1940), Bruce and Randall (1985) corrected it as *C. carolinus*. Although many authors included this species to be one member of scarids in Taiwan, it is not proven until Bruce and Randall (1985) examined the specimens from Taiwan. It is worth to note here that the body size of this

species is the smallest one in this genus.

***Leptoscarus vaigiensis* (Quoy and Gaimard)**

Fig. 3

Scarus vaigiensis Quoy and Gaimard, 1824: 288 (type locality, Waigeo) (not seen); Valenciennes, in Cuvier and Valenciennes, 1840: 214.

Scarus caeruleo-punctatus Valenciennes, in Cuvier and Valenciennes, 1840: 262.

Scarichthys caeruleopunctatus Fowler and Bean, 1928: 375-76.

Leptoscarus coeruleopunctatus de Beaufort, 1940: 259.

Leptoscarus vaigiensis de Beaufort, 1940: 257; Schultz, 1958: 126-27; Schultz, 1969: 39-40; Masuda *et al.*, 1975: 312; Masuda *et al.*, 1984: 218; Bruce and Randall, 1985: 24.

Materials: ASIZP 056313, IP, 130.3 mm SL, Jul. 25, 1988, Hsiaoliuchiu; ASIZP 056312, TP, 165.0 mm SL, Jul. 25, 1986, Hsiaoliuchiu.

Diagnosis: P. 13; median predorsal scales usually 4. Head 3.71-4.02, body depth 3.80-3.43 in standard length. Snout 3.89-4.10, orbit 4.43-4.94 in head length. Teeth completely fused into dental plates, the upper plate enclosed by the lower, cutting edges of dental plate finely serrated. Caudal fin slightly rounded to truncated in adults. Color of IP, body greenish with white and brown on scales, 5 irregular white stripes running along body side; irregular white spots on head; membranes of dorsal, anal, and pelvic fins pale with dark oblique bars; pectoral fin yellowish; caudal fin membrane yellowish with whitish spotted lines.

Remarks: *Leptoscarus* is distinguished from the rest of scarids by having elongate and moderately compressed body shape, and one row of 4 scales on cheek.

SUBFAMILY SCARINAE

***Bolbometopon muricatum* (Valenciennes)**

Fig. 4

Scarus muricatus Valenciennes, in Cuvier and Valenciennes, 1840: 208 (type locality, Java).

Pseudoscarus muricatus Bleeker, 1862: 26.

Bolbometopon muricatum: Masuda *et al.*, 1975: 307; Randall and Bruce, 1983: 6; Masuda *et al.*, 1984: 218; Choat and Randall, 1986: 197.

Materials: ASIZP 056263, adult, 635.0 mm SL, Sep. 11, 1986, Hengchun.

Diagnosis: P. 13; median predorsal scales 3; 3 scale rows on cheek (upper row 6 scales, middle row 5, and lower row 1 or 2). Head 3.04, body depth 2.48 in standard length. Snout 2.90, orbit 9.39 in head length. Dental plate white, its basal three-fourths covered by lip; no canine teeth on dental plates. Caudal fin with double emargination in adults. Color of adults, body uniformly dull grayish brown-green, with paler purplish stripes following the scales rows of body side, fins with the same color as body.

Remarks: The genus *Bolbometopon* is characterized by having a hump on top of head, immediately before the orbit the hump may increase its size with the growth of fish.

Cetoscarus bicolor (Rüppell)

Fig. 5-7

Scarus bicolor Rüppell, 1829: 82 (type locality, Jeddah) (not seen).

Cetoscarus pulchellus: Smith, 1956: 17.

Chlorurus pulchellus: Schultz, 1958: 28.

Bolbometopon bicolor: Shen, 1984b: 77.

Cetoscarus bicolor: Schultz, 1958: 27; Masuda *et al.*, 1975: 308; Randall and Bruce, 1983: 6; Masuda *et al.*, 1984: 218; Choat and Randall, 1986: 195.

Materials: ASIZP 056262, juvenile, 72.2 mm SL, Nov. 22, 1978, Oranpi; ASIZP 056261, IP, 465.7 mm SL, Apr. 15, 1986, Hengchun; ASIZP 056260, TP, 317.0 mm SL, Feb. 17, 1987, Houpihu.

Diagnosis: P. 14; median predorsal scales 5-6, 3 scales rows on cheek (the upper and middle 6-7, and the lower row 3-6). Head 2.73 (2.85), body depth 2.89 (2.29) in standard length. Snout 1.83 (2.10), orbit 8.24 (9.67) in head length.

Dental plates white, its basal three-fourths covered by lip; posterior to those, no canine teeth on dental plates. Color of juvenile, body white, head except snout orange red edged black lines, snout pink; a moderate black blotch rimmed orange on the anterior; posterior edged of dorsal fin rimmed orange red line. Color of IP, body light brown red above, darker below with 5-8 irregular black short bars on scales. Color of TP, body dark blue green, scales margined orange, and orange spots form oblique patch from nape running to the base of anal fin; an orange line from upper lip through the base of pectoral fin to the origin of anal fin, above it orange spots scattered on body and head; a board blue green zone next to the orange line; dorsal and anal fins blue green with parallel orange stripe on the bases of fins; pectoral fin purplish black; pelvic fin yellow, outer edged with green; caudal fin membrane outer and base margined with orange, center blue green.

Remarks: *Cetoscarus bicolor* has been once placed under *Bolbometopon*. But their striking differences on the body shape especially lacking the head hump of this species and different meristic counts, we agree with Smith (1956) to establish this new genus.

Hipposcarus longiceps (Valenciennes)

Fig. 8, 9

Scarus longiceps Valenciennes, in Cuvier and Valenciennes, 1840: 241 (type locality, Waigeu); Masuda *et al.*, 1984: 220.

Scarus harid (non Forsskal), Schultz, 1958: 50.

Hipposcarus longiceps Choat and Randall, 1986: 196.

Materials: ASIZP 056259, IP, 301.5 mm SL, Sep. 11, 1986, Hengchun; ASIZP 056258, TP, 352.0 mm SL, Oct. 15, 1987, Hengchun.

Diagnosis: P. 14; median predorsal scales 4-5; 3 scales rows on cheek (upper row 6 scales, middle 5-7, and lower 1-3). Head 2.99 (3.03), body depth 2.84 (2.64) in standard length. Snout 2.02 (2.17), orbit

7.96 (7.31) in head length. Dental plate white, its basal nearly covered by lips; no canine teeth on dental plates. Color of IP, body light tan above and pale below, scale edged white; head as body but lighter; dorsal and anal fins light yellow outer and middle with a grey blue stripe; caudal fin yellow brown. Color of TP, purplish blue above and pale below, scales edge with orange; snout above upper lip purplish blue below purplish green running through the base of pectoral fin to the base of anal fin; dorsal and anal fins yellow, outer and middle with a purplish blue longitudinal stripes; pectoral fin yellow above and purplish blue below; pelvic rays pale yellow, spine light purplish blue; caudal fin dark yellow green.

Remarks: *Hipposcarus* is distinctive among scarids in its pointed head, narrow dental plates, and unique pattern of scales on the cheek. *H. longiceps* was named as *H. hard* by Chen and Yu (1986). The striking difference between the two species is the caudal fin shape. The former with strongly double emarginate with very short lobes while the latter with very extending lobes.

***Scarus atropectoralis* Schultz**

Fig. 10

Scarus atropectoralis Schultz, 1958: 79 (type locality, Celebes, Buka Island); Masuda *et al.*, 1984: 219.

Scarus caudofasciatus: Masuda *et al.*, 1975: 310.

Materials: ASIZP 056271, adult, 306.0 mm SL, Apr. 22, 1987, Hongtsai.

Diagnosis: P. 15; median predorsal scales 6; 3 scales rows on cheek (upper row 5-6 scales, middle 6, and lower 1 or 2). Head 3.02, body depth 2.74 in standard length. Snout 2.08, orbit 8.31 in head length. Dental plates white, lips covered two-third of upper dental plate and about half of lower; no canine teeth on dental plates. Caudal fin emarginate in adults.

Color of adult, uniformly bright red with 5 dark vertical bars on body side, fins red.

