



The Photographic Checklist of the Freshwater Chironomids of the Niger Delta, Nigeria

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Authors' contributions

This work was carried out in collaboration between both authors. Author JO designed the study, wrote the protocol and interpreted the data. Author JO anchored the field study, gathered the initial data and performed preliminary data analysis. Author MU managed the literature searches and produced the initial draft. Both authors read and approved the final manuscript

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ABSTRACT

A photographic checklist of the Chironomids under the subfamily Chironominae from the Niger Delta of Nigeria was compiled using records of specimens collected over a period of thirty years from many field trips. The photographic keys were described to show the cephalothorax with mentum, mandibles, premandibles and ventromental plates. A total of twelve illustrations, consisting of nine genera and twelve species, were documented. These were *Chironomus imicola*, *Chironomus transvaalensis*, *Endochironomus sp.*, *Parachironomus biannulatus*, *Parachironominae sp.*, *Limnochironomus sp.*, *Pseudochironomus prasinatus*, *Tanytarsus curticornis* and *Tanytarsus thienemanni*, *Paratanytarsus sp.*, *Microtendipes sp.*, *Pentapedilum sp.* Six of these species namely *Microtendipes sp.*, *Parachironomus biannulatus*, *Pentapedilum sp.*, *Pseudochironomus prasinatus*, *Tanytarsus curticornis* and *Tanytarsus thienemanni* occur in both lotic and lentic waters. Those that occurred only in lentic waters were *Chironomus imicola*, and *Parachironominae sp.*, while *Endochironomus sp.*, *Limnochironomus sp.* and *Paratanytarsus sp.* occurred only in lotic water.

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Three of the genera recorded in the literature of studies in the Niger Delta, namely *Chironomus*, *Pseudochironomus* and *Tanytarsus*, are in the current description while new genera to the literature of the Niger Delta were *Parachironomus*, *Endochironomus*, *Limnochironomus*, *Paratanytarsus*, *Microtendipes* and *Pentapedilum*. This current contribution to the taxonomy of the Chironominae provide the basis to further study the associations of taxa and how well these associations can be used for selecting indicators for biomonitoring and conservation.

Keywords: *Chirominids; chironominae; Niger Delta; lentic; lotic; ecology.*

1. INTRODUCTION

The Chirominidae, a large Dipterian family with predominantly immature stages, are one of the best bioindicators of water quality in freshwater habitats. They are one of the most ubiquitous of all the macrobenthic invertebrate groups in the tropics [1-4]; and they occupy a sensitive position in the food chain of the aquatic environment as they serve as food sources to other higher vertebrate and invertebrate. Currently documented evidence of the Chirominid fauna of the Niger Delta is scattered in some publications [5-11]. This information is unique to few freshwater rivers and streams in the western Niger Delta. Several studies have investigated benthic invertebrate communities in specific rivers, namely Anambra River [12], and Ogba River [13]. In most of these studies, invertebrates have been identified to family level, and occasionally genus, [14], but this article goes beyond the previous to identify some of the organisms up to the species level. To support and enable effective water quality management in a wide range of freshwater systems in the Niger Delta, much taxonomic work on the Chirominid taxa is required. In this paper, we present photographic illustrations of Chirominids to complement existing taxonomic studies, providing a fast and mostly visual identification of this group in the Niger Delta.

2. MATERIALS AND METHODS

Chironominae larvae were collected from different substrates with different sizes of pond nets to fit the substrate. Samples were preserved in 75% alcohol. The samples were mounted on slides and identified up to species and/or genus level, using key materials published by [15-20]. Optimal photographic results were obtained using a Brunel digital microscope (DN-117M) equipped with a Camera system. Photographs were taken with ScopelImage 9.0 software, allowing automated retention of focused parts

and a sequence of exposures at different focal depths.

3. RESULTS

The illustrated taxa consist of twelve species belonging to the subfamily Chironominae. The twelve species were *Chironomus imicola*, *Chironomus transvaalensis*; *Endochironomus* sp., *Parachironomus biannulatus*; *Parachironominae* sp.; *Limnochironomus* sp.; *Pseudochironomus prasinatus*; *Tanytarsus curticornis*, and *Tanytarsus thienemanni*; *Paratanytarsus* sp.; *Microtendipes* sp.; *Pentapedilum* sp. The genera of *Tanytarsini* and the *Chironomini* have two species and can be separated by the shape of ventromental plates. The rest of the taxa belong to a genus. The illustrated taxa were found in either lotic or lentic systems while some were found to occur in both systems. Three species, namely *Chironomus imicola*, *Chironomus transvaalensis* and *Parachironomus* sp. were found in lentic systems (standing water) while species, *Endochironomus* sp., *Limnochironomus* sp. and *Paratanytarsus* sp. were found in lotic systems. Six species namely *Microtendipes* sp; *Parachironomus biannulatus*; *Pentapedilum* sp; *Pseudochironomus prasinatus*; *Tanytarsus curticornis* and *Tanytarsus thienemanni*, occurred in both lotic and lentic systems.

3.1 Species Descriptions

Chironomus imicola (Plates 1.0 - 3.0) is unique and easily recognizable with a mandible that has pectin mandibularis. A premandibule is present with no premandibular brush but with apical teeth (Plate 1.0). The ventromental plates are subtriangular and more widely separated medially. The mentum is toothed with the fifth tooth bifid and the median tooth trifid. Larvae were found in organically enriched lentic environments.

