First, field-based record of the lobed river mullet, Cestraeus plicatilis (Pisces: Mugilidae) from Papua New Guinea

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Characters: 7,700 – Figs: 3 – Tab: 1

Abstract

The euryhaline species *Cestraeus plicatilis* Valenciennes 1836 (Mugilidae; Mugiliformes) was previously recorded from the Philippines Islands to New Caledonia, except Solomon Islands, Bismark Archipelago, New Guinea and Admiralty Islands. The present occurrence extends the distribution area of this species to New Britain, Papua New Guinea.

French title

Premier signalement du mulet de rivière lobe en Papouasie Nouvelle Guinée

French abstract

L'espèce euryhaline *Cestraeus plicatilis* Valenciennes 1836 (Mugilidae ; Mugiliformes) a été répertoriée précédemment des îles Philippines à la Nouvelle-Calédonie, excepté aux iles Salomon, archipel de Bismark, Nouvelle-Guinée et îles de l'Amirauté. Le présent signalement permet d'élargir l'aire de répartition de cette espèce à la Nouvelle-Bretagne occidentale, Papouasie Nouvelle Guinée.

Mullets (Mugilidae) are a group of euryhaline fishes that are characterized by having a sub-cylindrical body, large eyes often surrounded by an adipose tissue, an unusually large, single scale present at each side of the first dorsal, pectoral, and pelvic fins, and two widely spaced dorsal fins of which the first has four spinous rays (Crosetti and Blaber, 2015). The family contains 79 species in 25 valid genera (Fricke *et al*., 2020), all of which primarily inhabit marine and estuaries of tropical and temperate seas while some members of the family spend most of their adult life in freshwaters and may return to the sea at some stages of their lives (De Silva, 1980). Members of the genus *Cestraeus* are one such group that inhabit freshwaters.

Cestraeus is the only genus that has lips with lamellae and fleshy lobes to the mandible – all other mullets do not have this characteristic (Thomson, 1997). Three species are currently known in this genus, two of which have been recorded in Papua New Guinea (PNG), but not *Cestraeus plicatilis* (Hyslop, 1996; Allen, 1991). The lobed river mullet was only recorded in the Philippines, Sulawesi (Indonesia), New Caledonia, Vanuatu, and Fiji and no data for this species remains elsewhere (Hoese, 2012). This paper presents the first record of *C. plicatilis* in PNG.

METHODS AND MATERIALS

By using underwater visual survey, we recorded *C. plicatilis* at six sampling sites along the Kumkom River at the foothills of the Whiteman Range, New Britain, PNG (Fig. 1, see details of riparian vegetation in Tab. I). Mullets show similar external anatomy and it is difficult to determine species in the field. We used mouth parts and pectoral fin lengths to determine species following Thomson (1997) and Harrison and Senou (2002). The holotype (MNHN IC-A2894, Muséum national d'Histoire naturelle, France) exists but is on poor condition (Fig. 2). No specimen was preserved from this work.

RESULTS AND DISCUSSIONS

Cestraeus plicatilis Valenciennes 1836 is distinguished from *Cestraeus oxyrhyncus* Valenciennes 1836 by having medial lobes on the lower jaw reaching corner of the mouth (Fig. 2). *Cestraeus plicatilis* is further distinguished from *Cestraeus goldiei* (Macleay 1883) by having a relatively shorter pectoral fin not reaching the vertical scale line originating at the base of the first dorsal fin (Fig. 3). Other features defining *C. plicatilis* rather than *C. goldiei* are: interorbital area only moderately convex (not strongly), dentary symphysis rounded (rather than more pointed) (Fig. 2), and vomer usually lacking distinct tooth patches (Harrison and Senou, 2002).

