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# SYSTEMATIC STUDIES OF CORAL-CODS (SERRANIDAE) FROM THE ANDAMAN SEA (PHUKET PROVINCE) THAILAND

*by*

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# SYSTEMATIC STUDIES OF CORAL-CODS (SERRANIDAE) FROM THE ANDAMAN SEA (PHUKET PROVINCE) THAILAND

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## ABSTRACT

Phuket Province is located on Phuket island, the largest island of Thailand, it also includes twenty-six small islands, they are in the Andaman Sea. Fish fauna in those islands are more or less rich and diverse in different areas of study. One of the most interesting groups is Serranids, the coral-cods family. They are recognized as being abundant in tropical seas. Most of them are edible and several are ornamental species. Thirty-seven species so far were collected in the water around Phuket and adjacent islands. There are eleven genera, they are: *Anthias*, *Anyperodon*, *Cephalopholis*, *Cromileptes*, *Diploprion*, *Epinephelus*, *Grammistes*, *Plectropoma*, *Pogonoperca*, *Promicrops* and *Variola*. Some nine of eleven genera have only one species of each. Four species of the serranids are found to be new records of fish fauna from Thai-waters.


## INTRODUCTION:

The coral-cods (family Serranidae) is one of the most important groups of food fishes, many species are recognized as ornamental ones and some have been known to cause of poisoning. There are several common names used such as groupers, rock-cods and sea-basses. They are most abundant in tropical seas. The sizes of the species vary to a great extent; the weight of some is recorded up to 1,000 pounds, but some species are mature at more or less one inch in length. Many species are widely distributed for example the species *Epinephelus tauvina* (Forskål) and *Promicrops lanceolatus* (Bloch). Most young coral-cods live under the coral shelters, but the large adults are rarely found in coral-reef areas of shallow waters, certainly many live in the deeper water.

Systematic study of Fishes in Thailand is probably a less interesting field as compared to others. Although it seems to be fundamental work, it is essential for advanced studies, at least in Fisheries. Only a few scientists are interested in this field so it is progressing slowly especially in some developing countries.

In Thailand the investigation of the Serranid group has been going on since 1969 by the Department of Fisheries in order to help the Thai people in the Fishery business. The investigation was done in the gulf of Thailand and the Andaman Sea, only twenty-nine species were reported. My systematic work of this family started

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several years ago, when I had made coral reef fish collections in Thai waters. Up to now there have been 37 species found, three of them are recognized as ornamental species, the rest are all edible ones. However the information of their ecology and distribution in Thai-water is certainly scarce.

## MATERIALS AND METHODS :

This study was based on the specimens collected from the waters around Phuket island and several small offshore islands in the Andaman sea. The specimens from Kasetsart University Museum of Fisheries (KUMF) and the specimens from Phuket Marine Biological Center (PMBC) as well as those of my own collection were examined. Moreover the collections were made from the local village market in Phuket province, most specimens were taken from shallow water by trapping, trawling and hook and line fishing.

Phuket island is the largest island of Thailand, it is the main part of Phuket Province, which is one of seventy-two provinces of Thailand. Phuket island situated in the Indian Ocean on the west coast of the Peninsula between latitude 7° 50' N. to 8° 10' N. and longitude 90° 10' E. to 98° 20' E. Besides Phuket main island, there are twenty-six small ones, scattered around the main island. Phuket island itself is surrounded by sandy, pebbly and rocky coasts except the area close to the mainland which has more or less some mangrove habitat. Nowadays Phuket province is recognized as a tourist spot. (Map 1 : Ko = Island ; Ao = Bay,)

During the investigation of coral reef fishes in 1977-78, eighteen species of serranids were collected. There were three more collection trips made in 1981-82, when eleven species were found. There are twenty species identified from PMBC and twenty-nine species from the Department of Fisheries (Banasopit, 1969). Thirteen species were located at KUMF, collected at different times. All the specimens were identified to species. (Table 1)

## RESULTS :

The total number of species identified from the fish collected in the water around Phuket island are 37 species, of 11 genera. Some nine of eleven genera are composed of one species each, they are *Grammistes*, *Pogonoperca*, *Diploprion*, *Anyperodon*, *Cromileptes*, *Plectropoma*, *Promicrops Variola* and *Anthias*, eight species of genus *Cephalopholis* and twenty species of genus *Epinephelus*.

