



A NEW BIG-SIZED ORTHOPTERAN (INSECTA, ORTHOPTERA, ENSIFERA) FROM THE BRAZILIAN LOWER CRETACEOUS: PALEOBIOMECHANIC AND PALEOECOLOGICAL IMPLICATIONS

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INTRODUCTION

The Orthoptera and Neuroptera are the most common orders of insects from the Araripe Basin (Lower Cretaceous, Northeast Brazil), in terms of collected specimens as well as in number of named species (Martins-Neto, 2006). Orthopterans are mainly represented by Grylloidea among the Ensifera, and Locustopsoidea among the Caelifera. Some groups are especially rare such as Hagloidea, Tettigonioidea, and Gryllotalpoidea. Here is present the first Cretaceous record of a Stenopelmatoidea with high jumping ability and very specialised burrowing structures. This new material represents the biggest known fossil Orthoptera.

OBJECTIVE

The present contribution presents a new bizarre orthopteran, which came from the Brazilian Lower Cretaceous exhibiting a very peculiar biomechanics pattern (all of the member with a great robustness index) and morphological tools very conspicuous as the pronounced sickle-like digits, indicative of a burrowing paleoecological habitus.

MATERIAL

The material consists of one slab of fossil Orthoptera collected by the senior author during a field trip (1999) at Mina Pedra Branca (type locality), Nova Olinda-Santana do Cariri road, 4 km from the municipal district of Nova Olinda. Type stratum: laminated limestone level, Crato Member, lowermost unit of the Santana Formation, Araripe Basin, Upper Aptian, Lower Cretaceous. The adopted terminology and classification follows Martins-Neto (1991). The material is presently housed at Sociedade Brasileira de Paleontropodologia (SBPr).

RESULTS AND DISCUSSION

We present here a big sized orthopteran, macropterous, stunt, with body length around 40 mm, probably male (no evidence of ovipositor preserved). Head twice wider than long, 9 mm wide and 4 mm long. Pronotum seliform, a little wider and shorter than the head. Fore femur 12.6 mm long and 2.6 mm wide (RI - robustness index - width/length - 0.20). Fore tibia 6.6 mm long and 2.4 mm wide (RI, 0.36), and no evidence of tympanums. Mid tibia 7.1 mm long and 3 mm wide (RI, 0.42). Mid tarsus length, 9.6 mm. Hind femur 25 mm long and 6.5 mm wide (RI, 0.26). Hind tibia 13.8 mm long and 3 mm wide (RI, 0.21). Hind tarsus 14.5 mm: digit IV sickle-like, distally curved, without terminal claws, and intensely pubescent. Fore, mid and hind tarsi four segmented and all articles with a notably developed pulvilli. No evidence of spines or apical spurs in all tibia. No evidence of cerci. Wings poorly preserved, longer than the body. This new species is one of the biggest known Cretaceous orthopteran. Within Stenopelmatoidea, only Cooloolinae Rentz (Mimnermidae Brunner-Wattenwyl) shares some apomorphic characteristics with this specimen, such as the modification of the fore legs (tibia short and robust, tarsi four-segmented) and body stunt. This new specimen differs from all known Stenopelmatoidea in having all three pair of legs modified (tibia shorter than femur, tarsi longer than tibia with well-developed pulvilli).

CONCLUSION

As attested by the number of described species, the Araripe Orthopterofauna is diverse. This fauna is dominated by ensiferans in number of named species as well by the number of collected specimens (Martins-Neto, 1995, 2006). The present contribution reveals the presence of rare Ensifera

groups, such as Stenopelmatoidea, represented by rather bizarre forms, revealing an unexpected diversity at the Cretaceous Araripe times. Another interesting aspect regards paleoecology: groups morphologically as distinct as cearagryllyds exhibits the same habitus (the ovipositor shape and length; body shape, robustness). This can represent a possible case of mimetic strategy, in relation to the occupation of similar ecological niche, laying their eggs at the same places (the coniferous trunks, for example). Under the soil a diverse community of burrowing crickets (Gryllotalpoids and closely related species) and on the leaves could have a diverse community of grasshoppers (especially Locustopsidae). Paleobiomechanically just the hind legs of orthopterans can exhibit a high robustness values (jumping ability) and the others legs are very slim. The specimen presented here exhibits a progressively high robustness values for its legs revealing a more accurate jumping ability, perhaps asynchronous of all pair of legs. Another interesting ecological aspect is the tarsi morphology of this new specimen: powerful sickle-like structures suggesting fossorial habitus.

The conjunction of paleobiomechanic and paleoecological aspects suggests a big-sized orthopteran with high jumping ability, possibiliting its survival at land, escaping for predators with its long and asynchrony of jumps and, in the other hand, a powerful ability for burrowing, maybe its more frequent habitat.

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