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Original article

A revision of chamaeleonids from the Lower Miocene of the Czech Republic with description of a new species of *Chamaeleo* (Squamata, Chamaeleonidae)☆

Révision des caméléonidés du Miocène inférieur de République tchèque, avec description d'une nouvelle espèce de Chamaeleo *(Squamata, Chamaeleonidae)*

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Abstract

A revision of *Chamaeleo caroliquarti* Moody and Roček is presented. The comparisons of the holotypic left dentary with those of specimens subsequently assigned to *C. caroliquarti* and of the Recent species of *Chamaeleo, Furcifer* and *Calumma* is carried out. It is shown that the type dentaries of *C. caroliquarti* include two different morphotypes with the absence of unique features. Within the Recent chameleons, the exact determination of the individual species merely on the basis of the dentaries is impossible. The holotypic dentary of *C. caroliquarti* is basically identical with that of *C. calyptratus*. However, the same morphology of the dentary as present in *C. caroliquarti* is also present in other species of different genera such as *Calumma globifer* and *Furcifer pardalis*. The paratypic dentaries of *C. caroliquarti* have a different morphology to the holotype and are indistinguishable from that in the Recent *C. chamaeleon*. On the other hand, a new species of the genus *Chamaeleo*, *C. andrusovi*, is described on the basis of isolated cranial elements, which possess clear autapomorphic features. This material comes from the Lower Miocene (Ottnangian) zone MN 4 in the Dolnice locality of the Czech Republic, and it differs from Recent and fossil chameleons in the following combination of characters: (1) its typically developed strongly pustular ornamentation and its distribution on the external surfaces of the skull roofing bones; (2) the frontoparietal suture is digitiform with a well-developed, anteriorly directed mesial spine, and (3) the parietal bone narrows posteriorly at its midlength, it is not bowed dorsally and it does not contribute posteriorly to a dorsal sagittal crest. This new material expands our knowledge of the cranial anatomy of Lower Miocene chameleons.

Keywords: Squamata; *Chamaeleo andrusovi* nov. sp.; *Chamaeleo caroliquarti*; *Nomen dubium*; Lower Miocene

Résumé

Dans le cadre de la révision de l'espèce *Chamaeleo caroliquarti* Moody et Roček, la comparaison de l'holotype dentaire gauche avec des spécimens attribués ultérieurement à *C. caroliquarti* ainsi qu'aux espèces actuelles de *Chamaeleo*, *Furcifer* et *Calumma* est réalisée. Nous montrons que les os dentaires de *C. caroliquarti* regroupent deux morphotypes différents, avec une absence de caractères uniques. Au sein des caméléons actuels, la détermination spécifique précise sur la base des os dentaires est impossible. L'holotype dentaire de *C. caroliquarti* est fondamentalement identique à celui de *C. calyptratus* ainsi qu'à celle d'autres espèces et d'autres genres, comme *Calumma globifer* et *Furcifer pardalis*. Les os dentaires paratypes de *C. caroliquarti* montrent des morphologies différentes de celle de l'holotype, et indistinguables de celle de l'actuel *C. chamaeleon*. D'autre part, une nouvelle espèce du genre *Chamaeleo*, *C. andrusovi*, est décrite à partir d'éléments crâniens isolés montrant des caractères autapomorphiques clairs. Le matériel provient du Miocène inférieur (Ottnangien, zone MN 4) de la localité de Dolnice, près de Cheb, en République tchèque. Cette nouvelle espèce diffère des autres espèces actuelles et fossiles de caméléons par la combinaison des caractères suivants : (1) une ornementation pustuleuse fortement développée typique, et sa distribution sur les surfaces externes des os du toit du crâne ; (2) une suture antérieure digitiforme avec une épine médiane bien développée et dirigée vers l'avant et (3) un rétrécissement bilatéral

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postérieur du pariétal à mi-longueur, pariétal qui n'est pas arqué dorsalement et qui ne contribue pas postérieurement à une crête sagittale dorsale. Ce nouveau matériel élargi notre connaissance de l'anatomie crânienne des caméléons du Miocène inférieur.

Mots clés : Squamata ; *Chamaeleo andrusovi* nov. sp. ; *Chamaeleo caroliquarti* ; *Nomen dubium* ; Miocène inférieur

1. Introduction

The Chamaeleonidae is a bizarre family of lizards, which includes extant species from Africa, Madagascar, southwest Asia, the Mediterranean region of Europe and extinct species from the Miocene in the Czech Republic and Germany (Estes, 1983) and in the Pleistocene of Spain. Five fossil species of the genus *Chamaeleo* have been recovered from the Miocene of Europe: *C. caroliquarti* Moody and Roček, 1980 (MN 4, Czech Republic and Germany), *C. bavaricus* Schleich, 1983 (MN 6, Germany), *C. pfeili* Schleich, 1984 (MN 4b, Germany), *C. simplex* Schleich, 1994 (MN 5, Germany) and *C. sulcodentatus* Schleich, 1994 (MN 5, Germany). From the Pleistocene of Spain, the Recent species *C. chamaeleon* has been recorded (Talavera and Sanchiz, 1983).