### Family Serranidae

Body robust, oblong, moderately elongate, large head, operculum with three spines. Mouth large, its cleft horizontal or oblique, teeth on bands in jaws, vomer, and palatine; with a few anterior canines and sometimes canines on sides of lower jaw. Scales small or moderate in size, mostly ctenoid, sometimes cycloid. Single dorsal fin

spinous and soft rays partially separated by notch; anal fin mostly with three spines; pectoral fins normally rounded; pelvic fin close to base of pectorals; caudal fin usually rounded, truncate or lunate. Color pattern on body of various types, spots, blotches, stripes or combinations. Mostly they inhabit in coral reef areas, some living normally at fair depths, some are found in the deeper zone.

**(1) Genus *Grammistes* Bloch**

Body oblong, compressed; covered with small cycloid scales embedded in skin. Head covered with minute scales. Mouth large, oblique maxillary with supplemental bone, lower jaw prominent with a small dermal appendage on chin. Preoperculum with several strong spines. It seems to be rare, only a single species known. It is recognized as an ornamental species.

*Grammistes sexlineatus* (Thunberg)

**(2) Genus *Pogonoperca* Günther**

Body oblong, compressed, covered with minute cycloid scales, embedded in skin. Head also covered with minute scales. Mouth large lower jaw prominent with a large dermal appendage at its symphysis slightly shorter than diameter of eye. Seven strong dorsal spines and three anal spines. Pectoral and caudal rounded. Only one species known, it is recognized as an ornamental species.

*Pogonoperca punctata* ( Cuv. & Val. )

**(3) Genus *Diploprion* Cuvier and Valenciennes**

Body ovate, compressed, covered with very small ctenoid scales also covering cheek, preoperculum and some part of operculum. Head naked, large. Mouth large, protractile and oblique; maxillary with a supplemental bone; lower jaw slightly prominent with no dermal appendages. Preoperculum with a double serrated edge. Eight strong dorsal spines and two anal spines, pectoral and caudal rounded. Single species known, it is recognized as an ornamental species.

*Diploprion bifasciatum* (Kuhl & van Hass.)

**(4) Genus *Anyperodon* Günther**

Body elongate, compressed, covered with small ciliated scales. Head pointed. Mouth large, protractile, maxillary with supplemental bone, lower jaw with no appendage. Preoperculum rounded with fine denticulation. Eleven dorsal spines and three short anal spines, pectoral obtusely pointed, caudal rounded. One species known from Thai-water. Edible species.

*Anyperodon leucogrammicus* (Cuv. & Val.)

**(5) Genus *Cephalopholis* Bloch**

Body oblong, compressed, covered with small ctenoid scales. Head large, obtusely pointed. Mouth large with small canines in front, but no canines at sides of jaw. Preoperculum margin normally serrated. Nine dorsal spines and three anal spines, most pectoral and caudal distinctly rounded except some with caudal truncate. The colors and patterns are very striking, and variations often occur, it is a rather difficult group to identify. They usually inhabit shallow, warm water. Eight species found in Thai-waters. All of them are edible.

*Cephalopholis argus* (Bl. & Schn.)
*C. aurantius* (Val.)
*C. boenack* (Bloch)
*C. cyanostigma* (Cuv. & Val.)
*C. miniatus* (Forskål)
*C. pachycentrum* (Cuv. & Val.)
*C. rogaa* (Forskål)
*C. sonnerati* (Cuv. & Val.)

**(6) Genus *Cromileptes* Swainson**

Body oblong, very compressed, covered with small cycloid scales. Head small concave. Mouth large oblique and protractile, maxillary with supplemental bone. Preoperculum serrated with strong teeth at rounded angle operculum with two weak spines. Ten dorsal spines and three anal spines. Pectoral and caudal rounded. Single species known. The small fish is recognized as an ornamental species but the large one is known as the best food fish and it is the most expensive too. That is

*Cromileptes altivelis* ( Cuv. & Val.)

