Distribution Pattern of the Fresh Water Invertebrate Biota of Ago-Iwoye, Nigeria

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Abstract: Studies on streams of Ago-Iwoye have been specialized. Onabamiro (1951) identified *Cyclops* as the vectors of dracontiasis, a water-borne disease prevalent at that time. Other studies have focused on specific diseases. These include the baccalaureate project works of Onasanya (1987) on the bacteria, Okunoren (1987) on the fungi and Siwoku (1986) on the snail vectors of Schistosomes. Toyobo's baccalaureate project work (1990) was on the habitat factors of the streams. The distribution of pelagic & benthic invertebrates and those associated with submerged vegetation were studied by using an improvised plankton net to take water samples once every month for nine (9) months, from seven (7) sampling locations in Ago-Iwoye, a fast developing University town in the South-West of Nigeria. In decreasing order, pelagic samples yielded more invertebrates than benthic and submerged vegetation samples. The ponds yielded so much more invertebrates than the streams. Analysis revealed that the aquatic organisms are of high population density during the dry season and low population density during the wet season. Forty-eight (48) genera were obtained, thirty-two (32) of which were identified. The Brachionidae Family showed the greatest diversity while the Cyclopidae Family showed the greatest abundance.
[Agboola OA, Owa SO. **Distribution Pattern of the Fresh Water Invertebrate Biota of Ago-Iwoye, Nigeria.** *Nat Sci* 2013;11(5):6-9]. (ISSN: 1545-0740). http://www.sciencepub.net/nature. 2

Keywords: Pelagic; benthic; plankton; diversity

1. Introduction

Water, like air, is vital to man. Stream water is dear to inhabitants of Ago-Iwoye, a town in South-West Nigeria because of many reasons. Pipe borne water is limited in its distribution, short-lived and erratic in flow and often contains sediments. This makes these streams and ponds very important source of water. Many of the inhabitants are un-informed about water quality. As a result, the stream water in these places is used for general purposes. It is taken for direct drinking, washing of clothes and plates, etc. Some harmful organisms get dried on the plates and bowls which are used in taking garri, their staple food, which is eaten raw. To such inhabitants a stream is clean if particulate matters cannot be seen with the unaided eyes.

Studies on streams of Ago-Iwoye have been specific on particular organisms. Onabamiro (1951) identified *Cyclops* as the vectors of dracontiasis, a water-borne disease prevalent at that time. Other studies have focused on specific diseases. These include the baccalaureate project works of Onasanya (1987) on the bacteria, Okunoren (1987) on the fungi and Siwoku (1986) on the snail vectors of Schistosomes. Toyobo's baccalaureate project work (1990) was on the habitat factors of the streams.

This study is a checklist of the aquatic invertebrates of the streams and aimed at detecting what species are present so that their real and potential dangers to water consumers may be assessed.

2. Materials And Methods

Ago Iwoye is a fast growing University town in the Ijebu-North Local Government Area of Ogun State in the South-West of Nigeria, lying within the geographical coordinates 6° 57' 0" North and 3° 55' 0" East. Seven sampling sites were selected representing three types of water bodies.

Type 1 comprises of two ponds. One was located about 200 meters before the University Mini Campus when coming into the town. It was an artificial fish pond with about 7, 200 sq. meter surface area, 11% of which was covered with vegetation. An auto mechanical workshop was situated along the length, from where black oil and other dirt were washed into pond. The workers washed themselves into the same pond at the close of work daily.

The second pond was situated along Onabamiro street, not very far from the mini campus. It was a smaller artificial fish pond of about 80 sq. meter surface area. Three trees overshadowed it and provided some form of shade over the surface of the pond. Fed by a brook, the pond had an open outlet. Its surface was kept vegetation free. Water was occasionally drawn from it for laundry; the soap water was usually thrown within its catchment basin but not directly into it.

Type 2 was a stream sampled at two locations C and D. Location C was at the upper part of the stream. Location D was situated within the densely populated residential area, adjacent to a local abattoir.

Type 3 comprised of small water bodies which were seasonal. One of these was a drainage channel which drained residential quarters. It also received effluents from kitchen wastes, thus was rich in organic components.

The second in this group was a fairly wide portion along a very slow seasonal stream. It was surrounded with vegetation and supported fingerlings. At an upper part of this stream, about 12 meters to the site of sampling, there was a refuse dump.

The third in this group was along a major road which led back to the mini Campus. The sample portion was found adjacent a residential estate fully occupied by students. It was also seasonal. Occasionally, cars were washed very near it and the dirty water indirectly drained back into the stream.

