

Morphological Study on the Fishes of the Family Pomacentridae I. A Taxonomical Revision of the Family Pomacentridae (Pisces; Perciformes) from Korea

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ABSTRACT

Three damselfishes, *Dascyllus melanurus*, *Dascyllus trimaculatus* and *Pomacentrus nagasakiensis* were collected in the coastal waters of Cheju Island, Korea, during the period from July 1994 to May 1997. These taxa were a new records to the Korean fish fauna. This study re-describe about family Pomacentridae (6 genera, 13 species) including 3 new recorded species and suggest the taxonomic key of family Pomacentridae from Korea.

Key words: Taxonomy, Perciformes, Pomacentridae, key, Korea

INTRODUCTION

There are few groups of coral reef fishes and damselfishes are most famous family which are widespread in the world's tropical ocean at least 28 genera with 315 species (Allen, 1991). These were known as 18 genera, 91 species in Japan (Masuda *et al.*, 1984; Nakabo, 1993) but just 5 genera, 10 species were recored in Korea (Chyung, 1977; Kim *et al.*, 1994a, b; Lee and Kim, 1996). Most of damselfishes are inhabit the tropic ocean but a few species penetrate freshwater, and they have a various color and morphological patterns by their inhabitable areas (Allen, 1991; Baik, 1977).

These fishes have many problems to taxa. Damselfishes, most of all are extremely successful from an evolutionary standpoint, having been invaded nearly every inshore habitats in tropical seas. But

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they present to complex color patterns and characters of body that vary with individuals and between localities in a species. So study of damselfishes are undergoing in various part (Allen, 1975).

Taxonomic study of damselfishes are from Cuvier and Valenciennes (1830) and Günther (1862) about study of new species and taxonomy, and recently study of damselfishes are like this; Comparative ecology and functional osteology of fourteen species of damselfish (Pisces: Pomacentridae) at alligator reef, Florida keys (Emery, 1973), damselfishes of the southern seas (Allen, 1975), a review of the damselfishes of the genus *Chromis* from Japan and Taiwan, with description of a new species (Randall *et al.*, 1981) and damselfishes of the World (Allen, 1991).

In these day, study about damselfishes were activated in Korea, because of the economical importance. Study of damselfishes from Korea were as follow; Research on the ornamental marine fishes in Seogwipo coast, Jeju-Do (Baik, 1975), fishes collected in the fishing ground of *Chromis notatus* along the coast of Seogwipo in Jeju-do (Baik, 1977), fisheries biology for fishing improvement and optimum catch of a damselfish, *Chromis notatus* in Seogwipo, Jeju Island (Go and Jeon, 1983a, b), studies on the reproductive cycle of damselfish, *Chromis notatus* (Temminck et Schlegel) (Lee and Lee, 1987), new record of the damselfish from Korea (Kim *et al.*, 1994a, b) and a revision of the suborder Labroidei from Korea (Lee and Kim, 1996).

In this paper, three unrecorded species from Korea were suggested. So totally 6 genus, 13 species of damselfishes from Korea were studied to get the resource of morphological and taxonomical study.

MATERIALS AND METHODS

The damselfish were collected from Cheju-Island, Pusan and Chungmu, Korea in July 1994 ~ May 1997 (Fig. 1, Table 1).

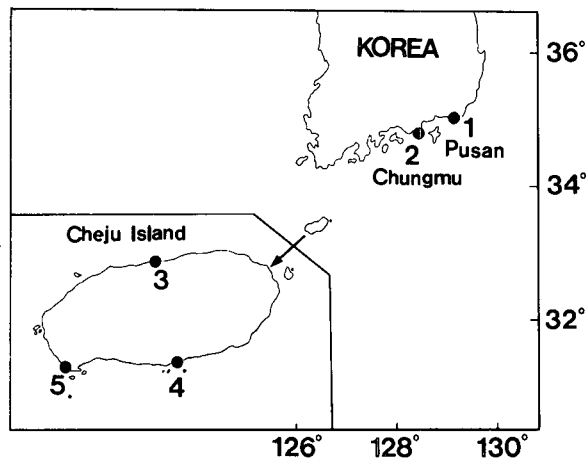


Fig. 1. A map showing the sampling sites of the damselfishes from Korea.

1: Chagalchi market, Nampodong, Pusan 2: Chungmu, Kyungsangnam-do 3: Dongmoon market, Cheju, Cheju Island 4: Seogwipo, Cheju Island 5: Mosulpo, Cheju Island

Table 1. Sampling data of family Pomacentridae fishes in Korea

Species	Locality	Collecting date	Number of specimens	Standard length (mm)
Genus <i>Amphiprion</i>				
<i>Amphiprion clarkii</i>	Cheju Island	Apr. 1997	2	52.4~56.9
Genus <i>Chromis</i>				
<i>Chromis notata</i>	Cheju Island, Pusan	March 1993-May 1997	38	52.4~141.0
<i>Chromis analis</i>	Cheju Island	March 1993-May 1997	22	82.8~139.2
<i>Chromis fumea</i>	Cheju Island	March 1993-May 1997	27	58.7~84.1
Genus <i>Dascyllus</i>				
<i>Dascyllus melanurus</i>	Cheju Island	Apr. 1997	1	32.9
<i>Dascyllus trimaculatus</i>	Cheju Island	Apr. 1997	2	18.4~21.9
Genus <i>Abudefduf</i>				
<i>Abudefduf sordidus</i>	Cheju Island	Apr.-May 1997	2	27.7~31.1
<i>Abudefduf vaigiensis</i>	Cheju Island	July 1996	1	94.3
<i>Abudefduf notatus</i>	Cheju Island	July 1996	3	15.3~35.9
Genus <i>Pomacentrus</i>				
<i>Pomacentrus coelestis</i>	Cheju Island	July 1995	2	33.3~34.0
<i>Pomacentrus nagasakiensis</i>	Cheju Island	July 1994	1	71.5

Identify of these species were used by Allen (1975, 1991), Randall *et al.* (1981), Nakabo (1993) and Nelson (1994), and measurements and counts were made by the method of Randall and McCarthy (1988) and Allen (1991) (Fig. 2). Collected samples were instantly moved to the laboratory with dry ice and measured with a caliper to the nearest 10th of millimeter. Skeleton, margin of suborbital and preopercle and pored lateral line scales were observed by the staining method of Kawamura and Hosoya (1991).