Our record for *C. plicatilis* in New Britain is not a surprise. *Cestraeus plicatilis* was previously recorded in the Philippines, Sulawesi (Indonesia), New Caledonia, Vanuatu, and Fiji and data was missing only from New Guinea, the Admiralty Islands, and the Bismarck

and Solomon Archipelagos (e.g. Boseto *et al*., 2007). No specimen of *Cestraeus plicatilis* has ever been recorded from New Guinea and the disjunctive distribution of *C. plicatilis* may be due to confusion with *C. oxyrhynchus* (Hoese, 2012, Ghasemzadeh, 2015). Our study probably reflects lack of field work in the freshwater systems of New Britain. Nonetheless, what interested us was the record of adult size *C. plicatilis* ($\bar{x}$ 30 cm fork length, n = 7) far inland and at very shallow rivers of depth <1 m (Tab. I). We believe our find indirectly points to the lack of disturbance and fishing pressure in the river systems at the foothills of the Whiteman Range, New Britain. Our study further increased knowledge about regional distribution of the Data Deficient *C. plicatilis* (Hoese, 2012).

Acknowledgements. – We thank our field assistants and gifted fishers, Joe Penny and Brendan Kilme of Bereme Village, Fr. Patrick Pose, and the local landowners of the Whiteman Range, West New Britain Province, who allowed us to sample fish in their pristine rivers. We also thank Ahulo Otio for hosting us in Kimbe. Ian J. Harrison carefully read the manuscript and made valuable comments which let to many improvements, and together with Kent Carpenter, liaised with FAO for use of images in Figures 2 and 3. Jason Paliau provided Figure 1. The New Guinea Binatang Research Centre provided logistical support during fieldwork and hosted PKA in Madang during write-up of this paper. This study was funded by the UNDP-CEPA partnership grant CbFCCRM-2014 (awarded to PST).

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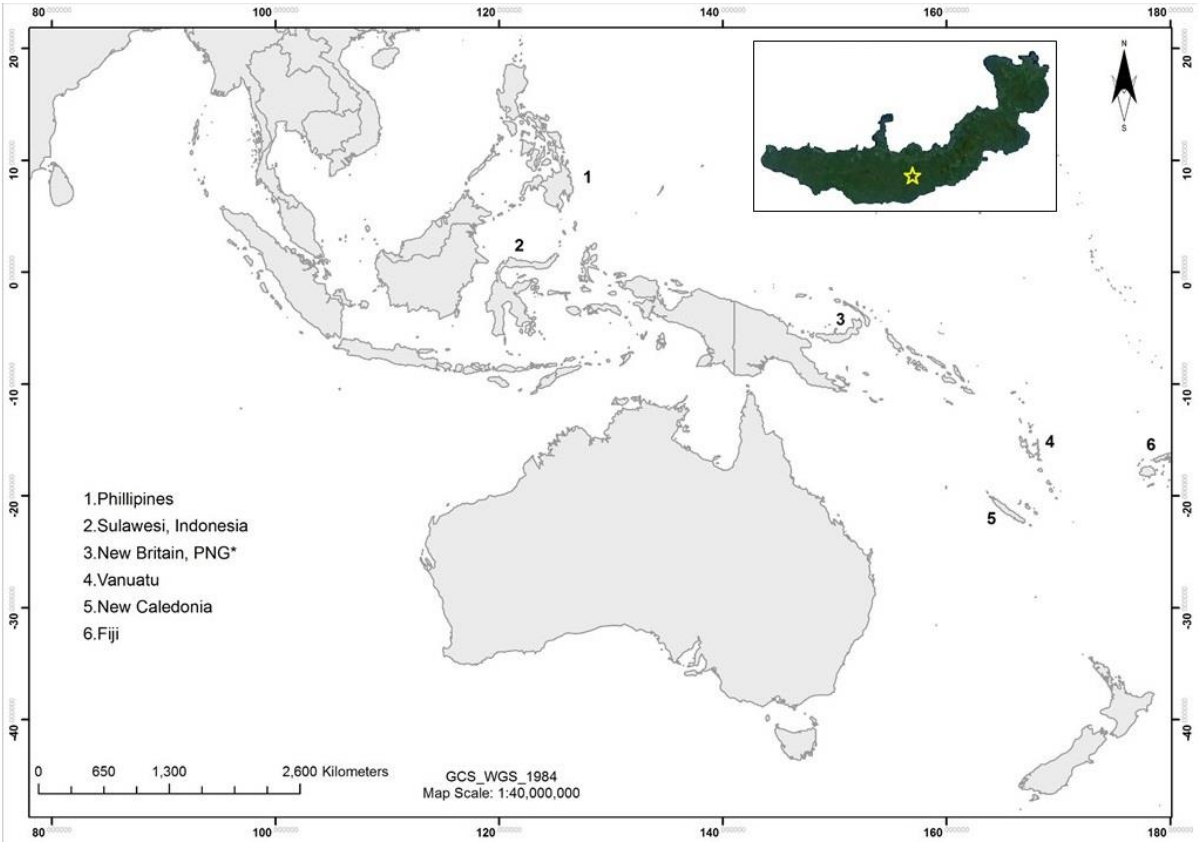
Figure and Table legends