Remarks: The genus *Scarus* is characterized by having 3-7 median predorsal scales, 2 or 3 scales rows on cheek, and the shape of *Scarus* is uniformly similar to each other.

***Scarus bowersi* (Snyder)**

Fig. 11

Callyodon bowersi Snyder, 1909: 602 (type locality, Nafa, Okinawa, Ryukyu Island) (not seen).

Callyodon sordidus Fowler and Bean, 1928: 398.

Scarus bowersi Schultz, 1958: 72; Masuda *et al.*, 1975: 309; 1984: 219.

Materials: ASIZP 056307, adult, 198.9 mm SL, Jul. 24, 1986, Hsiaoliuchiu.

Diagnosis: P. 15; median predorsal scales 3-4; 2 scales rows on cheek (upper row 4 scales, and lower 4-5). Head 2.85, body depth 2.42 in standard length. Snout 2.41, orbit 7.43 in head length. Dental plate white, its basal about one-fourth covered by lips; posterior to those, 0-2 canine teeth; caudal fin slightly rounded to truncated in adults. Color of adult, body dark blue green, scales edged orange; quarish purple blotch on dorsal surface of snout; an triangle orange area behind eye about eye level extending to about tip of pectoral fin; dorsal fin blue green with 2 yellow longitudinal bars; anal fin blue green with yellow stripe on the base; caudal fin membrane blue green with orange streak stripes.

Remarks: This species was mistakenly listed in Chen and Yu (1986), since the paper of Mr. Liu, C. H. which he cited was not exist. Thus, we consider this species as a new record from Taiwan.

***Scarus dimidiatus* Bleeker**

Fig. 12, 13

Scarus dimidiatus Bleeker, 1859: 17 (type locality, Dreh, New Guinea); Masuda *et al.*, 1975: 309; Randall and Choat, 1980: 397; Masuda *et al.*,

1984: 219; Choat and Randall, 1986: 203.

Hiemistoma dimidiatus Schultz, 1958: 74.

Materials: ASIZP 056268, IP, 178.0 mm SL, Feb. 5, 1986, Hengchun; ASIZP 056267, TP, 242.0 mm SL, Feb. 5, 1986, Hengchun.

Diagnosis: P. 14; median predorsal scales 6; 3 scales rows on cheek (upper row 6 scales, middle 5, and lower 1 or 2). Head 2.97 (2.66), body depth 2.94 (33.14) in standard length. Snout 2.13 (2.31), orbit 7.54 (7.43) in head length. Dental plate white, its basal nearly covered by lips; posterior to those, no canine teeth on dental plates. Caudal fin rounded to truncated in adults. Color of IP, body brown yellow, shading to whitish ventrally, with 5 slightly oblique board dark grey-brown bars on upper half of body and 3 white stripes running from the posterior edge of operculum to the origin of anal fin; snout below lower lip to the base of pelvic pink. Color of TP, the triangle area, upper part of head posterior to mid-interorbital space and anterodorsal part of body to base of seventh dorsal spine, and anterior part of snout solid blue green; posterior to those, blue green; a dark oblique blue green bar running from eye to the base of pectoral fin, an pink bar adjacent to it; below it light blue green.

Scarus festivus Valenciennes

Fig. 14

Scarus festivus Valenciennes, in Cuvier and Valenciennes, 1840: 282 (type locality unknown); Randall and Bruce, 1983: 16; Masuda *et al.*, 1984: 218.

Scarus lunula: Schultz, 1958: 54; Masuda *et al.*, 1975: 308.

Callyodon (Margaritodon) lunula: Smith, 1959: 272.

Materials: ASIZP 056288, adult, 289.0 mm SL, Feb. 17, 1987, Houpihu.

Diagnosis: P. 13; median predorsal scales 4; 3 scales rows on cheek (upper row 6, middle 6, and lower 1-2). Head 3.31, body depth 2.53 in standard length.

Snout 2.56, orbit 6.99 in head length. Dental plate white, its basal about half of upper dental plate and less of lower plate covered by lips; posterior to them, one canine teeth dorsoposterior on upper dental plates respectively, one or two on lower dental plates. Caudal fin emarginate to lunate. Color of adult, body blue green above and yellow green to pale below, scales edged orange; anterior, above, and posterior of eye with two blue green bars; a blue green band submarginally on operculum; caudal peduncle pale yellow; dorsal and anal fins blue green middle with a longitudinal orange band; caudal fin light orange, outer and inner lobes margined blue green.

Scarus forsteni (Bleeker)

Fig. 15, 16

Pseudoscarus forsteni Bleeker, 1861: 238 (type locality, Celebes and Molussas).

Scarus tricolor: (not Bleeker, 1849) Randall and Choat, 1980: 396.

Scarus forsteni Choat and Randall, 1986: 204.

Materials: ASIZP 056282, IP, 205.8 mm SL, Sep. 11, 1986, Hengchun; ASIZP 056318, TP, 265.0 mm SL, Dec. 12, 1979, Hsiaoliuchiu.

Diagnosis: P. 14; median predorsal scales 6; 3 scales rows on cheek (upper row 5-6 scales, middle 6-7, and lower 1-3). Head 3.31 (2.81), body depth 2.65 (2.66) in standard length. Snout 2.29 (2.49), orbital diameter 5.33 (5.99) in head length. Dental plates pale or rosy in IP, dark blue green in terminal males, its basal about two-thirds to seven-eighths covered by lips; posterior to those, no canine teeth on dental plates. Caudal fin emarginate in adults. Color of IP, variable, most back with reddish brown, the midflank with a irregular broad longitudinal dark purplish blue band, ventrally light reddish or yellowish. Color of TP, scales on body blue green margined pale

salmon, scales green striking on back and forward to caudal peduncle, becoming salmon ventrally; thorax blue green and extending forward, and upper with a longitudinal green line from the base of pectoral fin to caudal peduncle; upper head include eye olive, lower with a blue green line from upper lip to the edge of operculum; upper lip with one orange and one blue-green band, lower lip with one blue-green bend; dorsal and anal fins yellow, distal and base both with one longitudinal turquoise band; pectoral fin blue-green upper and the lower salmon pink and pale; pelvic fin yellow, spine blue-green; caudal fin blue-green, yellow in lobes, olive on the base.

***Scarus frenatus* Lacépède**

Fig. 17, 18

Scarus frenatus Lacépède, 1802: 3, 13 (type locality, Mauritius); Schultz, 1958: 83; 1969: 27; Masuda *et al.*, 1975: 310; Randall and Bruce, 1983: 17; Masuda *et al.*, 1984: 218; Choat and Randall, 1986: 205.

Callyodon vermiculatus Fowler and Bean, 1928: 472.
Callyodon frenatus: Smith, 1959: 279.

Materials: Underwater photograph of juvenile, Dec. 9, 1986, Nanwan; ASIZP 056330, IP, 229.8 mm SL, Jun. 11, 1988, Hengchen.

Diagnosis: P. 14; median predorsal scales 6; 3 scale rows on cheek. Head length 3.09, body depth 2.73 in standard length. Snout 2.44, orbit 7.43 in head length. Dental plates white in IP, 0 canine teeth posterior to them. Color of juvenile, reddish brown anteriorly, posteriorly shading to pale purplish blue with irregularly scattered small white spots; spinous portion of dorsal fin and anal fin membrane striking marked in red and white; caudal fin membrane transparent. Color of IP, head greyish brown, scales light yellowish orange margined dark blue green in trunk, caudal peduncle light brown; fins red brown.

Remarks: This species is rarely found in Taiwan. Although we have observed the adults of this species in water occasionally. They always swim far away from divers so that the photo of adult fish could not be easily obtained.

***Scarus ghobban* (Forsskål)**

Fig. 19, 20

Scarus ghobban Forsskål, 1775: 28 (type locality, Jeddah, Red Sea) (not seen); Masuda *et al.*, 1975: 310; Randall and Bruce, 1983: 20; Masuda *et al.*, 1984: 219; Choat and Randall, 1986: 207.

Scarus lacerta Valenciennes, in Cuvier and Valenciennes, 1840: 217.

Scarus dussumieri Valenciennes, in Cuvier and Valenciennes, 1840: 252.

