PROTEOCEPHALIDEA FROM AMAZONIAN FRESHWATER FISHES : NEW SYSTEMATIC ARRANGEMENT FOR THE SPECIES DESCRIBED BY WOODLAND AS **ANTHOBOTHRIUM** (TETRAPHYLLIDEA) (*)

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ABSTRACT

The taxonomic status of the Brazilian species ***Anthobothrium pristis***, ***A.piramutab***, ***A. mandubé*** *and* ***A. karuatayi*** *has been reappraised.* ***A. pristis*** *from an elasmobranch in the Amazon, is confirmed as a member of the tetraphyllidean genus* ***Anthobothrium***, *but the others, from siluroid teleosts, are transferred to Proteocephalidea.* ***A. piramutab*** *is transferred to* ***Proteocephalus*** *as a new combination.* ***Gibsoniela*** *n.g. is erected in Zygobothriinae for* ***A. mandubé*** *and* ***Brayela*** *n.g. is erected in a new subfamily, Brayelainae for* ***A. karuatayi***.

INTRODUCTION

Recently, the opportunity arose to examine the types of cestodes described by Woodland (1933, 1934, 1935) from Amazonian fishes, including the species described by him as members of the tetraphyllidean genus **Anthobothrium** Beneden, 1850: **A. pristis** Woodland, 1934, **A. karuatayi** Woodland, 1934, **A. mandubé** Woodland, 1935 and **A. piramutab** Woodland, 1933. **A. pristis** is a parasite of **Pristis perrottetii**, an elasmobranch, but the other species were found in siluroid teleosts. In Woodland's opinion, "these species would seem to be as much proteocephalan as tetraphyllidean. It is difficult to assign this tapeworm to its correct systematic position" (Woodland, 1933).

Wardle & McLeod (1952) placed the species **A. piramutab**, **A. pristis** and **A. karuatayi** as **Incertae sedis**. Nevertheless, these species can be identified on the basis of the descriptions of Woodland.

Yamaguti (1959) placed in **Anthobothrium**, **A. pristis**, **A. piramutab**, **A. mandubé** and **A. karuatayi**; mentioning in a footnote that they have characters intermediate between

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Phillobothriidae and Proteocephalidae.

The teleosts are not the usual hosts of adult tetraphyllids and there are only a few references in the literature of this kind of parasitism of which most are controversial and are probably errors made by the collector or accidental parasites of estuarine fishes.

Type specimens deposited in the collections of the British Museum (Natural History) were examined and compared, when possible, to specimens in the Oswaldo Cruz Institute (IOC). As a result, species of **Anthobothrium** from freshwater teleosts in the Amazon, Brazil, are transferred from the Tetraphyllidea to the Proteocephalidea.

MATERIAL AND METHODS

The material in the BM(NH) is kept part as wet material (spirit) and part in whole mounts (Balsam). It was possible to make whole mounts and sections of proglottids of only one species, **P. piramutab** (Woodland, 1933) com. n. Whole mount preparations were stained with acetic carmine and sections with haematoxylin-eosin.

RESULTS AND DISCUSSION

TETRAPHYLLIDEA : PHILLOBOTHRIIDAE

Anthobothrium pristis Woodland, 1934

Host: **Pristis perrottetii** Müeller & Henle, 1841

Geographical distribution: Parintins, Amazon River, Brazil.

Col. BM (NH) numbers, 2.23.32-39 and 3.22.118-119

The host is the well known swordfish; Woodland (1934) considered it to be a freshwater elasmobranch, but it is a marine fish, able to enter streams and swim for many miles from the mouth of the river. This explain why this elasmobranch is found in the Amazon rivers, where it is relatively common.

My examination of Woodland's specimens of **A. pristis** confirmed that this species is a tetraphyllid. For this reason, it will not be discussed here. Nevertheless, its study was useful in order to compare its morphology with the characters of the species that Woodland described from teleosts, erronously designated as **Anthobothrium**.

