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Recurrent attachment of *Batrachobdelloides tricarinata* (Rhynchobdellae: Glossiphoniidae) on Cichlids in an Undisturbed Lake, Southeast, Nigeria

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Abstract
The information on the attachment pattern of *Batrachobdelloides tricarinata* on fish hosts and specificity to individual fish hosts in different aquatic ecosystems has little information in Tropical Africa. Its attachment frequency on cichlid individual species in the present study indicated possible infection specificity on cichlid hosts despite presence of other potential fish hosts that equally maintain abundance in a tropical freshwater Lake that was studied during its long period of fallow with little or no anthropogenic disturbance. There was active relationship between season (wet and dry) and depth (2.18±0.60 m) of the Lake. Whereas more collection was recorded during dry season months with highest attachment on *Tilapia zillii* 9.48%, rainy periods had lower collection percentage, which coincides with relatively higher depth. The estimated 69% of this annelid parasite with body dry weight (0.08 ± 0.05 g) were collected from the cichlids out of which *Tilapia zillii* (45%) had the highest recurrent attachment of the parasite and highest percentage collection 11(9.48%) in dry season months.

Keywords: Depth of aquatic reservoir, season, *Batrachobdelloides tricannata*, freshwater Lake

1. Introduction
Most named records of Glossiphoniid leeches from African fish and many of those found free in the habitat have been proven to be the same with *Batrachobdelloides tricannata* [1]. Although, *B. tricarinata* has been induced experimentally to feed on hosts of diverse fish families; *Clarias* spp., *Bagrus* spp., *Oreochromis* spp. *Barbus* spp. goldfish and *Protopterus aethiopicus* [1], under natural conditions *B. tricarinata* of a given geographical region would show preference to feed on a particular host [2].
However, hitherto in Africa there is no record of leeches' specificity on fish hosts.
B. tricarinata although not considered a serious parasitic problem, plays damaging roles at facilitating secondary infections of both micro and macro - parasites. For instance, in most cases, skin ulcerations caused by ecto-parasites are secondary affected by microorganisms [3]. On the other hand, the rife and heightened curiosity owning to heavy concomitant clinostomatid infections with serious debilitating effects and occasional deaths pertinent to the cichlids, which are commonly caught species in the Lake is perhaps facilitated by these Annelids [4]. Nevertheless, frequent clinostomatids infections occurred during habitat contraction of dry season months when chances of contact between the hosts and the larvae was relatively higher [4, 5]. Similarly, in places where increased human activities are much around water bank and enormous and indiscriminate influx of refuse could support such infection when appreciable volume of the aquatic reservoir is reduced through inducing stress [6, 7]. Stress can permanently affect the organism by increasing the corticoid hormone production of the adrenal gland. The corticoids block the protective mechanisms of the fish phagocytosis and immune responsiveness, thereby making the fish prone to parasitic infections [8].

Materials and Methods
Opi Lake is a tropical freshwater Lake (GPS N06.75275*, E007.49104*) in the valley about 300 meters from Uhere River, Northeast of Nsukka, Enugu State, Nigeria. The Lake is seasonally flooded during wet season and habitat contraction during dry season months. The depth was determined monthly according to details in [9]. The adjoining vegetation mainly

composed of deciduous plants of the Lake area have been studied [10]. Nevertheless, this Lake appears a better understanding due to its undisturbed situation and fallow for many years sequel to road cut by erosion to its site. This period of fallow naturally encouraged infection of only cichlids by these Annelids despite the presence of other fish hosts that constitute fish composition of the Lake.

