



**Studies on Histopathology of *Clarias batrachus*
(Linnaeus) Intestine Parasited by Cestode,
Lytocesus clariasae Jadhav and Gahvane, 1991**

C. J. Hiware*, R. T. Pawar** and Chalobol Wongsawad***

ABSTRACT

The present communication deals with the intestinal histopathology of freshwater predatory fish, *Clarias batrachus* (Linneaus) caused due to the infection of Caryophyllaeid cestode, *Lytocesus clariasae* Jadhav and Gahvane, 1991 collected from Aurangabad M.S. India. The parasite has deeply penetrative type of scolex, which causes the heavy mechanical injury to the intestinal tissue. The epithelial compression, inflammation was highly observed. The scolex of parasites crosses majority of the intestinal layers (Internal epithelium, submucosa, muscularis layer) and come to lie near serosa suggesting that, it is very dangerous and destructive parasites to the host.

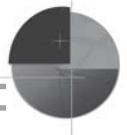
Keywords: *Lytocesus clariasae* Cestode Histopathology *Clarias batrachus*
Mechanical injury

Correspondance author ; Assoc.Prof.Dr.Chalobol Wongsawad Email: cwongsawd@yahoo.com

*Department of Zoology, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad 431004, M.S.; India.

**Arts, Commerce and Science College, Kille - Dharur, Dist. Beed.

***Department of Biology, Faculty of Science, Chiang Mai University, Chiang Mai 50202 ,Thailand.



การศึกษาพยาธิวิทยาของลำไส้ปลาดุก
***Clarias batrachus* (Linnaeus) ที่ติดพยาธิตัวตืด**
***Lytocestus clariasae* Jadhav and Gahvane, 1991**

ซี.เจ.อิวาร์ย์* อาร์.ที. พาวา** และ ชโอลบล วงศ์สวัสดิ์***

บทคัดย่อ

การศึกษาเกี่ยวกับพยาธิวิทยาของลำไส้ปลาดุก *Clarias batrachus* (Linnaeus) ซึ่งเป็นปลาบกกลุ่ม Caryophylliaeid ที่จับได้จากเมือง Aurangabad ประเทศอินเดีย จากการติดพยาธิตัวตืดในกลุ่ม *Lytocestus clariasae* Jadhav and Gahvane, 1991 พยาธิมีการฝังตัวลึกลงในผนังลำไส้โดยใช้ส่วน scolex ทำให้เกิดบาดแผลร้ายแรงในเนื้อเยื่อ และพบการหลุดลอกและบวมของลำไส้อ่อนมาก นอกจากนี้ยังพบส่วน scolex แทรกในชั้นต่างๆ ของลำไส้ (internal epithelium, submucosa, muscularis layer) รวมถึงชั้น serosa แสดงให้เห็นว่าหนอนพยาธินิดนี้เป็นอันตรายร้ายแรงต่อปลาที่ติดพยาธิ

คำสำคัญ : *Lytocestus clariasae* พยาธิตัวตืด พยาธิวิทยา *Clarias batrachus* บาดแผลร้ายแรง

Correspondance author : ดร.ดร.ชโอลบล วงศ์สวัสดิ์ Email: cwongsawd@yahoo.com

*ภาควิชาสัตวแพทย์ ดร.นาบชาเขน อัมเบดการ์ มหาวิทยาลัยมาราಠาดา อูรังกาบัด 431004 อินเดีย

** ภาควิชาสัตวแพทย์ วิทยาลัยอาร์ท คอมเมօช แอนชาيد์ คิลเล-ดาวูมหารัชภูม อินเดีย

***ภาควิชาชีววิทยา คณะวิทยาศาสตร์ มหาวิทยาลัยเชียงใหม่ 50202 ประเทศไทย



Introduction

The degree of response varies from host to host and also varies in different tissue sides, within the host. It varies markedly in some species with the stream of a particular species of host and parasite. Sometimes necrotic nodules or abscesses also develop and sometimes no marked cellular secretions is seen, even though the scolex enters and dilates the crypts of Liberkuhan and invades the lamina propria to cause bleeding.

