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Morphometric and Meristic Characters of Selangat Fish (*Anodontostoma sp.*) from Kelabat Bay and Tukak Strait, Bangka Belitung

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***Abstract*—Morphometric and meristic characters are authentic methods for the specimen identification. The study on morphometric and meristic characters in fishes is important for the differentiation of taxonomic units and are able to spot differences between fish population. This study aims to analyze and determine the differences in morphometric and meristic character of the Selangat Fish (*Anodontostoma sp.*) between Kelabat Bay and Tukak Strait. Samples of fish were identified and analyzed with reference to Saanin (1995) and Rahardjo (1985) identification method. The analyze of data using Multivariate Analysis with Statistics SPSS 17.0, to test whether there are real character differences between population groups determined. This research also determine the similarities of morphometrics character. The results of the 23 morphometric multivariance analysis of Selangat fish showed similarities as 52.17%. There are no significant difference of meristic characteristics of Selangat fish between Kelabat Bay and Tukak Strait, except part of pectoral rays from Tukak Strait (P IV 8 – 9) compared pectoral rays of Selangat Fish from Kelabat Bay (P I 16 – 18). The difference in morphometric (47.83%) and meristic indicates that different locations and environment have considerable impact on morphometric and meristic characters**.

Keywords—Morphometric, Meristic, Anodontostoma sp, Bangka Belitung

I. INTRODUCTION

Types of Selangat Fish in Kelabat Bay become superior commodities in Belinyu (the northern part of Bangka Island) with a high selling price compared to Selangat Fish from Tukak Sadai, South Bangka Regency. This is alleged that the community prefers Selangat Fish from Kelabat Bay because of its unique taste, meat texture, especially the different morphology. Selangat fish is one of the demersal fish that usually lives in coastal waters. Selangat fish have ecological value as a counterweight to ecosystems and economic value [1].

As one of the habitats of the Selangat Fish, Kelabat Bay is a semi-closed waters consisting of two parts, Teluk Kelabat Dalam (TKD) and Teluk Kelabat Luar (TKL) [2] [3]. TKD is a place where several rivers flow, while the TKL is directly related to the South China Sea. It is different from the Tukak Strait located in the South Bangka Regency, which is geographically bordered by Toboali and Gaspar Strait in the north, the Java Sea in the south and the east by Lepar Pongok District.

Previous research on Selangat Fish is still very limited, such as research about Biology of Reproduction of Selangat Fish in the Jakarta Bay [4] and research about the food of Selangat Fish in West Java Waters [5]. Ecological and description of Selangat Fish information have not been widely disclosed, especially the uniqueness of Selangat Fish in Bangka Island has never been done, so this study aims to compare Selangat Fish from Kelabat Bay (northern part of Bangka) and Tukak Strait (southern part of Bangka) by comparing morphometric and meristic characters. Species identification is a primary step for research work and plays a important role to study the behavioral of fish. Measurements of morphometric and meristic counts are considered as authentic and easiest methods for the specimen identification which is termed as morphological systematic [6]. The study on morphometric and meristic characters in fishes is important because they can be used for the differentiation of taxonomic units and are able to spot differences between fish population.

II. MATERIAL AND METHODS

A. Sampling of Selangat Fish Samples

Selangat Fish samples were collected from Kelabat Bay (Fig. 1) and Tukak Strait (Fig. 2) on March 2018. Sampling was used purposive sampling technique based on coordination with fisherman in Kelabat Bay and Tukak Strait to determine the coordinate of sampling. The fishes collected from sampling location brought to the laboratory for the studies (morphometric and meristic analysis). Species identification was carried out using standard references for taxsonomi identification [7],[8]. A total of 40 specimens were studied from Kelabat Bay and Tukak Strait.