The specimens examined here were deposited in the Ichthyological Laboratory, Department of Marine biology, Pukyong National University, PKNU 04001~04200.

DESCRIPTION AND REVIEWS

Family Pomacentridae 자리돔과 (Fig. 3)

Body short and depth usually high and compressed; covered with ctenoid scales of varying size; nostril usually single on each side (*Chromis* and *Dascyllus* have species with double nostrils); small mouth, rather strong teeth: vomer and palatines toothless; preorbital sheathing the small maxillary; lateral line incomplete or interrupted; lower pharyngeals fully united; branchiostegals rays 5 to 7, gill

rakers rather long and slender; anal fin with two spines: subopercular shelf present; single continuous dorsal fin with 8~17 spines and usually 11~18 soft rays.

Key to the subfamily of Pomacentridae from Korea

- 1a. More than 50 in a longitudinal series scales from rear edge of opercle to base of caudal fin; all the opercles usually serrate.....Amphiprioninae
- 1b. Less than 45 in a longitudinal series scales; all the opercles not serrate.....2
- 2a. Upper and lower edge of caudal base usually with two to three projecting spiniform procurent caudal rays; teeth conical, either biserial or multiserial; head usually entirely scales except narrow region at front of snout and around each nostril.....Chrominae
- 2b. Upper and lower edge of caudal base without projecting spiniform rays; teeth conical or incisiform, uniserial or biserial; head scaled entirely or frequently without scales on snout, preorbital and suborbital.....Pomacentrinae

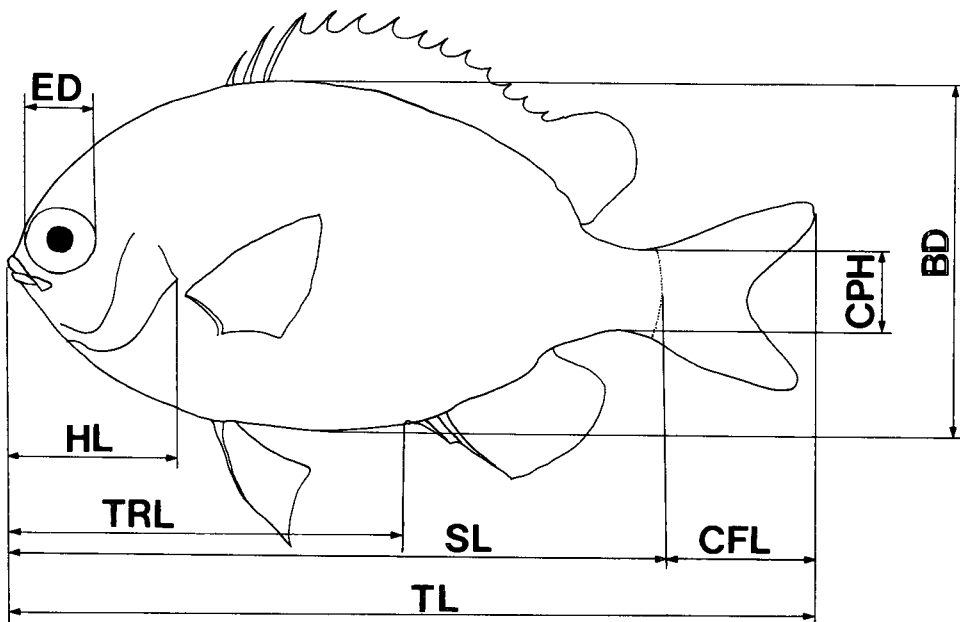


Fig. 2. Diagram showing the method of measuring body part of family Pomacentridae from Korea. BD: body depth; CPH: caudal peduncle height; ED: eye diameter; HL: head length; SL: standard length; TRL: trunk length; TL: total length.

Subfamily Amphiprioninae 흰동가리亞科

Great body depth; preopercle usually serrate; dorsal fin with 10 spines, and 14~20 soft rays; four middle hypural bones usually distinct; pelvic maxillary scale process strongly developed; caudal fin rounded. Colored damselfishes which live with large sea anemones for protection. They probably have a factor in the skin inhibiting nematocyst discharge. They have 2 genera, 28 species in the world

(Nelson, 1994). But, only 1 genus, 1 species are known in Korea (Chyung, 1977; Lee and Kim, 1996).

Genus *Amphiprion* Bloch and Schneider, 1801 흰동가리屬

Amphiprion Bloch and Schneider, 1801, p. 200 (type species: *Lutjanus ephippium* Bloch)

Body short and deep; preorbital serrate and no large spine, opercles and preopercle denticulated, the denticles on the opercle and subopercle being almost spinose; teeth one row, conical; dorsal spines 9 to 11; body cover with small scales; branchiostegal rays 5. Body color bright and one or more sharply defined white cross band, more vivid in the young than in adults; caudal fin more rounded in the young than in adults.

***Amphiprion clarkii* (Bennett), 1830 흰동가리 (Fig. 3A)**

Anthias clarkii Bennett, 1830, p. 29 (type locality: Ceylon).

Amphiprion polymnus Mori, 1952, p.119 (Cheju Isl.); Lindberg and Krasnyukova, 1969, p. 387 (Cheju Isl.).

Material examined. PKNU 04001~04002, 2 specimens, 52.4~56.9mm in standard length (SL), Mosulpo, Seogwipo in Cheju Island, Korea, 27 April 1997.

Diagnosis. D. X, 15~16; A. II, 13~14; P. 19~20; tubed lateral-line scales 36~40; gill rakers 18~20. Body depth 1.7~2.0 in SL.

Body short and deeply compressed; head rounded anteriorly, snout short; interorbital space convex; anterior part of suborbital strong spine; ridge of opercle, interopercle and subopercle sharp spines; head and body cover with ctenoid; naked area on interorbital space, snout and chin; lateral line incomplete; predorsal scales extending to interorbital region.

Color of body dark orange with three white cross band, last around the tail; color in alcohol generally tan to black with three white bands; caudal and pectoral fin pale; remainder of fin darker or pale.