Five different fish species were caught during this one year survey using multiple fishing gear (cast nets, hook and line and seine nets (150 mm – 200 mm) and metal boat paddled by two field assistants (Length = 13 feet 3 inches, Width = 3 feet 2 inches and Height = 1 foot 10 inches), monthly (November 2007 – October 2008). The fish composition of the Lake caught includes *Sarotherodon melanotheron*, *Tilapia zillii*, *Tilapia guinensis*, *Parachana obscura*, and *Clarias gariepinus.* They were identified based on the details in [11]. The fish were examined for the presence of *B. tricarinata in situ*. The other collections were made from the net of those that were not attached on the fish hosts immediately after they were caught. The monthly abundance was calculated and the recovered *B. tricarinata* were measured to nearest 0.01 cm and 0.01 g to determine the length parameters and weight using meter rule and electronic weighing balance respectively.

Results

Out of the five commonly caught fish samples of Opi Lake; *Tilapia guinensis* (n = 206), *Sarotherodon melanotheron* (n = 177), *Chana opuschuria* (n = 42), *Clarias gariepinus* (n = 36) and *Tilapia zillii* (n = 392) constituting commercially important fish resource, the *Tilapia zillii* had the highest collected number of samples whereas *Clarias gariepinus* had the least.

The overall collection rate indicates that the cichlids were collected more than the other two fish samples of *Chana opuschuria* (n = 42) and *Clarias gariepinus* (n = 36). The infection rate shows that besides more infection of the cichlids generally, the *Tilapia zillii* (n = 392) in particular had highest level of infection of the *B. tricarinata* while *Parachana obscura* and *Clarias gariepinus* sampled were not infected by the leeches.

For instance, the total 168 *B. tricarinata* were collected, 116 were collected from the skin of the Cichlids as follows: *Sarotherodon melanotheron* (28), *Tilapia zillii* (77), and *Tilapia guinensis* (11)) whereas 52 were not attached to any host during the collections but were collected from the sampling net. Consequently, There was 69% of *B. tricarinata* recovered from the cichlids out of which *Tilapia zillii* (45%) had the highest recurrent attachment of *B. tricarinata* and highest collection 11(9.48%) in January 2008 whereas *Sarotherodon melanotheron* had the lowest with no collections in May, June, September, and October 2007.

The leech had body dry weight (0.08 ± 0.05 g), anterior sucker (0.31 ± 0.11cm), posterior sucker (0.15 ± 0.05 cm), body length (2.55 ± 0.75 cm), and body width (0.61 ± 0.17 cm).

The % collection between wet and dry season months showed that more collection of *B. tricarinata* occurred during dry season months when there was habitat contraction and low collection during rainy season months when the floodplains were full and the value for depth (2.18±0.60 m) was comparatively higher. % collection of leeches in *Tilapia zillii* had the highest value in January 9.48 as the highest recorded % collection values whereas *Sarotherodon melanotheron* and *Tilapia guinensis* had 2.59 in December and 5.17 in November, all in dry season months when the habitat had contracted and volume of the Lake had reduced respectively (Figure 1).