Wardle & McLeod (1952) stated, "The three species described by Woodland-**piramutab**, **pristis** and **karuatayi** are peculiar in being found in freshwater fishes, namely siluroid fishes of the Amazon drainage system of Brazil. **Pristis** is a typical phyllobothriid ..," They did not mention **A. mandubé** but Yamaguti (1959 p.68) referred to it in a footnote. Yamaguti makes it obvious that he thought all these species came from teleosts.

PROTEOCEPHALIDEA : PROTEOCEPHALIDAE

PROTEOCEPHALINAE MOLA, 1929

Proteocephalus piramutab (Woodland, 1933) comb.n.

syn. : **Anthobothrium piramutab** Woodland, 1933

Host : **Brachyplatystoma vaillanti** Cuvier & Vallenciennes

Geographical distribution : Carajá, Amazon River, Brazil

Col. BM (NH) numbers, 2.23.27-31 and 3.22.120-123

Col. IOC number, 32.089 a-f

Woodland got numerous samples, including gravid ones, so it was possible to restudy the type material of this species. This study was based on ten specimens.

The most important character is the scolex which consists of a central pillar bearing four suckers (Fig.1) having the form of thick-walled cups (the cavities). The shape of the suckers nervertheless can change, depending on the state of the contraction of the scolex. Woodland described them as typical bothridia of the Tetraphyllidea, but they are suckers of the proteocephalidean type. They resemble, for example, suckers of **Choanoscolex abscissus** (Riggenbach, 1895). The proteocephalid scolex varies greatly even in species of the same genus.

Woodland (1933) described a small rostellum, but in my opinion it seems to be an apex. Possibly there are glands on it as pointed out by Woodland.

As for the proglottids, although Woodland considered some characters of **P. piramutab** as tetraphyllidean, there is not enough support for this assertion.

It is true that sections of proglottids do not show longitudinal muscles, but although this character (i.e. the inconspicuous longitudinal muscles) is considered typical of tetraphyllideans, it can also occur in proteocephalids, as for instance in **Sciadocephalus megalodiscus** (Diesing, 1850), **Nomimoscolex piracatinga** Woodland, 1935 and **Monticellia surubin** (Woodland, 1933).

Although we can not observe the separation between cortical and medullary parenchyma in **P. piramutab**, we can consider that the reproductive system is entirely medullar, including the vitellaria, which is irregularly distributed, and not in the semi-circular disposition as described by Woodland.

Finally, even though the suckers do not show the characteristic proteocephalan shape, we know that this group of tapeworms is characterized by the great morphological variation of these structures; some species developed some characteristics aparently similar to tetraphyllideans, but this would be due to convergent evolution instead of meaning close relationship between proteocephalans and tetraphyllideans.

Among the Proteocephalidea only Proteocephalinae could contain this species; according to the classification system of Freze (1965) and Brooks (1978) it will be not necessary to erect a new genus. The type of scolex and the weakness of longitudinal muscles of strobila are good diferential characters of specific value. I propose consequently a new taxonomic arrangement for this species, designated as **Proteocephalus piramutab** (Woodland, 1933) comb. n.

ZYGOBOTHRIINAE WOODLAND, 1933

Gibsoniela mandubé (Woodland, 1935) gen. n.

syn. : **Anthobothrium mandubé** Woodland, 1935

Host : **Ageneiosus brevifilis** (Cuvier & Vallenciennes)

Geographical distribution: Manaus, Amazon River and S. João, Mato Grosso (new geographical distribution).

Col. BM (NH) numbers, 2.23.18-23 and 2.23.24-26

Col. IOC numbers 3702 and 32.090 a-b.

Woodland (1935) placed this species in **Anthobothrium** due to the peculiar form of the scolex which he thought was similar to the bothridia of Tetraphyllidea, particularly to **Onchobothrium**, but without the characteristic hooks of this genus.