**(7) Genus *Epinephelus* Bloch**

Body rather robust, more or less compressed, covered with small ctenoid scales often embedded in skin. Head scaly, mouth large, protractile with small teeth in bands on jaws, vomer and palatines, anterior teeth enlarged; maxillary exposed with supplemental bone; lower jaw prominent scaly. Preopercular margin serrate. Eleven dorsal spines and three anal spines, pectoral rounded, caudal truncate, rounded or emarginate. There are many species mainly in the Indo-Pacific, marking of most species changes especially with growth. Numerous species of these genera are value food fishes widely distributed in all tropical and subtropical seas. Most of them attain large size. Twenty species found in water around Phuket island, they are:

*Epinephelus amblycephalus* (Bleeker)
*E. areolatus* (Forskål)
*E. bleekeri* (Vail & Bocourt)

*Epinephelus boelang* Bleeker
*E. caeruleopunctatus* (Bloch)
*E. corallicola* (Cuv. & Val.)
*E. fasciatus* (Forskål)
*E. flavocaeruleus* (Lac.)
*E. fuscoguttatus* (Forskål)
*E. grammicus* Day
*E. megachir* (Rich.)
*E. merra* Bloch
*E. moara* (Temm. & Schl.)
*E. morrhua* (Cuv. & Val.)
*E. nebulosus* (Cuv. & Val.)
*E. sexfasciatus* (Cuv. & Val.)
*E. summana* (Forskål)
*E. tauvina* (Forskål)
*E. undulosus* (Q. & G.)
*E. urodelus* (Cuv. & Val.)

**(8) Genus** *Plectropoma* Cuvier

Body elongate, compressed, covered with ciliated scales. Head convex, naked on front. Mouth large protractile, maxillary with supplemental bone, lower jaw prominent, scaly anterior and lateral teeth canine. Preoperculum rounded nearly entire, operculum with three flat spines. Seven to eight dorsal spines and three anal spines. Pectoral rounded, caudal truncate in young emarginate in adult. The species grow to a large size and are widely distributed from Red sea, East Africa to Pacific islands, China, Japan, Australia, Fiji, Samoa, etc. One species known from Phuket island.

*Plectropoma maculatum* (Bloch)

**(9) Genus** *Promicrops* **Poey**

Body robust, rather elongate with small cycloid scales. Head large; mouth large and oblique, maxillary reach beyond posterior border of eye, lower jaw prominent. Preoperculum obtusely rounded with fine serration, opercular flap obtusely pointed. Eleven dorsal spines and three anal spines caudal rounded. One species known from Pacific region. This species grows to more than 3 meters, one of the worldwide distributed species from west coast of Africa to Hawaii. Small fish found in shallow water near shore and some entering rivers. One species examined.

*Promicrops lanceolatus* (Bloch)
*Syn.* = *Epinephelus lanceolatus* (Bloch)

**(1) Genus *Variola* Swainson**

Body elongate, moderately compressed, covered with small ctenoid scales, but head with cycloid scales. Mouth large, protractile, maxillary with supplemental bone, lower jaw prominent, teeth in jaw pluriseriate, the inner series enlarged two curved canines anterior in both jaws and one or two canines on each side of the mandible, also teeth on vomer and palatine. Preoperculum more or less finely serrated, operculum with three spines. Nine dorsal spines and three anal spines, pectoral rounded, caudal lunate, lobes produced. One species of the tropical Indo-Pacific known.

*Variola louti* (Forskål)

**(11) Genus *Anthias* Bloch**

Body oblong strongly compressed covered with smooth moderate ciliated scales. Head scaly. Mouth moderate, protractile. Anterior teeth canines. Maxillary with no supplemental bone, exposed scaly. Preoperculum serrated with teeth near angle enlarged, operculum with two to three spines. Ten dorsal spines and three anal spines. Caudal emarginate usually with filamentous lobe, Lovely small fish of tropical water, it is recognized as an ornamental species. Only one species seen in Phuket area.