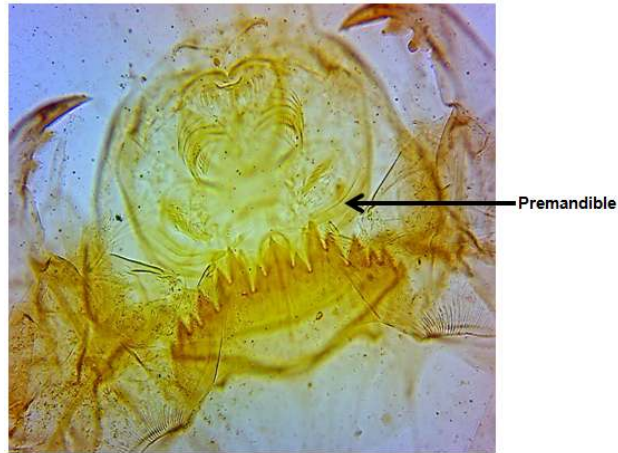


Plate 1.0. Premandible of *Chironomus imicola*

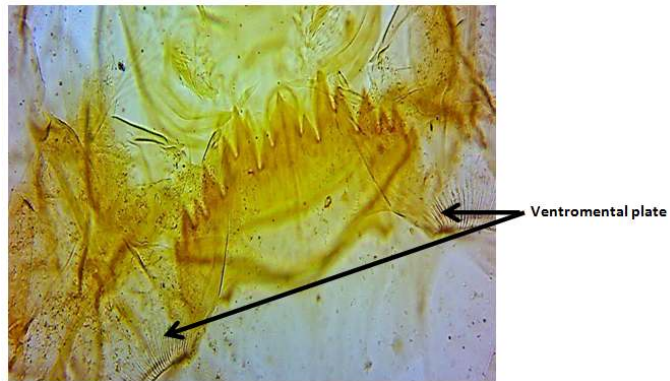


Plate 2.0. Ventromental plate of *Chironomus imicola*

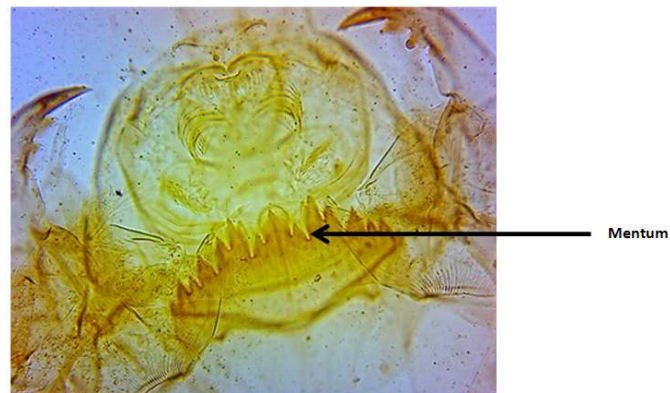


Plate 3.0. Mentum of *Chironomus imicola*

Chironomus transvaalensis (Plates 4.0 -6.0). The species has six lateral teeth on the mentum in decreasing length from the median to the end of the mentum. There were no bifid and trifid teeth on the mentum. The premandibles are with

apical teeth but without a premandibular brush. The outer base of the mandible has no outer striations. Larvae were often found in organically enriched aquatic environments, both lotic and lentic.