Materials: ASIZP 056273, IP, 173.5 mm SL, Sep. 11, 1986, Hengchun; ASIZP 056272, TP, 366.1 mm SL, Apr. 15, 1986, Hengchun.

Diagnosis: P. 15; median predorsal scales 6; 3 scales rows on cheek (upper and middle 5-6, and lower row 0-2). Head 3.02 (2.86), body depth 2.72 (3.23) in standard length. Snout 2.46 (2.80), orbit diameter 8.13 (6.42) in head length. Dental plates white, its basal one-half to four-fifths covered by lips; 0-1 weakly canine teeth on dental plates. Caudal fin slightly double emarginate in IP, double emarginate in TP. Color of IP, brownish yellow with scales edged with blue forming 5 irregular vertical bars, 4 bars on body trunk, the last one on caudal peduncle; two short blue bars, one right above eye, the other from lower lip and stopping on suborbital; 1 and 2 blue bars above and below snout; dorsal and anal fins similar to body color, outer and base with one longitudinal blue stripe; pectoral and pelvic fins pale yellow anteriorly rimmed with blue; caudal fin yellow outer rimmed blue. Color of TP, dorsal head and body green, each scale edged with salmon pink or orange; green grading reduced ventrally pinkish to sides and

ventral body; cheek and operculum pale orange; chin and isthmus blue green; dorsal and anal fins yellow, outer and base rimmed longitudinal blue green stripes; pectoral fin blue; pelvic fin pale yellow, spine edged blue; caudal fin blue green, inner part adjacent to outer lobes yellow.

***Scarus gibbus* Rüppell**

Fig. 21-23

Scarus gibbus Rüppell, 1829: 81 (type locality, Mohila, Red Sea) (not seen); Masuda *et al.*, 1975: 308; Randall and Choat, 1980: 407; Randall and Bruce, 1983: 22; Masuda *et al.*, 1984: 218; Choat and Randall, 1986: 209.

Scarus microrhinos Bleeker, 1854: 200.

Chlorurus gibbus: Smith, 1959: 27.

Materials: ASIZP 056275, juvenile, 38.0 mm SL, May 27, 1985, Chinwashi; ASIZP 056274, IP, 278.0 mm SL, Feb. 17, 1986, Houpihu; ASIZP 056316, TP, 321.4 mm SL, Feb. 5, 1986, Hengchun.

Diagnosis: P. 15; median predorsal scales 4; 3 cheek scales rows (upper row 4-7 scales, middle 3-6, and lower 1-6). Head 2.88 (2.69), body depth 2.76 (2.89) in standard length. Snout 2.30 (2.37), orbital diameter 8.67 (8.60) in head length. Dental plate dark green shading to pale at edged and its basal one-fourth or less covered by lips; posterior to those, 0-2 strong canine teeth dorsoposterior on dental plates. The profile of snout rising steeply, and a hump above eye which growing larger with age. Caudal fin slightly rounded in juvenile, emarginate in IP and lunate in TP. Color of juvenile, uniformly dark black brown, with 3 white stripes on head and body. Color of IP, body yellowish blue-green or blue green, scales edged orange; eye rimmed blue, upper and lower lips marked blue bends, one oblique narrowly blue band from the corner of mouth to edge of operculum near the base of pectoral fin; adjacent below pale bluish green; dorsal and anal

fins yellowish green distal and base with blue lines; caudal fin pale blue green and outer darker, the base pale brown green. Color of TP, upper body and dorsal half of head blue green, dark brown blue green laterally, pale ventrally; eye rimmed blue, transverse band of pale blue green on chin; median fins blue green base with the black band; pectoral fin blue green distal darker; pelvic fin blue green shading to pale.

***Scarus globiceps* Valenciennes**

Fig. 24

Scarus globiceps Valenciennes, in Cuvier and Valenciennes, 1840: 242 (type locality, Tahiti); Schultz, 1958: 75; Randall and Choat, 1980: 391; Choat and Randall, 1986: 210.

Callyodon dubius (non Bennett) Smith, 1956: 12.

Callyodon globiceps: Smith, 1956: 14.

Scarus aeruginosus (non Valenciennes) Schultz, 1958: 96.

Materials: ASIZP 056307, IP, 163.6 mm SL, Sep. 11, 1986, Hengchun.

Diagnosis: P. 14; median predorsal scales 4; 3 scale rows on cheek (upper row 5, middle 6, and lower 1-2). Head 2.87, body depth 2.84 in standard length. Snout 2.52, orbit 6.63 in head length. Dental plates white, its basal covering or nearly covering by lips. Caudal fin slightly rounded to slightly emarginate in initial phase. Color of IP, body grey brown, shading to light reddish brown ventrally, with 2 or 3 longitudinal whitish stripes on abdomen; median fins dusky brown, the base with light reddish tinge; pectoral fin membrane pale upper yellow, reddish brown on the base; pelvic fin reddish brown.

***Scarus niger* (Forsskål)**

Fig. 25, 26

Scarus niger Forsskål, 1775: 28 (type locality, Red Sea) (not seen); Schultz, 1958: 93; Masuda *et al.*, 1975: 311; Randall and Bruce, 1983: 24; Masuda *et al.*, 1984: 220; Choat and Randall, 1986: 214.

Scarus nuchipunctatus Valenciennes, in Cuvier and Valenciennes, 1840: 224.

Callyodon niger: Smith, 1956: 13.

Materials: ASIZP 056310, IP, 227.4 mm SL, Apr. 15, 1986, Hengchun; ASIZP 056311, IP, 183.4 mm SL, Sep. 11, 1986, Hengchun; ASIZP 056308, TP, 174.8 mm SL, Feb. 17, 1987, Houpihu; ASIZP 056309, TP, 286.6 mm SL, May 24, 1986, Hengchun.

Diagnosis: P. 13-14; median predorsal scales 6-7; 3 scale rows on cheek (upper row 5-6 scales, middle 6-7, and lower 2-4). Head 2.78-2.86 (2.85-2.99), body depth 2.14-2.40 (2.60-2.71) in standard length. Snout 2.22-2.47 (2.48-2.51), orbit 5.70-7.43 (6.18-6.33) in head length. Dental plates blue green, its basal three-fourths covered by lips; no canine teeth dorsoposterior on dental plates. Caudal fin slightly double emarginate in IP, double emarginate with the lobes slightly produced in terminal males. Color of IP, body uniformly reddish brown, scales with 4 or 5 short dark brown bars, but not on scales of caudal peduncle; head lighter, upper lip marked short orange bar and green one next to it, lower lip marked green one and next orange one, at the corner of mouth a oblique green line extending to eye, some short irregular bars radiate around eye; fins orange brown edged with blue line. Color of TP, body uniformly dark blue green or dark brown green; the markings of head as the same as initial phase; dorsal and anal fins brown orange or brown yellow green, edged with wavy longitudinal blue band; caudal fin yellow or orange outer edge with blue line, membrane with 2 narrowly vertical blue bands, center with board yellow band.

Remarks: This world widely distributed species occurs abundantly in Taiwan.

Scarus oedema (Snyder)

Fig. 27

Callyodon oedema Snyder, 1909: 603 (type locality, Nafa, Okinawa, Ryukyu Islands) (not seen); Fowler and Bean, 1928: 385.

Scarus oedema: Masuda *et al.*, 1984: 220.

Materials: ASIZP 056264, adult, 360.5 mm SL, May 26, 1987, Hongtsai.

Diagnosis: P. 14; median predorsal scales 3; 3 scales rows on cheek (upper row and middle 5, and lower 1 or 2). Head 3.47, body depth 2.60 in standard length. Snout 2.40, orbit 7.52 in head length. Dental plate green shading to white, its basal about half of upper dental plate and about three-fourths of lower covered by lips; posterior to those, 2 canine teeth dorsoposterior on dental plates. Caudal fin slightly rounded to truncated in adults. Color of adults, body dark brown green; head and thorax extending to the origin of anal fin dark brown; dorsal and anal fin brown edged with green; pectoral fin brown edged with grey blue; pelvic and caudal fins dark brown.

