

A new mousebird (Coliiformes: Coliidae) from the Oligocene of Germany

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Summary

A new species and genus of mousebird (Coliiformes: Coliidae) from the Oligocene (Rupelian) of Frauenweiler near Wiesloch (Baden-Württemberg, Germany) is described. *Oligocolius brevitarsus* n. gen. n. sp. is the first Oligocene mousebird and one of the most complete skeletons of early Tertiary Coliidae to have come to light so far. The new taxon has a more strongly developed wing and a much shorter tarsometatarsus than recent mousebirds and was probably adapted to a more sustained flight.

Key words: Coliiformes, Coliidae, Oligocene, *Oligocolius brevitarsus* n. gen. n. sp., wing proportions

Zusammenfassung

Ein neuer Mausvogel (Coliiformes: Coliidae) aus dem Oligozän Deutschlands

Eine neue Gattung und Art der Mausvögel (Coliiformes: Coliidae) wird aus dem Oligozän (Rupel) von Frauenweiler bei Wiesloch (Baden-Württemberg, Deutschland) beschrieben. *Oligocolius brevitarsus* n. gen. n. sp. ist der erste oligozäne Mausvogel und eines der vollständigsten Skelette frühtertiärer Coliidae, das bisher gefunden wurde. Das neue Taxon hat einen kräftiger entwickelten Flügel und einen viel kürzeren Tarsometatarsus als rezente Mausvögel und war wahrscheinlich an einen Flug angepaßt, der ausdauernder als bei rezenten Arten war.

Introduction

The order Coliiformes (mousebirds or colies) comprises two families, the extinct Sandcoleidae Houde & Olson 1992, and the Coliidae Swainson 1837 (see Mayr & Peters, 1998). Although the distribution of the two recent genera *Colius* and *Urocolius* is restricted to Africa south of the Sahara, most fossil species have been discovered in Europe and North America.

The Sandcoleidae are fairly abundant in the Lower and Middle Eocene, but apparently disappeared towards the end of the Eocene. The

very coly-like Lower Eocene genus *Chascacocolius* Houde & Olson 1992, originally referred to the Sandcoleidae, has been considered to be of uncertain systematic affinities by Mayr & Peters (1998) and might be more closely related to the Coliidae.

The earliest certain record of the Coliidae is *Masillacolius brevidactylus* Mayr & Peters 1998 from the Middle Eocene of Messel (Germany). This species is distinguished from all other coliiform birds by its comparatively short toes. Mourer-Chauviré (1988) identified two species of mousebirds in Upper Eocene deposits of the Quercy (France) after which she

named the new genus *Primocolius* (*P. sigei* Mourer-Chauviré 1988 and *P. minor* Mourer-Chauviré 1988). *Primocolius* is known only from a few bones (humerus, tarsometatarsus, proximal carpometacarpus).

All other mousebirds which have been reported so far are from younger deposits and closely resemble the extant species. Ballmann (1969) assigned some taxa which Milne-Edwards (1867–71) described from the Miocene of France to the Coliidae (“*Picus*” *archiaci*, “*P.*” *consobrinus*, “*Limnatornis*” *paludicola*, “*Necronis*” *palustris*), and also reported undescribed colies from the Miocene of Germany (Ballmann, 1979). Rich & Haarhoff (1985) described an early Pliocene species from South Africa which they referred to the genus *Colius*.

The specimen described here is not only the first Oligocene mousebird but also one of the most complete skeletons of early Tertiary Coliidae known so far. It was found in a Rupelian clay pit at Frauenweiler near Wiesloch (Baden-Württemberg, Germany). A brief description of the geology of this site has been given by Micklich & Parin (1996). According to these authors the sediments of Frauenweiler are marine and were deposited during a transgression caused by rifting activities. They have an absolute age of approximately 32 million years and the coliform bird described in this study is thus about 3 million years younger than the latest records of the genus *Primocolius* in the Quercy (locality Escamps) which have an absolute age of ca. 35 million years (Legendre & Lévêque, 1997). Although the deposits of Frauenweiler are known mainly because of their rich fish fauna, in recent years several bird skeletons have been found, most of which, however, belong to an odd procariiform species with diving adaptations. The bird presented in this study is one of the few land birds, and also the first avian taxon described from Frauenweiler.