*Anthias squamipinnis* (Peters)

**DISCUSSION :**

The coral-cods collection was made in the shallow water around Phuket island and adjacent areas. Most of the deep water species were not found. The collection of serranids in last few years (1981-82) was more scanty than those collections in 1977-78, the causes of this depletion may have been overfishing in the continental shelf and the illegal fishing using dynamite which would have destroyed the reef areas. Of those species of Serranids reported in the Fishes of the Indo-Australian Archipelago, (Weber and de Beaufort, 1931) belonging to seven subfamilies, only four subfamilies are recorded from Phuket island (Table 3). The largest subfamily is Epinephelinae including 5 genera of 47 species in the Fishes of Indo-Australian Archipelago but there are 8 genera of 33 species from Phuket island. The author splits the genus *Epinephelus* into which Dr. Weber & de Beaufort placed those fishes which have nine to eleven dorsal spines with no curved canines on sides of mandible. Several taxonomists place the fish with nine and eleven spines into separate genera (Smith, 1965; Munro 1955). So in present study the author decided to separate the fish into different genera according to the number of dorsal spines and curved canines. It seems to be the old classification problem. Some taxonomists are "lumpers" and some are "splitters". There is another problem with the Serranidae, some small exotic species such as Anthiids and Diploprionids have been seperated from the Serranidae by some taxonomists who changed their subfamily rank to family the Anthiidae and Diploprionidae, while Weber & de Beaufort and others put them into subfamilies of Serranidae. The author of the present study prefers to keep them in the subfamilies Anthiinae and Diploprioninae of family Serranidae. The same problem also occurs in other works with different groups of fishes.

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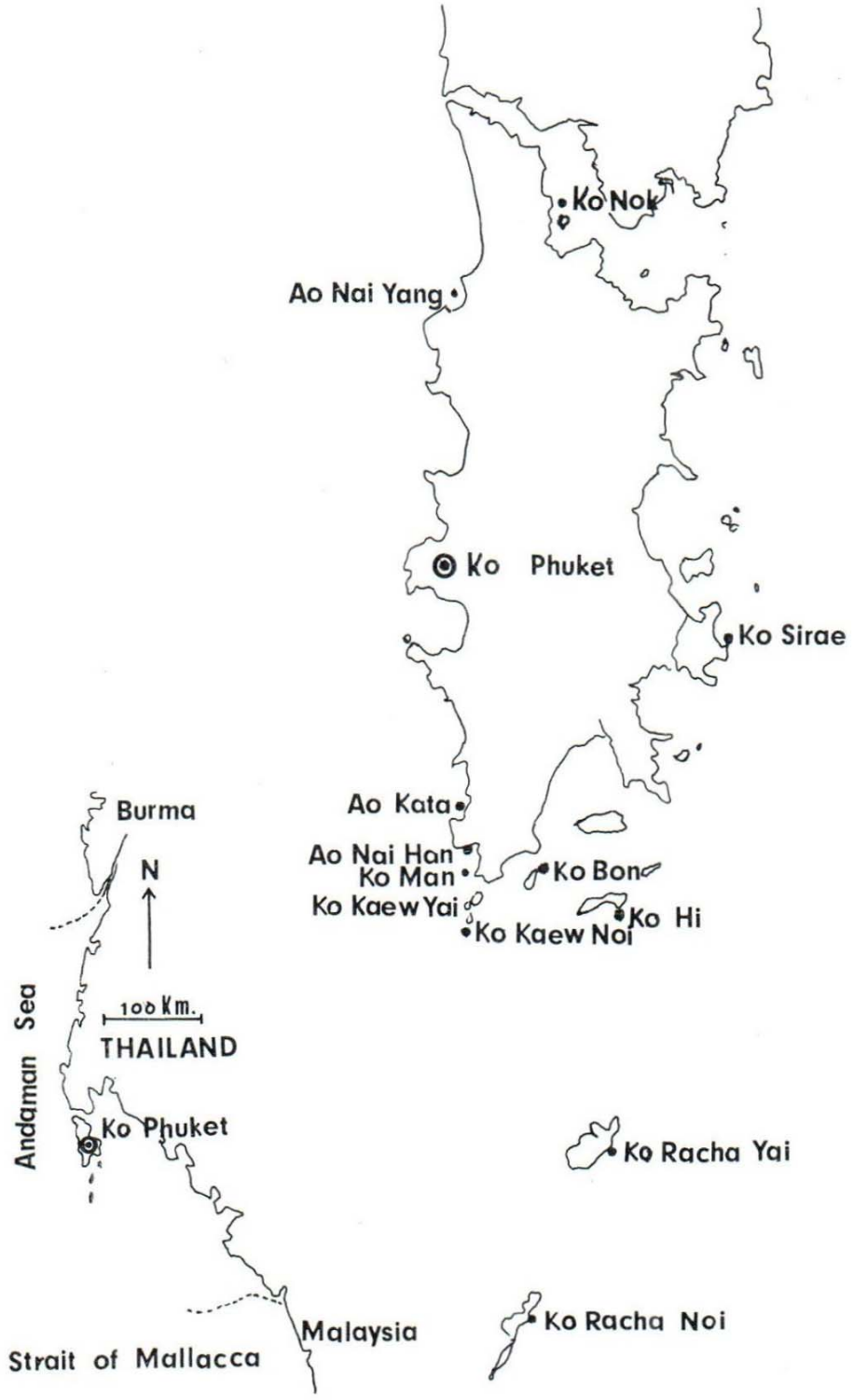