Figure 1. – *Cestraeus plicatilis* is known in the Philippines, Indonesia (Sulawesi), Fiji, New Caledonia, and Vanuatu, and now in New Britain, Papua New Guinea (3*). Insert: satellite map of New Britain showing survey area where *C. plicatilis* was recorded (yellow star).

Figure 2. – Ventral view of the head sections of all three *Cestraeus* species: **A**&**D**: *C. oxyrhynchus*; **B**: *C. goldiei*; **C**, **E**&**F**: *C. plicatilis*. Images **A**-**C** are adapted from Harrison and Senou (2002), with permission from I. Harrison and FAO; image **D** and **E**, provided by I. Harrison, is of the holotypes stored at Muséum national d'Histoire naturelle, France (ID #: MNHN A4313 and A2894); image **F** is taken from a live specimen of *C. plicatilis* collected in this study and inserted for comparison.

Figure 3. – *Cestraeus goldiei* (**A**) has relatively longer pectoral fins than the similar looking *C. plicatilis* (**B**,**C**). The dashed lines are inserted for comparison of pectoral fin lengths. Images **A** and **B** are adapted from Harrison and Senou (2002), and used with permission from FAO.

Table I. – Coordinates of sampling spots. Although we sampled 14 other rivers (details not provided in this table) in the interiors of the Whiteman Range, New Britain, *Cestraeus plicatilis* was only recorded in the Kumkom River and its branch, Ngutngutnga.



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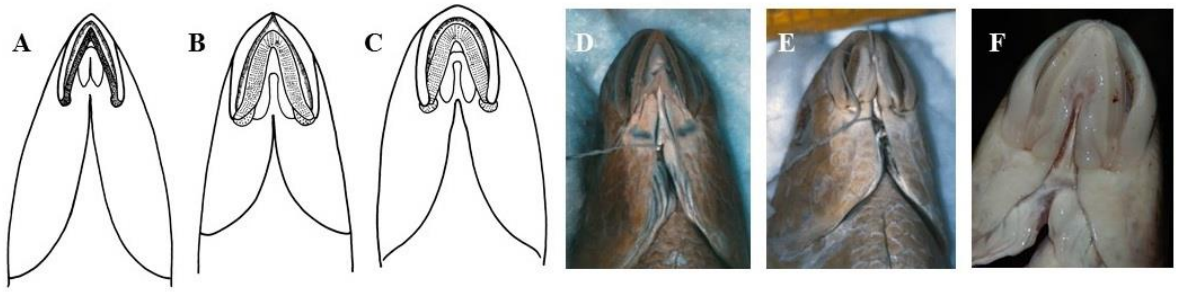