The fossil specimen was prepared according to the “resin transfer method” (e.g. Toombs & Rixon, 1950; Kühne, 1961); the anatomical terminology follows Baumel & Witmer (1993).

Systematics

Coliiformes Murie 1872

Coliidae Swainson 1837

Apart from being similar to mousebirds in its overall osteology, the bird described in this study exhibits the following features listed by Mayr & Peters (1998) as diagnostic for the Coliiformes: pygostyle large, cristae cnemiales and crista patellaris forming a continuous ridge which circumscribes a groove on the cranial side of the tibiotarsus, proximal phalanges of fourth toe shortened. It can be assigned to the Coliidae because of the presence of a well-developed processus intermetacarpalis on the carpometacarpus and a crescent-shaped depression proximad the condylus dorsalis of the humerus (see Ballmann, 1969; Mayr & Peters, 1998).

Oligocolius n. gen.

Type species: *Oligocolius brevitarsus* n. sp.

Diagnosis: *Oligocolius* n. gen. has a more strongly developed wing (larger proximal end of humerus, relatively longer ulna and carpometacarpus) and a shorter tarsometatarsus than all other Coliidae known so far.

Differential diagnosis: *Oligocolius* n. gen. differs from:

– *Chascacocolius* Houde & Olson 1992 in: presence of a well developed processus intermetacarpalis on carpometacarpus, ulna distinctly longer than humerus (ulna as long as humerus in *Chascacocolius*), foramen obturatum of pelvis closed.

– *Masillacolius* Mayr & Peters 1998 in: ulna distinctly longer than humerus (ulna shorter than humerus in *Masillacolius*), humerus with larger proximal end, tarsometatarsus much shorter, claws more slender.

– *Primocolius* Mourer-Chauviré 1988 in: humerus with wider proximal end, tarsometatarsus with wider proximal end and medio-laterally narrower trochlea metatarsi IV.

– *Colius* Brisson 1760 and *Urocolius* Bonaparte 1854 in: humerus with wider proximal end, ulna distinctly longer than humerus, car-

pometacarpus relatively longer and with straighter os metacarpale minus, scapula with wider shaft, crista cnemialis cranialis (proximal tibiotarsus) protruding less proximally, pelvis with medio-laterally wider cranial part and synsacrum with distinct processus costales, tarsometatarsus relatively shorter, trochlea metatarsi II reaching farther distally.

Etymology: The generic name refers to the Oligocene age of the taxon.

Oligocolius brevitorsus n. sp.
(Figs. 1–4)

Holotype: SMNS 80529/2 (Staatliches Museum für Naturkunde Stuttgart, Germany) – incomplete disarticulated skeleton lacking the skull, most of the left wing and the left foot.

Type locality: Frauenweiler south of Wiesloch (Baden-Württemberg, Germany), clay pit of the Bott-Eder GmbH (“Grube Unterfeld”).

Type horizon: Rupelian, Oligocene (see Micklich & Parin, 1996).

Referred specimens: none.

Dimensions (maximum length along longitudinal axis, in mm): Humerus: ca. 24.5 (r); ulna: 27.2 (r); carpometacarpus: 16.8 (r); femur: 21.6 (r); tibiotarsus: 27.6 (l); tarsometatarsus: 15.8 (r).

Diagnosis: Same as for genus. *Oligocolius brevitorsus* n. sp. has an overall size similar to recent colies.

Etymology: The specific name is derived from *brevis* (Lat.): short, and refers to the short tarsometatarsus of the species.

Description and comparison:

– Vertebrae: At least eight praesacral vertebrae and six isolated caudal vertebrae (including the pygostyle) can be counted. Details of the cervical vertebrae are not visible and the thoracic vertebrae do not show taxonomically important details. Four caudal vertebrae obviously lack processus ventrales whereas in recent colies long processus ventrales are absent on only the two most cranial caudal vertebrae. The pygostyle lies across the caudal part of the pelvis, it bears a long processus dorsalis and also exhibits small processus laterales.

– Trachea: Several ossified tracheal rings are scattered over the slab.