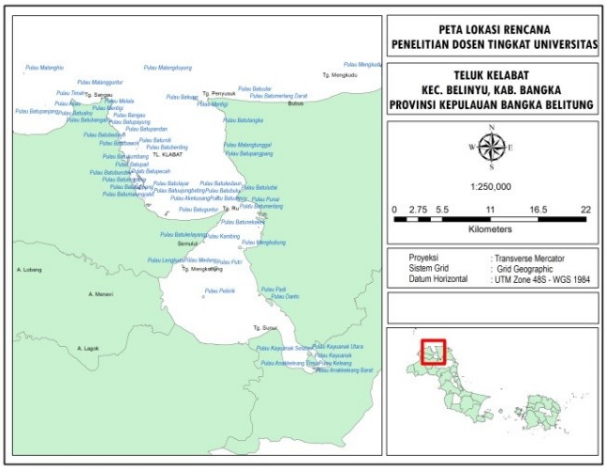

Fig. 1. Location map of sampling in Kelabat Bay, Bangka Regency (Northern Part of Bangka)

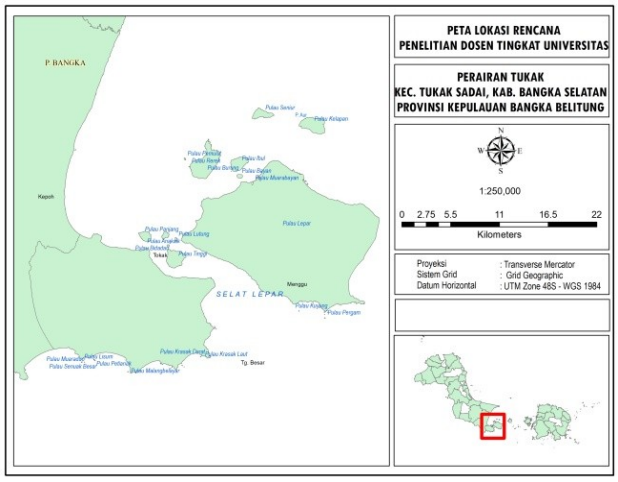

Fig. 2. Location map of sampling in Tukak Strait, South Bangka Regency (Southern Part of Bangka Island)

B. Morphometric Characteristic

Morphometrics is a measure related to the size of the length, width, height of the body or parts of the fish's body [8]. Measurement of morphometric characters covering 25 characters, namely Total Length (TL), Standard Length (SL), Head Length (HL), Head Width (HW), Head Depth (HD), Eyes Diameter (ED), Snout Length (SNL), Distance between eyes (IW), Pre Anal Length (PAL), Body Depth (BD), Body Width (BW), Length of the base of ventral fin (PVL), Least width of caudal peduncle (CPD), Length of caudal peduncle (CPL), Dorsal Base Length (DBL), Length of the longest fin ray of the dorsal fin (DFH), Pectoral fin length (PCL), Pre pectoral length (PPL), Anal Base Length (ABL), Pre dorsal length (PDL), Caudal fin length (on the top) (LUCL), Caudal fin length (minimum distance) (LMCL), Caudal fin length (on the bottom) (LCLL) [9].

C. Meristic Characteristic

Meristic is a quantitative calculation of the characteristics (body parts) of fish, for example the number and size of fins. Meristic characters that are counted as many as 9 characters, among others: Dorsal Rays, Anal Rays, Pectoral Rays, Ventral Rays, Caudal Rays, Linea Lateralis, Caudal Peduncle Scale, Transverse Scale, Pedorsal Scale [9].

D. Data Analysis

The analyze of data using Multivariate Analysis with Statistics SPSS 17.0, to test whether there are real character differences between population groups determined by quantitative variables. This research also determine the similarities of morphometrics character.

III. RESULT AND DISCUSSION

A. Morphometric Characteristic

A total of 40 specimens (20 specimens from Kelabat Bay and 20 specimens from Tukak Strait) ranging from 12.0 – 15.4 cm were used for the studies of morphometric and meristic characteristic.

