

The earliest fossil record of a modern-type piciform bird from the late Oligocene of Germany

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Summary

Presented here is a record of a piciform bird from a late Oligocene fissure filling from Germany. This is the earliest known fossil record of a modern-type piciform bird and the only one from deposits earlier than Miocene. The specimen, an isolated tarsometatarsus, is similar in size and proportions to the tarsometatarsus of the recent Cardinal-Woodpecker (*Dendropicos fuscescens*, Picidae). However, owing to its fragmented state a reliable assignment to any of the recent piciform families is not possible.

Keywords: Piciformes, Pici, late Oligocene, fossil birds, earliest record.

Zusammenfassung

Der älteste Nachweis eines modernen Spechtvogels aus dem späten Oligozän Deutschlands

Ein Nachweis eines Spechtvogels wird aus einer spätoligozänen Spaltenfüllung Deutschlands beschrieben. Es ist der bisher älteste Nachweis eines modernen Spechtvogels und der einzige aus vor-miozänen Ablagerungen. Das Exemplar, ein isolierter Tarsometatarsus, ähnelt in Größe und Proportionen dem Tarsometatarsus des rezenten Kardinalspechts (*Dendropicos fuscescens*, Picidae). Aufgrund seiner fragmentarischen Erhaltung ist jedoch keine zuverlässige Zuordnung zu einer der rezenten Familien spechtartiger Vögel möglich.

Introduction

Recent Piciformes (woodpeckers and allies) are generally classified within two “suborders”, the Galbulae (including the neotropical Galbulidae, jacamars, and Bucconidae, puffbirds) and the Pici (Capitonidae, barbets [including “Ramphastidae”, toucans, see Prum 1988], Indicatoridae, honeyguides, and Picidae, woodpeckers, wrynecks, piculets). A monophyly of both, Galbulae and Pici, is well supported with derived osteological characters

(Simpson & Cracraft 1981, Mayr 1998a). Hardly corroborated with derived characters, however, is the monophyly of the taxon (Galbulae + Pici), i. e. the traditional Piciformes, and the Galbulae possibly are more closely related to some coraciiform taxa (Olson 1983, Sibley & Ahlquist 1990).

Feduccia & Martin (1976) classified several fossil birds from the Eocene of North America within the Piciformes, but with the possible exception of “*Neanis kistneri* Feduccia 1973

(which might be a representative of the Galbulae) all of these were misidentified in order (see Houde & Olson 1989, 1992, Mayr 1998a, 1998b, Mayr & Peters 1998). The earliest representatives of the Piciformes belong to the extinct family Primoscenidae Harrison & Walker 1977 and are among the predominant small perching birds in the early Eocene (about 50 million years ago) of Europe. These birds show a mosaic of piciform and passeriform characters (Mayr 1998a) and with regard to the morphology of their distal tarsometatarsus most closely resemble the early Miocene piciform family Zygodactylidae Brodkorb 1971. Mayr (1998a) described another extinct piciform family, the Miopiconidae, which is the sister taxon of the Pici and which is known from the Middle Miocene of Morocco.

The early Tertiary fossil record of the modern-type Piciformes of the suborder Pici is very sparse. Specimens from the early to Middle Miocene of Europe have been classified within the Capitonidae, in the genus *Capitonides* Ballmann 1969b (Ballmann 1969a, 1969b, 1983). Laybourne et al. (1994) assigned a feather preserved in amber from the Dominican Republic to the Picidae; the exact age of this specimen is unknown, according to the authors its minimum age is Lower Miocene. Olson (1985) mentioned Middle Miocene fossils of a “medium-sized woodpecker” from New Mexico (USA) which have not been figured or described so far. Ballmann (1976) described a record of the Picidae from the Upper Miocene of the Gargano Peninsula (Italy). All other fossil Piciformes are from younger, Pliocene or Pleistocene, deposits (see Olson 1985, Feduccia 1996).

Presented here is a record of a piciform bird from the late Oligocene fissure filling Herrlingen 9 near Ulm (Baden-Württemberg, Germany) which is the earliest known fossil record of a modern-type piciform bird. The few other avian remains which have been found at this locality belong mainly to the Passeriformes.

Material and methods

Comparisons have been made with skeletons of the following recent piciform taxa (all in the ornithological collection of Forschungsinstitut Senckenberg): Capitonidae: *Aulacorhynchus derbianus*, *Capito squamatus*, *Lybius minor*, *L. vieilloti*, *Megalaima armillaris*, *M. asiatica*, *M. javensis*, *M. mystacophanos*, *M. virens*, *Pogoniolus bilineatus*, *P. scolopaceus*, *Psilopogon pyrolophus*, *Pteroglossus castanotis*, *Ramphastos ambiguus*, *R. toco*, *R. vitellinus*, *Selenidera maculirostris*, *Trachyphonus margaritatus*; Indicatoridae: *Indicator variegatus*; Picidae: *Campethera abingoni*, *C. cailliautii*, *C. nivosa*, *Chrysocolaptes lucidus*, *Colaptes auratus*, *Dendrocopos major*, *D. medius*, *Dendropicops fuscescens*, *Dryocopus martius*, *Jynx ruficollis*, *J. torquilla*, *Melanerpes carolinus*, *Picus canus*, *P. viridis*, *Sphyrapicus varius*. In addition, representatives of all other higher avian taxa have been investigated. The osteological terminology used in this study follows Baumel & Witmer (1993), the dimensions are in millimeters. The fossil specimen is deposited in Forschungsinstitut Senckenberg, Frankfurt/M., Germany (SMF).

