

Histological overview of Asian Redtail Catfish (*Hemibagrus nemurus*) gonads in the Progo River, Magelang District, Indonesia

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ABSTRACT

The aim of this research was to provide the latest database or information in the form of reproductive conditions in determining the potential resources of Asian redtail catfish *Hemibagrus nemurus* so that it can help in domestication efforts that lead to the cultivation of native aquatic commodities in Magelang. The research method used was descriptive method by analyzing the distribution of oocytes in the histological cross-sectional area of the gonads of *H. nemurus*. Based on the research results, it showed that *H. nemurus* can spawn several times throughout the year so that it has potential in efforts to manage, develop and reserve endemic fish in Magelang.

Key words: Freshwater fish, Reproduction, Native fish

Introduction

The status of Indonesian freshwater fish resources has been reported by Hubert *et al.*, (2015) who noted that there are 1218 species consisting of 84 families including 1172 are native species from 79 families and 630 fish species are endemic. Specifically in Java and small island in around it, several studies have documented the new record of non-native, native and endemic freshwater fishes (Hasan *et al.*, 2019a; Hasan *et al.*, 2020; Saptadjaya *et al.*, 2020; Serdiati *et al.*, 2020; Ihwan *et al.*, 2020). *H. nemurus* fish belong to the phylum Chordata, Pisces class, Teleostei sub-class, order Siluriformes, sub-order Siluridae, family Bagridae, genus *Mystus* and species *Hemibagrus nemurus* C.V. The Bagridae family is commonly found throughout freshwater, in Asia

and Africa. In taxonomy, *H. nemurus* fish underwent several name changes, from the results of research by Kottelat and Ng (1993) that the Bagridae family living in Asia had a revised taxonomy (underwent a name change), initially *Macrones* then changed to *Mystus* and after that became *Hemibagrus*. including: *H. baramenesis*, *H. guttatus*, *H. menoda*, *H. nemurus*, *H. olyroides*, *H. planiceps*, *H. pluriradiatus*, *H. wyckii*.

Several studies that had been carried out at several location points in Indonesia were still limited to general biological aspects of *H. nemurus* fish from different physical conditions according to each area, such as research on morphological characteristics using the Based Truss Morphometrics method (Aryani *et al.*, 2013), swimming movement performance on flume tanks (Nofrizal *et al.*, 2015), food

habits (Windy *et al.*, 2013) to domestication with various treatments (Kusmini *et al.*, 2018). Research that has been conducted by previous researchers has not shown information on specific reproductive aspects regarding the distribution of oocytes in the histological section of the gonads of *H. nemurus* fish (*H. nemurus*) caught in the Progo Magelang river, so the urgency of this study was to analyze the distribution of oocytes of *H. nemurus* fish (*H. nemurus*) on The cross-sectional area of histology, which was examined in the research "Histological Overview of Asian Redtail Catfish (*H. nemurus*) Gonads in the Progo River, Magelang District, Indonesia".

Materials and Methods

The research was conducted in 3 places, sampling in the Progo river, identified *H. nemurus* fish (*H. nemurus*) at the Agricultural Laboratory of Tidar University and sample tested at the IRTL UGM (Integrated Research and Testing Laboratory, Universitas Gadjah Mada). The research time was carried out from February to August 2020.

Data Analysis

Survey the research location

The location survey aimed to determine the location of the study based on the boundaries of the area and the physical conditions of the waters that represent each sampling station. This observation was to determine the distribution and relationship with habitat characteristics (Eduardo *et al.*, 2018).

Fish identification

The fish caught were placed in the coolbox then recorded and the number of individuals counted. The fish was stored in 96% alcohol or 10% formalin to be used as specimens (Hasan *et al.*, 2019b; Hasan and Tamam, 2019).

Gonad histological preparations

Histology was the science that was used to observe the organ tissue of an organism in detail (Pratiwi and Manan, 2015).

Results

The gonad development of *H. nemurus* from several test samples experienced different phases for each individual gonad. Starting from the conditions

where the development of gonad cells was slightly visible and the dominant empty space was in the area of the histological cross section (Figure 1), then in other individuals the cell development had not been seen and only a channel was visible with the symptom column epithelium (Figure 2). Furthermore, there were individuals whose gonads experience a level of maturity which was marked by the development of egg cells that were clearly visible with varying sizes, there were primary oocytes (OP) and secondary oocytes (OS) that fill the cross-sectional area of the histological preparations. However, there were also individuals who had ovulated which were characterized by no visible development of gonad cells and only visible cell space (Figure 5). Oocyte diameter can be used as a parameter to determine the quality of the oocyte. The increase in egg diameter was in line with the increase in the TKG value. Effendie (2002) explains that egg quality can be seen from its size. This was directly related to the increasing size of the yolk which serves as a food reserve for the larvae.

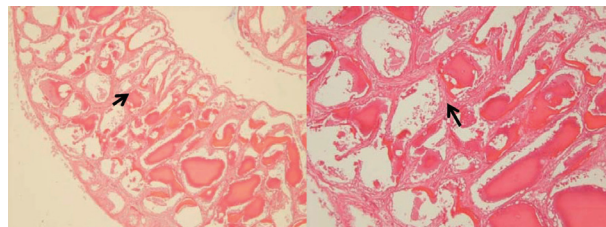


Fig. 1. Histological overview of *H. nemurus* Fish (*H. nemurus*) gonads. Code 1. 10x zoom (left) and 20x zoom (right).