Remarks: *S. oedema* is distincted from other scarids by having hump on head, right above eye and vertically abrupt to snout. The profile of head hump of *Bolbometopon* is different.

Scarus oviceps Valenciennes

Fig. 28, 29

Scarus oviceps Valenciennes, in Cuvier and Valenciennes, 1840: 244 (type locality, Tahiti); Masuda *et al.*, 1984: 219; Choat and Randall, 1986: 214.

Materials: ASIZP 056266, IP, 187.9 mm SL, Feb. 17, 1987, Houpihu; ASIZP 056265, TP, 167.0 mm SL, Feb. 17, 1985, Houpihu.

Diagnosis: P. 14; median predorsal scales 6; 3 scales rows on cheek (upper row 5-6 scales, middle 5-6, and lower 2). Head 2.90 (2.54), body depth 3.06 (2.73) in standard length. Snout 2.34 (2.34), orbital diameter 6.50 (6.59) in head length. Dental plate white, its basal about half of upper dental plate and lesser on lower covered by lips; no canine teeth dorsoposterior

on dental plates. Caudal fin emarginate in adults. Color of IP, body yellowish brown, shading to pale ventrally, scales edged with grey; upper lip of snout through entire eye to seventh dorsal spine dark brown to black; posterior with 2 yellow saddles, the second smaller; dorsal fin reddish brown, distal margin darker; fins pale reddish brown except pectoral fin dark brown above and pale below. Color of TP, body blue green, scales edged with orange; the pronounced black area in the same place of initial phase's purplish; cheek pinkish; the middle zone of body trunk yellow green; dorsal and anal fins blue green, pectoral fin upper edged pale salmon-pink next with brown pale below; caudal fin blue green upper and lower lobes and base submargined brown yellow.

***Scarus ovifrons* Temminck and Schlegeli**

Scarus ovifrons Temminck and Schlegeli, 1846. (not seen); Masuda *et al.* 1984: 221.

Remarks: No any specimen of this species was collected during our study period. However, the photograph (354-4 a, b) of Shen (1984b) show the evidence. Furthermore, Schultz have recorded the species known from southern Japan and Taiwan in 1969 (Randall and Bruce, 1983). Thus we agree that this species belongs to one member of the fish fauna list of Taiwan.

***Scarus prasiognathos* Valenciennes**

Fig. 30-32

Scarus prasiognathos Valenciennes, in Cuvier and valenciennes, 1840: 272 (type locality, New Ireland); Randall and Choat, 1980: 394; Randall and Bruce, 1983: 26; Masuda *et al.*, 1984: 220.

Scarus chlorodon: Schultz, 1969: 26; Masuda *et al.*, 1975: 310.

Scarus janthochir Bleeker, 1862: 30.

Materials: ASIZP 056315, juvenile, 28.7 mm SL, Feb. 17, 1978, Wanlitung; ASIZP 056271, IP, 285.0 mm SL, Apr. 22, 1987, Hengchun; ASIZP 056270, TP, 263.0 mm SL, Feb. 5, 1986, Hengchun.

Diagnosis: P. 15; median predorsal scales 6 (rarely 7); 3 scales rows on cheek (upper row 5 scales, middle 6-7, and lower 1 or 2). Head 2.93 (3.46), body depth 2.44 (2.97) in standard length. Snout 2.44 (2.36), orbit 8.02 (8.63) in head length. Dental plate dark blue green edged with white, its basal nearly covered by lips; posterior to those, no canine teeth dorsoposterior on dental plates. Caudal fin slight round in juvenile, double emarginate in adults. Color of IP, body dark reddish brown and pale ventrally, with irregular small pale blue spots; head pale reddish brown, except chin with irregular blue spots or short bars, chin with longer blue bars and the longest one from the base of lower lip obliquely to eye; dorsal membrane with blue streaks and blue margin; caudal fin scattered with small blue spots and upper and lower lobes grey green. Color of TP, body brownish green-yellow, scales center edged with dark brownish green; a broad blue-green band passing from middle of orbit to front of snout; dorsal fin blue green with a streak of orange on each interradiation membrane; anal fin blue with a broad orange band middle with short blue-green line from the origin to distal edge; pectoral fin purplish blue margined with blue; pelvic fin green edge with blue and orange; caudal fin membrane dark blue green, lobes orange outer edged with dark blue.

Remarks: The blue green band on snout and anal fin will grow backward and inward, and the band size will increase with age; the body color become more green with age as well.

***Scarus psittacus* (Forsskål)**

Fig. 33, 34

Scarus psittacus Forsskål, 1775: 29 (type locality, Jeddah) (not seen); Randall and Bruce, 1983: 27; Masuda *et al.*, 1984: 220; Choat and Randall, 1986: 215.

Scarus venosus Valenciennes, in Cuvier and Valenciennes, 1840: 212.

Scarus forsteri Valenciennes, in Cuvier and Valenciennes, 1840: 275; Schultz, 1958: 64.

Materials: ASIZP 056319, IP, 172.0 mm SL, May 29, 1986, Hengchun; ASIZP 056304, TP, 192.0 mm SL, Sep. 11, 1986, Hengchun.

Diagnosis: P. 14; median predorsal scales 4; 2 scales rows on cheek (upper row 4-5 scales, and lower 4-6). Head 2.79 (3.02), body depth 2.58 (2.95) in standard length. Snout 2.77 (2.98), orbit 6.50 (6.40) in head length. Dental plates white, its basal almost to about three-fourths covered by lips; posterior to those, no canine teeth on dental plates. Caudal fin emarginate in adults. Color of IP, reddish brown and middle vertical zone darker, and pale orange-red from thorax extending to the base of anal fin; median fins orange-brown with pale margin, dorsal fin with a dark brown spot anterobasally on first interspinous membrane. Color of TP, scales of body half green and half orange to orange-salmon, caudal peduncle side with 5 longitudinal series of green spots and 3 stripes on abdomen; they may be yellowish along the back; head above level of lower edge of eye green, the nape mixed with yellow, the snout lavender-grey; lower head yellow-pink to orange-red, a blue band on upper lip extending through snout a short distance posterior to orbit; 2 green bands extending dorsoposteriorly from orbit; a submarginal green band on operculum; lower lip with 2 transverse short blue bands; caudal and anal fin blue green centered with broad orange mixed green band; pectoral fin green or blue green pale distal; caudal fin orange, upper and lower

lobes edged blue, posterior with a vertical blue spots in center of fin.

***Scarus pyrrhurus* (Jordan and Seale)**

Fig. 35, 36

Callyodon pyrrhurus Jordan and Seale, 1906: 314 (type locality, Pago Pago, Samoa) (not seen).

Scarus capistratooides (not Bleeker): Schlutz, 1969: 22.

Scarus japonensis Randall and Choat, 1980: 406; Masuda *et al.*, 1975: 311; 1984: 219.

Scarus pyrrhurus Choat and Randall, 1986: 216.

Materials: ASIZP 056277, IP, 236.0 mm SL, Apr. 15, 1986, Hengchun; ASIZP 056276, TP, 279.3 mm SL, Sep. 11, 1986, Hengchun.

Diagnosis: P. 14; median predorsal scales 4; 2 scales rows on cheek (upper row 4-6 scales, and lower 5-7). Head 2.74 (2.83), body depth 2.68 (2.91) in standard length. Snout 2.41 (2.53), orbit 8.78 (7.13) in head length. Dental plates light brown with white, its basal about half of upper dental plate and about two-thirds of lower covered by lips; 1-2 canine teeth on dental plates. Caudal fin slightly rounded in IP, slightly emarginate in TP. Color of IP, body and head dark brown overall, scales edged black; snout reddish brown; dorsal fin pale brown outer and near base with reddish brown stripes; anal and pelvic fins similar to body color; pectoral pale brown membrane yellowish or reddish; caudal fin reddish brown. Color of TP, upper blue green shading to yellowish pink ventrally, scales edged with narrowly orange bars; upper head yellowish blue-green with 2 parallel bands, one from snout and the other behind the posteriorly margin of eye; eye rimmed yellow; blue band from upper lip running through suborbital to angle of operculum; chin reddish pink; dorsal and anal fin yellow distal and base with blue longitudinal band; pectoral fin reddish pink shading to pale below, upper edged yellow green; pelvic fin yellow distal blue; caudal fin blue green, submargined yellow.