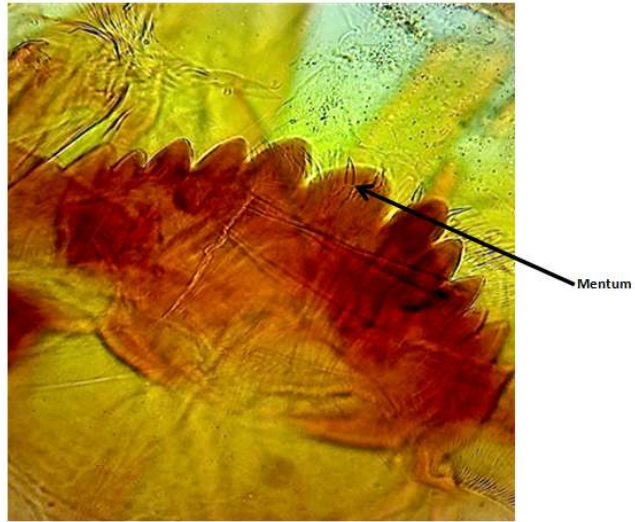


Plate 4.0. Mentum of *Chironomus transvaalensis*

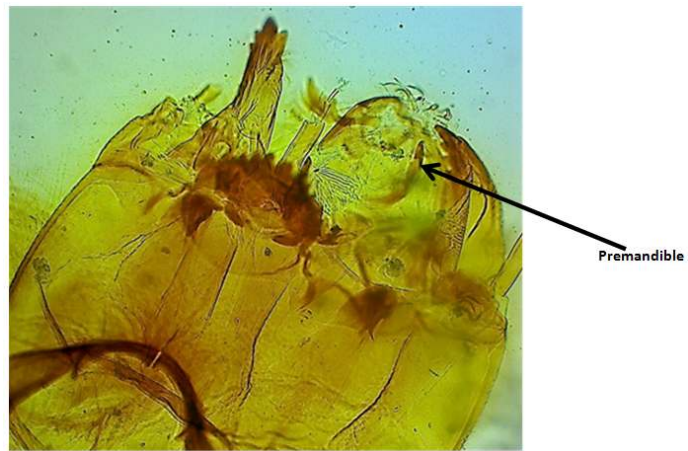


Plate 5.0. Preamandible of *Chironomus transvaalensis*

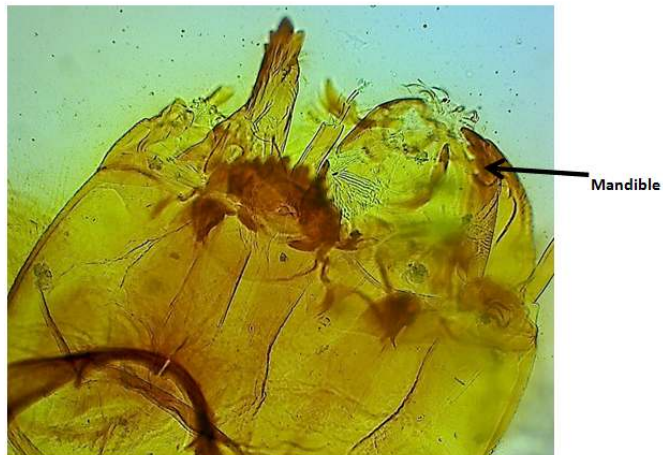


Plate 6.0. Mandible of *Chironomus transvaalensis*

Parachironomus biannulatus (Plates 7.0 – 9.0). The ventromental plates are crenulated and widely separated. The mentum have seven pointed lateral teeth and one median tooth on the same focal plane. The mandible has a long apical tooth.

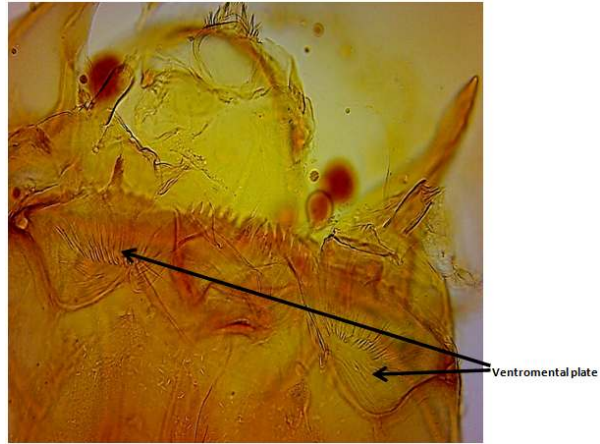


Plate 7.0. Ventromental plate of *Parachironomus biannulatus*



Plate 8.0. Mentum of *Parachironomus biannulatus*

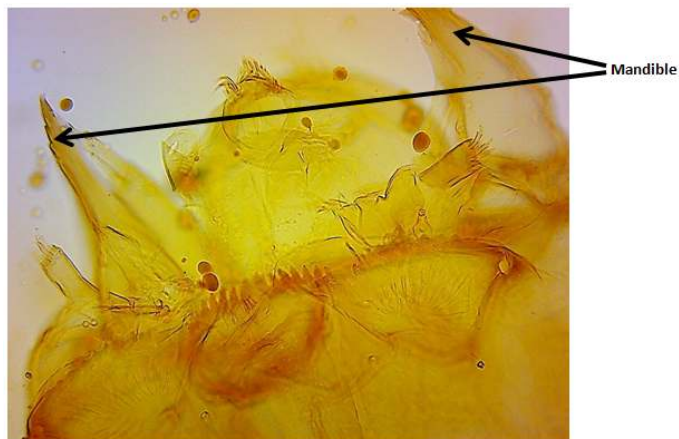


Plate 9.0. Mandible of *Parachironomus biannulatus*

Endochironomus sp. (Plates. 10.0 – 11.0). The species has a mentum with seven median teeth and the two middle ones fused together. The first lateral is bigger than all other laterals while the fifth lateral is smaller than the fourth and sixth teeth. The seventh lateral tooth on the mentum is curved outside. The ventromental plates are lobed at the end with lines from the first lateral tooth to the ventromental plate.

Larvae were found in oxygen rich lotic environments.

Limnochironomus sp. (Plates 12.0 – 13.0). The mentum has a single round median tooth with the six laterals. The first lateral is bifid. Ventromental plate is widely separated medially. Larvae were found in oxygen rich lotic environments.

