The JSFS 85th Anniversary-Commemorative International Symposium
"Fisheries Science for Future Generations"
Symposium Proceedings, No. 02004

Original article

Anatomical and microscopic structure of thoracic adhesive apparatus in hill stream catfish genus *Glyptothorax* from northern of Thailand

Tosapon Chamnivikaipong and Apinun Suvarnaraksha *

Faculty of Fisheries Technology and Aquatic Resources, Maejo University, San sai, Chiang Mai, 50290, Thailand
* Correspondence: Apinun@mju.ac.th; Tel: +66932365515

Keywords: Anatomy; Microanatomy; Scanning electron microscopy; Histological study; Adhesive apparatus; *Glyptothorax*; Fishes of Thailand.

Received: 18 July 2017 / Accepted: 4 September 2017

Introduction

The most mountainous streams of the northern Thailand are shallow-water bodies, characterized by low temperature, torrential current, pebble or rocky substratum and plant covered along the river bank. Hill stream catfish genus *Glyptothorax* has developed a morphological specialization to formed an adhesion pad on thoracic position called "Thoracic adhesive apparatus" (ADH) [1-4] while in certain sisorid catfish in the same habitat, there additional adhesive device are located in paired fin. The thoracic adhesive apparatus is an important for their strong current living habitat. This publication is focus on gross anatomy, and microanatomy of an adhesive apparatus of genus *Glyptothorax* in the Northern Thai river drainages.

Materials and methods

Fishes were collected from streams and river from 6 province of northern of Thailand (Fig. 1), they were captured by using a backpack electro shocker and scoop net. After capture, fishes were euthanized in ice water, preserved in 10% formalin then stored in 75% ethanol at Maejo Aquatic Resources Natural Museum (MARNM), Maejo University and coding them, the whole ADH was carefully removed with the scalpel from anesthetized before attempt to Scanning electron microscopy (SEM) and Immunohistochemistry study (Histological study).

Material examined

Chiangmai: Maechaem: MARNM 0167 Huay mae yord; *G. trilineatus*. MARNM 0108 Huay mae nai, Mae suk sub district; *G. buchanani*. MARNM 0127 Huay mae na pen; *G. lampris*.
Chiangmai: Wiang Haeng: MARNM - Huay mae tae luang; *G. rugimentum*.
Chiangrai: Toung: MARNM 3418 Ing river (Southern part); *G. lampris*.
Mae Hong Son: Salween: MARNM 4563 Mae u ru; *G. dorsalis*. MARNM 4613 Sob ngae; *G. burmanicus*.
Nan: Pua: MARNM - N 19o 08' 34.61" E 100o 59' 43.96" 508 m. (Koon river), Doi phu ka National park; *G. trilineatus*.
Phayao: Chiang Kham: MARNM - Yuam river; *G. trilineatus*.
Tak: Mae Sod: MARNM - Mae la mao river; *G. trilineatus*.

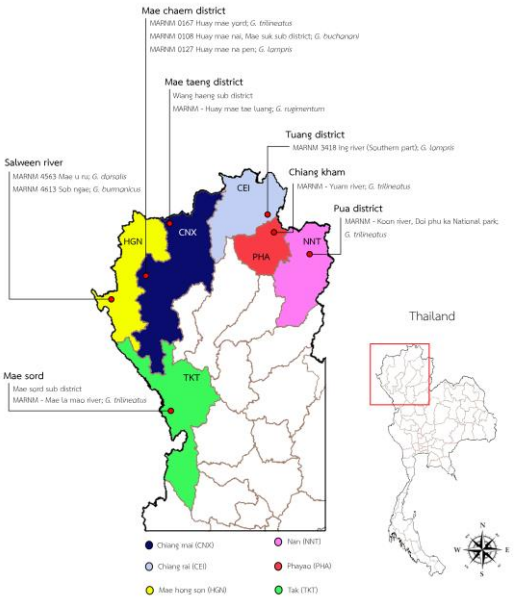

Fig. 1. Collection localities in 6 province from northern of Thailand.

Results

The thoracic adhesive apparatus of 6 *Glyptothorax* species from northern of Thailand are differing in external morphologies, which can separated to 4 types; heart type, pentagon type, olive bouquet type and gular bridge type (Fig. 2). A first type is familiar type, belonging in *G. trilineatus*, *G. buchanani* and *G. lampris* which oval, rounded-point in head position, caudally

open, with or without medial pit and lacking of anteromedial striae (except in *G. buchanani*) (Fig. 2 A1, A2). A second type is belonging in only *G. dorsalis* which is quite different from the first type by a straight edge to the rest become to a truncate shape (vs. wider and curved in Heart type) (Fig. 2 B1, B2). A third and fourth type are unique for 2 species by the formal is *G. burmanicus* which is rounded and medial pit present and caudally adjoin. The after is *G. rugimentum* which have ridge and grooves reaching to medial of isthmus and posteriorly open.