Collection at each of the sites was done at the beginning of each month from October to June. This was deliberately timed to span both the dry and rainy seasons.

Pelagic samples were collected using an improvised plankton net. It comprised of a metal circle of about 0.305m diameter, welded to a 1m length metal handle. To this metal frame, an untreated cotton mosquito net material was doubled and sown firmly to the metal frame. The base of the net was given an opening of about 1.8cm, giving the net material a cone shape. A specimen bottle of about 1.8cm neck was then firmly attached to the base of the net with the aid of rubber bands to withstand water pressure during sampling. The net material, being an inextensible one, was chosen so that it will not extend under water pressure and so allow the sample organisms to escape.

The net, during each sampling, was held at the end of the metal handle and waded through water. The water passed out freely through the pores of the net but washed the aquatic organisms into the bottle at the base of the net. When brought out of water, the organisms would have accumulated with some water in the specimen bottle. Often, samples were collected both in the open water and at the edge where there was vegetation. Submerged vegetation was also collected in some cases, since some organisms live on them. Specimens collected were transferred into labeled specimen bottles to which stock formalin was added to make 5% concentration.

To collect the benthic samples, a medium sized *Bournvita* tin of about 800ml capacity was used as a bottom scrapper. Two holes were made on the opposite sides of the top of the tin and a string was tied to the tin. The tin was pulled along the bottom of the water. No formalin was added so that detection of organisms was easier and also aided studying them live.

The collection of the organisms associated with aquatic vegetation (leaf and stem), was simply done by hand. Formalin was not added to this either. This is in order to study them alive and for easier detection of organisms. The submerged vegetation collection was immediately put in metal tins containing water from the same source so that disturbance was highly minimized, if any.

The samples were studied under compound ordinary and dissecting microscopes in the laboratory. The pelagic samples were studied under the compound microscopes while benthic and submerged vegetation samples were studied under the dissecting microscopes.

The sample bottles containing the water samples were left standing for between 36 and 48 hours undisturbed. This ensured that the fixed planktons were allowed to die and settle at the bottom of the specimen bottles. This was done as an alternative to centrifuging to make an aggregation of the organism in as little amount of water as possible. After settling, the samples were carefully decanted, after which a dropping pipette was used to transfer a drop unto the glass slide with a cover slip for examination. The animals found were identified and photographed.

Identification of the organisms was done as discussed by Jeje (1986), Yoloye (1988), Newell & Newell (1979).

Table 1: Taxal composition of identified invertebrate biota of Ago Iwoye

Phylum	Class	Order	Family	Genius	Species	Sub-species
Chlorophyta	Chlorophceae		Desmidiaceae	*Arthrospira* *Staurastrum* *Hydra* *Closterium*	*jennir*	
Cyanophyta	Cyanophyceae Coelastraceae		Chroccoccacea	*Anacytis* *Ankistrodesmus* *Scenedesmus*		
Baccillanophyta	Bacillariophyceae		Pennatae Notonectidae	*Asterionella* *Gyrosigma* *Notonecta* *Notholca* *Navicula* *Cyclotella*		
	Actinopodea	Acantharia		*Accanthochiasma* *Alteria*	*fusiforme*	
	Zygnemataceae		Zygematoidea	*Genicularia* *Zygnema* *Synedra* *Pectinatella*		
Arthropoda	Crustacea	Cladocera	Sididae Noimidae	*Pseudosida* *Diaphanosoma* *Moinidaphnia*	*bidentata* *maclaeyi*	
		Copepoda	Cyclopidae	*Thermocyclops* *Thermocyclops* *Cyclops*	*neglectus* *bicolor* *fuscus*	
		Calanoida	Diaptomidae	*Calanus*	*finmarchicus*	
Rotifera	Monogononta	Ploimida Synchaetidae	Collurellidae Polyarthra	*Lepadella* *Vulgaris*	*patella*	
Rotifera	Monogononta	Ploinida	Synchaetidae Euchlanidae Brachionidae	*Polyarthra* *Filinia* *Brachionus* *Brachionus* *Brachionus* *Brachionus*	*dolicoptera* *longiseta* *falcatus* *calyciflorus* *calyciflorus* *calyciflorus*	*falcatus* *anuraeiformis* *amphicerous*
TAXAL COMPOSITION OF THE LARGE INVERTEBRATE						
Mollusca	Gastropoda	Prosobranchiata	Pilidae	*Lanistes*	*libycus*	
Annelida	Hirudinea	Gnathobdellae	Hirudae	*Hirudo* *Geris*	*medicinalis*	

3. Results

The plankton collected and fully identified included thirty-two (32) genera. The large invertebrates collected belong to three (3) genera. Sixteen (16) organisms are un-identified.