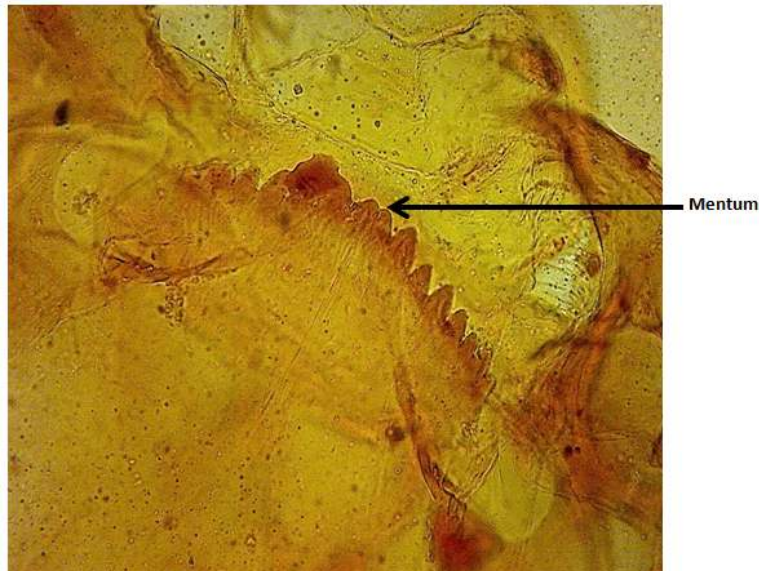


Plate 10.0. Mentum of *Endochironomus sp.*

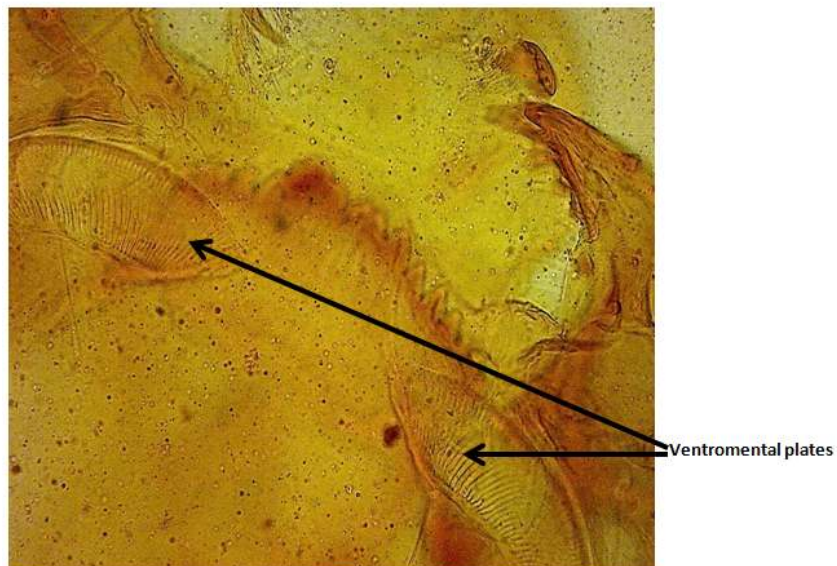


Plate 11.0. Ventromental plates of *Endochironomus sp.*

Pseudochironomus prasinatus (Plates 14.0 – 16.0). There are six lateral teeth and a median tooth on the mentum that are not on the same focal plane. The second lateral tooth is very short and slightly pressed to the first lateral tooth. The ventromental plates are semilunar, meeting at the midline. The mandible has one apical tooth and four inner teeth. Larvae were often found in both lotic and lentic environments.

Tanytarsus thienemanni (Plates 16.0 – 18.0). The median tooth on the mentum is bigger than

the six lateral teeth. The mandible has two inner teeth. The ventromental plate is slightly curved and pointed towards the midline. Larvae were often found in both lotic and lentic environments.

Tanytarsus curtitiomis (Plates 19.0 – 21.0) - has a large dorsal tooth on the mandible with two inner teeth. The mentum has one median and five lateral teeth. The median and the lateral teeth are on the same focal plane. The ventromental plates are semilunar, meeting at the midline. Larvae were often found in both lotic and lentic environments.

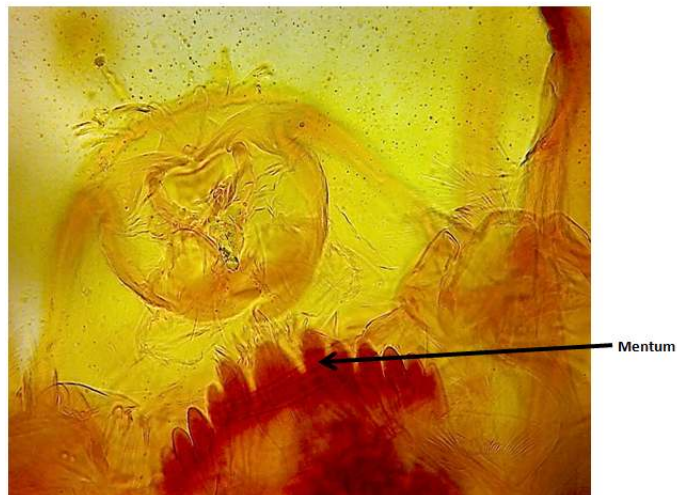


Plate 12.0. Mentum of *Limnochironomus* sp.

