

Note

Evaluation of urohyal bone for age determination in *Monopterus albus* (Zuiew, 1793)

A. Y. SOW, S. Z. ZULKIFLI AND A. ISMAIL

Department of Biology, Faculty of Science, Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia
e-mail: syaizwan@upm.edu.my

ABSTRACT

Present study aimed to determine the age of Asian paddy eel *Monopterus albus* using the urohyal bone. Majority of fish ages ranged between three and four years and were immature. Strong relationship between total length and body weight ($R^2=0.937$) was observed in *M. albus*. Further studies would justify the suitability of urohyal bone for determining the age of *M. albus*.

Keywords: Age, Body weight, Eel, *Monopterus albus*, Total length, Urohyal bone

The Asian paddy eel, *Monopterus albus* (Zuiew, 1793) belongs to the family Synbranchidae (Yang and Xiong, 2010). It is a favourite freshwater fish in many Asian countries (Sow *et al.*, 2012, 2013, 2014). This eel species is a protogynous hermaphrodite (Zhang *et al.*, 2008). While female *M. albus* can grow up to a total length of 30 cm, male can grow more than 40 cm (Redaksi Agromedia, 2000). Owing to the high economic value, information on age and growth of the species are crucial for aquaculturists and fishery managers. Many bony parts of fish such as otoliths, vertebrae, pectoral spines, scales, and urohyal bone have been used for age determination. There have been several attempts to use basihyal, epihyal and vertebral bones *M. albus* to age (Zhi-Qin *et al.*, 2008). Present study aimed to use the urohyal bone in determining the age of *M. albus* collected from paddy fields.

M. albus were sampled from paddy fields located at Tumpat, Kelantan (N 06°08.454' E 102°8.430') in Peninsular Malaysia (Fig. 1) using traps containing boiled fish baits. The traps were placed overnight at predetermined points in the paddy fields and were collected next morning. The collected fishes were transported to the laboratory for further analyses. Total length (TL) and body weight (BW) of the fishes sampled were recorded. Age determination using urohyal bone was done following Yang (1997) with minor modifications. The urohyal bone was retrieved from the head of *M. albus* after removal of surrounding tissue and rinsed with distilled water prior to soaking in 10% H₂O₂ to remove any adhering tissue. Once cleaned, the bone was rinsed with distilled water and dried at room temperature

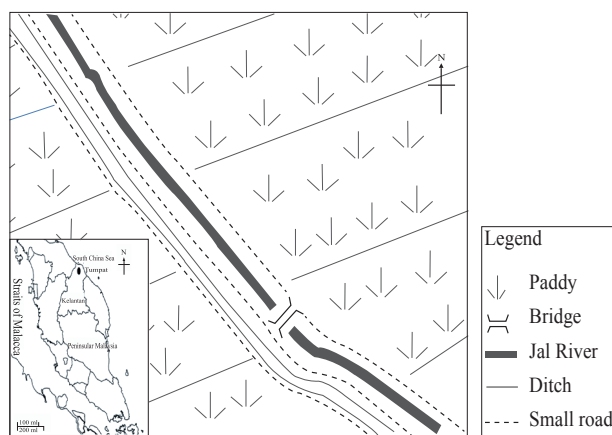


Fig. 1. Sampling site located at Kelantan in Peninsular Malaysia

before observing under a dissection microscope for age determination. All statistical analyses were carried out in SPSS 19.0 statistical software (IBM Corp., New York).

A total of 35 individuals of *M. albus* were collected. The mean total length (TL) and body weight (BW) were 44.83 ± 6.24 cm and 94.63 ± 37.03 g respectively. Since majority of the fishes were devoid of fully developed gonads, sex-wise analysis could not be performed. The age estimation process was conducted by counting the number of annuli observed on the urohyal bones (Fig. 2). Table 1 shows the estimated age of collected *M. albus* revealed by urohyal bone analyses. The oldest *M. albus* collected was 9 years old. Majority of *M. albus* samples (~63%) were 3 to 4 years old. Similar pattern was observed by Yang and Xiong (2010) who suggested that at this age, *M. albus* grows faster. The growth rate of *M. albus* increases at optimal biotic and abiotic factors