Thus the host parasite relationship results in the gain of one organism and the loss of another and leads to various diseases and disorders. Naturally it is important to study this relationship, not because of their parasitological value but for the relative existence of mankind. These studies may have considerable intrinsic interest and raise fundamental questions, common to other areas of biology, at a molecular, cellular, tissue and whole organism level.

The extensive study on the host parasite relationship has been carried out by *Amoebotaenia indiana* (1). *Hymenolepis nana* (2). Host response to implanted adult *H. nana* as studied by Coleman and Sa (3) and experimental immunization of dog against *E. granulosus* was first observed (4). Histopathology of *Acanthobothrium uncinatum* were observed from a fish *Rhynchobatus ajeeddensis* (5). They have studied the histopathology of intestine of fish caused due to cestodes (6-8) and the caryophyllaeidiasis

in fish hosts (9-13). In this first investigation we studied the histopathology of fish by cestode, *Clarias batrachus* (Linneaus).

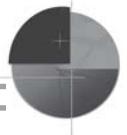
Methods

The freshwater fish, *Clarias batrachus* were brought to the laboratory, killed by pithing the brain, dissected out the intestine, examined for the cestode infections. The worms were collected from infected intestine, washed in saline solution, flattened, preserved in 4% formalin and later processed for taxonomical studies by using Semichon's alcoholic Borax Carmine stain. The worms attached to intestine were kept intact and small pieces of such intestines and other healthy intestine were fixed in Bouin's fluid fixative. Fixed tissues were washed, dehydrated through alcoholic grades, cleared in xylene and embedded in paraffin wax with melting point (58-60°C). Blocks were cut at 8μm and slides were stained with Haematoxylin-eosin stain. Best slides were selected and observed under the microscope for histopathological study.

Results

The present communication results indicate that the some of the intestines were found infected and some were not infected. The cestode parasites on closer observation turned out to be as *Lytocestus clariasae* Jadhav and Gahvane, 1991.

The healthy intestine of the predatory freshwater fish *Clarias batrachus* showed the healthy structure of intestinal epithelial



layers and all layers i.e. serosa, muscularis mucosa, submucosa and mucosa are clearly observed with intact architecture (Figs.1-2).

The infected intestine with the cestode *Lytocestus clariasae* Jadhav and Gahvane, 1991. It observed that the worm is hiving penetrative type of scolex and there is no doubt that they causes heavy mechanical tissue damage to their host, *Clarias batrachus* (Linnneaus) intestinal tissue. In T. S. of the infected intestine, it has been observed that the scolex of worm deeply penetrated through intestinal layers causing heavy mechanical injury to mucosa,

submucosa, come to lie near the muscularis mucosa. The intestinal villi encircle the scolex of worm and intestinal architecture get disturbed by the invasion of the worm scolex (Figs. 3-4). There is much compression of epithelium near worm and also the inflammatory cells get infiltrated in the lamina propria. The worm make very intimate contact with the host intestinal tissue to obtain the nourishment from the host, which resulting in the damage of intestinal tissue. (Author observed in histochemical studies also).



Fig.1 Cross section of normal (Healthy) histological structure of the host *Clarias batrachus* (L.) (40X)