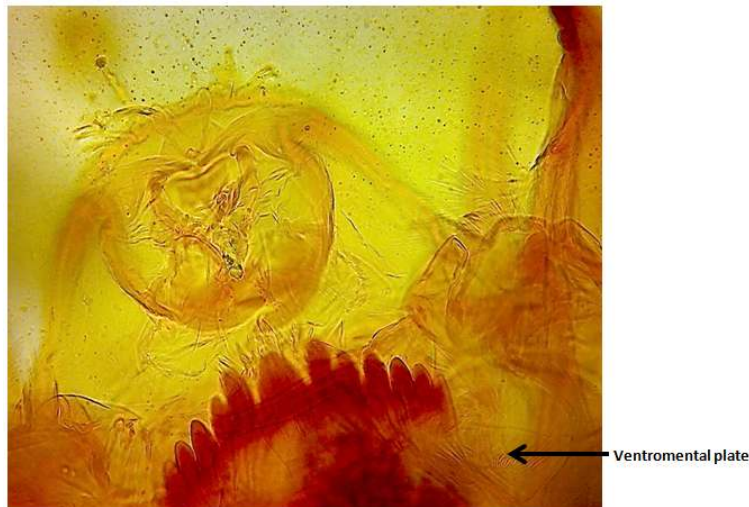


Plate 13.0. Ventromental plate of *Limnochironomus* sp

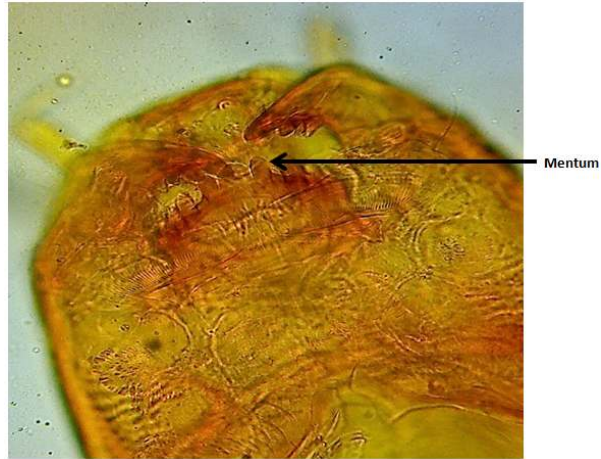


Plate 14.0. Mentum of *Pseudochironomus prasinatus*

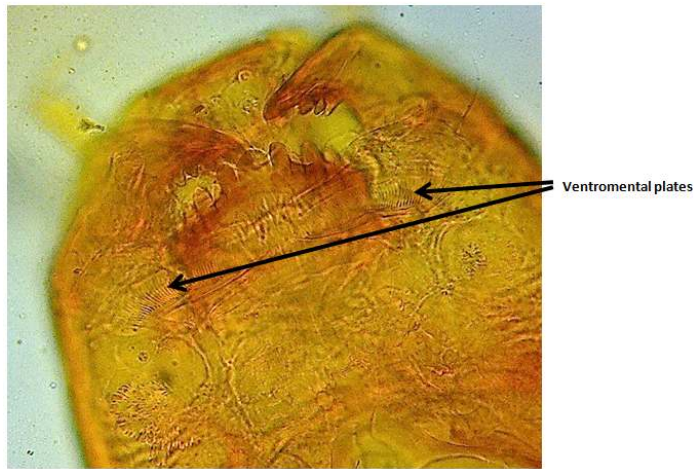


Plate 15.0. Ventromental plates of *Pseudochironomus prasinatus*

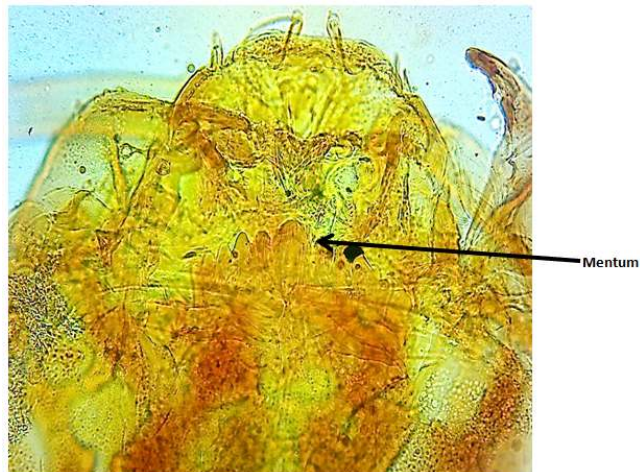


Plate 16.0. Mentum of *Tanytarsus thienemanni*

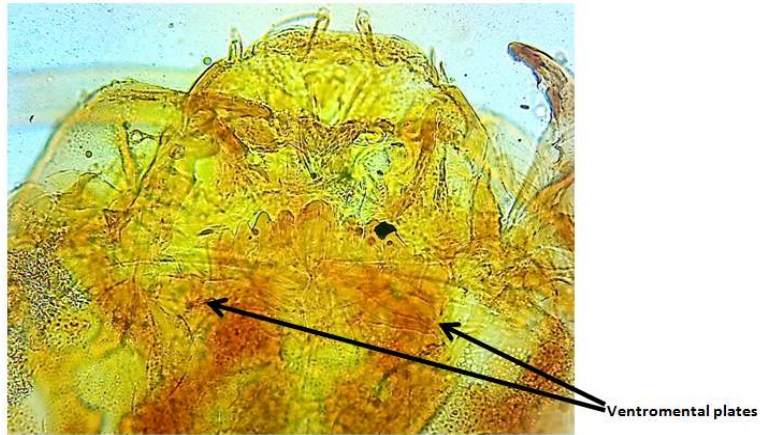


Plate 17.0. Ventromental plates of *Tanytarsus thienemanni*



Plate 18.0. Mandible of *Tanytarsus thienemanni*



Plate 19.0. Mandible of *Tanytarsus curtitiomis*

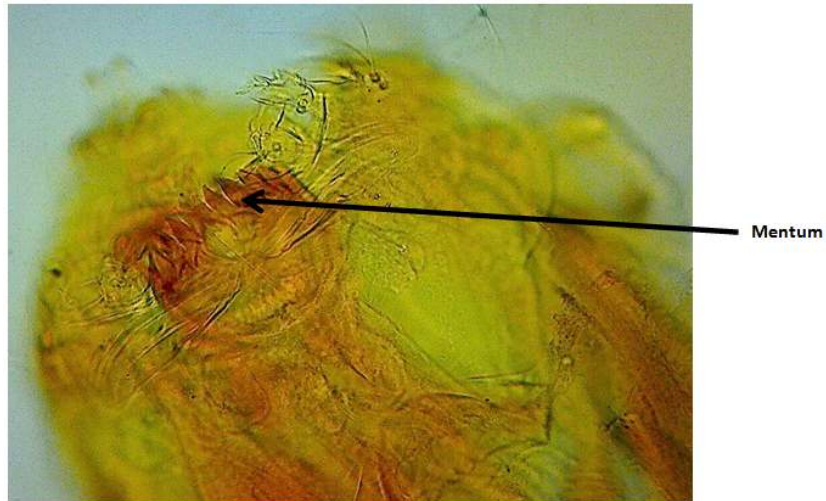


Plate 20.0. Mentum of *Tanytarsus curtitiomis*

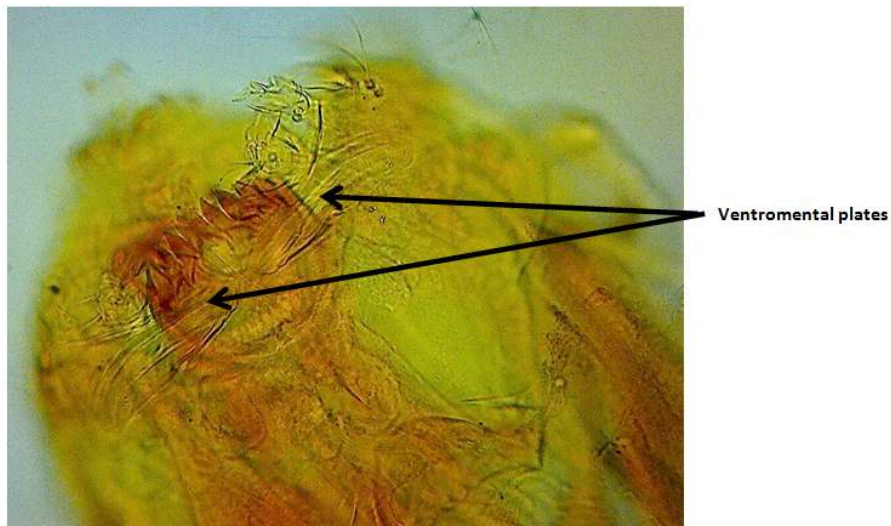


Plate 21.0. Ventromental plate of *Tanytarsus curtitiomis*

Paratanytarsus sp. (Plates 22.0 – 24.0). The ventromental plate is semilunar to subtriangular. There are three inner teeth on the mandible. The mentum is slightly arched. Larvae were found in oxygen rich lotic environments.

