



External Body Characteristics and Proximate Composition of Rocky Freshwater Prawn, *Caridina Africana* (Kingsley, 1882) Captured in Erin-Ijesa Waterfalls, South West Nigeria

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Abstract

An investigation was conducted on the morphometric features and proximate body composition of Rocky freshwater prawn, *Caridina africana* occurring at Erin-Ijesa Waterfalls in Osun State, Nigeria. The adult prawns were collected at the first layer of the Waterfalls using scoop nets and locally fabricated sieves because of the shallow nature of the water body and tiny size of the species. Morphometric features were measured using measuring board and Vernier calipers while the proximate analysis was determined by atomic absorption spectrophotometry in the laboratory. The morphometric variables placed the species correctly into the Infra-order Caridea and family Atyidae because the first and second chelipeds were shorter than the remaining three pairs of walking legs. Male prawns were significantly bigger ($p < 0.05$) than the females as revealed in the morphometric features. The proximate analysis showed that *C. africana* is composed of 58.79% protein, 5.42% lipid, 11.56% carbohydrate, 14.7% ash and 0.21% crude fibre. The micro-nutrient composition included iron, zinc, copper, nickel and cadmium. The values for these nutrients make the study to suggest that *C. africana* could be a nutritive food bio-material for humans and other livestock nutrition especially the fin-fish aquaculture programme.

Keywords: Morphometrics; *Caridina Africana*; Proximate Composition; Micronutrients; Erin-Ijesa Waterfalls

Introduction

Shrimps, prawns along with crabs, lobsters and crayfish are invertebrates belonging to the order Decapoda that are included in the Class Crustacea. Prawns are often confused with shrimps because they structurally appear very similar. Caridean freshwater prawns e.g. *Macrobrachium* species is distinguished by the pleura of

the second abdominal segment overlapping with both the first and the third somites (i.e. abdominal segments). In Penaeidea such as *Penaeus* species, pleuron of second somite only overlaps the third somite [1]. Confusion arose when American biologists referred to prawns as shrimps [2]. According to Powell (1982) [1], the usage of the terms 'shrimp' and 'prawn' varies in different parts of the world.

In Nigeria however, prawn is used for freshwater species while shrimp is used for marine and brackish species [3]. Shrimps are usually bigger than prawns except some *Macrobrachium* species that are bigger than shrimps [4]. Oyekanmi [5] reported the occurrence of *Caridina africana* as a prawn based on freshwater habitat in Erin-Ijesa Waterfalls. Omoniyi, et al. [6] reported the preponderance of *C. africana* in this Waterfall. There is dearth of information on taxonomy of endemic Nigerian shrimps and prawns; hence the need to identify this species with high degree of reliability becomes important since the identification of any stock forms the initial step into integral component of its management. Balogun and Akegbejo-Samsons [7] remarked that shrimps and prawns have gained popularity because of their rich animal protein, minerals and vitamins, thus the body composition of this species needs to be assessed for its nutritional importance. Therefore, this study reports on the morphometrics and body composition of *C. africana* in Erin-Ijesa Waterfalls for correct taxonomy and nutritional value to enhance its management at the habitat.

Materials and Methods

The study was carried out at Erin-Ijesa Waterfalls which is located in Oriade Local Government Area of Osun State within latitudes 7°30' and 8°45' North and longitudes 4°31' and 5°00' East. The Waterfalls have seven layers and prawns were abundantly found in the first layer. The water flows among the rocks and splashes with great forces to the evergreen vegetation. 1200 specimens of *C. africana* were collected from the first layer using a scoop net and locally fabricated sieves (mesh size 2-3mm). The prawns were transported in boxes of cold water to the laboratory where they were counted and weighed using a sensitive weighing balance (Model P1200W). The external features measured were the total length, rostral length, right chela and left chela lengths, antenna length, post-orbital carapace length using measuring board and

Vernier calipers. The arrangement of pleura was also observed using dissecting microscope. The body composition analysis was preceded by oven-drying by placing 50g of prawns flesh in an oven at 110°C for three hours after which it was milled using Moulinex Blender. Milled samples were placed in cellophane bags and kept in a refrigerator at 20°C prior to proximate analysis. The proximate body composition (crude protein, moisture, lipid, ash, crude fibre and carbohydrate) were determined according to AOAC [8]. Atomic Absorption Spectrophotometry (AAS) and Flame Photometry were used to determine micro mineral composition after digestion of the flesh. The elements determined were iron, copper, zinc, nickel, lead and cadmium.

Results and Discussion

The few morphometric features examined are presented in Table 1 which indicates that species is relatively small in body size ranging from 17-30.1mm. This maximum length was in conformity with the maximum length of 19-37mm described for *Caridina sp* by Powell [1]. The terminal brushes of setae on the chelae as described by Powell [1] were also observed in *C. africana* occurring at Erin-Ijesa Waterfalls. The pleuron of second abdominal segment (i.e. somite) overlapped with the first and third somites. Also, there were five pairs of walking legs in which the first and second pairs were shorter than the remaining three pairs. All these morphometric features were in agreement with the reports of Holthius [9] and Powell [1] which make the species to be placed into infra order Caridea and family Atyidae. A positive correlation coefficient ($r = 0.70$) was also established between the total body length and the antennal length indicating that larger specimens were having longer antennae. However, a negative correlation ($r = -0.67$) was found between rostral length and the post-orbital carapace length. Male prawn specimens were observed to be bigger than the females in most morphometric features.