Distribution and Habitat. Indo-west Pacific and Western Pacific including Cheju Island, Korea, Japan, Australia. Inhabits lagoons and outer reef slopes. Commensal with a variety of anemones; usually one adult pair and several juveniles per host.

Remark. The species was described as *Amphiprion xanthurus* by Chyung (1977) in Korea and this name was firstly described by Cuvier and Valenciennes (1830). He introduced that this species was firstly recorded as *Amphiprion polymnus* by Mori (1952) in Korea But *Amphiprion xanthurus* and *Amphiprion polymnus* have been studied as same species, and he used a *Amphiprion xanthurus*. Recently these species were reviewed by Allen (1975), Masuda *et al.*, (1984) and Nakabo (1993) and classified as same species and this species was firstly recorded by Bennett, (1830) with *Anthias clarkii*. So first used in binominal nomenclature by Bennett (1830) and according to the rules of zoological nomenclature, species names are *Amphiprion clarkii*.

Subfamily Chromonae 자리돔亞科

Dorsal fin with 12~15 spines; upper and lower edges of caudal peduncle usually with two or three short spiniform procurrent caudal rays. Genus *Dascyllus* appears to have a commensal relationship

with coral. In this subfamily, They have 4 genera, 87 species in the world (Nelson, 1994). But there are just 2 genera, 5 species in the Korea: *Chromis* and *Dascyllus*

Key to the genera and species of Chrominae from Korea

- 1a. Suborbital and hind margin of preopercle finely serrate..... *Dascyllus*.....2
 1b. Suborbital entire or covered with scales; hind margin of preopercle usually entire
 *Chromis*.....3
 2a. Dorsal soft-rays usually 12 (last ray frequently branched near base); anal ray 10; color of head and body pale with three black bars; caudal fin mostly dark.....*Dascyllus melanurus*
 2b. Dorsal soft-rays 15; anal ray usually 14; color generally dark brown to blackish; fins dark.
*Dascyllus trimaculatus*
 3a. Upper and lower spinous procurrent caudal rays 2..... 4
 3b. Upper and lower spinous procurrent caudal rays 3.....*Chromis analis*
 4a. Margin of preopercle smooth; large blackish spot on upper base of pectoral fin
*Chromis notata*
 4b. Margin of preopercle serrate; no blackish spot on upper base of pectoral fin.....*Chromis fumea*

Genus *Chromis* Cuvier, 1814 자리돔屬

Chromis Cuvier, 1814, p. 353 (type species: *Sparus chromis* Linnaeus).

This genus comprise of approximately 75 species which inhabit in the worlds (Allen, 1975) and only 3 species are known in Korea (Kim *et al.*, 1994a, b; Lee and Kim, 1996).

Dorsal spines XII to XIV; 2~3 spiniform procurrent caudal rays; 2 row of teeth, outer row of enlarged conical teeth and irregular band of villiform teeth behind; small scales cover with head part except nasal pore. The elongate body, forked caudal fin, and relatively small mouth (with conical teeth) in many of the species represent specialized adaptations for plankton feeding and a more open-water mode of life. Similar adaptive features are found in other midwater-feeding fishes which belong to families comprised mainly of benthic forms (Allen, 1975).

***Chromis notata* (Temminck et Schlegel), 1842 자리돔 (Fig. 3B)**

Heliases notatus Temminck et Schlegel, 1842, p. 66 (type locality: Japan).

Chromis notatus Chung, 1977, p. 402.

Material examined. PKNU 04010~04048, 38 specimens, 52.4~141.0mm in standard length (SL), Chungmu, Mosulpo, Seogwipo in Cheju Island, Korea, March 1993~May 1997.

Diagnosis. D. XIII, 12~14; A. II, 10~12; P. 18~20; spiniform procurrent caudal rays 2/2; tubed lateral-line scales 16~19; gill rakers 28~32. Body depth 2.0~2.4, head length 3.2~3.7; eye diameter 9.2~10.8; interorbital width 9.0~11.1; snout length 12.8~17.9; caudal peduncle length 6.9~7.5 in SL.

Depth of body is high and compressed. 1st to 4th dorsal fin membranes split form; margin of dorsal and anal soft fins angular; caudal fin forked, the lobes pointed (particularly upper portion) but not filamentous; lobes point of ventral fin reaching anus but not reaching to anal fins.

Margin of suborbital not long; margin of preopercle smooth; anterior nostril pore small; conical