Microtendipes sp. (Plates 25.0 – 28.0) – The species has a mentum with median teeth that is trifid. The lateral teeth on both sides of the mentum are also bifid followed by four smaller lateral teeth. The mandible is made up of a short apical tooth, three inner teeth and one dorsal tooth. The ventromental plates are semilunar,

meeting at the midline. A premandibule is present with no premandibular brush but with an apical tooth. Larvae were often found in both lotic and lentic environments.

Pentapedilum sp. (Plates 29.0 - 31.0). The mentum is typical with two median and five lateral teeth all on the same focal plane. The third lateral tooth is longer than the other lateral teeth. The mandible has one apical tooth and four inner teeth. The ventromental plates are crescent shaped and meet at the midline. Larvae were often found in both lotic and lentic environments.

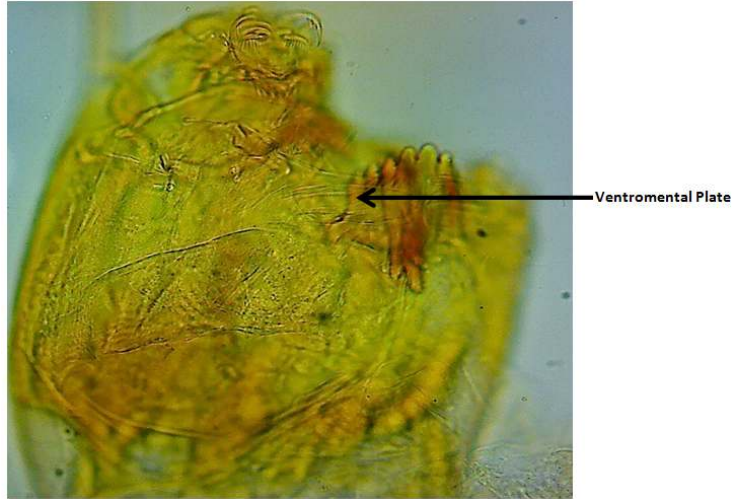


Plate 22.0. Ventromental plate of *Paratanytarsus* sp.