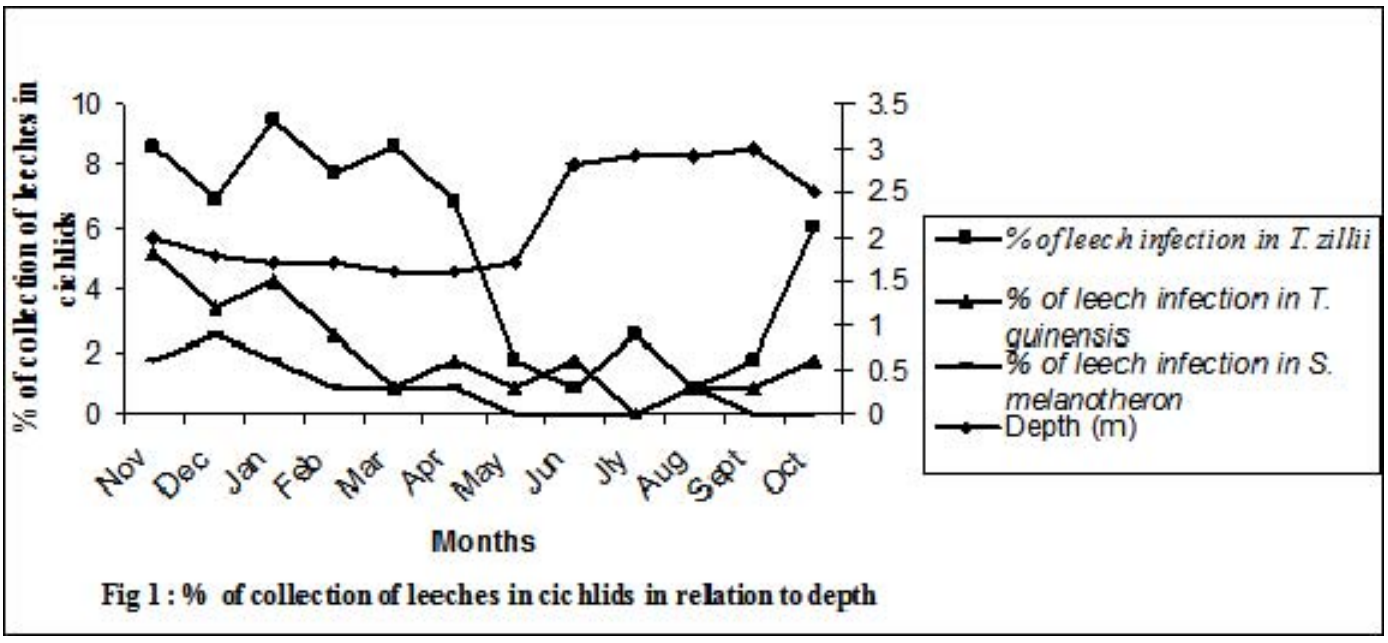

Fig 1 : % of collection of leeches in cichlids in relation to depth

Discussion

Leeches in non-salmonid fishes are probably the most important pathogenic organisms to whom they cause mortalities in Africa. In most cases however, lesions caused by ecto-parasites are secondary affected by microorganisms [3]. Ecto-parasites species have been found to be either host specific or ubiquitous and opportunistic [8]. Besides, infecting more *Tilapia zillii*, it also had the highest level of clinostomatid infections more than the other two cichlids, which may have been encouraged by the infection of the leeches [4]. Ecological determinants of host specificity are intricate to remove from other ecological factors. It may include local environmental conditions, the geographic range of utilized hosts, or host body mass [12]. The present study revealed that under a natural condition where the cichlids have large number *B. tricarinata* would attach more to the cichlids regardless of the presence of other fish hosts. All the same, it means that infection to other hosts in any other aquatic

ecosystems could be due to where there are higher host populations other than cichlids and human disturbances of the aquatic ecosystems as well.

Nevertheless, a similar experience, was recorded in East Africa where only 8 out of 16 different fish hosts harboured different parasites in aquatic ecosystem that is not always disturbed due to official restrictions. Similarly, complimentary differential host type specificity existed among the infected species where out of the infected 8 fish hosts only *S. sutor* was the most heavily infected with helminth parasites whereas *Sardinella* and *Leptoscarus* indicated the major hosts to external parasites [13].

Although, the species of *Tylodelphys* spp. have large population size and infect both freshwater and marine fish according to [14], however, the large number of *Tylodelphys* spp. in the Lake Naivasha infected other studied fish hosts with the exception of the similarly abundant *Barbus paludinosus* [15].

The wounds caused by these parasites on the skin of these cichlids are sources of heavy blood loss by these hosts and could serve as secondary infection path for other parasitic agents such as *Clinostomum* metacercariae, micro-parasites etc.

The parasites that infect their hosts generally or specifically either increase or reduce the host range, which is the representation of their mutual co-existence [16, 17]. Proportion of affected hosts may be a yardstick to evaluate hosts prone to infection due to both genetic and environmental factors [18].

Although, host specificity is equally important compared to body size and ability to reproduce, it is an established intricacy to measure the parameters for reasonable assessment between species [19].

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