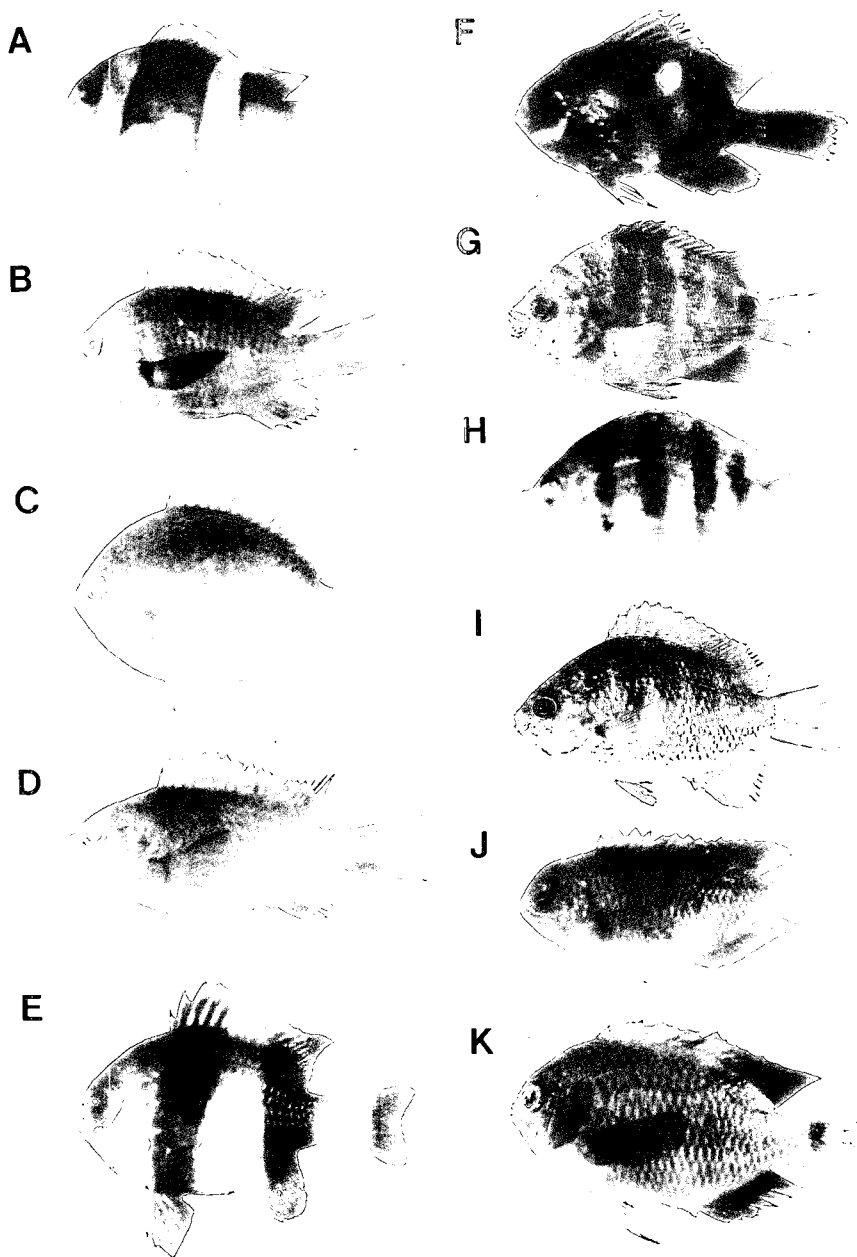


Fig. 3. A, *Amphiprion clarkii* (Bennett), 52.4 mm SL, Cheju Island; B, *Chromis natata* (Temminck and Schlegel), 128.3 mm SL, Cheju Island; C, *Chromis analis* (Cuvier), 139.2 mm SL, Cheju Island; D, *Chromis fumea* (Tanaka), 77.9 mm SL, Cheju Island; E, *Dascyllus melanurus* Bleeker, 32.9 mm SL, Cheju Island; F, *Dascyllus trimaculatus* (Rüppell), 21.9 mm SL, Cheju Island; G, *Abudefduf sordidus* (Forsskål), 31.1 mm SL, Cheju Island; H, *Abudefduf vaigiensis* (Quoy and Gaimard), 94.3 mm SL, Cheju Island; I, *Abudefduf notatus* (Day), 35.9 mm SL, Cheju Island; J, *Pomacentrus coelestis* Jordan and Starks, 34.0 mm SL, Cheju Island; K, *Pomacentrus nagasakiensis* Tanaka, 71.5 mm SL, Cheju Island.

teeth; regular 2 row teeth, outer of upper teeth 25 and lower teeth 22; 3 row scales cover preopercle, 4 row scales cover opercle; all base of fin cover scales.

Dorsal portion grayish brown, shading paler ventrally with a light blush iridescence; whitish spot at rear base of dorsal fin; anal and dorsal soft fins light blue; upper and lower margin of caudal fin blackish but center portion grayish; base of pectoral fin large blackish spot (sometime look like blue).

Distribution and Habitat. Northwestern Pacific including southern of Korea, Japan, Taiwan and China. Inhabits outer reefs and shallow-water, often seen large aggregations. In summer, this fish is rather common in the coastal waters of Cheju Island.

Remark. After Moyer and Ida (1976) suggested *Chromis miyakeensis* as new species. Randall, Ida and Moyer (1981) studied and recognized *Chromis miyakeensis* as a subspecies of *Chromis notata* by compare with body height, lateralis systems and caudal skeleton. *Chromis notata* have various form in this study which look like a *Chromis miyakeensis*. Sample of *Chromis notata*, 92.9~14.6mm SL from Cheju Island has significantly higher body height than small samples, 67.8~10.4mm SL. Body height of large size sample is 45.2~50.0% in SL and it can be compare with *Chromis miyakeensis*. So this species must be re-classify by study of body depth, caudal skeleton.

***Chromis analis* (Cuvier), 1830 노랑자리돔 (Fig. 3C)**

Heliases analis Cuvier in Cuvier and Valenciennes, 1830, p. 496 (type locality: Ambon, Indonesia).

Material examined. PKNU 04050~04072, 22 specimens, 82.8~39.2mm in standard length (SL), Mosulpo, Seogwipo in Cheju Island, Korea, March 1993~May 1997.

Diagnosis. D. XIII, 11~13; A. II, 11~12; P. 18~20; spiniform procurrent caudal rays 3/3; tubed lateral-line scales 16~19; gill rakers 23~28. Body depth 1.7~1.9, head length 3.1~3.5; eye diameter 8.7~10.0; interorbital width 7.6~9.3; snout length 13.5~17.9; caudal peduncle length 6.1~6.5 in SL.

Depth of body is high and compressed compare with other genus *Chromis*. Interspinous membrane of dorsal fin moderately incised; margin of dorsal and anal soft fins round, third dorsal soft ray the longest; caudal fin forked and sharp but not filamentous.

Free margin of suborbital very short, extending to edge of pupil; posterior nasal opening small, supraorbital pores small; margin of preopercle smooth; conical teeth, irregular 2 row teeth, outer of upper teeth 25 and lower teeth 22; 3 row scales cover preopercle, 4 row scales cover opercle; pores of lateralis system on head very developed and easy to invest.

Golden yellow to brown yellow; dorsal portion dark brown, shading paler ventrally with a light brown; dorsal, anal, pectoral, ventral and caudal fin rays yellow but base of dorsal fin dark brown; base of pectoral fin no spot.

Distribution and Habitat. Western Pacific including southern of Korea, Cheju Island, Japan, Ryukyu Island, Philippines, Palau, Indonesia, New Guinea, Australia and China. Inhabits steep outer reef slopes and rocky bottoms. Occurs solitarily or in small to large aggregations.

***Chromis fumea* (Tanaka), 1917 연무자리돔 (Fig. 3D)**

Pomacentrus fumeus Tanaka, 1917, p.9 (type locality: Nagasaki, Japan).