Plate 23.0. Mandible of *Paratanytarsus* sp.

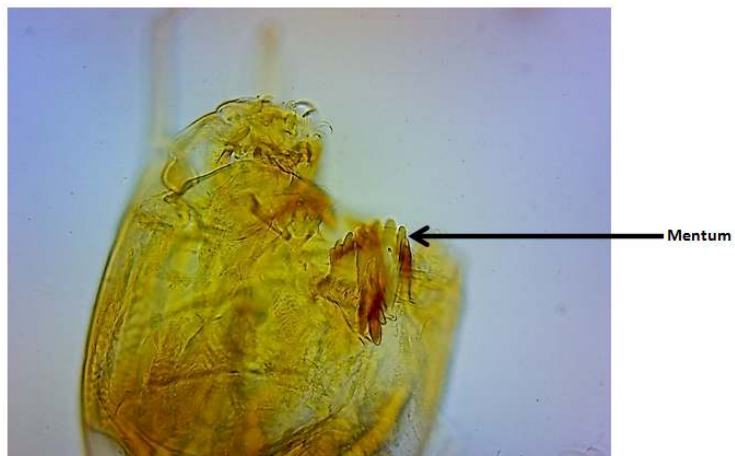


Plate 24.0. Mentum of *Paratanytarsus* sp.

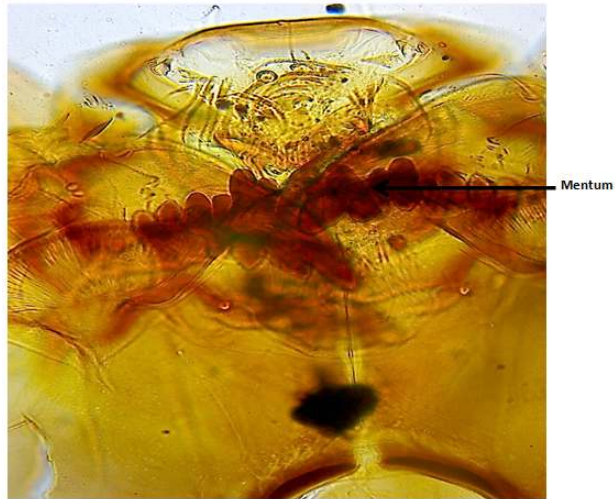


Plate 25.0. Mentum of *Microtendipes* sp.

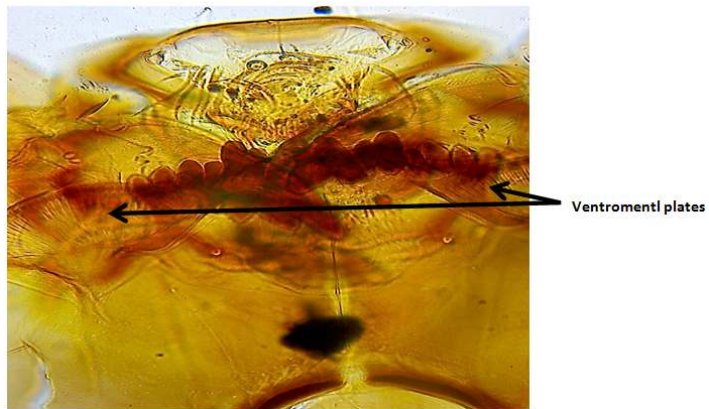


Plate 26.0. Ventromental plates of *Microtendipes* sp.

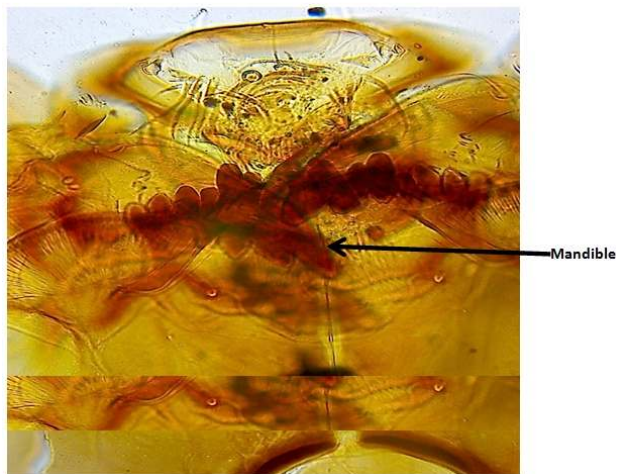


Plate 27.0. Mandible of *Microtendipes* sp.

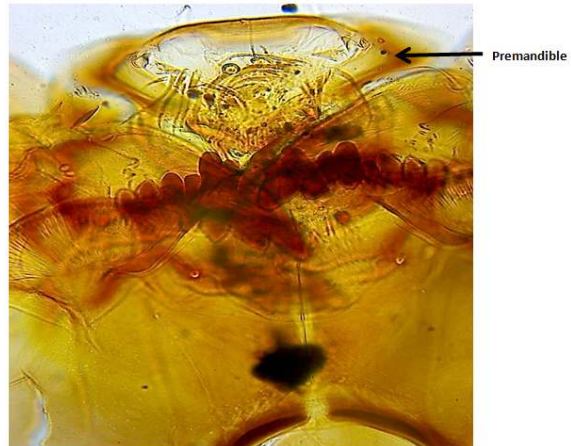


Plate 28.0. Premandible of *Microtendipes* sp.