	Combined data		Females			Males			
	Mean	Range	S.D.	Mean	Range	S.D.	Mean	Range	S.D.
Post-orbital carapace length (mm)	2.7	2.0-4.24	0.14	2.35	2.24-3.01	0.08	2.81	2.02-4.24	0.01
Total length (mm)	20.1	17.0-30.1	2.25	23.5	17.0-27.6	0.23	26.9	17.0-30.1	0.26
Body weight (g)	0.11	0.04-0.75	0.02	0.47	0.17-0.75	0.04	0.38	0.04-0.68	0.04
Left chela's length (mm)	11.4	9.84-12.04	0.36	10.72	9.82-11.22	0.28	11.65	10.6-12.0	0.41
Right chela's length (mm)	6.14	3.21-11.68	0.27	6.03	4.9-11.5	0.29	6.53	6.0-11.80	0.36
Antenna's length (mm)	5.21	3.54-16.27	0.51	8.18	3.54-16.0	0.48	8.65	6.32-16.27	0.62
Rostral length (mm)	1.98	1.02-2.50	0.03	1.91	1.9-2.25	0.02	1.92	1.79-2.50	0.04

Table 1: Morphometric features of *Caridina Africana*.

The results of proximate body composition and micronutrients are revealed in Tables 2 and 3

respectively. These results indicate that *C. africana* is high in nutritional values in spite of its tiny body size and this

observation compared very well with the report of Bello-Olusoji, et al. [4] on shrimps. According to Bello-Olusoji, et al. [4], regular consumption of prawns can correct some malnutrition diseases among children and elderly people, but the occurrence of heavy metals (lead and cadmium) in its micronutrients called for further attention. The species could acquire these elements from the habitat as it has been reported that it takes to omnivorous feeding habit [10,11]. However, *C. africana* can be preferred as one of the prawns that could solve malnutrition challenge of man because of its body composition as revealed in this study.

Composition	Average readings of three triplicates
Moisture	9.33
Ash	14.7
Protein	58.79
Lipid	5.42
Crude fibre	0.21
Carbohydrate	11.56

Table 2: Proximate analysis of *Caridina Africana*.

Micro Nutrients	Percentage composition
Zinc (Zn)	0.25
Iron (Fe)	5.25
Copper (Cu)	0.17
Lead (Pb)	0.05
Nickel (Ni)	0.46
Cadmium (Cd)	0.07

Table 3: Micro nutrients value of *Caridina Africana*.

Conclusion

In view of the impressive status of its body composition, *C. africana* can be cultured to reduce pressure on the wild stock. Oyekanmi had earlier recommended that cage culture of *C. africana* in its natural habitat could reveal its pond culture potentials. Not only this, the study recommended that like crayfish which is equally small in size, *C. africana* can be used as condiment to enhance flavor of a Nigerian typical soup.

References

- Powell CB (1982) Fresh and brackish water shrimps of economic importance in the Niger Delta. In Proceedings of the 2nd Annual Conference of the Fisheries Society of Nigeria (FISON) Calabar, Kainji Lake Research Institute, New Bussa, pp: 254-285.
- Wallace R (1997) Shrimp in Alabama.
- Akintola SI, Anetekhai MA, Fakoya KA, Adewolu MA (2010) Seasonal distribution and aspects of biology of Genus *Macrobrachium* from Badagry Creek, Nigeria. Nigerian Journal of Fisheries 7(1): 16-24.
- Bello-Olusoji OA, Adebayo OT, Adebusuyi T, Oyekanmi FB (2004) Proximate and Lipid characteristics of fresh frozen, cooked and dried shrimps. Journal of Applied Tropical Agriculture 9(1): 52-57.
- Oyekanmi FB (2011) Bio-ecology of freshwater Prawns *Macrobrachium vollenhovenii* (Herklots, 1857) and *Caridina africana* (Kingsley, 1882) at Asejire Lake and Erin-Ijesa waterfalls, Nigeria. PhD Thesis, Federal University of Agriculture, Abeokuta, Nigeria.
- Omoniyi IT, Oyekanmi FB, Akegbejo-Samsons Y (2012) Abundance, length-weight Relationship and Fecundity of *Macrobrachium vollenhovenii* and *Caridina africana* at Asejire Lake and Erin-Ijesa Waterfalls, Nigeria. Obeche Journal 30(1): 466-471.
- Balogun AM, Akegbejo-Samsons Y (1992) Waster yield, proximate and mineral composition of shrimp resources of Nigerian coastal waters. Bioresources Technology Tech 40(2): 157-161.
- AOAC (1990) official methods of Analysis. In: Williams S, (Ed.), 15th (Edn.), Association official Analytical Chemistry, Washington D.C.
- Holthius LB (1980) FAO species catalogue. Shrimps and prawns of the world. An annotated catalogue of species of interest to fisheries. 1.
- Bello-Olusoji OA, Balogun AM, Fagbenro OA, Ugbaja N (1995) Food and feeding studies of the African river prawn *Macrobranchium vollehovenii*. In: Lavens P, Jaspas E, Roelants I, (Eds.), Larvi' 1995 Fish and Shellfish Larviculture Symposium. Europ Aquac Soc, Special Publication, pp: 24: 425-427.
- Reed WB, Hopson J, Jenness AJ, Yaro I (1967) Fish and Fisheries of Northern Nigeria. Ministry of Agriculture, Zaria, pp: 1-262.