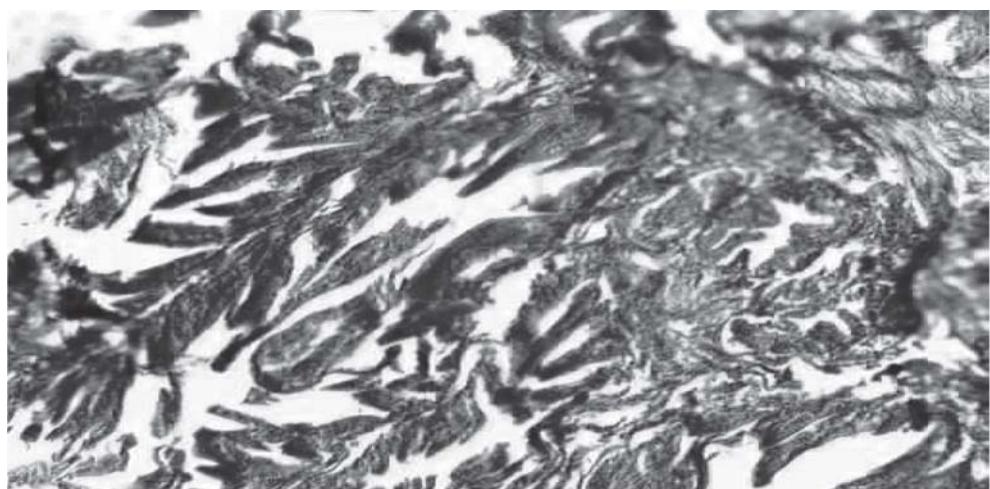


Fig.2 Cross section of normal (Healthy) villi highly magnified of the host *Clarias batrachus* (L.) (40X)



Fig.3 Cross section of intestine with infected intestinal villi and with deep penetration of scolex of parasite, arrow (40X).

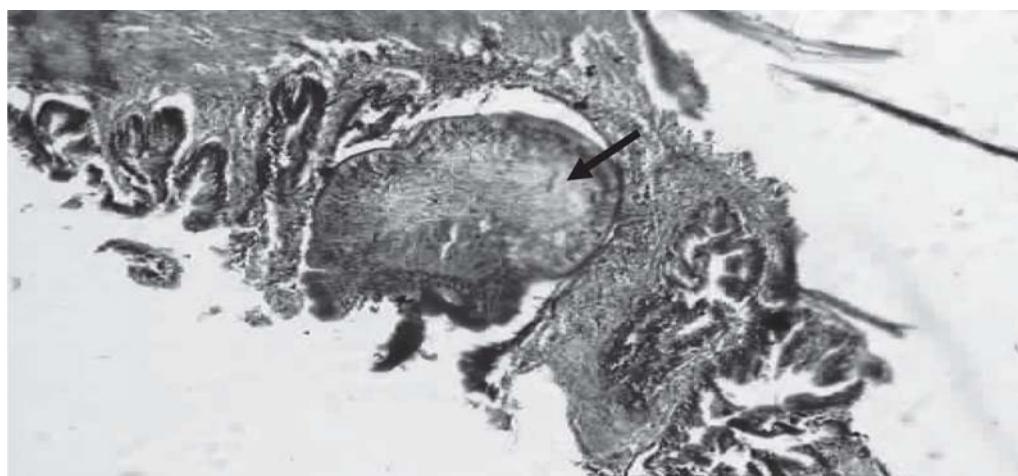


Fig.4 Cross section of intestine with infected intestinal villi and with deep penetration of scolex of parasite. Highly magnified, arrow (450X).

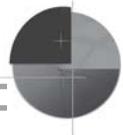
Discussion

The worm *Lytocestus clariasae* Jadhav and Gahvane, 1991. is having penetrative type of scolex. The worm burden was very high/heavy which blocks the complete intestinal passage, which may lead to the digestive disturbances causing physiological problems. In the present results are showing that parasites cause heavy mechanical damage creating ill health of fishes. The parasites causing heavy

damage so it is categorized as pathogenic.

The worm contact with host tissue and utilizes the nutritive materials, to the favorable for its nourishment and growth from the host tissue and makes host weak, affecting on the growth of host.

The patterns of scolex invasion in serosa showed as previous reports (7-9). The histopathology of this cestode revealed the same as the other caryophyllaeid cestodes (11-13) and the acanthocephala



(14). The Atlantic salmon (*Salmo salar*) had an anisakid larva partly embedded in the wall of an intestinal caecum (15). But the tapeworm (*Schistocephalus solidus*) once exposed from intestinal mucosa, the underlying tegument with microtriches might serve to facilitate migration into the body cavity (16). However, the helminths crosses majority of the intestinal layers (internal epithelium, submucosa, muscularis layer) and come to lie near serosa suggesting that, it is very dangerous and destructive parasites to the definitive host. The crowding effect of this cestode in *Clarias batrachus* would be the area of fruitful investigation.