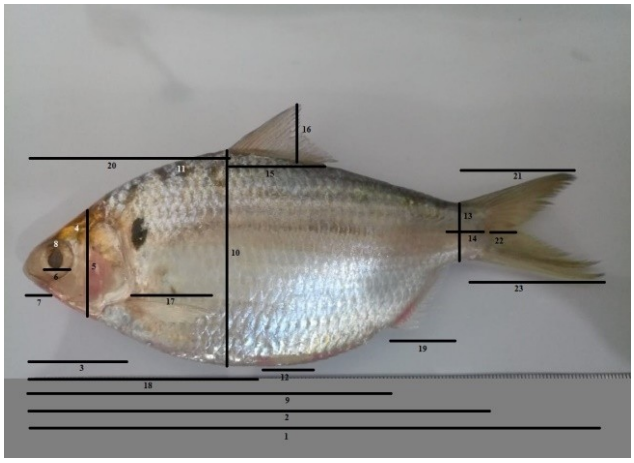

Fig. 3. Morphometric measurement of Selangat Fish: 1. Total Length (TL); 2. Standard Length (SL); 3. Head Length (HL); 4. Head Width (HW); 5. Head Depth (HD) ; 6. Eyes Diameter (ED); 7. Snout Length (SNL); 8. Distance between eyes (IW); 9. Pre Anal Length (PAL); 10. Body Depth (BD); 11. Body Width (BW); 12. Length of the base of ventral fin (PVL); 13. Least width of caudal peduncle (CPD); 14. Length of caudal peduncle (CPL); 15. Dorsal Base Length (DBL); 16. Length of the longest fin ray of the dorsal fin (DFH); 17. Pectoral fin length (PCL); 18. Pre pectoral length (PPL); 19. Anal Base Length (ABL); 20. Pre dorsal length (PDL); 21. Caudal fin length (on the top) (LUCL); 22. Caudal fin length (minimum distance) (LMCL); 23. Caudal fin length (on the bottom) (LCLL)

TABLE I. MULTIVARIATE ANALYSIS OF MORPHOMETRIC BETWEEN SELANGAT FISH FROM KELABAT BAY AND TUKAK STRAIT

Morphometric Characteristic	F	df1	df2	Sig,	Conclusion
TL	0,490	1	38	0,488	NS
SL	3,980	1	38	0,053	NS
HL	27,716	1	38	0,000	*
HW	1,248	1	38	0,271	NS
HD	1,047	1	38	0,313	NS
ED	13,414	1	38	0,001	*
SNL	2,398	1	38	0,130	NS
IW	1,729	1	38	0,196	NS
PAL	0,184	1	38	0,671	NS
BD	0,678	1	38	0,416	NS
BW	19,135	1	38	0,000	*

Morphometric Characteristic	F	df1	df2	Sig,	Conclusion
PVL	23,348	1	38	0,000	*
CPD	5,093	1	38	0,030	*
CPL	2,020	1	38	0,163	NS
DBL	3,661	1	38	0,063	NS
DFH	10,506	1	38	0,002	*
PCL	16,402	1	38	0,000	*
PPL	0,050	1	38	0,824	NS
ABL	52,785	1	38	0,000	*
PDL	6,610	1	38	0,014	*
LUCL	7,685	1	38	0,009	*
LMCL	0,469	1	38	0,498	NS
LCLL	4,657	1	38	0,037	*

NS) = Non-Significant (P>0,05)
*) = Significant (P<0,05)

Differences that occur between populations genetically, reproductive isolation, genetic differentiation will increase with geographical isolation. Indirectly this condition can be observed by observing morphological aspects, behavior, origin, physiological features and isozyme electrophoresis analysis [10]. The results of the 23 multivariance analysis of the morphometric variables of Selangat fish (Table 1) showed similarities of 52.17%. The interaction variance will arise because some alleles are responsible for a phenotype that is expressed periodically in different environments [11].