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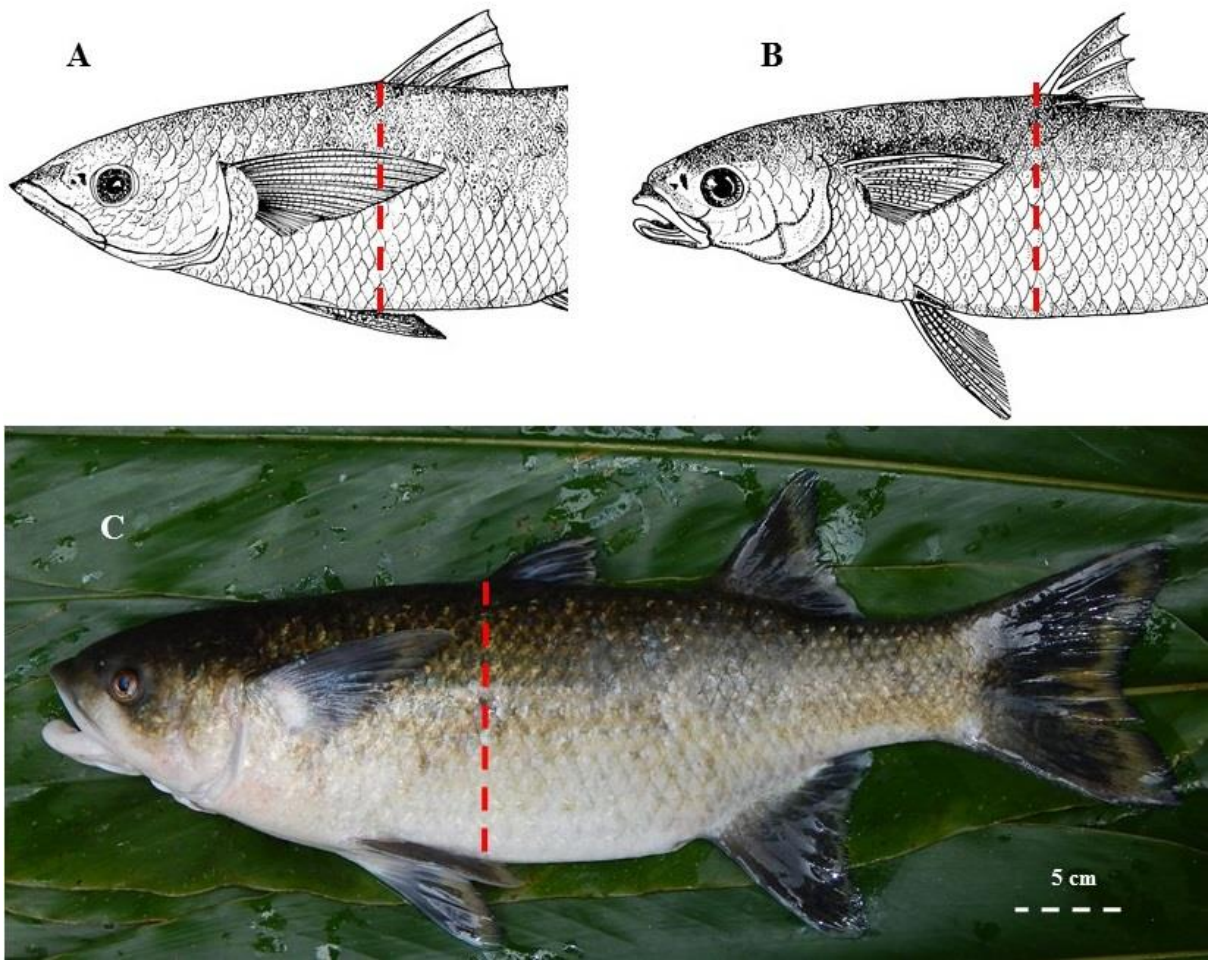

Figure 3. – *Cestraeus goldiei* (**A**) has relatively longer pectoral fins than the similar looking *C. plicatilis* (**B**,**C**); fork length (FL) of image ***C*** is 29.5 cm. The dashed lines are inserted for comparison of pectoral fin lengths. Images **A** and **B** are adapted from Harrison and Senou (2002), and used with permission from FAO.

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Date	**River***	**Coordinates**
13-Nov-15	Ngutngutnga	05^{0}57'57.0"S, 150^{0}32'17.4"E, Alt. 573 m
13-Nov-15	Ngutngutnga	05^{0}58'06.9"S, 150^{0}32'14.3"E, Alt. 608 m
13-Nov-15	Kumkom	05^{0}58'11.8"S, 150^{0}32'26.2"E, Alt. 619 m
15-Nov-15	Kumkom	05^{0}57'30.2"S, 150^{0}32'24.6"E, Alt. 508 m
15-Nov-15	Kumkom	05^{0}57'32.1"S, 150^{0}32'23.3"E, Alt. 514 m
17-Nov-15	Kumkom	05^{0}56'43.8"S, 150^{0}32'42.0"E, Alt. 469 m
* **Riparian vegetation.** Silty and sandy banks, stream size (5 – 8 m wide in pools, <1m in ripples), pool depth of <1 m, moderately fast flowing stream, deposits of muddy/silt with dead leaves in pools but very clear, large boulders at sections of creek, and cliff faces at some sections of the creek surveyed.		