**Map 1 Map of the west coast of Thailand showing Phuket Island**

**Table 1 Species of coral-cods found in the Andaman sea (Phuket island)**

| | KUMF | PMBC | DF 1969 | Coll. 1977-78 | Coll. 1981-82 |
|---|---|---|---|---|---|
| Family Serranidae | | | | | |
| (1) Subfamily Grammistinae | | | | | |
| ***Gramimistes sexlineatus* (Thunb.) | — | — | — | X | — |
| ***Pogonoperca punctata* (Cuv. & Val.) | — | — | — | X | — |
| (2) Subfamily Diploprioninae | | | | | |
| ***Diploprion bifasciatum* (Kuhl & van. Hass.) | — | — | — | X | — |
| (3) Subfamily Epinephelinae | | | | | |
| *Anyperodon leucogrammicus* (Cuv. & Val.) | — | X | X | X | — |
| *Cephalopholis argus* (Bl. & Schn.) | — | — | X | — | — |
| *C. aurantius* (Val.) | — | — | X | — | — |
| *C. boenack* (Bloch) | X | X | X | X | X |
| *C. cyanostima* (Cuv. & Val.) | X | — | X | — | — |
| *C. miniatus* (Forskål) | X | X | X | X | X |
| *C. pachycentrum* (Cuv. & Val.) | — | — | X | X | — |
| *C. rogaa* (Forskål) | — | X | X | — | X |
| *C. sonnerati* (Cuv. & Val.) | — | X | X | — | — |
| *Cromileptes altivelis* (Cuv. & Val.) | — | X | X | X | — |
| *Epinephelus amblycephalus* (Bleeker) | — | X | X | — | — |
| *E. areolatus* (Forskål) | X | X | X | — | X |
| *E. bleekeri* (Vail. & Bocourt) | — | X | X | — | X |
| *E. boelang* Bleeker | — | — | — | X | — |
| *E. caeruleopunctatus* (Bl.) | — | X | X | X | X |
| *E. corallicola* (Cuv. & Val.) | — | — | X | — | — |
| *E. fasciatus* (Forskål) | X | X | X | — | — |
| *E. flavocaeruleus* (Lac.) | — | — | X | — | — |
| *E fuscoguttatus* (Forskål) | — | — | X | — | — |
| *E. grammicus* Day | X | — | X | — | — |
| *E. megachir* (Rich.) | — | X | X | X | X |
| *E. merra* Bl. | — | X | — | X | — |
| *E. moara* (Temm. & Schl.) | — | — | X | X | — |
| *E. morrhua* (Cuv. & Val.) | — | X | X | — | — |
| *E. nebulosus* (Cuv. & Val.) | X | X | — | — | — |
| *E. sexfasciatus* (Cuv. & Val.) | X | X | X | — | X |
| *E. summana* (Forskål) | X | X | X | X | — |
| *E. tauvina* (Forskål) | X | X | X | — | X |
| *E. undulosus* (Q. & G.) | — | — | X | X | — |
| *E. urodelus* (Cuv. & Val.) | X | — | — | — | — |
| *Plectropoma maculatum* (Bl.) | X | X | X | X | X |
| *Promicrops lanceolatus* (Bl.) | X | — | X | X | X |
| *Variola louti* (Forskål) | — | X | X | — | — |
| (4) Subfamily Anthiinae | | | | | |
| ***Anthias squamipinnis* (Peters) | — | — | — | X | — |

**Remarks:**

** = New record species found by the author.

KUMF = Kasetsart University Museum of Fisheries.