Examination of the types of **G. mandubé** and the specimens deposited in IOC Helminthological Collection showed that their suckers superficially resemble the bothridia of Tetraphyllidea (Fig.2), they are long and trilobulate (not triloculate) but this character is not easily seen in most specimens, even by stereoscan microscopy. The lobes can be seen only in very good specimens. The sucker muscles are therefore very weak, unlike those in **Onchobothrium.**

It is very necessary also to point out that **Endorchis mandubé** Woodland, 1935, described from the same host (**Ageniosus brevifilis**) has also distinctly trilobulate suckers (Fig.3); it could be a synonym of **G. mandubé**, but this can not be confirmed because the material in BM (NH) is not in good condition.

Brooks (1978) preferred to utilize the name triloculate for this kind of sucker in proteocephalids, but true loculi are only found in Tetraphyllidea.

The segments are clearly proteocephalan in nature, but with some particularities. The vitelline follicles are mostly medullar, but some follicles can be seen in the cortical parenchyma, outside the well developed bundles of longitudinal muscles which demarcate the cortex and the medulla (Fig. 4).

As already observed by Woodland (1935), **G. mandubé** constitutes a transitional species in terms of the distribution of the vitelline follicles between the Proteocephalinae which have medullary vitelline follicles and Zygobothriinae in which the follicles are cortical. If the scheme of Freze (1965) is followed, it is necessary to propose an intermediate subfamily; however the taxonomic value of the distribution of the vitelline follicles is not clear; Freze (1965) pointed out that the vitelline follicles vary in position in groups of proteocephalids. A Zygobothriinae, **Nomimoscolex dorad** (Woodland, 1934) Freze, 1965 (described by Woodland as **Myzophorus dorad**) has the following generic diagnosis: "The vitellaria in the largest worm lie distinctly external to the principal logitudinal muscle-band, forming indistinct crescent in transverse section, but in many of the smaller worms some vitellaria follicles lie inside the bands". Some follicles are therefore medullary. This characteristic was not figured by Woodland, but was pointed out by Freze (1965). Consequently, the distribution of the

vitelline follicles is not significant at family level, so this species is provisionally placed in Zygobothriinae.

Trilobulate suckers seem to of generic significance; this character is not found in other species of proteocephalids. I propose the genus **Gibsoniela**, whose diagnosis can be improved with new species to described, is as follows: Scolex small with four elongate suckers and weak musculature, trilobulate. Scolex wider than neck. Segments wider than long, except terminal ones. Reproductive system entirely medullary except for the vitellaria, which are partly cortical and partly medullary. Ovary a thin, elongate, band of tissue. Longitudinal muscles of proglottis well developed.

Gibsoniela is named in honour of Dr. David Gibson, head of Parasitic Worms Section, British Museum (NH).

BRAYELAINAE new subfamily

Brayela karuatayi (Woodland, 1934) den. n.

Syn.: **Anthobothrium karuatayi** Woodland, 1934

Host: **Glanidium** sp

Geographical distribution: Manaus, Amazon River, Brazil

Col. BM (NH) numbers, 2.23.13-17

Woodland (1934) got only two specimens, one mature. The host was tentatively identified by him as **Glanidium**, a fish on which we have no data.

This species of proteocephalids is characterized by its scolex, each sucker is two compartments, with the aspect of eight suckers, but only four are opened (Fig. 5, 6); consequently one lobe is open and other is closed to the exterior. This character was well described by Woodland. Another important character is the uterine tube; as described by Woodland the uterus does not form lateral diverticula (outgrowths), but remains narrow and when full of eggs, splits longitudinally to liberate the eggs(Fig.7).

The proglottids are of proteocephalid type. Longitudinal muscles are inconspicuous and so the cortex and medulla cannot be well distinguished, nevertheless, I consider the genital system to be medullary.

Suckers divided into loculi are not rare in proteocephalids; in **Crepidobothrium** for instance, we can observe the beginning of septation of acetabula. The sections of **Brayela karuatayi** confirmed the division of each sucker (Fig. 6). In **Peltidocotyle** and **Goezeella** bi-loculate suckers also occur, although they are totally different from the species, **B. karuatayi**.