– Coracoid: Both the left and the right coracoid are only poorly preserved. The internal margin of the sternal end bears a distinct convex flange (like in the Sandcoleidae and *Chascacocolius*), the angulus medialis is very short and does not protrude medially. The poorly preserved proximal end of the left coracoid is visible above the proximal end of the left tibiotarsus; not many details can be recognized but

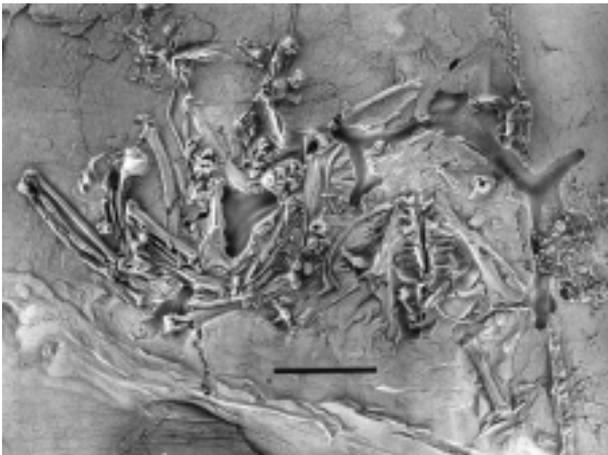


Fig. 1. *Oligocolius brevitorsus* n. gen. n. sp., Holotype (SMNS 80529/2). Covered with ammonium chloride to enhance contrast. Scale bar = 2 cm.
Abb. 1. *Oligocolius brevitorsus* n. gen. n. sp., Holotypus (SMNS 80529/2). Zur Kontrasterhöhung mit Ammoniumchlorid bedampft. Maßstab = 2 cm.

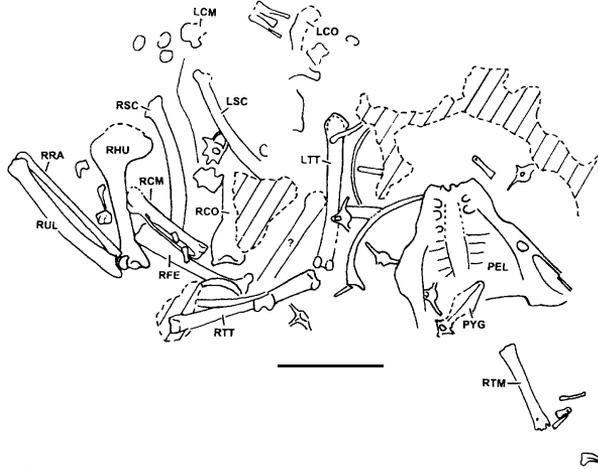


Fig. 2. Interpretative drawing of figure 1. Abbreviations: LCM – left carpometa­carpus, LCO – left coracoid, LSC – left scapula, LTT – left tibiotarsus, PEL – pelvis, PYG – pygostyle, RCM – right carpometa­carpus, RCO – right coracoid, RFE – right femur, RHU – right humerus, RRA – right radius, RSC – right scapula, RTM – right tarsometatarsus, RTT – right tibiotarsus, RUL – right ulna. Scale bar = 2 cm.

Abb. 2. Erklärende Zeichnung zu Abbildung 1. Abkürzungen: LCM – linker Carpometacarpus, LCO – linkes Coracoid, LSC – linke Scapula, LTT – linker Tibiotarsus, PEL – Pelvis, PYG – Pygostyl, RCM – rechter Carpometacarpus, RCO – rechtes Coracoid, RFE – rechter Femur, RHU – rechter Humerus, RRA – rechter Radius, RSC – rechte Scapula, RTM – rechter Tarsometatarsus, RTT – rechter Tibiotarsus, RUL – rechte Ulna. Maßstab = 2 cm.

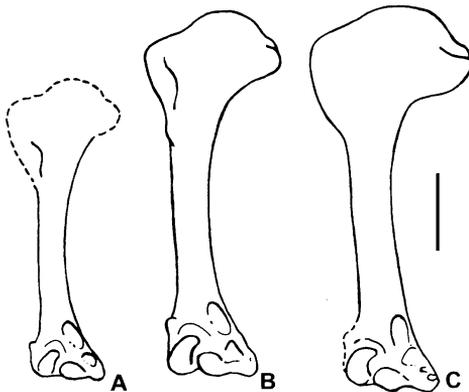


Fig. 3. Humeri in comparison. A) *Primocolius minor* Mourer-Chauviré 1988; B) *Primocolius sigei* Mourer-Chauviré 1988; C) *Oligocolius brevitar­sus* n. gen. n. sp.. Scale bar = 5 mm.