Chromis caudofasciata Shen and Chen, 1978.

Material examined. PKNU 04101~04127, 27 specimens, 58.7~84.1mm in standard length (SL), Mosulpo, Seogwipo in Cheju Island, Korea, March 1993~May 1997.

Diagnosis. D. XIII~XIV, 11~13; A. II, 10~11; P. 18~19; spiniform procurrent caudal rays 2/2; tubed lateral-line scales 17~19; gill rakers 26~32. Body depth 2.1~2.6, head length 3.1~3.9; eye diameter 7.9~10.0; interorbital width 9.3~11.6; snout length 14.3~17.9; caudal peduncle length 7.1~8.3 in SL.

Body short and compressed; snout length short. Scales ctenoid; no auxiliary scales; head fully scaled except the front of snout; suborbital scaled, its free margin extending only to a vertical at the front edge of pupil; crescent opening of supraorbital canal small. Only upper preopercular margin and corner finely serrated. Mouth small; 24~26 teeth conical in outer row on each side of the upper jaw; 22~24 conical teeth in outer row on each side of the lower jaw. The urohyal relatively short and broad; small processes dorsomedially. Posterior margin of the soft dorsal and anal fins angular and sharp; the caudal fin forked but not sharp, the lobe tips pointed to slightly rounded, upper and lower spiniform procurrent caudal rays 2. Yellowish gray, shading ventrally to whitish with light orange color. Interspinous membranes of the dorsal fin black, scaled part of dorsal fin yellowish green. Pelvic fins yellowish orange with first filamentous ray. Anal fins brown, shading to black to the tip. No black spots at base of pectoral fins, although axil and narrow upper edge of the base of fins black. Caudal fin with a broad blackish band in each lobe, the centro-posterior part of fin light orange.

Distribution and Habitat. Western Pacific including Cheju Island, Korea, Japan, Taiwan, Australia and northern New Zealand. *Chromis fumea* was found in lagoons and the exposed outer reefs or rocky areas (Randall *et al.*, 1981). They generally face the incoming current. Adults have been observed in tide pools and at depth of 15~20m, depending on the clarity of the water and the thermocline.

Their spawning behavior can be observed in depth of 15m. Males of this species guarded the egg mass attached on rocks. This species are omnivorous (Emery, 1973). In summer, this fish is rather common in the coastal waters of Cheju-Island.

Genus *Dascyllus* Cuvier, 1829 새줄자리돔屬 (신칭)

(New Korean genus name : sai-jul-ga-ri-dom)

Dascyllus Cuvier, 1829, p. 179 (type species: *Chaetodon aruanus* Linnaeus).

Tetradrachmum Cantor, 1850, p. 1222 (substitute name for *Dascyllus* Cuvier).

Pellochromis Fowler and Bean, 1928, p. 14 (type species: *Pomacentrus trimaculatus* R. p. 14).

Semadascyllus Fowler, 1941, p. 257 (type species: *Dascyllus albisella* Gill, by original designation).

Body highly orbiculate, depth usually 1.6~1.7 in SL; preorbital and suborbital scaly, lower edges serrate; edge of preopercle and other opercle bones more or less serrate; teeth of jaws small and conical, outer row of enlarged teeth and irregular band of villiform teeth behind; dorsal spines usually XII; scale rows in a longitudinal series from upper edge of operculum to base of caudal fin less

than 30.

This genus *Dascyllus* have 7 species in the worlds and 2 species was firstly found in Cheju Island, Korea 26 April 1977.

***Dascyllus melanurus* Bleeker, 1854 줄셋돔 (신칭) (Fig. 3E)**

(New Korean name : jul-sat-dom)

Dascyllus melanurus Bleeker, 1854, p. 100 (type locality: Neira and Banda, Indonesia).

Material examined, PKNU0 4130, 1 specimen, 32.9mm in standard length (SL), Mosulpo in Cheju Island, Korea, 26 April 1997.

Diagnosis. D. XII, 12; A. II, 12; P. 16; tubed lateral-line scales 16+8, gill rakers 27. Body depth 1.6, head length 3.1 in SL; eye diameter 2.2; interorbital width 2.6; caudal peduncle length 1.8 in Head length (Table 2).

Table 2. Comparison of some morphological measurements and counts of *Dascyllus melanurus*.

Characters	The present study	Randall and Allen (1977)
Number of specimens	1	18
Standard length (mm)	32.9	35.0~61.0
In head length		
Eye diameter	2.2	2.3~3.2
Interorbital width	2.6	2.7~3.3
Least height of caudal peduncle	1.8	1.8~2.1
In standard length		
Body depth	1.6	1.5~1.7
Head length	3.1	2.7~3.1
Meristic characters		
Dorsal fin rays	XII, 12	XII, 12
Anal fin rays	II, 12	II, 13
Pectoral fin rays	16	18
Spiniform procurrent caudal rays	2/2	-
Tubed lateral line scales	16+8	16~17
Lateral line below scales	3	-
Lateral line below scales	10	-

Base colour white with three contrasted black bars; dorsal fin largely covered by continuation of black body bars, except middle portion white and posterior edge of soft dorsal transparent; caudal fin mostly black except basal 1/3 white; anal fin mostly covered by continuation of third black body bar except base of anterior portion white; pelvic fins black; pectoral fin transparent.

Distribution and Habitat. Indo-Australian archipelago including Cheju Island, southern Korea and Japan. Inhabits sheltered lagoons.

***Dascyllus trimaculatus* (Rüppell), 1828** 세점자리돔 (신칭) (Fig. 3F)

(New Korean name : sai-jeom-ja-ri-dom)

Pomacentrus trimaculatus Rüppell, 1828, p. 39 (type locality: Massaua, Red sea).

Material examined. PKNU 04140~04141, 2 specimens, 18.4~21.9mm in standard length (SL), Mosulpo, Seogwipo in Cheju Island, Korea, 26 April 1997.

Diagnosis. D. XII, 15; A. II, 14; P. 20; tubed lateral-line scales 18+8~9. Body depth 1.7, head length 3.1 in SL; eye diameter 2.2; interorbital width 2.6~2.7; caudal peduncle length 1.9~2.0 in Head length (Table 3).