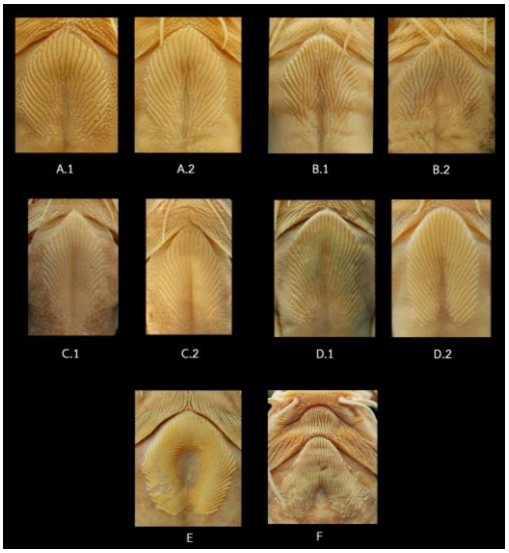

Fig. 2. Type of adhesive apparatus from 6 *Glyptothorax* species; *G. trilineatus* (A1, A2), *G. buchanani* (B1, B2), *G. lampris* (C1, C2), *G. dorsalis* (D1, D2), *G. burmanicus* (E) and *G. rugimentum* (F).

SEM photograph have showed more detail of ADH. Ridge and groove arranged in alternative structure, the formal covered by numerous hooklet 10–20 µm long. Grooves plain and without hooklet (Fig. 3).

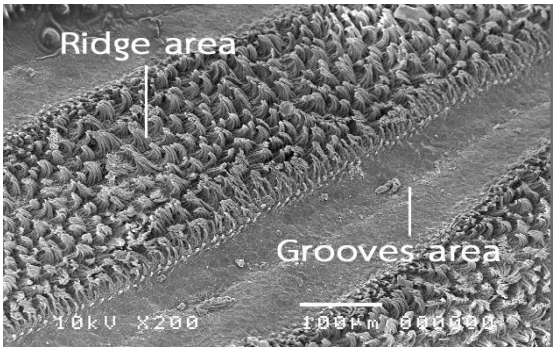

Fig. 3. SEM photograph of differentiates in ridge area and grooves area of *G. lampris*.

Histological examination shows an internal structure cell arrangement. Epidermis consist three layers. Columnar epithelial cells (CE) are long and slender cell which forms the basement layer. Formative cells (FC) are oval shaped cell and finely granular cytoplasm with centrally placed nuclei. Beak-shape cells (BC) are outermost layer which modified to long curved spine (hooklet).

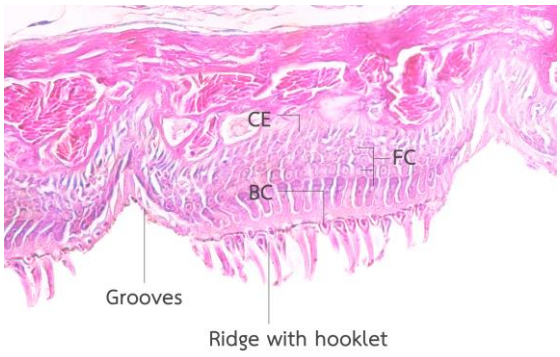

Fig. 4. Vertical section of ADH of *G. trilineatus* shows internal structure cell arrangement, ridge and grooves; beak-shape cell (BC), Formative cell (FC), Columnar epithelial cell (CE).

Conclusions

The thoracic adhesive apparatus of Northern Thai *Glyptothorax* are divided into 4 main types by their shapes and pattern of ridges and grooves with 1 sub types by their present or lacking of anteromedial striae [8] in *G. buchanani* in heart type group and a variation of present or absent of medial pit in the same type and same species were showed in present study. Ridge and groove of ADH are arranged in alternative structure from SEM technique and histology technique.

References

1. Bhatia B (1960) Adaptive modification in a Hill- stream catfish, *Glyptothorax telchitta* (Hamillton), 15 p
2. Linthoingambi I, Dayabanta K, Shashibala N (2013) Inter Res J Nat Appl Sci 3: 63–65
3. Linthoingambi I, Shashibala N (2015) Inter Res J Nat Appl Sci 2: 136–142
4. Ng HH, Kottelat M (2016) Zootaxa 4188: 1–92