Remarks: The color pattern of this species is very similar to *Scarus capistratoides*. The only difference is the latter species have yellowish caudal fin membrane while blue green of the former. However, *S. capistratoides* and its junior synonym *S. japonensis* once mistakenly separated as two valid species (Randall and Nelson 1979) and is an Indian species. It is the similar species *S. pyrrhurus* only can be found in western Pacific, ranging from Ryukyu Islands to Indonesia (Choat and Randall, 1986).

***Scarus rivulatus* Valenciennes**

Fig. 37, 38

Scarus rivulatus Valenciennes, in Cuvier and Valenciennes, 1840: 223 (type locality, Java); Randall and Choat, 1980: 390; Masuda *et al.*, 1984: 220; Choat and Randall, 1986: 217.

Scarus fasciatus Valenciennes, in Cuvier and Valenciennes, 1840: 222; Masuda *et al.*, 1975: 310.

Materials: ASIZP 056279, IP, 203.0 mm SL, Apr. 15, 1986, Hengchun; ASIZP 056278, TP, 333.1 mm SL, Feb. 17, 1987, Houpihu.

Diagnosis: P. 15; median predorsal scales 6, rarely 7; 3 scales rows on cheek (upper and middle row 4-5, and lower 1 or 2). Head 3.23 (3.22), body depth 2.51 (2.93) in standard length. Snout 2.36 (2.72), orbital diameter 8.63 (6.56) in head length. Dental plate white, its basal all or nearly covered by lips; 0-2 canine teeth on upper dental plates. Caudal fin rounded to truncated in IP, slightly double emarginate in TP. Color of IP, body color uniformly grey brown, upper dark and pale below; fins color similar to body except pelvic and anal fins reddish brown. Color of TP, body scales green, edged with orange bar; scales before spine portion of dorsal fin reddish green, backward predominant green; upper head purplish green, snout and chin reddish orange; snout and area of eye with irregular green markings; dorsal and anal fins green along the base, orange

yellow in the middle, edged with wavy blue band, the dorsal with a large green spot in middle of each interradiation membrane; pectoral fin yellowish green, upper edged with blue, adjacent orange line; pelvic fin pale orange or yellow lateral margined blue; caudal fin yellowish brown green or dark blue green with orange spots, posterior portion with short blue streaks.

***Scarus rubroviolaceus* Bleeker**

Fig. 39, 40

Scarus rubroviolaceus Bleeker, 1847: 162 (type locality, Batavia); Masuda *et al.*, 1975: 307; Randall and Bruce, 1983: 28; Masuda *et al.*, 1984: 221; Choat and Randall, 1986: 219.

Callyodon rubroviolaceus: Smith, 1956: 11.

Scarops rubroviolaceus Schultz, 1958: 21; 1969: 2.

Materials: ASIZP 056281, IP, 221.0 mm SL, Feb. 17, 1987, Hongchai; ASIZP 056280, TP, 428.0 mm SL, Apr. 15, 1987, Hengchun.

Diagnosis: P. 14-15; median predorsal scales 6; 3 scales rows on cheek (upper row 5-6 scales, middle 6-7, and lower 1-3). Head 3.05 (3.15), body depth 2.97 (3.14) in standard length. Snout 2.22 (2.30), orbit 8.41 (6.50) in head length. Dental plate white in IP, dark green edged with white in TP, its basal three-fourths covered by lips; posterior to those, 2 canine teeth dorsoposterior on dental plates. Caudal fin double emarginate in adults. Color of IP, body reddish brown, back darker and shading to abdomen, scales centered with 1 or 2 short brown bars; head, pectoral, pelvic and caudal fin reddish brown; dorsal and anal fins pale reddish brown, dorsal fin with dark margin. Color of TP, body salmon-pink, back scales half with yellow and half green, thorax yellowish green and extending to caudal peduncle; head above level of lower eye brownish yellow-green, operculum salmon mixed with green; dorsal fin pale orange with blue distal, a streak blue green along every ray; anal fin orange, near base and

edge with blue bands; pectoral fin blue green margined pale; pelvic fin orange edge blue; caudal fin brown green, upper and lower edged with blue green, and blue spots on posterior margin vertically.

***Scarus schlegeli* (Bleeker)**

Fig. 41, 42

Pseudoscarus schlegeli Bleeker, 1861: 242 (type locality, Celebes).

Scarus venosus: Masuda *et al.*, 1975: 309.

Scarus shlegeli Randall and Choat, 1980: 401; Masuda *et al.*, 1984: 222; Choat and Randall, 1986: 220.

Materials: ASIZP 056331, IP, 150.0 mm SL, Jun. 11, 1988, Hengchun; ASIZP 056284, TP, 281.0 mm SL, Feb. 17, 1987, Houpihu.

Diagnosis: P. 14; median predorsal scales 4; 2 scales rows on cheek (upper and lower row 4-5 scales). Head 2.71 (3.13), body depth 2.44 (3.00) in standard length. Snout 2.13 (2.99), orbit 7.24 (5.57) in head length. Dental plate white, its basal almost and nearly covered by lips; 1 or 2 canine teeth on dental plates. Caudal fin slightly double emarginate in adults. Color of TP, color pattern variable with age, body color pale brown orange mixed with solid green to dark brown blue mixed with blue, scales edged with orange; head above eye, nape, and backward to base of sixth dorsal spine and on 4th or 5th dorsal ray forming a vertical narrow zone lighter tone, and on the top of zone with a bright yellow squarish blotch; dorsal and anal fins orange or brown orange distal and base with blue band, membrane centered with interrupted blue band; caudal fin brown orange or dark, membrane with short blue bars or spots forming 3 or 4 vertical band.

***Scarus sordidus* Forsskål**

Fig. 43

Scarus sordidus Forsskål, 1775: 30 (type locality, Red Sea) (not seen); Schultz, 1958: 68; Randall and Bruce, 1983: 31; Masuda *et al.* 1984: 219; Choat and Randall, 1986: 221.

Scarus purpureus Valenciennes, in Cuvier and valenciennes, 1840: 277.

Materials: ASIZP 056283, TP, 172.8 mm SL, Feb. 17, 1987, Houpihu.

Diagnosis: P. 14-15; median predorsal scales 3; 2 scales rows on cheek (upper row 5 scales, and lower 3-5). Head 2.47, body depth 2.76 in standard length. Snout 2.32, orbit 7.07 in head length. Dental plate dark blue green and whitish edged in TP, its basal less than half covered by lip; posterior to those, 0-2 week canine teeth dorsoposterior on upper dental plates. Caudal fin slightly rounded to truncated in adults. Color of TP, body green, the edges of scales yellowish orange, and abdomen pale with 3 blue green stripes, midflank except caudal peduncle with a large or small bright yellowish orange blotch; upper and lower lips with a blue band join with one blue band and passing lower orbital a little distance posteriorly, above it brown green and below it orange green shading pale green; dorsal and anal fins blue green with a orange yellow band near base; pectoral fin blue upper mixed with a short narrow orange-red band; caudal fin blue-green edges and posterior margin with blue.

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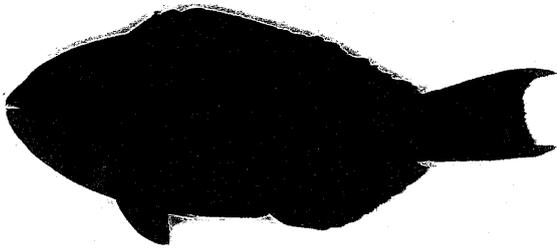


Fig. 1. *Calotomus carolinus*, IP, 246.9 mm SL.

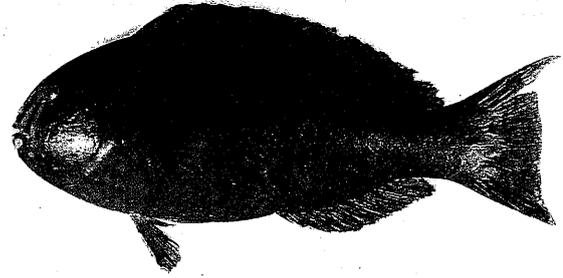


Fig. 2. *Calotomus carolinus*, TP, 235.0 mm SL.