Abb. 3. Humeri im Vergleich. A) *Primocolius minor* Mourer-Chauviré 1988; B) *Primocolius sigei* Mourer-Chauviré 1988; C) *Oligocolius brevitar­sus* n. gen. n. sp.. Maßstab = 5 mm.

the extremitas omalis appears to have been relatively longer than that of recent Coliidae.

- Scapula: In its proportions the scapula most closely resembles that of *Chascacocolius*. Its shaft is not as slender as in recent mousebirds; the acromion is short and broad.

- Ribs: Only a single vertebral rib is preserved in its complete length and bears a fairly large processus uncinatus.

- Humerus (Fig. 3C): The humerus is more robust than that of *Primocolius* (3A, B) and those of recent mousebirds and differs especially in the wider proximal end. The crista deltopectoralis is large measuring almost one third of the entire length of the bone. The shaft appears to have been straight. The distal end of the humerus is similar to that of *Primocolius sigei*. As in the latter and as in recent colies there is a distinct crescent-shaped depression proximad of the condylus dorsalis. The fossa musculi

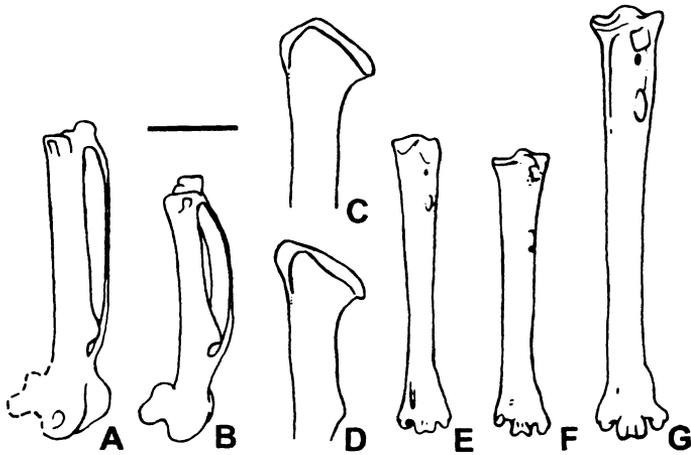


Fig. 4. Carpometacarpus (A, B), proximal tibiotarsus (C, D), and tarsometatarsus (E–G) in comparison. A) *Oligocolius brevitarus* n. gen. n. sp.; B) *Colius castanotus* Verreaux & Verreaux 1855; C) *Oligocolius brevitarus* n. gen. n. sp.; D) *Urocolius macrourus* Linnaeus 1766; E) *Primocolius minor* Mourer-Chauviré 1988 (reconstructed after specimens QU 15860 and ECA 3214 in Mourer-Chauviré, 1988); F) *Oligocolius brevitarus* n. gen. n. sp.; G) *Colius castanotus* Verreaux & Verreaux 1855. Scale bar = 5 mm.

Abb. 4. Carpometacarpus (A, B), proximaler Tibiotarsus (C, D) und Tarsometatarsus (E–G) im Vergleich: A) *Oligocolius brevitarus* n. gen. n. sp.; B) *Colius castanotus* Verreaux & Verreaux 1855; C) *Oligocolius brevitarus* n. gen. n. sp.; D) *Urocolius macrourus* Linnaeus 1766; E) *Primocolius minor* Mourer-Chauviré 1988 (rekonstruiert nach den Exemplaren QU 15860 und ECA 3214 in Mourer-Chauviré, 1988); F) *Oligocolius brevitarus* n. gen. n. sp.; G) *Colius castanotus* Verreaux & Verreaux 1855. Maßstab = 5 mm.

brachialis is shallow. The processus flexorius is less pronounced than in recent colies.

– Ulna: Unlike in other mousebirds the ulna distinctly exceeds the humerus in length (in *Urocolius* it is only slightly longer, in all other Coliidae it is shorter). As far as comparable its distal and proximal ends, however, do not differ from recent colies. The cotyla dorsalis appears to have been large, the tuberculum ligamenti collateralis ventralis is low. Papillae remigales are not visible.

