Perching, climbing and clinging abilities in the Early Paleogene Sandcoleidae and *Chascacocolius* (Aves: Coliiformes)

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The recent order Coliiformes comprises a single family, the Coliidae (mousebirds), with six species of the frugivorous birds occurring in Africa south of the Sahara. The extinct coliiform birds Sandcoleidae have been found in Early and Middle Eocene of North America and Europe (see review in Mayr, 2001a; 2005a). Functional morphology of these birds was beyond the main scope of those who studied the Sandcoleidae although some comments on their function and mode of life were made by a few authors (Houde & Olson, 1992; Mayr & Peters, 1998; Mayr & Mourer-Chauviré, 2004; Mayr, 2005b). The *Chascacocolius* was originally described as a member of the Sandcoleidae (Houde & Olson, 1992) but its placement within this family is questionable (Mayr & Peters, 1998; Dyke and Waterhouse, 2000; Mayr & Mourer-Chauvire, 2004).

The structure of the hind limb shows that the Sandcoleidae most probably were arboreal birds. Digits I and IV could rotate and were pointing either forward or backward as in the recent Coliidae (Houde & Olson, 1992). The wing-like flange of trochlea metatarsi II in Sandcoleidae (Mayr & Mourer-Chauvire, 2004) resembles that of trochlea metatarsi IV of the recent Coliidae – this structure serves in latter as a tendon-fixing prominence (Steinbacher, 1935). This structure indicates the increased movability of digit II in the Sandcoleidae. The more proximal than in the recent Coliidae position of facet for metatarsal I (Houde & Olson, 1992) is also related to ability of turning the second toe backward.

Uintornis and *Eobucco* possess asymmetrical trochlea metatarsi III with enlarged outer flange (Houde & Olson, 1992). This is strong evidence for lateral displacement of digit III. Together with ability of rotation of digits IV and I, and displacement to some degree of digit II it shows that the two medial toes opposed the two lateral toes. Apparently, their foot resembled that of some swifts in that digit III and IV held laterally and digits I and II held medially (Collins, 1983).

Sandcoleidae obviously could climb (but probably were better clingers) because they have a shallow carina sterni as in the recent climbing Phoeniculidae and trochlea metatarsi III with rather deep groove though not as deep as in climbing Picinae. The only character that prejudices the perfect climbing in Sandcoleidae is the rotational ability of the tarsus that most probably was increased in Sandcoleidae. That may be inferred from the weak development of the eminentia intercotylaris – what may be seen at least in *Eobucco* (Feduccia & Martin, 1976). This prominence is weakly developed also in parrots whose tarsometatarsus is able to rotate notably round its long axis (Zinoviev, 2000) but is fairly protuberant for example in woodpeckers which have almost no rotation of tarsometatarsus due to the stability needed for climbing. Most probably Sandcoleidae were frugivorous birds (Mayr & Peters, 1998) and thus they could use their movable feet either to manipulate fruits or to cling to them.

The pelvis of the Chascacocolius is very distinct from those of the other Sandcoleiform and demonstrates features distinct from Sandcoleidae but characteristic of climbing forms: well developed proc. terminalis ilii and short preacetabular portion of the ilium. Pr. terminalis ilii serves as an area of origin of the shank flexors, *m. flexor cruris lateralis* and *m. iliofibularis*, and is absent in every other mousebirds, either fossil or recent. However, this process is well developed in the climbing woodpeckers in contrast to the perching wryneck (Zelenkov & Dzerzhinsky, 2006). The short preacetabular portion of ilium is also characteristic of woodpeckers and other climbing birds and is related to the decreased role of the pronator muscles, *m. iliotrochanterici* (Zelenkov & Dzerzhinsky, 2006). Unfortunately, the unclear systematic position of Chascacocolius doesn't allow considering the scansorial behavior primitive or derived within the early colliforms.

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