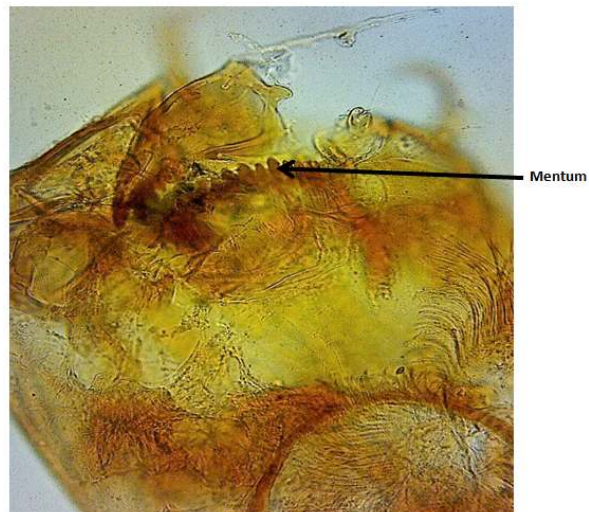


Plate 29.0. Mentum of *Pentapedilum* sp.

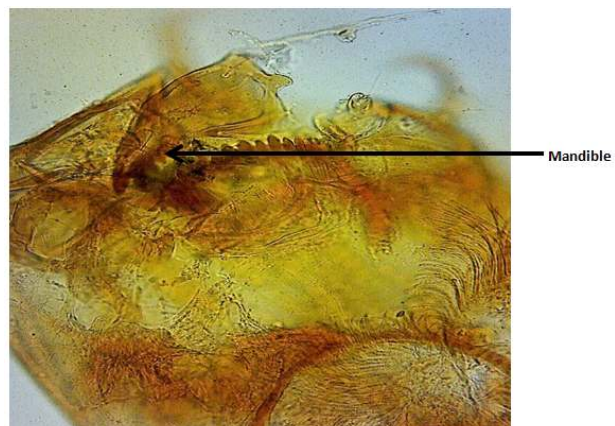


Plate 30.0. Mandible of *Pentapedilum* sp.

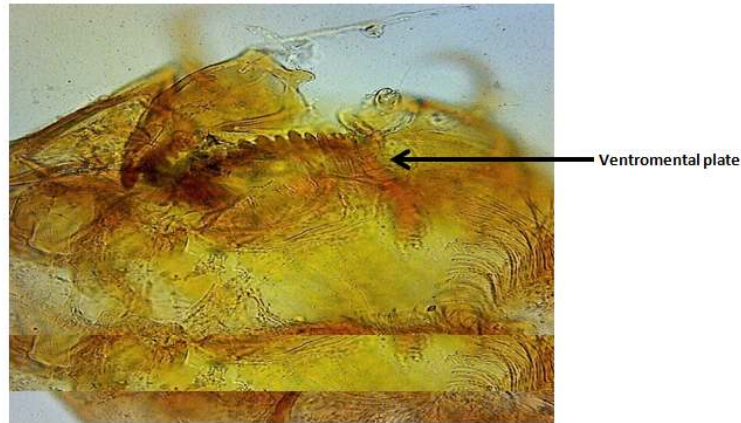


Plate 31.0. Ventromental plate of *Pentapedilum* sp.

4. DISCUSSION

The study presents the taxonomic status of the subfamily Chironominae in the Niger Delta. Illustrated keys are presented as well as descriptions of twelve species in the area. A review of literature shows that members of the Chironominae reported in ecological studies from the Niger Delta consist of six genera and seven species. The species mentioned were *Chironomus fractilobus*, *Chironomus transvaalensis*, *Polypedilum* sp., *Pseudochironomus* sp., *Stictochironomus* sp., *Tanytarsus* sp., *Cryptochironomus* sp. [2,1,3,5]. Three of the genera recorded, namely *Chironomus*, *Pseudochironomus* and *Tanytarsus*, are in the current description while new genera to the literature of the Niger Delta are *Parachironomus*, *Endochironomus*, *Limnochironomus*, *Paratanytarsus*, *Microtendipes* and *Pentapedilum*. The current description compares with previous contributions to the African Chironominae from the Guinean Republic [21] with a record of sixteen genera. Four genera from this study which were recognised and described are *Endochironomus*, *Parachironomus*, *Limnochironomus* and *Parachironomus*. From other West African (Cameroon, Gabon and Chad) countries, a review by Hilde et al. [22] also documented Chironomina taxa comprising forty-three (43) Chironomina and ten (10) Tanytarsini and provided evidence of the significant (70.2%) faunal diversity between West and East African Chironomid fauna. The present study further provides a biogeographical complement of information to the

recorded genera and species below the Sahelian region.

5. CONCLUSION

The current contribution to the taxonomy of the Chironominae offers a basis to engage in further study of the associations of taxa and how well these associations can be used for selecting indicators for biomonitoring and conservation. Further study of life history patterns, life cycle length and growth rate, can provide the optima for responding to changes in environmental variables such as temperature and hydrology in emerging climate change scenarios.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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