– Carpometacarpus (Fig. 4A): The carpometacarpus is also distinctly larger relative to the other limb elements than that of recent colies (Table 1). As in *Chascacocolius*, but unlike in recent mousebirds (Fig. 4B), the os metacarpale minus is scarcely bowed. The processus intermetacarpalis is distinct like in *Colius* and *Urocolius*. The facies articularis digitalis minor protrudes distally.

– Other elements of the wing: The os carpi ulnare is similar to the corresponding ossicle of extant mousebirds. The os carpi radiale bears a small tubercle on the facies articularis metacarpalis which is absent in *Colius* and *Urocolius*.

– Pelvis: In its general shape the wide pelvis resembles that of recent colies, its cranial part, however, is much wider than in the latter. While the pelvis of *O. brevitarus* has the same length as that of *Urocolius macrourus*, its medio-lateral width across the middle of the alae praeacetabulares ilii is 12.4 mm vs. 8.4 mm *U. macrourus*. Unlike in extant mousebirds, the synsacrum bears five pairs of well developed processus costales. The foramen obturatum is closed, the fenestra ischiopubica wide. Unfortunately, neither the distal end of the os pubis nor the processus terminalis ischii are preserved.

– Femur: The femur has the same absolute size as that of *Urocolius macrourus* which it also

closely resembles in its proportions. The tuberculum musculi gastrocnemialis lateralis is large like in all other coliiiform birds.

– Tibiotarsus (Fig. 4C): The tibiotarsus is rather short and stout. As in all other coliiiform birds both the cristae cnemiales and the crista patellaris form a continuous ridge which circumscribes a groove on the cranial side of the bone. The crista cnemialis cranialis, however, protrudes less proximally than in recent colies (Figs. 4C, D). The proximal end of the tibiotarsus thus has a more triangular shape and resembles more closely that of *Chascacocolius* and those of some recent climbing birds (e.g. the Pici and Dendrocolaptidae). Owing to preservation it is not discernible whether the crista cnemialis cranialis is continuous with a ridge opposite to the crista fibularis like in other Coliiformes. The distal end of the bone is similar to that in recent mousebirds, the condylus lateralis is slightly larger than the condylus medialis; the incisura intercondylaris is wide. As in the extant species the rather low trochlea cartilaginosa tibialis bears a shallow furrow.

– Tarsometatarsus (Fig. 4F): Both in absolute and in relative size the tarsometatarsus is much shorter than that of all recent mousebirds (Table 1). Its shaft is rather narrow in the mid-section and becomes wider towards the proximal and distal ends of the bone. In its proportions the tarsometatarsus most closely resembles the corresponding bone of *Primocolius minor* (Fig. 4E). As in this species the cotylae of the proximal end do not protrude as far dorsally as in recent mousebirds (see Mourer-Chauviré, 1988: Fig. 2). The tuberositas musculi tibialis cranialis is large and situated near the medial margin of the bone. The foramen vasculare distale seems to have been small but owing to preservation it is hardly visible. The three trochleae metatarsorum are on the same level, i.e. in distal view the distal end of the tarsometatarsus is not curved. The trochlea metatarsi IV is narrow and shorter than the other trochleae metatarsorum. The trochlea metatarsi II is narrow, too, but reaches as far distally as the small trochlea metatarsi III. In recent mouse-

birds the trochlea metatarsi II is shorter than the trochlea metatarsi III (Fig. 4G). With regard to this feature the tarsometatarsi which have been assigned to *P. minor* differ slightly: whereas in specimen PRR 2631 the trochlea metatarsi II reaches as far distally as in *O. brevitarisus*, it is slightly shorter in specimen ECA 3214.

– Toes: At least five phalanges (including two claws) are visible. Among these is the proximal (first) phalanx of the fourth toe, which not only is shortened like in all other coliiiform birds but also has a ventrally protruding proximal articulation surface like in *Colius* and *Urocolius*. Viewed laterally, the single claw which is preserved bears a sulcus neurovascularis and resembles that of recent colies; its tuberculum flexorium is distinct.

