The peculiar scapula of the late Eocene *Elaphrocnemus phasianus* MILNE-EDWARDS, 1892 (Aves, Cariamae)

With 1 Text-figure

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**Abstract**

The Eocene bird *Elaphrocnemus phasianus* is a stem lineage representative of the Cariamidae ( seriema) and among the most abundant medium-sized avian species in the Quercy fissure fillings in France. We describe the previously unknown scapula of this species, which exhibits a highly unusual morphology. Most notably, the acromion is greatly elongated and there is a concave facies articularis coracoidei rather than a tuberculum coracoideum as in most other birds. These features also distinguish *Elaphrocnemus* from other representatives of the Cariamae. The long acromion probably serves to strengthen the canalis triosseus, which in other Cariamae is achieved by a bony bridge connecting the processus procoracoideus and acrocoracoideus of the coracoid. The peculiarities of the pectoral girdle and wing of *Elaphrocnemus* may indicate that this taxon had better flight capabilities than other Cariamae.

**Key words:** fossil birds, Paleogene, *Elaphrocnemus*, Quercy

**Zusammenfassung**

Die eozäne Vogelart *Elaphrocnemus phasianus* ist ein Stammgruppenvertreter der Cariamidae (Seriemas) und eine der häufigsten mittelgroßen Vogelarten in den Spaltenfüllungen von Quercy in Frankreich. Wir beschreiben die bisher unbekannte Scapula dieses Vögel, die eine hoch ungewöhnliche Morphologie aufweist. Insbesondere ist das Acromion stark verlängert und es gibt eine konkave Facies articularis coracoidei statt eines Tuberculum coracoideum wie bei den meisten anderen Vögeln. Diese Merkmale unterscheiden *Elaphrocnemus* auch von anderen Vertretern der Cariamae. Das lange Acromion diente vermutlich dazu, den Canalis triosseus zu verstärken, was in anderen Cariamae durch eine knöcherne Brücke erzielt wird, welche die Processus procoracoideus und acrocoracoideus des Coracoids verbindet. Die Eigenheiten des Brustgürtels und Flügel von *Elaphrocnemus* weisen darauf hin, daß dieses Taxon vermutlich eine bessere Flugfähigkeit als andere Cariamae hatte.

**Schlüsselworte:** fossile Vogel, Paläogene, *Elaphrocnemus*, Quercy

**Introduction**

*Elaphrocnemus* is one of the most abundant medium-sized avian taxa in the 19th century collections from the middle Eocene to late Oligocene age Quercy fissure fillings in France. Three species were distinguished by Mourer-Chauviré (1983), i.e. *E. phasianus* Milne-Edwards, 1892, *E. crex* Milne-Edwards, 1892, and *E. breckforti* Mourer-Chauviré, 1983. Mourer-Chauviré (1983) also recognized that the wing bones assigned to the taxon "*Filholornis*" actually belong to *Elaphrocnemus*, and Mayr & Mourer-Chauviré (2006) assigned an almost complete skull and other cranial remains to *E. phasianus*. The
exact age of the specimens from the old collections is unknown, but new excavations have shown that *Elaphrocnemus phasianus* occurs in late Eocene deposits and *E. crex* in Oligocene sites (Mourer-Chauviré 1983).

*Elaphrocnemus* was assigned to the Idiornithidae by Mourer-Chauviré (1983) and earlier authors (e.g. Craft 1973), which also includes the middle Eocene to late Oligocene *Idiornis* Milne-Edwards, 1892 and three further, less well-known taxa from the quarry fissure fillings. Together with the Phorusrhacidae (Paleocene to Pliocene of South America, Pleistocene of North America) and Bathornithidae (late Eocene and Oligocene of North America), these birds are stem group representatives of the Cariamidae (seriemas), whose two extant species have a South American distribution. The taxon including extant Cariamidae and their fossil stem lineage representatives is usually termed Cariamae.

*Elaphrocnemus* distinctly differs from *Idiornis* and extant Cariamidae in several osteological features, and may be outside a clade including *Idiornis*, Phorusrhacidae, and Cariamidae (Mayr 2002). In the present note we describe the previously unknown scapula of *Elaphrocnemus phasianus*, which exhibits a very unusual morphology without counterpart among other birds.

Anatomical terminology follows Baumel & Witmer (1993) and Vanden Berge & Zweers (1993). The fossil specimens are deposited in the collections of the Naturhistorisches Museum Basel, Switzerland (NMB) and the Université des Sciences et Techniques du Languedoc, Montpellier, France (USTL).

