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A Study on the Osteological Characters of Six Sparid Fishes Referred to the Genera *Chrysophrys* and *Pagrus*

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It was pointed out by Whitley (1931) that *Chrysophrys major* Temminck and Schlegel from Japan, *C. auratus* (Bloch and Schneider) from New Zealand, *C. unicolor* Quoy and Gaimard from West Australia and *C. guttulatus* Cuvier and Valenciennes from East Australia, may be treated as belonging to the single genus *Chrysophrys*, distinct from other sparid genera found in the Indian and Pacific Oceans, mainly because of differences in the shape of teeth and body color. Recently Akazaki (1962) made the comparison of morphological characters of the three species, *Pagrus pagrus* (Linné) from Europe, *P. auratus* (Bloch and Schneider) from Australia and *P. major* (Temminck and Schlegel) from Japan. He concluded that these three species should fall into the single genus, and better be referred to the senior generic name *Pagrus* Cuvier, 1817 (Type, *Sparus argenteus* Bloch and Schneider) than to junior *Chrysophrys* Quoy and Gaimard, 1824 (Type, *C. unicolor* Quoy and Gaimard).

The present authors studied the skulls and the vertebrae of three species in the genus *Chrysophrys* from Japan and the Australian waters and three species of the genus *Pagrus* from America and Africa, and found some marked differences between the two genera as shown in Table 1 and figure 1.

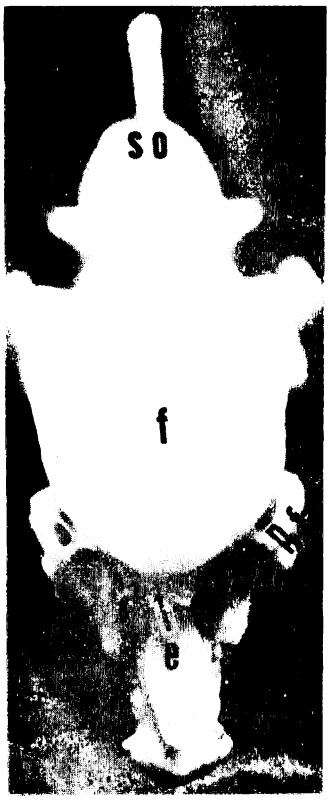
It was witnessed that, in the adult of the three species of *Chrysophrys*, the frontals are fused to form a gibbous smooth surface with several small holes in pairs, that a part of the supraoccipital is swelled markedly (Fig. 1–1), that the prefrontals are separated from the frontals, and that the upper part of the ethmoid is small. Also it was noticed that the middle part of some haemal spines are globular in some individuals.

In the adult of the three species of *Pagrus*, the frontals are fused but not forming gibbous smooth surface (Fig. 1–2), and there are a few pairs of small holes on rough surface which bears longitudinal grooves. A small spine grows over the small hole in pair on the frontal of *P. pagrus* and *P. africanus* but not of *P. laniarius* (Fig. 1–3). The supraoccipital and haemal spines show no elaborations as observed in the genus *Chrysophrys*.

Morphology of the skulls of some sparid fishes has been investigated by Tomiyama (1934), Hotta (1961), Akazaki (1962) and others, but no comparative study in details of the skull in the species referred to the two genera *Chrysophrys* and *Pagrus* has hitherto been made. Our present study made clear that marked differences are present to distinguish these two genera, although some characters are in common among the species in both genus. Also it was noted that a black distal margin on the caudal fin appears only in the three species of the genus *Chrysophrys*. These findings led the authors to presume that these two genera could be treated as distinct.

It may be added that there are some similarities among *P. africanus* and the three species of *Chrysophrys*, for instance in some characters of the skull (Table 1), and this fact may indicate the close phyletic relationship between the two genera. The present authors fully realize the necessity of further considerations on the systematic treatment of the family Sparidae as a whole including the clarification of the status of the two genera.

The authors wish to express their sincere gratitude to Professor Yoshio Hiyama of the



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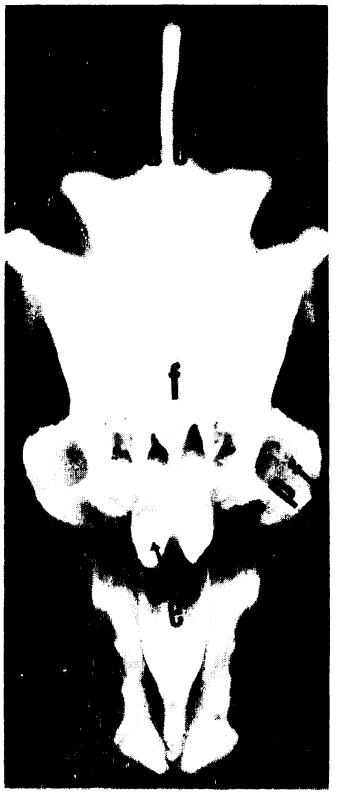