PMBC = Phuket Marine Biological Center.

DF = Department of Fisheries.

Coll. 1977-78 = The author's collection in 1977-78.

Coll. 1981-82 = The author's collection in 1981-82.

**Table 2 Species of Serranids from Indian Ocean (Japan Marine Fishery Resource Research center)***

1. *Aethaloperca rogaa* (Forskål)
2. *Variola louti* (Forskål)
3. *Cephalopholis sonnerati* (Val.)
4. *C. miniatus* (Forskål)
5. *Plectropomus maculatus* (Bloch)
6. *P. truncatus* Fowler
7. *P. malanoleucus* (Lac.)
8. *Anyperodon leucogrammicus* (Val.)
9. *Epinephelus flavocaeruleus* (Lac.)
10. *E. caeruleopunctatus* (Bl.)
11. *E. cometae* Tanaka
12. *E. morrhua* (Val.)
13. *E. poecilonotus* (Temm. & Schl.)
14. *E. bleekeri* (Vaillant & Bocourt)
15. *E. chlorostigma* (Val.)
16. *E. areolatus* (Forskål)
17. *E. gaimardi* (Val.)
18. *E. salonotus* Smith & Smith
19. *E. merra* Bloch
20. *E. fuscus* Fourmanoir
21. *E. fasciatus* (Forskål)
22. *E. truncatus* Katayama
23. *E. amblycephalus* (Blkr.)
24. *E. compressus* Postel Fourm. et Gueze
25. *E. leprosus* Smith
26. *E. fuscoguttatus* (Forskål)
27. *E. tauvina* (Forskål)
28. *E. chewa* Morgans
29. *E. malabaricus* (Schn.)

*Kyushin, Kenichiro and other, 1977. Fishes of Indian Ocean. Japan Marine Fishery Resource Research center, Tokyo.

**Table 3 Subfamilies and genera from Indo - Australian Archipelago and from collections of the Andaman Sea**

| Subfamilies and Generic names | 1) Fish of the Indo-Austral. Arch. | 2) Andaman Sea (Phuket Is.) |
|---|---|---|
| 1. Subfamily Grammistinae | X | X |
| *Grammistes* | X | X |
| *Pogonoperca* | X | X |
| 2. Subfamily Diploprioninae | X | X |
| *Diploprion* | X | X |
| 3. Subfamily Epinephelinae | X | X |
| *Variola* | X | X |
| *Epinephelus* | X | X |
| *Cephalopholis** | — | X |
| *Promicrops** | — | X |
| *Anyperodon* | X | X |
| *Cromileptes* | X | X |
| *Plectropoma* | X | X |
| 4. Subfamily Centrogenysinae | X | — |
| *Centrogenys* | X | — |
| 5. Subfamily Serraninae | X | — |
| *Chelidoperca* | X | — |
| 6. Subfamily Anthiinae | X | X |
| *Holanthias* | X | — |
| *Odontanthias* | X | — |
| *Anthias* | X | X |
| *Plectranthias* | X | — |
| *Dactylanthias* | X | — |
| *Pteranthias* | X | — |
| *Xenanthias* | X | — |
| *Sphenanthias* | X | — |
| 7. Subfamily Pseudochromidinae | X | — |
| *Pseudogramma* | X | — |
| *Dampieria* | X | — |
| *Pseudochromis* | X | — |
| *Nematochromis* | X | — |

**Remark :*** Dr. Weber and de Beaufort put in the genus *Epinephelus*

1) Weber and de Beaufort, 1931.

2) The present study by the author.