Chameleons of the Czech Republic were first described by Moody and Roček (1980) from the Lower Miocene (MN 4) in the Dolnice locality. They described a new species of chameleon, *C. caroliquarti,* based on several isolated dentaries and maxillae. Subsequently, Roček (1984) attributed a postorbital from the same locality to this species. Chameleons from a second Lower Miocene (MN 3) locality, Merkur in North Bohemia, comprise several maxillae and dentaries and these were described by Fejfar and Schleich (1994) and Vejvalka (1997, unpublished).

Moody and Roček (1980) based their new species, *C. caroliquarti,* on a holotypic dentary and several paratypic maxillae and several other fragmentary dentaries. The anterior end of the Meckelian canal of the holotypic dentary turns ventrally and ends immediately anterior to the symphysis, which is oval in outline (Moody and Roček, 1980: fig. 1, pl. 1, fig. 2). However, the paratypic dentaries are fragmentary, and the anterior end of the Meckelian canal is straight penetrating the lowermost portion of the symphysis, which is square in outline (Moody and Roček, 1980; this is particularly evident on the relatively well-preserved dentary BSP 1937 II 19601: pl. 3, fig. 3). Hence, we have two different morphologies of the anterior portion of the dentary, and this requires revision of the current understanding of the anatomy of the dentary of chameleons. The new material from the Lower Miocene localities described below contributes to the solution of this problem.

This new chameleon material originates from both previously known chameleon localities in the Czech Republic (Dolnice and Merkur), and besides the maxillae, postorbital and dentaries previously described, it also includes new cranial elements described here for the first time, thus expanding our knowledge of the cranial anatomy of Lower Miocene chameleons. Therefore, the aims of this paper are:

- the taxonomic revision of the species *C. caroliquarti* Moody and Roček, 1980;
- the description of new cranial material of chameleons from the Lower Miocene localities in the Czech Republic.

2. Material and methods

This study is based mainly on fossils housed in the National Museum at Prague, Czech Republic. These comprise isolated elements collected by screen-washing or surface prospecting from the Lower Miocene (Ottnangian), zone MN 4, of the Dolnice locality (Czech Republic) and on fossils housed in the Geological collection of the Bilína opencast mine. This paper also deals with isolated dentaries collected by screen-washing or surface prospecting from the Lower Miocene (Eggenburgian), zone MN 3, of the Merkur-North locality (Czech Republic). All the Chamaeleonidae skull-roofing bones can be assigned to a single taxon, new species of *Chamaeleo*, on the basis of the unique external surface ornamentation. The material includes the parietal (holotype), jugal, prefrontal, and postfrontal portion of the postorbitofrontal, as described in this paper. This same morphology is also present in the postorbital portion of the postorbitofrontal (DP-FNSP 226), and incorrectly described by Roček (1984) as belonging to the species *C. caroliquarti*. The new dentaries material is identical to that of the paratypic dentaries of *C. caroliquarti* described by Moody and Roček (1980). However, as can be seen below, they do not differ also from dentaries of the extant *C. chamaeleon.*

The following specimens of extant species of chameleons of different ontogenetic stages deposited in the collections of the Department of Ecology, Comenius University in Bratislava, Faculty of Natural Sciences, have been used for comparisons: *C. calyptratus*, DE 65, DE 74-77; *C. Chamaeleon*, DE 66; *Furcifer pardalis*, DE 80-81; *Calumma globifer*, DE 82-85. Comparisons based on the literature included recent descriptions of extant species from Madagascar (Rieppel and Crumly, 1997) and North Africa (Schleich et al., 1996), and also extinct species from Germany (Schleich, 1983, 1984, 1994).

Abbreviations of repositories: Ah- number is the SGDB: geological collection of the Bílina opencast mine at Merkur-North, Czech Republic (Bílina city); DP-FNSP: Department of Paleontology, Charles University, Prague, Czech Republic; Pb: National Museum, Prague, Czech Republic; DE: Collection of Department of Ecology, Comenius University, Bratislava, Slovakia; BSP: Bayerische Staatssammlung für Paläontologie und historische Geologie in Munich.