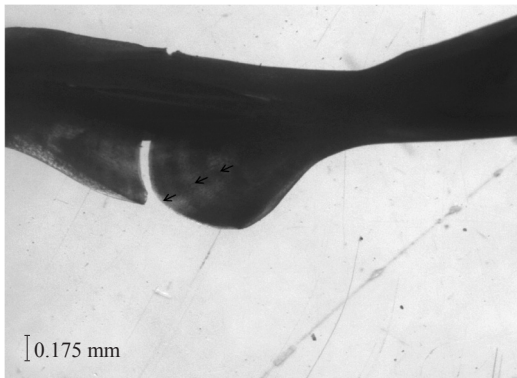


Fig. 2. Urohyal bone of *M. albus* used for age determination (3 years old; 78.90 g BW, 43.20 cm TL)

such as food sources, pH and water quality (Redaksi Agromedia, 2000). The findings of the present study as well as that of Yang and Xiong (2010) can be used as suitable size guideline for sustainable *M. albus* collection from paddy areas. Lower number of *M. albus* in other age groups could be due to emigration and changes in behavioural characteristics during sampling period.

Data on TL and BW at different estimated ages are shown in Table 1. There is a strong relationship between TL and BW of *M. albus* ($R^2=0.937$) (Fig. 3).

Methods to estimate fish age may vary among the fish species selected (Khan *et al.*, 2011). Analysis of otoliths is one of the methods that can provide the most

suitable age estimation (Seyfabadi *et al.*, 2014) because otoliths do not show reabsorption and their growth is acellular rather than by calcification (Secor *et al.*, 1995). Estimation of fish age can also be conducted by analysing vertebrae (Khan *et al.*, 2011). However, the disadvantage of using vertebrae as an age estimation method is that it is time consuming (Clark, 1987). Pectoral spine section can also be used to estimate fish age (Quick and Bruton, 1984). However, use of pectoral spines for age estimation has disadvantages of underestimation or overestimation of growth and natural mortality coefficients if the annuli are not correctly identified (Casey and Natanson, 1992).

Present study indicates the scope of using urohyal bone as an alternative tool to estimate the age of fish species. As the process to obtain urohyal bone is simple, this technique is suitable when large number of samples are to be analysed. Further studies with larger sample size of *M. albus* are needed to standardise ageing of *M. albus* using urohyal bone.

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Table 1. Mean and data range for total length (TL) and body weight (BW) of *M. albus*

Age (year)	3	4	5	6	7	8	9
TL (cm)	41.2±7.8	46.3±4.9	45.5±4.9	41.1±9.3	46.3±5.1	51.4±3.5	43.9
TL range (cm)	29.4-49.0	40.9-58.6	40.1-49.7	31.1-49.5	40.5-50.0	48.9-53.9	NA
BW (g)	75.1±43.4	98.5±33.7	106.0±36.8	80.0±39.7	103.9±46.5	137.3±1.4	82
BW range (g)	31.7-118.5	64.8-132.2	69.2-142.8	40.3-119.7	57.4-150.4	135.9-138.7	NA
n	8	14	4	3	3	2	1

*Remarks: TL: total length; BW: body weight; n: number of individual samples; NA: not available

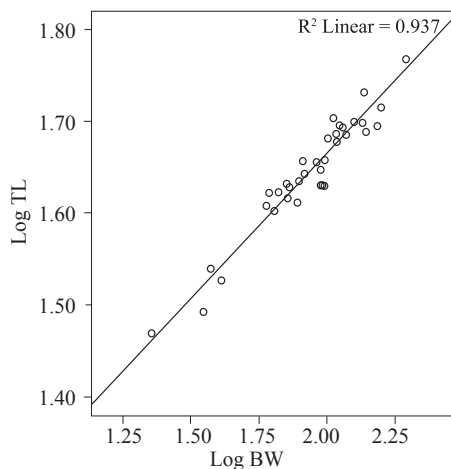


Fig. 3. Relationship between total length and body weight of *M. albus*

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