Acknowledgements

The authors are grateful to the Professor and Head, Department of Zoology, Dr.Babasaheb Ambedkar Marathwada University, Aurangabad, India; the Applied Technology for Biodiversity Research Unit, and to Parasitology Research Laboratory, Faculty of Science, Chiang Mai University, Thailand for providing necessary laboratory and library facilities during tenure of this work.

References

1. Mitra, K.B. and Shinde, G.B.: Histopathology of cestode *A. indiana* (Cohn, 1900), *Gallus domesticus*, at Aurangabad, India. Curr. Sci. Vol. 49(5): 206-207, 1980.
2. Bailey, W.S.: Host tissue reactions to initial superimposed infection with *Hymenolepis nana* var *Fraterna*. J. Parasit, 37: 440-444, 1951.
3. Coleman, R. M. and DE. Sa, L. M.: Host response to implanted adult *Hymenolepis nana*. J. Parasit., 50 (Suppl.) :17, 1962.
4. Foresk, Z. and Rukavina, J. : [Experimental immunization of dogs against *Echinococcus granulosus*. I. First observation.] Veterinaria, Saraj., 8: 479-482, 1959.
5. Murlidhar, A. and Shinde, G.B. : Histopathology of the cestode, *Acanthobothrium uncinatum* (Rudolphi, 1819) from *Rhynchobatus ajeddensis* at Kakinada, A.P. India. Indian. J. of Parasitology 11(1): 85-86, 1987.
6. Bauer, O.N. : The ecology of parasites of freshwater Fish: In: Parasites of fresh water fish and the biological basis of their control. and river fisheries, 45 : 3-215, 1959.
7. Hayunga, E.G.: Comparative histology of the scolices of three caryophyllaeid tapeworms : Relationship to pathology and site selection in host intestine. Diss. Abs. Int., 38, 1977.
8. Mackiewicz, J.S.: Relationship of pathology of scolex morphology among caryophyllid cestodes. F. Parasitkde, 39(3): 232-246, 1972.
9. Gopal Krishnan, V.: Diseases and parasites of fishes in warm water ponds in Asia and the far East, fisheries. Report. FAO-UN 445: 319-343. (Proceedings of the Foto world symposium on warm water pond fish culture), 1968.
10. Satpute, L.R. and Agrawal, S.M.: A "Diverticulosis" of the fish duodenum infected with cestodes. Indian J. Exper. Biol., 12: 373-375, 1974.



11. Ahmed, A.T.A. and Sanaullah, M.: Pathological observation of the intestinal lesions induced by caryophyllaeid cestodes in *Clarias batrachus* (Linnaeus). (Siluriformes: Clariidae) Fish Path. 14: 1-7, 1975.
12. Bose, K.C. and Sinha, A.K.: Histopathology of *Clarias batrachus* (Linn.) infected by *Lytocestus indicus* Moghe, 1925. Science Culture 47: 186-187, 1981.
13. Niyogi, A. and Agrawal, S.M.: Intestinal pathology due to caryophyllaeids parasitizing *Clarias batrachus* (Linn.) at Raipur. Indian J. Helminth. 41: 112-119, 1989.
14. Dezfuli, B.S., Giovinazzo, G., Lui, A. and Giari L.: Inflammatory response to *Dentitruuncus truttae* (Acanthocephala) in the intestine of brown trout. Fish et Shellfish Immunology. 24:726-733, 2008.
15. Marty, G.: Anisakid larva in the viscera of a farmed Atlantic salmon (*Salmo salar*). Aquaculture. 279: 209-210, 2008.
16. Hammerschmidt, K. and Kurtz, J.: *Schistocephalus solidus*: Establishment of tapeworms in sticklebacks- fast food or fast lane?. Experimental Parasitology. 116: 142-149, 2007.