The check-list of the plankton is presented in table 1, with their classification.

Table 2: Distribution of Organisms According to Their Micro-habitats in Sampled Streams

MICRO-HABITATS	ORGANISMS	DISTRIBUTION
Benthic	*Spirogyra* *Arthrospira jennir* Blue-green Algae	Common Rare Very common
Sub-merged Vegetation	*Hydra sp.* *Dero sp.*	Common Rare
Pellagic	*Lanistes libycus* *Hirudo medicinalis* *Dero sp.* *Gerris sp.*	Common Rare Rare Rare

Table 3: Distribution of Organisms According to Their Micro-habitats in Sampled Ponds

MICRO-HABITATS	ORGANISMS	DISTRIBUTION
Benthic	Amoeboid forms Aquatic insects Algae *Hydra sp.* Chlorophyceae Family	Very Common Common Common Very Common Common
Sub-merged Vegetation	*Hydra sp.* Eggs *Lepadella patella* Insects	Common Common Rare Rare
Pellagic	Family Culicidae (larvae) Gerris sp. *Lepadella patella* *Hydra sp.* Family Sididae Family Brachionidae Family Filinidae *Calanus finmarchicus* (Nauplius & Meta-nuplius) *Calanus sp.* Family Cyclopidae Family Pennatae Family Synchaetidae Family Palingeniidae Order Acantharia Family Chlorophyceae Family Cyanophyceae Fingerlings *Bosmina sp.* *Eubranchipus sp.* *Gyrosigma sp.* *Arthrospira jennir* *Genicularia sp.* *Baetis sp.* *Bufo sp.* (tadpole)	Common Rare Very common Common Common Very Common Common Very Common Common Common Very Common Common Common Rare Very Common Very Common Rare Rare Rare Common Rare Common Common Common

KEY: Distribution, in the context of this work, does not depict spatial arrangement but the frequency of encountering the organisms in the course of the work in their micro-habitats. Samples were collected a total nine times (once monthly), the organisms encountered between 7 and 9 months are said to be very common, 4 to 6 are termed common while those found between 1 and 3 months are said to be rare.

Discussion

Of all isolated plankton, the most abundant were Brachionidae, Sididae, Collurellidae and Diapptomidae families but the group with the greatest diversity in the Cyclopidae family. This finding agrees with the findings of Onabamiro (1951) who traced dracontiasis to the *Cyclops* and inferred that the prevalence of the disease was due to the abundance of the *Cyclops*.

There is also a wide similarity between the results of this work and that of Jeje & Fernando (1986) in the abundance and diversity of the Brachionidae and Cyclopidae families.

The majority of the plankton, according to this work, stay rather permanently in the open waters where they feed. The Benthos is amoeboid. This work agrees with Lindberg (1950, 1951) who described Cyclopoid copepods from S.W Nigeria and with Onabamiro (1952, 1957) who described cyclopoids from western Nigeria. The fact that all these predecessors found *Cyclops* supports the assertion that the Cyclopidae family is very abundant and diversified.

The major divisions in the taxal composition provided in this work are the same as provided by Imevbore (1965) in his checklist of organisms of the Eleyele reservoir. Five phyla were represented in the small invertebrates while the large invertebrates were in two phyla. Of all these phyla, Baccillanophyta yielded the most members.

In comparison, the ponds yielded so much more organisms than did the streams. The sampling was done in three ways, namely benthic, pelagic and submerged vegetation.

In the streams, most of the organisms in the pelagic samples were in the *rare* category. In all, five of the nine organisms were in the rare category. There was no major difference in the number of organisms in the three different sample areas.

In the ponds samples, the three areas yielded more organisms than in the streams samples. Of the 33 organisms extracted from the ponds samples, only eight are categorized as rare. The pelagic samples of the ponds yielded up to 24 organisms.

4. **Conclusion**

After the comprehensive identification of the planktons, the results indicated that the most abundant were Brachionidae, Sididae, Collurellidae and Diapptomidae families but the group with the greatest diversity in the Cyclopidae family. Of all the five families, Brachionidae showed the greatest diversity, while Cyclopidae showed the greatest abundance. The ponds also were found to be far richer in invertebrate biota than the streams of Ago Iwoye, with the majority of the organisms found in the pelagic zone. The submerged vegetation samples yielded the least.

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3/18/2013