Table 3. Comparison of some morphological measurements and counts of *Dascyllus trimaculatus*.

Characters	The present study	Randall and Allen (1977)
Number of specimens	2	30
Standard length (mm)	18.4~21.9	54.0~100.0
In head length		
Eye diameter	2.2	2.3~3.1
Interorbital width	2.6~2.7	2.5~3.1
Least height of caudal peduncle	1.9~2.0	1.6~1.8
In standard length		
Body depth	1.7	1.4~1.6
Head length	3.1	3.1~3.6
Meristic characters		
Dorsal fin rays	XII, 15	XII, 15
Anal fin rays	II, 14	II, 14
Pectoral fin rays	20	19~20
Spiniform procurent caudal rays	2/2	-
Tubed lateral line scales	18+8~9	18~19
Lateral line below scales	4	-
Lateral line below scales	11	-

Young are overall black with lighter (bluish) scale; prominent white blotch present on forehead and upper sides (bisected by about 10~13th tubed lateral-line scales); all fin black except pectorals and outer half of soft dorsal transparent (Randall and Allen, 1977). Black to dark brown with 3 white spots, adults generally lose the forehead spot and the spot on the upper side is much reduced or frequently absent. Head and fin normally black and the scales of the body possess black margins; center of body scales range from dark grey to pale bluish grey.

Lighter colour are generally exhibited by fish which are feeding or by males in courtship. A peculiar variation exists in some areas which has the pelvic, anal and caudal fins orange and also his colour may extend on to the abdomen, breast, and lower portion of the head. In addition, there is a row elongate orange "windows" which occupy the middle portion of the spinious dorsal fin (Randall and Allen, 1977).

Distribution and Habitat. Tropical Indo-west Pacific including Cheju Island, southern Korea and Japan. Inhabits lagoons and outer reef environments. Occur in small to large aggregations. The stomachs of several specimens from the Palau Islands contained about 40 percent algae and 60 percent copepods and other planktonic crustacea (Allen, 1975).

Subfamily Pomacentrinae 파랑돔亞科

Body moderately elongate; upper and lower edges of caudal peduncle without projecting spiny caudal rays, no spiniform procurrent caudal rays. Papilla-like structures on posterior circumorbitals small scales. Caudal fin more or less forked, the lobes rounded; lower pharyngeals triangular; branchiostegals 5 or 6. Species numerous in the tropical sea; extremely variable in form and color, the brilliant coloration apparently dependent on surroundings. They have 21 genera, 199 species in the world and over half the species are contained in the genera *Pomacentrus* (53 species), *Stegastes* (33 species), *Chrysiptera* (25 species) and *Abudefduf* (18 species) (Nelson, 1994).

Key to the genera and species of Pomacentrinae from Korea

- 1a. Hind margin of preopercle entire; upper and lower jaw teeth uniserial; more five band on body..... *Abudefduf*.....2
- 1b. Hind margin of preopercle crenulate or weakly to strongly serrate; upper and lower jaw teeth biserial; no band on body or less five..... 4
- 2a. Caudal peduncle with large black spot on dorsal surface; dorsal soft rays 15 to 16
.....*Abudefduf sordidus*
- 2b. Caudal peduncle without large black spot on dorsal surface; dorsal soft rays usually 12 to 14
.....3
- 3a. Color of body dark with one to four narrow (about one to two scales wide) pale bars on side; black spot on opercular; caudal fin pale*Abudefduf notatus*
- 3b. Color of body usually pale to brown with four to seven dark bars on sides; no spot on opercular; caudal fin pale to black*Abudefduf vaigiensis*
- 4a. Lobes of upper and lower caudal fin rounded; center of caudal fin moderately hollowed; suborbital naked (at least anteriorly); hind margin of preopercle distinct serrate.....
.....*Pomacentrus*.....5
- 4b. Lobes of upper and lower caudal fin moderately elongated and sharp; center of caudal fin deeply hollowed; suborbital scaly; hind margin of preopercle crenulate or weakly serrate
.....*Neopomacentrus violascens*
- 5a. Color of body brownish except tail part, including peduncle and caudal fin; body depth high over 2.2 in SL.....*Pomacentrus chrysurus*
- 5b. Color of body uniformly dark brownish, including peduncle and caudal fin; body depth lower than

- 1.9~2.1 in SL6
 6a. Front of suborbital with one or two strong and large posteriorly directed spines, margin of suborbital serrate*Pomacentrus nagasakiensis*
 6b. Front of suborbital with no strong and large posteriorly directed spines, margin of suborbital entire*Pomacentrus coelestis*

Genus *Abudefduf* Forsskål, 1775 줄자돚屬

Abudefduf Forsskål, 1775, p. 59 (type species: *Chaetodon sordidus* Forssk l).

This genus contains relatively large pomacentrids which frequently exhibit a pattern of dark bars and only 3 species are known in Korea (Chyung, 1977; Lee and Kim, 1996).

Dorsal spines XIII; pectoral rays 18~20; tubed lateral line scales 20~22; gill rakers 21~27; notch of suborbital absent; margin of preopercle and suborbital round; teeth usually uniserial; snout cover with scale in front of orbit; body depth 1.6~1.9 in SL; color pattern composed of dark cross bars on sides.

Aggregations of these fishes are often a conspicuous feature of the fauna which is associated with wharf pilings, boat moorings and breakwaters. All of the species dwell in relatively shallow water. Spawning generally takes place on bare rock, etc., which have previously been cleared of algae by the male. The eggs which hatch in five to six days are guarded throughout the incubation period by the male. The fry are pelagic for several weeks (Allen, 1975).

***Abudefduf sordidus* (Forsskål), 1775 줄자돚 (Fig. 3G)**

Chaetodon sordidus Forsskål, 1775, p. 62 (type locality: Djedda, Red Sea).

Material examined. PKNU 04150~04151, 2 specimens, 27.7~31.1mm in standard length (SL), Mosulpo, Seogwipo in Cheju Island, Korea, April~May 1997.

Diagnosis. D. XIII, 15~16; A. II, 14~15; P. 19; tubed lateral-line scales 21~22+6~8; gill rakers 26~28. Body depth 1.6~1.8 in SL.