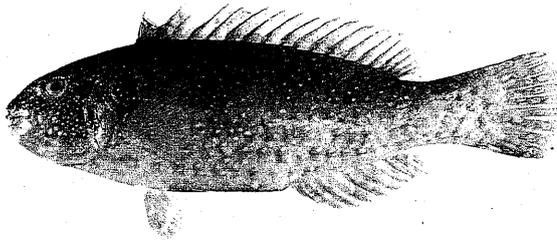


Fig. 3. *Leptoscarus vaigiensis*, IP, 130.3 mm SL.

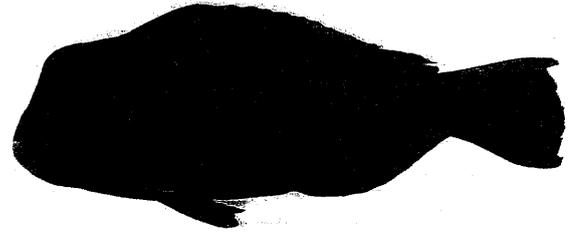


Fig. 4. *Boblometopon muricatum*, ad., 635.0 mm SL.

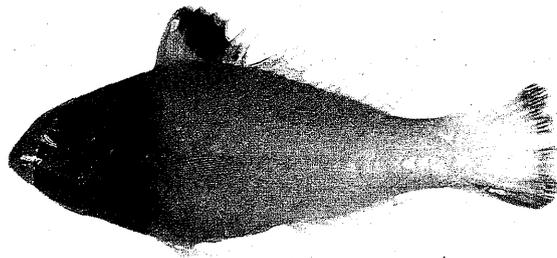


Fig. 5. *Cetoscarus bicolor*, juv., 72.2 mm SL.

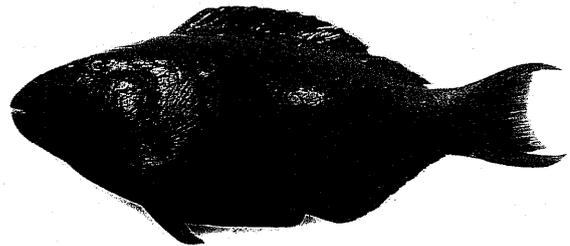


Fig. 6. *Cetoscarus bicolor*, IP, 465.7 mm SL.

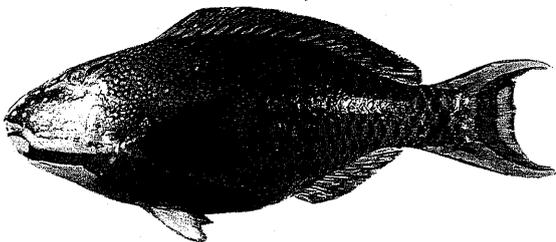


Fig. 7. *Cetoscarus bicolor*, TP, 317.0 mm SL.

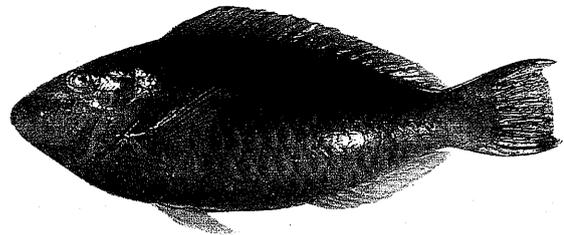


Fig. 8. *Hipposcarus longiceps*, IP, 301.5 mm SL.

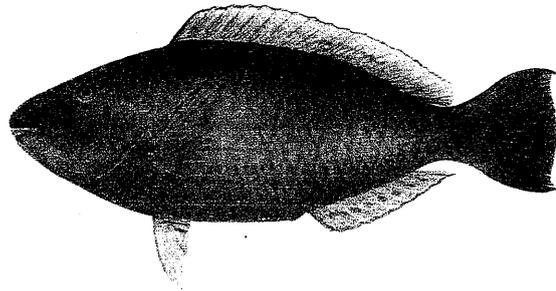


Fig. 9. *Hipposcarus longiceps*, TP, 352.0 mm SL.

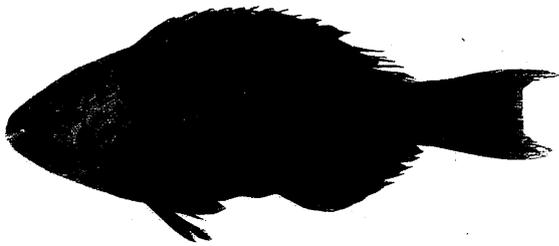


Fig. 10. *Scarus atropectoralis*, ad., 306.0 mm SL.

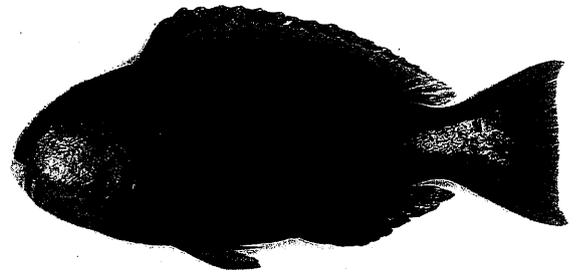


Fig. 11. *Scarus bowersi*, ad., 198.9 mm SL.



Fig. 12. *Scarus dimidiatus*, IP, 178.0 mm SL.

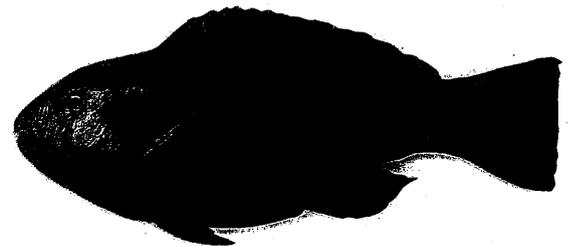


Fig. 13. *Scarus dimidiatus*, TP, 242.0 mm SL.

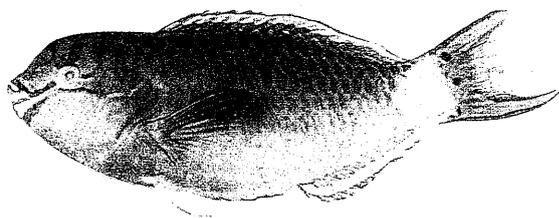


Fig. 14. *Scarus festivus*, ad., 289.0 mm SL.

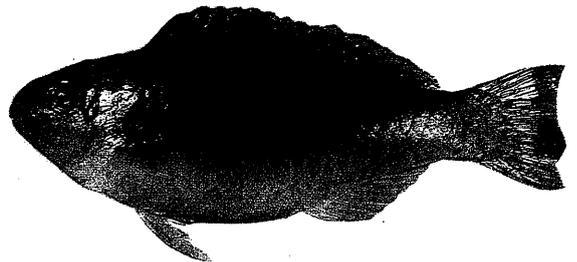


Fig. 15. *Scarus forsteni*, IP, 205.8 mm SL.

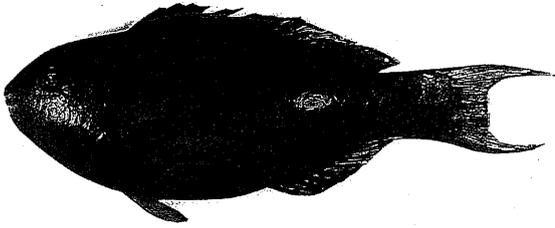


Fig. 16. *Scarus forsteni*, TP, 265.0 mm SL.

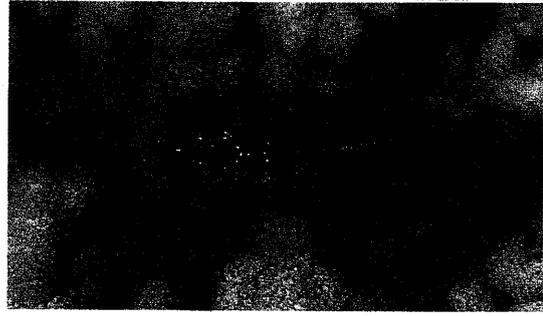


Fig. 17. *Scarus frenatus*, juv., photographed in Nanwan.