Similarities between morphometric variable characters (Fig. 4. Dendogram) generally are at a similarity value of 66.68%. High diversity in phenotypes is strongly influenced by genetic expression and genetic interactions with the environment. Fish have high variability both inside (intrapopulation) and between populations. If the population is in the same environment or there is continuous continuity, migration and gene flow will continue. Among them will reveal many similarities both phenotype and genotype. However, if the population is in a highly contrasting environment or there is a change with little migration, it is likely that changes in population structure will occur. These factors, will affect genetic variation and the size of the original population and allow to influence heterzigosity in a species [12]. Generally, fish show the presence of sub-divisions of each species due to various isolations.

B. Merisctic Characteristics

During the present studies, seven meristic characters have been counted (Table 2 and 3).

TABLE II. MERISTIC CHARACTERISTICS OF SELANGAT FISH FROM KELABAT BAY

No	Meristic Characters	Data (Range)
1	Dorsal Rays	D X 7
2	Anal Rays	A 13 – 22
3	Pectoral Rays	P I 16 – 18
4	Ventral Rays	V III 5 – 8
5	Caudal Rays	C II 20 – 30
6	Caudal Peduncle Scale	62 – 82
7	Pedorsal Scale	11 – 16

TABLE III. MERISTIC CHARACTERISTICS OF SELANGAT FISH FROM TUKAK STRAIT

No	Meristic Characters	Data (Range)
1	Dorsal Rays	D VII - VIII 8 - 9
2	Anal Rays	A 17 – 19
3	Pectoral Rays	P IV 8 – 9
4	Ventral Rays	V III 5 – 7
5	Caudal Rays	C II 22 – 26
6	Caudal Peduncle Scale	72 – 78
7	Pedorsal Scale	13 – 16

Variations in meristic characters were reported in many fishes. During present studies, it has also observed that the meristic counts are dependent of body size and there is change in meristic counts with increase in body length. Meristic characteristics of Selangat fish between Kelabat Bay and Tukak Strait there is no significant differentiation, except part of pectoral rays from Tukak Strait have hard rays about P IV 8 – 9 (Table 3) compared pectoral rays of Selangat Fish from Kelabat Bay (P I 16 – 18). This difference in the pectoral rays indicates that different locations and environment have considerable impact on meristic characters [13],[14].

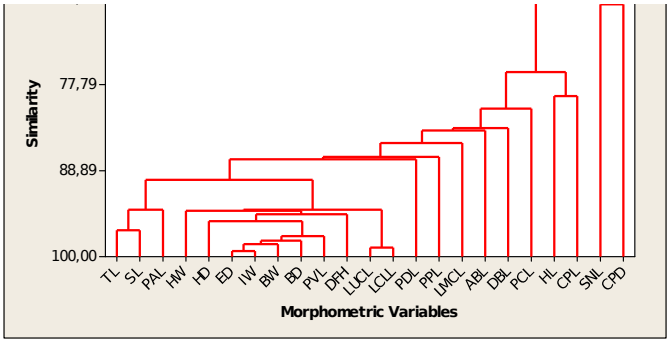

Fig. 4. Morphometric variable correlations between Selangat Fish From Kelabat Bay and Tukak Strait

IV. CONCLUSION

The morphometric measurements confirmed that 23 multivariance analysis of the morphometric variables of Selangat fish (from Kelabat Bay and Tukak Strait) showed similarities of 52.17%. The 12 morphometric characters that tend to be the same among others are Total Length (TL), Standard Length (SL), Head Width (HW), Head Depth (HD), Snout Length (SNL), Distance between eyes (IW), Pre Anal Length (PAL), Body Depth (BD), Length of caudal peduncle (CPL), Dorsal Base Length (DBL), Pre pectoral length (PPL) and Caudal fin length (minimum distance) (LMCL). Meristic characteristics of Selangat fish between Kelabat Bay and Tukak Strait there is no significant differentiation, except part of pectoral rays (Kelabat Bay: P I 16 – 18 and Tukak Strait: P IV 8 – 9). The difference in morphometric and meristic indicates that different locations and environment have considerable impact on morphometric and meristic characters.

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