Teeth with notched summits; third to sixth dorsal spines considerably longer than the last; soft dorsal angular; caudal slightly lobed, lobes pointed; color of body brownish with dark, five dark bars on body side, more distinct in juveniles, band from first half of dorsal fin to ventral; several narrow white vertical bands from back to abdomen; white edged prominent back spot on free portion of upper caudal peduncle; ventral and anal black; black spot on anterior dorsal spines; caudal yellowish, with dark outer edges.

Distribution and Habitat. From Indo-west Pacific to eastern Africa including Cheju Island, southern Korea, Australia and Japan. Inhabits rocky inshore reefs in areas of mild to moderate surge, juvenile often present in surge pools; feeds mainly on benthic algae (Allen, 1975).

***Abudefduf vaigiensis* (Quoy and Gaimard), 1825 해포리고기 (Fig. 3H)**

Glyphisodon vaigiensis Quoy and Gaimard, 1825, p. 391 (type locality: Andaman Island).

Material examined. PKNU 04160~04161, 2 specimen, 26.2~94.3mm in standard length (SL), Sungsanpo in Cheju Island, Korea, April 1989 and Seogwipo in Cheju Island, Korea, July 1996.

Diagnosis. D. XIII, 12; A. II, 11~12; P. 19; tubed lateral-line scales 19~22+9~10; gill rakers 23

~25. Body depth 1.6~1.7 in SL.

Body depth high and compressed; eye large; body cover with cycloid scales, small scales with base of dorsal and anal fins, head portion scales except nostril pore; robes of soft rays of dorsal and anal fin rounded.

This species similar with *Abudefduf sordidus* but generally white to pale blue, yellowish dorsally with 5 wide black bars on side; 1st band start predorsal fin portion and pass pectoral fin; 5th band caudal peduncle.

Distribution and Habitat. From Indo-west Pacific to eastern Africa including Cheju Island, southern Korea, Australia and Japan. Inhabits upper edge of outer reefs slopes and inshore rocky reefs depth in range 1~12m.

***Abudefduf notatus* (Day), 1869 동갈자돔 (Fig. 3I)**

Glyphidodon notatus Day, 1869, p. 521 (type locality: Andaman Island).

Abudefduf notatus: Smith, 1960, p. 332.

Material examined. PKNU 04170~04172, 3 specimens, 15.3~35.9mm in standard length (SL), Mosulpo, Seogwipo in Cheju Island, Korea, July 1996.

Diagnosis. D. XIII, 13~14; A. II, 13~14; P. 18; tubed lateral-line scales 19~21+11; gill rakers 26~27. Body depth 1.7~1.9 in SL.

Suborbital decreases rapidly in width posteriorly; dorsal fin rays much longer than spines; caudal deeply forked, upper and lower lobes of caudal fin rays pointed; last dorsal ray branched near base; small scales with base of dorsal and anal fins; suborbital and preopercle scales except snout; preopercle and subopercle rounded and entire.

Generally dark brown with one to four narrow pale bars on side; 1st from first dorsal spine to base of pectoral, 2nd from third spine to middle of ventral, 3rd from seventh spines, 4th from tenth and 5th from over free portion of tail; fine brownish, except caudal yellowish; blue spots on scales and dark mark at pectoral ray base.

Distribution and Habitat. From Indo-west Pacific to southern Africa including Cheju Island, southern Korea, Australia, Philippine and Japan. Inhabits rocky inshore reefs where there is usually moderate to strong wave action depth in range 1~12m (Allen, 1975).

Genus *Pomacentrus* Lacépède, 1802 파랑돔屬

Pomacentrus Lac p de, 1802, p. 508 (type species: *Chaetodon pavo* Bloch).

This genus contains relatively second largest in family and genus 53 (Nelson, 1994), and only 2 species are known in Korea (Chyung, 1977; Lee and Kim, 1996).

Body ovate, or oblong, compressed, the profile steep; dorsal spines XIII; anal spines 2; branchiostegals 4~5; suborbital serrated except *P. coelestis*; preopercle usually with distinct serrate; prominent notch between preorbital and suborbital; teeth biserial anteriorly and small, compressed; the crown smooth or marginated; scales rather large; snout scaly; lateral line ceases below the soft dorsal fin; body depth high in SL.

***Pomacentrus coelestis* Jordan and Starks, 1901 파랑돔 (Fig. 3J)**

Pomacentrus coelestis Jordan and Starks, 1901, pp. 198~206 (type locality: Japan).

Material examined. PKNU 04180~04181, 2 specimens, 33.3~34.0mm in standard length (SL), Mosulpo, Seogwipo in Cheju Island, Korea, July 1995.

Diagnosis. D. XIII, 13~14; A. II, 14; P. 18; tubed lateral-line scales 17~18+7; gill rakers 20~22. Body depth 2.2~2.3 in SL.

Body ovate-oblong, anterior dorsal profile; front of snout on a level to lower margin of eye; mouth very small; maxillary reaching to below anterior edge of pupil; teeth in a single row in jaw, conical; preorbital entire; no notch between dorsal fin spinous and rays; snout lower jaw; interorbital ring, and the edge of preopercle naked; cheeks with 2 row scales; scales on top of head extending forward to above anterior edge of pupil; a row of scales on base of anal and dorsal fin rays; interorbital space convex.

Body black in a alcohol but live body color cobalt blue; dorsal and anal blackish; darker anteriorly; ventrals light, outer edge dusky; pectorals and caudal yellowish, a black band across base of pectoral rays; edge of caudal and tips of rays dusky.

Distribution and Habitat. Indian ocean and western Pacific including Cheju Island, southern Korea, Australia and Japan. Inhabits mainly outer reef, frequently among rubble and in areas exposed to wave action or strong currents; depth range 1~12 m (Allen, 1975).

***Pomacentrus chrysurus* Cuvier, 1830** 파랑줄돔

Pomacentrus chrysurus Cuvier, 1830, pp. 499 (type locality: Southern Sea).

Pomacentrus tripunctatus Mori, 1952, p. 119.