Discussion

Oligocolius brevitarisus n. gen. n. sp. shares a well developed processus intermetacarpalis (carpometacarpus) with *Primocolius*, *Colius*, and *Urocolius*. Mayr & Peters (1998) also listed a reduced lateral foramen vasculare proximale (tarsometatarsus) in order to support a monophyly of *Primocolius* and the recent colies; owing to preservation, however, this feature is not visible in *Oligocolius*. At present the exact interrelationships between *Oligocolius*, *Primocolius*, and the recent colies remain uncertain, since neither a monophyly of the two fossil genera nor a closer relationship of one of the fossil genera to recent colies can be supported convincingly with derived characters.

O. brevitarisus differs distinctly from recent mousebirds in the proportions of its limb elements in that the wing bones, especially ulna and carpometacarpus, are in both absolute and relative size longer than in *Colius* and *Urocolius*, whereas the tarsometatarsus is much shorter (Table 1). This probably indicates that the Oligocene species was adapted to a more sustained flight than the extant colies, which fly mainly over short distances (Schifter 1972). Within recent mousebirds the more peripatetic

Table 1. Wing and leg ratios of fossil and recent Coliiformes (standard deviation in parentheses, abbreviations: hum – humerus, uln – ulna, cmc – carpometacarpus, tmt – tarsometatarsus).**Tab. 1.** Längenverhältnisse von Flügel- und Beinknochen fossiler und rezenter Coliiformes (Standardabweichung in Klammern, Abkürzungen: hum – humerus, uln – ulna, cmc – carpometacarpus, tmt – tarsometatarsus).

	hum:uln	hum:cmc	uln:tmt	hum:tmt	cmc:tmt
Coliidae					
<i>Oligocolius brevatarsus</i> (n=1)	0.90	1.46	1.72	1.55	1.06
<i>Masillacolius brevidactylus</i> (n=1)	ca. 1.10	ca. 1.56	ca. 0.83	ca. 0.97	ca. 0.62
<i>Urocolius indicus</i> (n=4)	0.98 (0.02)	1.61 (0.05)	1.21 (0.02)	1.18 (0.01)	0.72 (0.02)
<i>Urocolius macrourus</i> (n=1)	0.97	1.59	1.18	1.14	0.72
<i>Colius striatus</i> (n=4)	1.11 (0.02)	1.79 (0.06)	0.93 (0.02)	1.04 (0.03)	0.59 (0.02)
<i>Colius castanotus</i> (n=1)	1.06	1.68	0.95	1.01	0.60
Sandcoleidae					
<i>Eoglaucidium pallas</i> (n=1)	1.04	1.87	1.73	1.80	0.96
family inc. sed.					
<i>Chascacocolius oscitans</i> (n=1)*	1.01	1.67			

* calculation based on measurements in Houde & Olson (1992)

genus *Urocolius* also has both a more strongly developed wing and a shorter tarsometatarsus than the rather sedentary genus *Colius*. These differences are, however, much less distinct than those between *O. brevatarsus* and the recent genera. As not only extant mousebirds but also the more basal (see Mayr & Peters, 1998) genus *Masillacolius* and all Sandcoleidae have a narrower humerus and relatively shorter ulna and carpometacarpus, the strongly developed wing most likely is autapomorphic for *O. brevatarsus*.

Mayr (1998) tentatively referred a fragmentary skeleton from the Upper Eocene deposits of Montmartre (Paris) to the genus *Primocolius*. The specimen (Muséum national d'histoire naturelle, Paris: GY 758 a + b, figured in Milne-Edwards, 1867–71: pl. 160) resembles recent colies in its limb proportions, but unfortunately is too poorly preserved for detailed comparisons. Yet, if one estimates the original length of the incomplete humerus which Mourer-Chauviré (1988) assigned to *P. minor* at approximately 19.8 mm, the ratio of humerus to tarsometatarsus of *P. minor* is about 1.20, which is also distinctly less than the same ratio for *O. brevatarsus* and closer to recent mousebirds (see Table 1).

Recent mousebirds are excellent climbers and this was probably also true for *O. brevitar-*

sus, since the proximal tibiotarsus of this species – although it differs slightly from that of *Colius* and *Urocolius* – exhibits a morphology typical for climbing birds (see description and Figs. 4C, D). Owing to its short tarsometatarsus the Oligocene species might, however, have been less terrestrial than the extant colies which are able to move quickly on the ground (Schifter, 1972).

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