Concerning the morphology of uterus, according to Freze (1965), something similar also occurs in **Spasskyelina**; In this genus the uterus has few developed diverticula.

I assume that in **B. karuatayi** the reproductive system is enterely medullary; according to this character is could be placed in Proteocephalinae, but it can be distinguished from this subfamily by the uterus (that does not from lateral outgrowths). So is will be necessary to raise a new subfamily and a new genus. We propose Brayelainae characterized by the uterus without lateral diverticula; and the genus **Brayela** by its

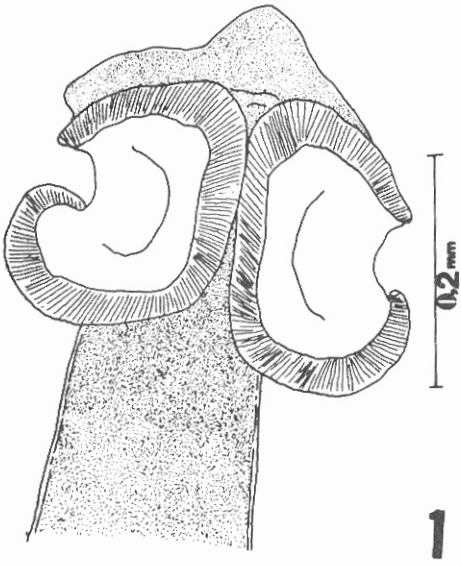

Fig. 1 - **Proteocephalus piramutab** (Woodland, 1933) comb. n. Scolex (from Woodland, 1933).

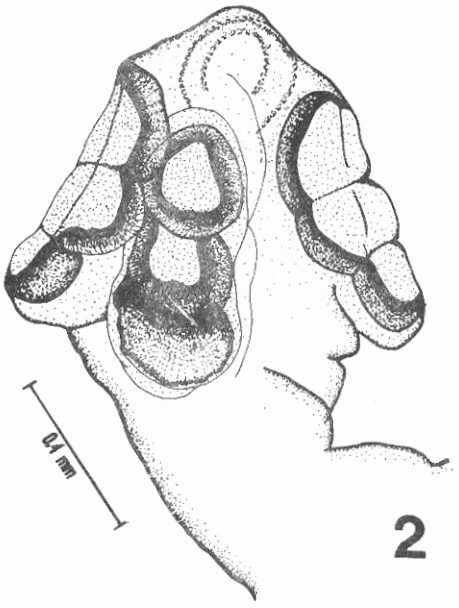

Fig. 2 - **Gibsoniela mandubé** (Woodland, 193 gen. n. Scolex with trilobulate suckers.

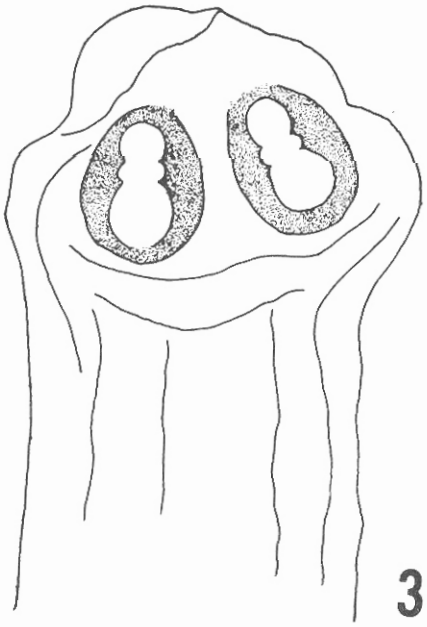

Fig. 3 - **Endorchis mandubé** Woodland, 1935. Scolex (probably trilobulate). From Woodland, 1935.