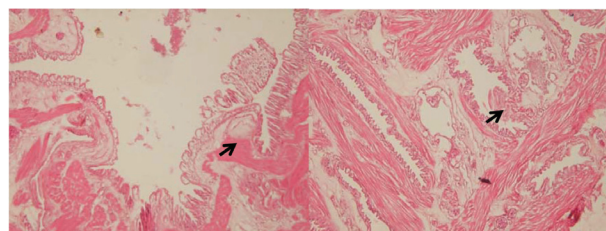


Fig. 2. Histological overview of *H. nemurus* Fish (*H. nemurus*) gonads. Code 2 and 3. 20x zoom

The histological observation of the *H. nemurus* (*H. nemurus*) gonads above showed that there were various stages in one ovary slice (Figure 3). This means that the *H. nemurus* fish was a fish that can spawn all year round. Yustina (2002) stated that the heterogeneity of egg diameter distribution patterns can be an indication that the spawning fish were not

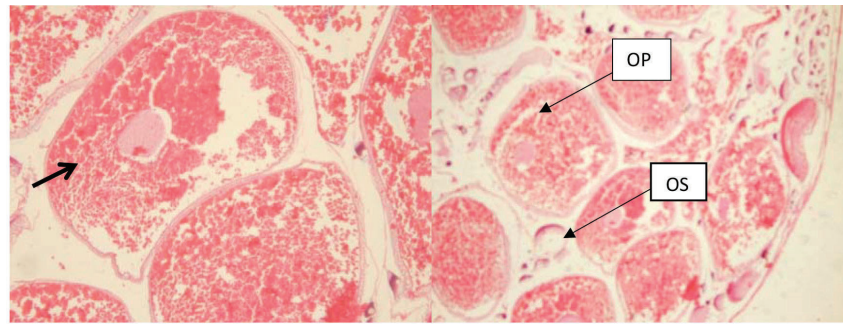


Fig. 3. Histological overview of *H. nemurus* Fish (*H. nemurus*) gonads. Code 4. 20x zoom (left) and 4x zoom (right)

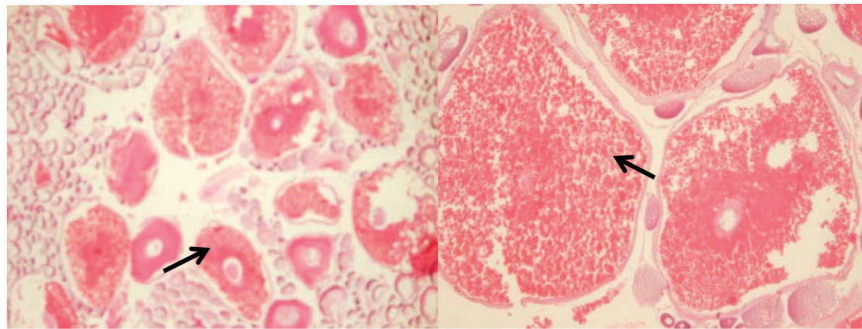


Fig. 4. Histological overview of *H. nemurus* Fish (*H. nemurus*) gonads. Code 5. 4x zoom (left) and 20x zoom (right)

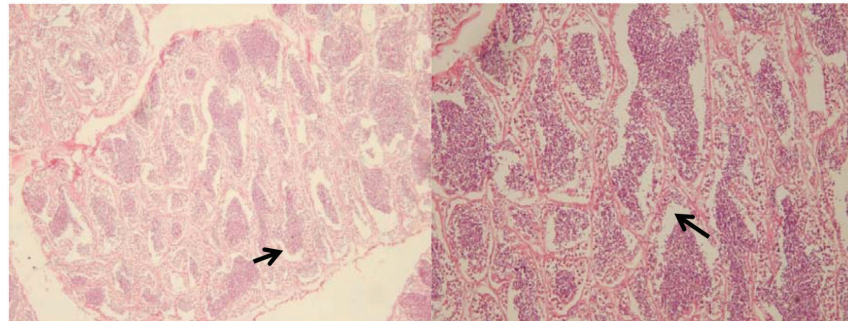


Fig. 5. Histological overview of *H. nemurus* Fish (*H. nemurus*) gonads. Code 6. 10x zoom (left) and 20x zoom (right)

spawning all at once (partial spawning). This indicated that the process of egg maturity in the ovaries of *H. nemurus* fish was not the same or takes place simultaneously.

The results of further observations found that secondary oocyte dominance (OS) was higher than primary oocyte (OP) in one histological cross-sectional area, then the *H. nemurus* fish was in gonad mature condition, but on the other hand, if the primary oocyte dominance was higher it indicated that

the *H. nemurus* fish had not yet matured gonads. Microscopically, female gonadal tissue can be clearly observed follicles (ovum), primary oocytes, secondary oocytes and mature oocytes ready for ovulation. According to Mujtahidah (2016), the parts of the oocytes can be clearly distinguished, including primary oocytes, secondary oocytes, YVD (Yolk Vesicle Deposition), YGD (Yolk Granule Deposition) and the radiata zone that compose the follicle.

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