Systematic paleontology

Piciformes (Meyer & Wolf 1810)

Pici (sensu Simpson & Cracraft 1981)

The following combination of characters presented by the specimen described below is diagnostic for the Pici: retinaculum extensorium tarsometatarsi ossified (except some Capitonidae); foramen vasculare distale very small; dorsal side of distal tarsometatarsus flat, trochleae metatarsorum arranged in the same plane; trochlea metatarsi IV turned plantarly (in the fossil specimen the trochlea metatarsi IV is broken, but the remaining parts clearly indicate that it was retroverted). Outgroup comparisons with putatively basal neognathous birds (e. g. Anseriformes, Galliformes) suggest that all of these characters are derived.

The specimen differs from the Miopiconidae in that the part of the shaft which abuts on the plantar surface of the trochlea metatarsi III is less vaulted, the trochlea metatarsi III is more deeply grooved.



Fig. 1. Specimen SMF Av 429 (A, C) in comparison with the right tarsometatarsus of the recent Cardinal Woodpecker *Dendropicos fuscescens* (Picidae) (B, D). A, B, plantar view; C, D, dorsal view.

Abb. 1. Exemplar SMF Av 429 (A, C) im Vergleich mit dem rechten Tarsometatarsus des rezenten Kardinalspechts *Dendropicos fuscescens* (Picidae) (B, D). A, B, Plantaransicht; C, D, Dorsalansicht.

family incertae sedis
gen. et. sp. indet.

Referred specimen: SMF Av 429 (incomplete right tarsometatarsus, lacking the lateral part of the proximal end and the trochleae metatarsorum II and IV) (Fig. 1).

Locality: Fissure filling Herrlingen 9 near Ulm (Baden-Württemberg, Germany).

Horizon: Late Oligocene, MP 29 (Engesser 1999: tab. 30.2), absolute age about 25 million years (Legendre & Lévêque 1997).

Dimensions: Maximum length, 14.7; medio-lateral width of trochlea metatarsi III, 0.8; medio-lateral width of shaft at narrowest section, 1.0.

Description and comparison: The specimen is similar in size and proportions to the tarsometatarsus of the recent *Dendropicos fuscescens* (Cardinal-Woodpecker, Picidae).

The tuberositas musculi tibialis cranialis is situated at the medial side of the sulcus extensorius. Most of the hypotarsus is broken, but two adjacent sulci hypotarsi can be recognized. The fossa parahypotarsalis lateralis appears to have been very distinct, although only its distal part is visible. The foramina vascularia proximalia are very small, centrally positioned, and situated close together (in some recent Capitonidae, e. g. *Lybius* and *Psilopogon*, the medial foramen vasculare proximale is much larger than the lateral one). The retinaculum extensorium tarsometatarsi is ossified and

forms an arcus extensorius. The margo medialis bears a medially protruding bulge on the level of the foramina vascularia proximalia. This bulge is present in all the recent Picidae I investigated, but is absent in some Capitonidae (including *Capitonides*), and in *Indicator* and *Jynx*. If viewed medially, the proximal end of the margo medialis is very narrow in dorso-ventral direction. The shaft of the bone slightly widens towards its proximal end. As in all recent Pici, the foramen vasculare distale is very small. Some recent Picidae (e. g. *Picus viridis*, *Sphyrapicus varius*, *Campethera* spp.) also exhibit a second, medial foramen on the distal tarsometatarsus which is absent in the fossil specimen. The fossa metatarsi I is shallow. The trochleae metatarsorum II and IV are broken, but what is remaining from the trochlea metatarsi IV clearly indicates that it was retroverted. The trochlea metatarsi III is small and directed somewhat medially. Unfortunately, this trochlea is slightly damaged in the fossil specimen, as far as can be discerned it is not as deeply grooved as the trochlea metatarsi III of recent trunk-climbing woodpeckers, but deeper than that of recent Capitonidae.

Discussion

SMF Av 429 is the first record of a representative of the Pici from deposits earlier than Miocene. Compared to recent Pici, the specimen most closely resembles the Picidae. It is stouter than the tarsometatarsus of recent and fossil Capitonidae, and it is distinguished from the corresponding bone of the Indicatoridae by the presence of a medially protruding bulge on its medial margin. Yet due to its fragmented state, a reliable assignment to any of the recent families is not possible. Because it cannot be compared with the recent genera in detail, the specimen has not been named – given its age however it is likely to represent an extinct genus.

In size, SMF Av 429 corresponds with the smallest species of the recent Picidae. Not much can be said about the living habits of the

fossil species. Recent trunk-climbing woodpeckers are characterized by a very deeply grooved trochlea metatarsi III, this feature is also present in *Jynx* but absent in the Capitonidae. As stated above, in the fossil specimen the sulcus on the trochlea metatarsi III appears to be intermediate in its depth between that of recent Picidae and that of recent Capitonidae. This might indicate that the fossil species was not as specialized for trunk climbing as recent Picidae.

The fossil record of piciform birds suggests that at least in Europe the radiation of modern-type Piciformes took place contemporaneously with the radiation of passeriform birds, at the end of the Oligocene. Obviously, at this time many ecological niches for small perching birds were vacant in Europe. The fossil evidence further supports an Old World origin of the Pici, which is in concordance with the fact that their sister taxon, the Miopiconidae, is known from North African deposits only.

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