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Figure 1. Skulls of two sparid fish: 1. Dorsal view of *Chrysophrys major* Temminck and Schlegel, male, 289 mm in body length (Japan); 2 and 3. Dorsal and lateral views of *Pagrus pagrus* (Linné), male, 318 mm in body length (Western North America). e–ethmoid, f–frontal, pf–prefrontal, so–supraoccipital, s–small spine over the small hole on frontals.

Table 1. Comparison of osteological characters among the six species referred to the genus *Chrysophrys* and *Pagrus*.

Species	Range of body length (mm)	No. of samples examined	Locality	Supra-occipital	Frontals	Pre-frontal	Ethmoid	Haemal spines
Chrysophrys major	160—508	56	Shimoda, Japan and East China Sea	Base swelled	In the young (B.L. 200 mm.), they are fused. A few pairs small holes and longitudinal grooves present. Section of anterior part concave. In the adult, also fused, a few pairs of small holes on smooth surface. Anterior part gibbous.	Not fused with frontal	Upper part small	Middle part of some spines globose*
Chrysophrys unicolor	149—337	27	Western Australia	Thickened toward dossal edge	In the young (B.L. 170 mm.), they are fused. A few pairs of small holes and longitudinal grooves present. Section of anterior part concave. In the adult, also fused with a few pairs of small holes on smooth surface. Anterior part gibbous.	Not fused with frontal	Upper part small	Middle part of 6th to 8th spines globose on specimens over 160 mm. in B.L.
Chrysophrys auratus	204—452	30	Northwest New Zealand	Ditto	In the young (B.L. 200-250 mm.), they are fused or not. A few pairs of small holes and longitudinal grooves present. Section of anterior part concave. In the adult, also fused with a few pairs of small holes on smooth surface. Anterior part gibbous.	Not fused with frontal	Upper part small	Middle part of 6th to 8th spines globose
Pagrus pagrus	285—322	10	Western North America	Not swelled nor thickened	In general, they are fused with a few pairs of small holes and longitudinal grooves on rough surface. Small paired spines situated crossing above small holes on frontals. Anterior part not gibbous.	Fused with frontal	Upper part large	Normal
Pagrus africanus	208—250	10	Northwest Africa	Ditto	In general, they are fused with a few pairs of small holes and longitudinal grooves on rather smooth surface. Small paired spines situated crossing above small holes on frontals. Anterior part not gibbous.	Not fused with frontal	Upper part flat	Normal
Pagrus laniarius	217—237	4	Southern Africa	Ditto	In general, they are fused with a few pairs of large holes and longitudinal grooves on rough surface. Anterior part not gibbous.	Fused with frontal	Upper part flat	Normal

* Prof. Takashi Hibiya of The University of Tokyo supplied the information on haemal spines of *C. major*.

University of Tokyo, under whose guidance this work was carried out.

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マダイ類2属，*Chrysophrys* と *Pagrus* に属する6種の骨格の研究． 安田富士郎・水口憲哉．近年，*Chrysophrys* は *Pagrus* に統一する提唱がなされているが，この2属に属する各3種について，骨格とくに頭骨と脊椎骨について比較検討を行なったところ，2属の間に著しい差が存在することが発見されたので，現段階では，*Chrysophrys* 属を *Pagrus* 属とは独立の属としてとり扱うのが妥当だと考える．

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図 書 紹 介

FISH MIGRATION. F. R. Harden Jones. 1968. Edwards Arnold (Publishers) Ltd. London. i-viii, 1-325. 86 figs. 38 tabs. £ 6. Harden Jones 氏は 1953 年に N. B. Marshall 氏と共に，Biological Reviews に「硬骨魚類の鰾の構造と機能」という優れた綜説を書いた．その中に鰾と垂直移動に関する氏の論文が引用されているから，この綜説は氏の研究の総まとめであったのであろう．今回の Fish migration の序文の冒頭には，1953 年に行なわれたケンブリッジ大学の博物学会の会合で魚の回游に興味を持って研究を始めたと記されているから，鰾の綜説を書き上げると同時にこの方面へ転向されたのであろう．本書には 904 篇の引用文献が付されているから研究者には甚だ好都合であるが，その中で 1956 年次後の氏の論文が 12 篇引用されているから，本