Remark. Mori (1952) was firstly recorded this species as *Pomacentrus tripunctatus* from Korea and Chung (1977) was re-recorded this species as *Pomacentrus dorsalis*. But, recently *Pomacentrus dorsalis* Gill, 1859 and *Pomacentrus rhodonatus* Bleeker, 1853 was studied as same species, and also *Pomacentrus rhodonatus* and *Pomacentrus chrysurus* Cuvier, 1830 was same species (Allen, 1991; Lee and Kim, 1996). So first used in binominal nomenclature by Cuvier (1830) and according to the rule of zoological nomenclature, this species names are *Pomacentrus chrysurus* (Lee and Kim, 1996).

Distribution and Habitat. East Indian ocean and Pacific including Cheju Island, southern Korea, northern Australia and Japan. Inhabits sandy areas of lagoons and inshore reefs around rock or coral outcrops; depth range 1~3 m (Allen, 1975).

***Pomacentrus nagasakiensis* Tanaka, 1917** 나가사끼자리돔 (신칭) (Fig. 3K)

(New Korean name : nagasaki-ja-ri-dom)

Pomacentrus nagasakiensis Tanaka, 1917, p. 9 (type locality: Japan).

Material examined. PKNU 04200, 1 specimen, 71.5mm in standard length (SL), Mosulpo, in Cheju Island, Korea, July 1994.

Diagnosis. D. XIII, 15; A. II, 16; P. 17; tubed lateral-line scales 18+7; body depth 2.1; head length 3.1 in SL; eye diameter 3.1; interorbital width 3.5; caudal peduncle length 1.9 in Head length (Table 4).

Body depth high and compressed; body cover with cycloid scales except anterior snout and

suborbital; posterior preopercle, outer of suborbital and preorbital strongly serrate; front of suborbital with one or two strong and large posteriorly directed spines; suborbital naked; head portion no vertical black line in each side; upper and lower lobes of caudal fin rounded; center of caudal fin moderately hollowed.

Body uniformly dark brownish in alcohol (live body color blue), including peduncle and caudal fin; dorsal soft fin membrane large black brownish spot and round of this spot light cobalt; outer of base of pectoral fin black spot.

Distribution and Habitat. From western to eastern Pacific including Cheju Island, Korea, Australia and Japan. Inhabits coral reefs and rocky inshore areas (Allen, 1975).

Table 4. Comparison of some morphological measurements and counts of *Pomacentrus nagasakiensis*.

Characters	The present study	Randall and Allen (1977)	Tanaka(1917)
Number of specimens	1	2	-
Standard length (mm)	71.5	18.4~21.9	-
In head length			
Eye diameter	3.1	2.2	3
Interorbital width	3.5	2.6~2.7	3.5
Least height of caudal peduncle	1.9	1.9~2.0	2.0
In standard length			
Body depth	2.1	1.7	2.5
Head length	3.1	3.1	3.4
Meristic characters			
Dorsal fin rays	XIII, 15	XII, 15	XIII, 15
Anal fin rays	II, 16	II, 14	II, 16
Pectoral fin rays	17	20	17
Tubed lateral line scales	18+7	18	18
Lateral line below scales	4	4	-
Lateral line below scales	10	11	-

Genus *Neopomacentrus* Allen, 1975 점자돔屬

Neopomacentrus Allen, 1975, p.166 (type species: *Glyphisodon anabatoides* Bleeker).

This genus *Neopomacentrus* contains approximately 13 species which are restricted to the Indo-West Pacific (Allen, 1975) and only one species (*Pomacentrus violascens*) are known in Korea (Chyung, 1977; Lee and Kim, 1996). This genus was firstly described by Allen (1975). Lee and Kim (1996) was re-studied about genus *Pomacentrus* from Korea and *Pomacentrus violascens* was re-named as genus *Neopomacentrus*. Genus *Neopomacentrus* has following characters;

Body elongate and compressed; caudal fin forked; scale large about 27~28 in median lateral line

series; edge of preopercle slightly crenulate to weakly serrate; margin of suborbital usually smooth or hidden by scales; dorsal rays XIII, 10 to 12; middle rays of soft dorsal and anal fins and outer rays of caudal frequently produced into long filaments (Allen, 1975).

***Neopomacentrus violascens* (Bleeker), 1848 점자돔**

Pristotis violascens Bleeker, 1848, p. 637 (type locality: Sumbawa, Indonesia).

Remark. This genus have been placed by *Pomacentrus* and *Abudefduf*, because of the presence or absence of serrate on the margin of the preopercle, single nasal opening on each side of snout, mouth oblique; nearly terminal; lateral line gently arched below dorsal fin; terminating 1 to 2 scale rows below base of soft dorsal; snout tip, lip, chin, and isthmus naked; remainder of head and body scaled, scales finely ctenoid; preopercle scale rows 3~4; lower margin of suborbital smooth to weakly serrate or completely hidden by scales; margin of preopercle slightly crenulate to weakly serrate; upper margin of opercle armed with 1~2 flattened spines; caudal fin deeply forked (Allen, 1975).

This species was firstly recorded as *Pomacentrus violascens* as by Mori (1952) and Chyung (1977) from Korea. And, recently *Pomacentrus violascens* from Korea was re-recorded as *Neopomacentrus violascens* by caudal fin shape and scales of suborbital bone (Lee and Kim, 1996).

Distribution and Habitat. Indo-Australian Archipelago including Cheju Island, southern Korea, Philippines, Indonesia and Japan. Inhabits inshore reefs on soft bottoms around coral or rock outcrops, wharf pillings, wreckage, etc, depth 5~25 m (Allen, 1975; Chyung, 1977). but this species is rare at Cheju Island, Korea.

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자리돔과 (Family Pomacentridae) 어류의 형태학적 연구

1. 자리돔과 어류의 분류학적 재검토

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요 약

1994년 7월부터 1997년 5월사이 부산, 충무 및 제주도에서 채집된 자리돔과 어류 가운데 *Dascyllus melanurus* (신칭: 줄셋돔), *Dascyllus trimaculatus* (신칭: 세점자리돔) 및 *Pomacentrus nagasakiensis* (신칭: 나가사끼자리돔)가 국내 미기록종으로 분류되었다. 이들 3종의 계수, 계측형질을 기재하였으며 이들과 함께 자리돔과 어류 6속 13종에 대한 검색표를 제시하였다.