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FISHES**Jongkar Grinang¹ and Kelvin K.P. Lim²**

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ABSTRACT

A survey on fish diversity was carried out at 19 streams in the Bau Limestone Area. Thirty-five species representing 25 genera and 15 families were recorded. This seems to be the first record of fish fauna from the Bau Limestone Area. Twenty-six species recorded for the first time on this survey bring the total number of fish species known from Sarawak limestone habitats to 74. Of the 35 species identified from this collection, six are endemic to Borneo, and two are introduced species. Fishes of the family Cyprinidae seem to be the most abundant with 66% of the total individuals collected followed by the Hemiramphidae (11%), Balitoridae (5%) and Channidae (4%).

Keywords: fish, Bau limestone, diversity

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INTRODUCTION

There has been ichthyological exploration and research in Sarawak since the mid-19th century (Lim and Kottelat, 1995). Although there was no extensive study of the State's freshwater fish fauna, several small collections have been made, and the specimens referred to in the works of Herre (1940a, 1940b), Brittan (1951, 1954), Cramphorn (1978, 1982), Watson and Balon (1984), Chapman (1985), Lelek (1987), Lim and Kottelat (1995) and Wong (1997). The most recent fish diversity studies were conducted in the Lanjak-Entimau Wildlife Sanctuary (Leh, 2000) and the Rayu Basin of the Kubah National Park (Doi *et al.*, 2001).

Of the 449 species of freshwater fishes recorded from within the political boundaries of Malaysia, about 254 are known from Sarawak (Kottelat and Lim, 1995; MOSTE, 1997; Doi *et al.*, 2001) including two species presently described by Tan and Ng (2004). This figure appears to be low in relation to the large expanse of freshwater habitats in the State. Compared to Peninsular Malaysia and Sabah, the freshwater fish fauna of Sarawak seems to be less well-studied (see Moshin and Ambak, 1983; Inger and Chin, 1990).

Apart from Gunung Mulu National Park (Cramphorn, 1978; Chapman, 1985), there appears to be no records of fishes inhabiting other limestone habitats in Sarawak. Aquatic habitats in limestone areas are characterised by hard and alkaline water (pH above 7), influenced largely by the substrates of calcium carbonate at the source of the drainages. The Bau area has the largest limestone areas in the State, but its fish fauna was previously not inventoried. This paper reports on the fish diversity recorded from there.

MATERIALS AND METHODS

The Bau Limestone Area is one of six limestone biodistricts that have been recognised in Sarawak (SBC, 2000), and lies within the latitude of 1° 21'N to 1° 24'N and longitude of 110° 2'E to 110° 11'E. It is situated about 40 km to the southeast of Kuching city, and consists of many limestone hills (locally referred to as *Gunung*) which are the sources of various streams.

Most of the limestone hills visited during the survey are situated close to each other, except for Gunung Poing, Gunung Aup, Gunung Stulang and Gunung Podam that are isolated to the southwest of the small town of Bau. Nineteen streams including cave passages and ex-minings were surveyed. The pH values and other conditions of the water in the various survey sites were not measured. Two categories of stream are recognised based on physical habitat characteristics.

1. Streams that are narrow (1-2 m wide) and shallow (less than 0.5 m) with slow water current. The substrates consist of sand and mud. Concentrations of leaf-litter are important microhabitats in these streams which tend to be under shade and have clear, cool water. They originate from the base of Gunung Meraja, Gunung Kawa, Gunung Aup, Gunung Poing, Gunung Apin, Gunung Tai Ton, Gunung Krian and Gunung Umbut.

2. Streams that are wider (2-4 m) and deeper (0.5-1 m). The substrates consist of sand, gravel, pebble and rock. Water current is very strong and riffle zones are present. Such streams originate from Gunung Podam, Gunung Stulang, Gunung Batu Payong, Gunung Pambor, Gunung Tongga, Gunung Ropih, Gunung Batu, Gunung Doya, Gunung Jebong, Gunung Tabai and Gunung Lanyang.

From September 2001 to December 2002, random samplings of fish were made at nineteen streams around the limestone outcrops with scoop-nets, kick-nets and cast-nets. Collections were also made in cave passages and ex-minings. Fish specimens obtained were immediately preserved in 10% formaldehyde. Identification of the specimens was conducted in the laboratory at the Sarawak Biodiversity Centre with reference to Kottelat *et al.* (1993), Ng and Ng (1998) and Roberts (1989). After a week, the