



Central ocellus of extinct cockroaches (Blattida: Caloblattinidae)

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Abstract

Third, central ocellus, lost in living cockroaches, is discovered in the diverse Upper Jurassic representatives of the family Caloblattinidae. Three new genera possessing central ocellus are described: *Decomposita triocella* gen. et sp. nov.; *Srdiecko tri* gen. et sp. nov.; *Paleovia praecarnia* gen. et sp. nov. Presence of central ocellus, although a plesiomorphy, in the Caloblattinidae falsifies the last argument against their ancestral position in respect to mantises (via the Liberiblattinidae).

Key words: Blattida (= Blattaria = Blattodea), mantodea, head, central ocellus, Kimmeridgian, Jurassic, Karatau

Introduction

The number of visual sensors varies greatly among organisms. Within vertebrates, besides paired eyes, the third eye (pineal organ) is present in living reptiles such as tuatara (Sphenodontidae) and was present in most of extinct fishes (ostracoderms, petalichthyids, acanthocoracids, rhenanids, palaeoniscoids, rhipidistians) amphibians (*Ichthyostega*, loxommatoids, temnospondyls, anthracosaurians, lepospondyls, microsaurians, dissopterygians) and reptiles (millerosaurians, procolophonoids, eosuchians, pleurosaurians, lizards, sauropterygians (including aquatic nothosaurs and ichthyosaurs), placodonts, archosaurs, dinosaurs, pterosaurs, anomodonts, theriodonts, pelycosaurians and cynodonts). The pineal organ is missing in turtles and crocodylians and is not opened in living frogs (Carroll 1988).

Terrestrial arthropods exhibit a variety of additional optical sensors (eyes or ocelli): merostomates 2–4, arachnids 2–6, and tracheates 1–4. Insects usually have two compound eyes, sometimes divided, and two to four additional ocelli (Melnikov and Rasnitsyn 1984). Among Dictyoptera (cockroaches, typified here as Blattida; termites (Isoptera) and mantises), the presence of two lateral ocelli vary, except for its stable absence in the wood-boring semi-social cockroaches of the family Cryptocercidae and the termopsid termites (Deitz *et al.* 2003). The stable absence of a third, central ocellus in cockroaches, and its presence in the derived praying mantises was the most recent argument against their close relation, even when the cockroach family Liberiblattinidae (descendant of the certain Caloblattinidae) is known to represent the stem for mantises (Vršanský 2002).

Synapomorphies of Liberiblattinidae and the mantises include presence of forewing reticulations, secondarily enlarged and branched Sc, the identical morphology of hindwings with simple Sc, RS differentiated, straight M, branched CuA and simple CuP, free foreleg coxae (conservatively preserved attached only basally) and longitudinal femoral ridge with two rows of spines (Vršanský 2002). The central ocellus (plesiomorphic for cockroaches) is now recovered from various Upper Jurassic cockroaches of the family Caloblattinidae