### Systematic Paleontology

**Aves Linnaeus, 1758**  
Cariameae (sensu Mourer-Chauviré 1983)

*Elaphrocnemus phasianus* Milne-Edwards, 1892

**Referred specimens**: NMB Q.D.378, NMB Q.D.293 (left scapulae lacking the caudal ends, Text-fig. 1).

**Locality and horizon**: Unknown locality and horizon of the quarry fissure fillings in France; probably late Eocene (see Introduction).

**Measurements** (in mm): NMB Q.D.378: maximum length as preserved, 41.7; maximum diameter of facies articularis humeralis, 4.7. NMB Q.D.293: maximum length as preserved, 32.6; maximum diameter of facies articularis humeralis, 5.3.

**Description and comparison**: The most unusual feature of the two scapulae is the greatly elongated acromion, which exceeds that of most extant birds, including the Cariamidae, in relative length (only in Pelicanidae [pelicans] is there a similarly elongated acromion). The acromion of the scapula of *E. phasianus* is further characterized and distinguished from that of the Cariamidae by its square tip which forms a small medial and the presence of a ridge along the margo dorsalis (Text-figs 1A-F). As in extant Cariamidae the facies articularis coracoidei forms an angle with the comparatively small facies articularis humeralis. In contrast to the former, however, the facies articularis coracoidei of *E. phasianus* is concave, which corresponds to the fact that the facies articularis scapularis of the coracoid of *E. phasianus* is convex and not flat or concave as in other birds (Text-fig. 1G).

The scapula of *Idiornis gallicus* (Milne-Edwards, 1892) differs from that of *E. phasianus* in that there is a tuberculum coracoideum (Mourer-Chauviré 1983: 101), which corresponds to the fact that the coracoid of *Idiornis* has a concave cotyla scapularis. The acromion of the scapulae of the bathornithid (see Olson 1985) Bathornis grallator (Wetmore, 1944) and the Phorusrhacidae is very short (Sinclair & Farr 1932, Wetmore 1944: fig. 8). The acromion of the only known scapula of bathornithid Paracrus wetmorei is broken, and there is a large pneumatic foramen caudal to the facies articularis humeralis (Craft 1968). The scapulae of other fossil Cariamidae are unknown.

### Discussion

Both scapulae articulate well with the coracoid of *E. phasianus* (NMB Q.D.242) (Text-fig. 1H). The presence of a concave facies articularis coracoidei allows an unambiguous assignment to *Elaphrocnemus*, which is the only avian taxon of matching size known from the Quarry fissure fillings with a convex facies articularis scapularis of the coracoid. This identification is also supported by the fact that, although scapulae are rather rare among the 19th century material of the Quarry fissure fillings, two specimens are present in the collection of NMB, in which bones of *E. phasianus* are the most abundant remains of medium-sized birds from the Quarry deposits.

Mourer-Chauviré (1983) assigned a different type of scapula to the larger species *E. crex*, which has an only slightly elongated acromion. This bone (USTL ITD 527; Text-fig. 11) was associated with remains of *E. crex* in the Quarry locality Itardies. Given the great similarity of the coracoids, it is however unlikely that the scapulae of *E. phasianus* and *E. crex* are so different. Because USTL ITD 527 further lacks a concave facies articularis coracoidei, we conclude that this specimen has been erroneously referred to *Elaphrocnemus*.

The coracoid of *Elaphrocnemus* differs from that of other Cariamidae in that the processus acrocoracoideus is greatly reduced. In *Idiornis* and extant Cariamidae this process fuses with the processus acrocoracoideus to form a closed canalis trissorus which guides the tendon of musculus supracoracoideus (Text-fig. 1). In *Elaphrocnemus*, by contrast, closure of the canalis trissorus is accomplished by the very long acromion of the scapula (Text-fig. 1H).

Also with regard to the morphology of the wing bones, *Elaphrocnemus* distinctly differs from other representatives of the Cariamidae. Most notably, the humerus exhibits a strongly protruding, triangular crista deltopectoralis, which resembles that of extant Columbidae (pigeons and doves) and Psittacidae (parrots) in its shape (Mourer-Chauviré 1983: pl. 1). The functional significance of the large crista deltopectoralis of the Columbidae and Psittacidae has been detailed by Stégmann (1964), who noted that in these taxa the furcula is very weak owing to the presence of a large crop. One of the major functions of the avian furcula is to serve as an insertion site for the cranial portion of the musculus pectoralis. The cranial curvature of the scapi clavicularum of the normally developed furcula results in a cranial position of a portion of this muscle...