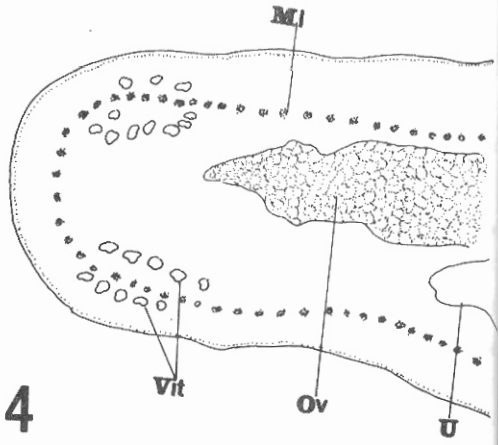

Fig. 4 - **Gibsoniela mandubé** (Woodland, 1935). Section of segment: M.l. = longitud muscles; Vit = vitellaria; Ov = ova u = uterus (from Woodland, 1935). S vitelline follicles in the cortex.

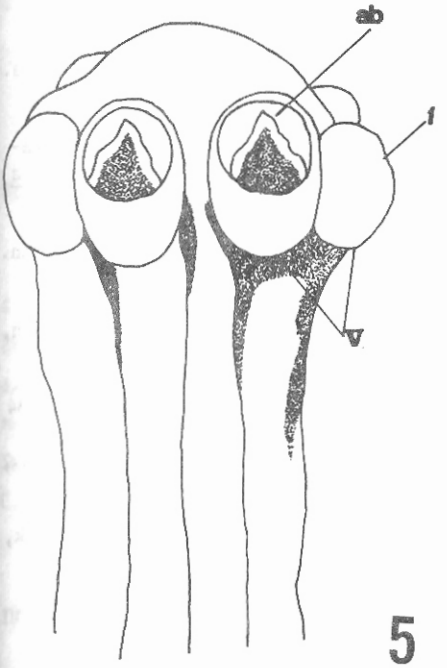

Fig. 5 - **Brayela karuatayi** (Woodland, 1934) gen. n. Scolex. ab = open; f = closed; V = sucker (from Woodland, 1935).

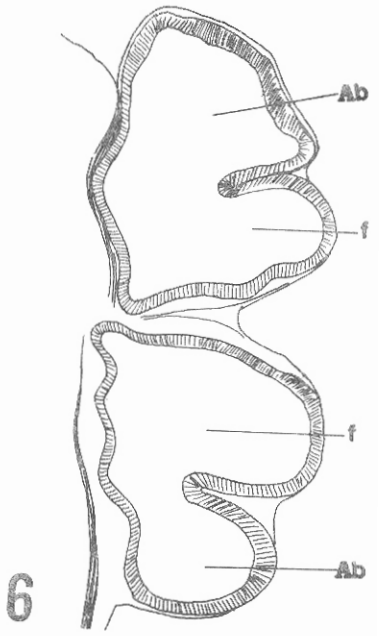

Fig. 6 - **B. karuatayi.** Section of suckers, Ab = open; f = closed (from Woodland, 1935).

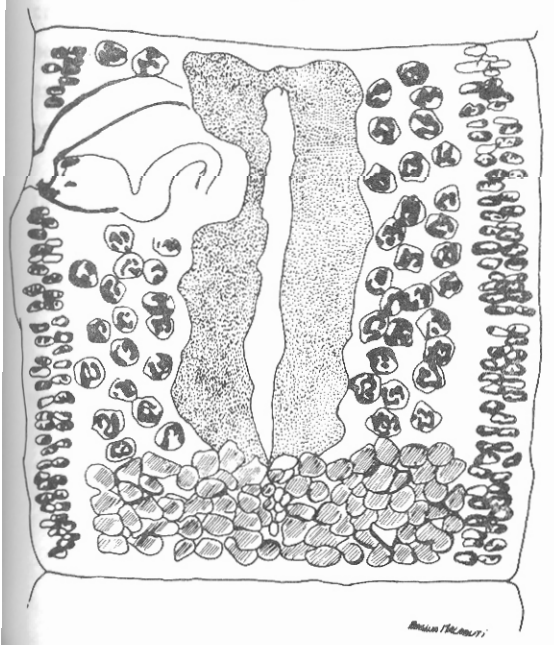

Fig. 7 - **B. karuatayi.** Gravid segment. Note the uterus without diverticula (from Woodland, 1935).

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