Fig. 18. *Scarus frenatus*, IP, 229.8 mm SL.

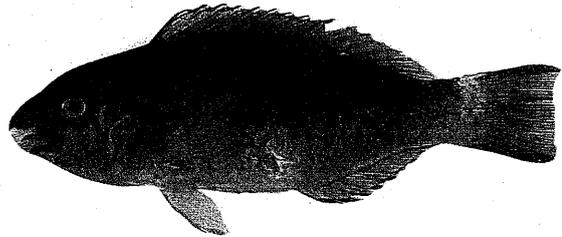


Fig. 19. *Scarus ghobban*, IP, 173.5 mm SL.

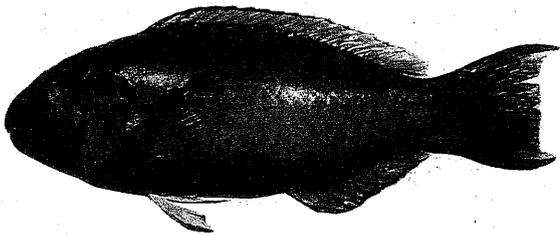


Fig. 20. *Scarus ghobban*, TP, 366.1 mm SL.



Fig. 21. *Scarus gibbus*, juv., 38.0 mm SL.

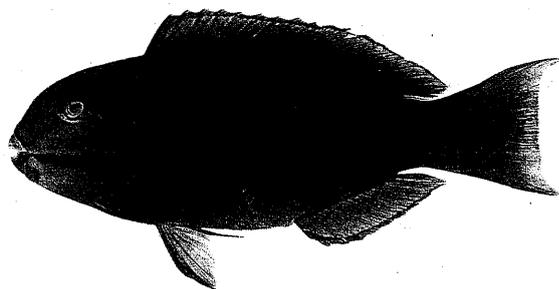


Fig. 22. *Scarus gibbus*, IP, 278.0 mm SL.

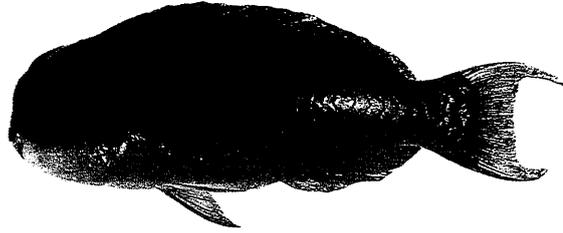


Fig. 23. *Scarus gibbus*, TP, 321.4 mm SL.

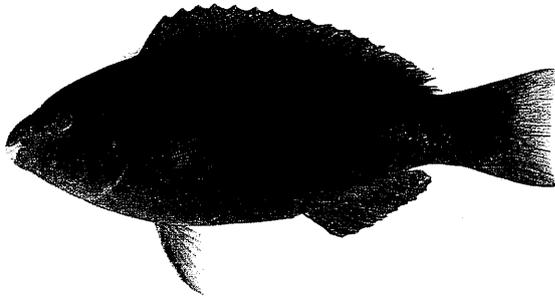


Fig. 24. *Scarus globiceps*, IP, 163.6 mm SL.

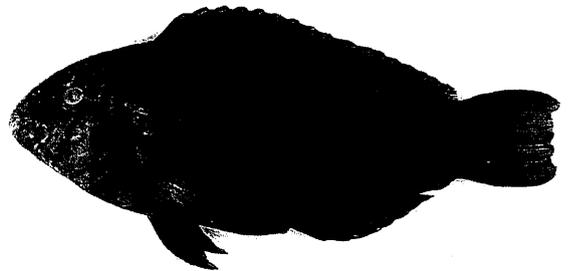


Fig. 25. *Scarus niger*, IP, 227.4 mm SL.

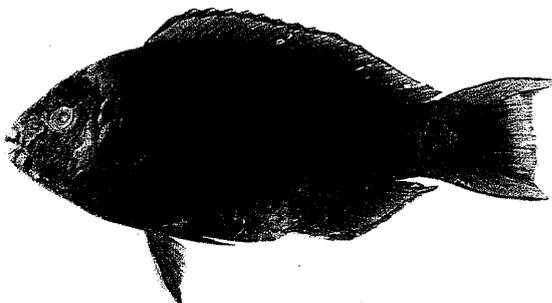


Fig. 26. *Scarus niger*, TP, 276.6 mm SL.

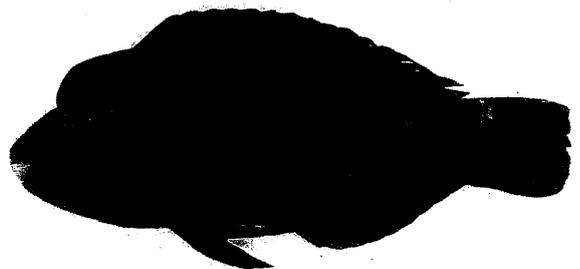


Fig. 27. *Scarus oedema*, ad., 360.5 mm SL.

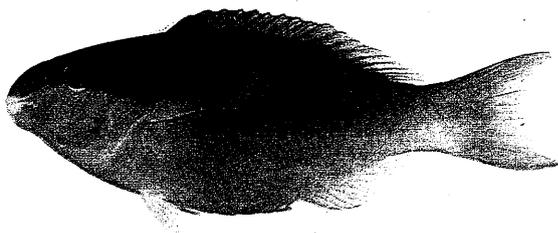


Fig. 28. *Scarus oviceps*, IP, 187.9 mm SL.

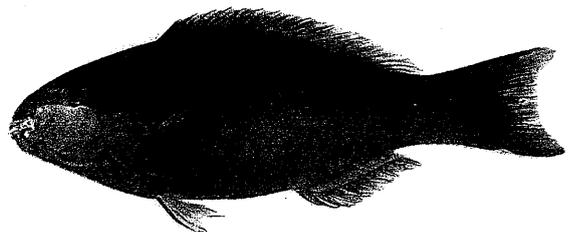


Fig. 29. *Scarus oviceps*, TP, 167.0 mm SL.

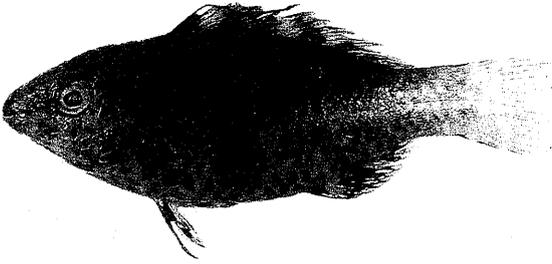


Fig. 30. *Scarus prasiognathos*, juv., 28.7 mm SL.

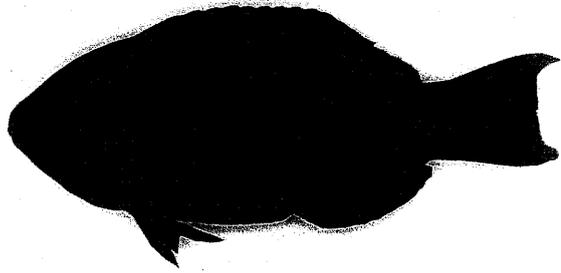


Fig. 31. *Scarus prasiognathos*, IP, 285.0 mm SL.

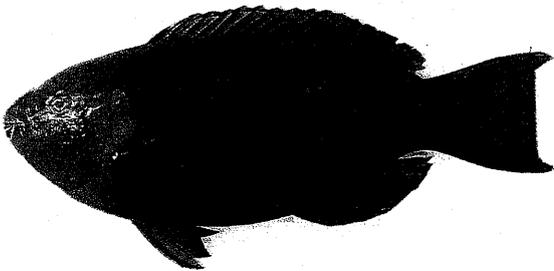


Fig. 32. *Scarus prasiognathos*, TP, 263.0 mm SL.

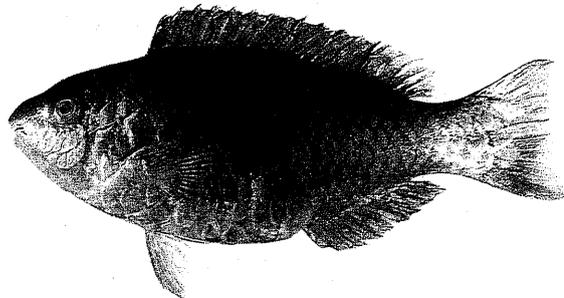


Fig. 33. *Scarus psittacus*, IP, 172.0 mm SL.



Fig. 34. *Scarus psittacus*, TP, 192.0 mm SL.

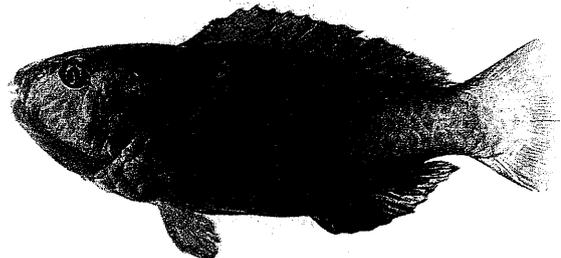


Fig. 35. *Scarus pyrrhurus*, IP, 236.0 mm SL.

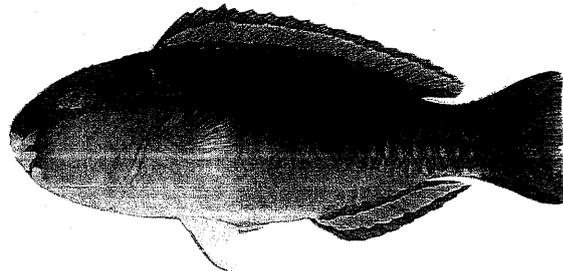


Fig. 36. *Scarus pyrrhurus*, TP, 279.3 mm SL.

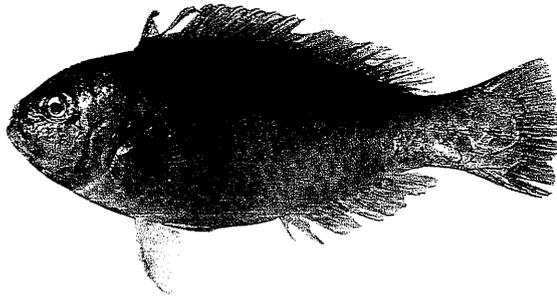


Fig. 37. *Scarus rivulatus*, IP, 203.0 mm SL.

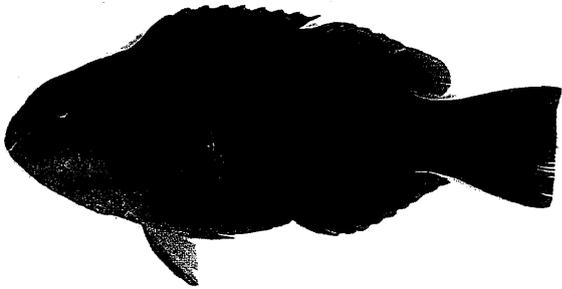


Fig. 38. *Scarus rivulatus*, TP, 333.1 mm SL.

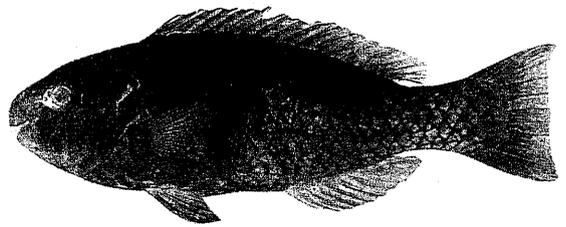


Fig. 39. *Scarus rubroviolaceus*, IP, 221.0 mm SL.

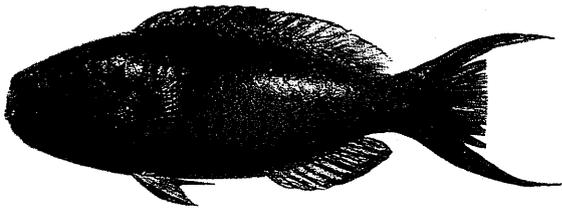


Fig. 40. *Scarus rubroviolaceus*, TP, 428.0 mm SL.

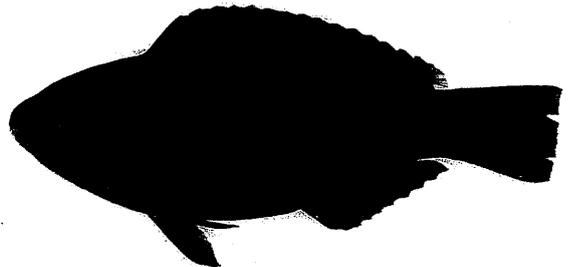


Fig. 41. *Scarus schlegeli*, IP, 150.0 mm SL.

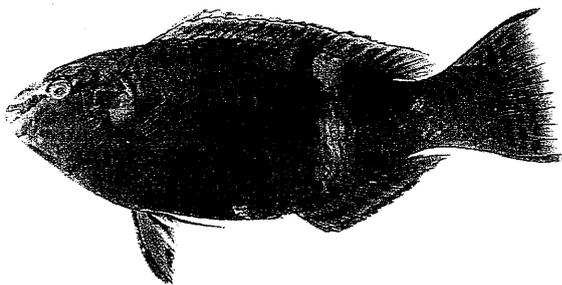


Fig. 42. *Scarus schlegeli*, TP, 281.0 mm SL.

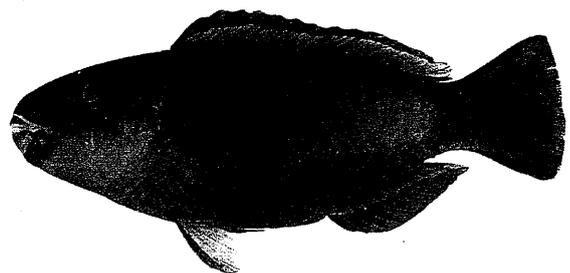


Fig. 43. *Scarus sordidus*, TP, 172.8 mm SL.

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臺灣產鸚哥魚科魚類

邵廣昭 陳立文

本文係整理報導本省所產之鸚哥魚科魚類，至目前為止經採隻鑑定確定產於臺灣之鸚哥魚科魚類，共計有二亞科六屬廿六種。其中之鸚鯉亞科 (Sparisomatinae) 計有 2 屬 3 種，它們分別是卡羅鸚鯉 (*Calotomus carolinus*)，臺灣鸚鯉 (*C. spinidens*) 及織鸚鯉 (*Leptoscarus varigiensis*)。鸚哥魚亞科 (Scarinae) 的魚類共有 4 屬 23 種；包括隆頭鸚哥魚 (*Bolbometopon muricatum*)，長吻鸚哥魚 (*Hipposcarus longiceps*)，紅鸚哥魚 (*Scarus atropectoralis*)，鮑氏鸚哥魚 (*Scarus bowersi*)，新月鸚哥魚 (*Scarus dimidiatus*)，疣鸚哥魚 (*Scarus oedema*)，雜紋鸚哥魚 (*Scarus rivulatus*)，史氏鸚哥魚 (*Scarus schlegeli*)，青鸚哥魚 (*Cetoscarus bicolor*)，橫紋鸚哥魚 (*Scarus fasciatus*)，福氏鸚哥魚 (*Scarus forsteni*)，黃鸚哥魚 (*Scarus frenatus*)，藍點鸚哥魚 (*Scarus ghobban*)，鈍頭鸚哥魚 (*Scarus gibbus*)，蟲紋鸚哥魚 (*Scarus globiceps*)，卵頭鸚哥魚 (*Scarus ovifrons*)，紅尾鸚哥魚 (*Scarus pyrrhurus*)，頸斑鸚哥魚 (*Scarus niger*)，姬鸚哥魚 (*Scarus oviceps*)，綠領鸚哥魚 (*Scarus rubroviolaceus*)，以及白斑鸚哥魚 (*Scarus sordidus*)。鸚哥魚亞科之前八種為本省之新記錄種。本文並附有檢索表，鑑別特徵，同種異名和新鮮魚標本不同體色的彩色相片以供查考。

