

Senckenbergiana lethaea	80	(1)	59 – 65	6 Text-figs, 1 Tab.	Frankfurt am Main, 31.05.2000
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A new raptor-like bird from the Lower Eocene of North America and Europe

With 6 Text-figures and 1 Table

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Abstract

Tynskya eocaena n. gen. n. sp. is described from Lower Eocene deposits of the Green River Formation (Wyoming, USA). The species is characterized by a distinctive morphology of the tarsometatarsus. Although *Tynskya eocaena* resembles the Lower and Middle Eocene Pseudasturidae MAYR 1998 and some recent strigiform and falconiform birds in several aspects, it has not been possible to find derived characters which convincingly support a classification of this species into one of the known higher avian taxa. Birds closely related to *Tynskya eocaena* have also been found in the Lower Eocene London Clay of Walton-on-the-Naze (Essex, England) and give a further example of the great similarity between the early Eocene avifauna of North America and Europe.

Key words: Aves, raptor-like bird, *Tynskya eocaena*, Lower Eocene, Tertiary, Green River Formation, Wyoming.

Kurzfassung

[Ein neuer raubvogelähnlicher Vogel aus dem unteren Eozän von Nordamerika und Europa] — *Tynskya eocaena* n. gen. n. sp. wird aus untereozänen Ablagerungen der Green River Formation (Wyoming, USA) beschrieben. Die Art ist durch einen kennzeichnenden Bau des Tarsometatarsus charakterisiert. Obwohl *Tynskya eocaena* den unter- und mitteleozänen Pseudasturidae MAYR 1998 und einigen rezenten strigiformen und falconiformen Vögeln hinsichtlich verschiedener Merkmale ähnelt, konnten keine abgeleiteten Merkmale gefunden werden, die eine Klassifikation dieser Art in eines der bekannten höheren Vogel-Taxa überzeugend unterstützen. Mit *Tynskya eocaena* nahe verwandte Vögel wurden auch im unterem Eozän des London Clay von Walton-on-the-Naze (Essex, England) gefunden und geben ein weiteres Beispiel für die große Übereinstimmung zwischen der frühtertiären Avifauna von Nordamerika und Europa.

Introduction

While the mid-Tertiary (i. e. Oligocene and Miocene) avifauna in general is of rather modern aspect, birds from the Lower and Middle Eocene often show a mosaic distribution of characters typical for several avian “families” and “orders”. Just because of their age it is likely that many of these bird

are in sister group relationship to more than one higher extant taxon, and a phylogenetic assignment is thus very difficult given the poor knowledge on the interrelationships of the recent birds. This is especially true for the new taxon from the Lower Eocene of North America and England which is described in this study.

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Material and method

The anatomical terminology follows BAUMEL & WITMER (1993). The dimensions represent the maximum length of the bone along its longitudinal axis, except for the claws where the distance between the tuberculum extensorium and the apex phalangeis has been measured.

Systematics

Order and family incertae sedis

Tynskya n. gen.

Type species: *Tynskya eocaena* n. sp.

Etymology: The genus has been named after the type locality ("Tynsky Quarry"). *Tynskya* n. gen. is feminine in gender.

Diagnosis: Beak short and robust and, as far as it can be compared, similar to that of some falconiform birds (e. g. *Accipiter nisus*); humerus roughly corresponding in proportions to that of *Upupa epops* (Upupidae) but with shorter and more rounded crista deltopectoralis; carpometacarpus with straight os metacarpale minus and large trochlea carpalis; legs long (tibiotarsus is longest limb element). Tarsometatarsus robust, half as long as tibiotarsus and very distinctive: shaft of about equal width over most of its length; hypotarsus similar to that of the Strigiformes and some Falconiformes (Accipitridae and Falconidae) in that crista medialis hypotarsi larger than crista lateralis hypotarsi and both cristae bordering a wide sulcus; crista medialis hypotarsi passing into a crista medianoplantaris; foramen vasculare distale small (WN 96939); fossa metatarsi I large and situated at the beginning of the distal third of the tarsometatarsus; trochleae metatarsorum arranged on a curve; trochlea metatarsi II small; trochlea metatarsi III very broad and reaching farther distally than the other trochleae metatarsorum; trochlea metatarsi IV similar to that of turacos (Musophagidae) and reaching less far distally than trochlea metatarsi II; no well-developed Sehnenhalter (terminology after STEINBACHER 1935) present. Processus articularis tarsometatarsalis of os metatarsale I long; toes long; claws with small tuberculum flexorium which is situated rather far distally.

Differential diagnosis: *Tynskya* n. gen. differs from the

- Pseudasturidae MAYR 1998 in: skull smaller in relative size; humerus stouter with larger proximal end; foramen vasculare distale (tarsometatarsus) smaller; trochlea metatarsi IV without well developed Sehnenhalter; processus articularis tarsometatarsalis of os metatarsale I longer.
- Strigiformes in: humerus stouter with larger proximal end and smaller crista bicipitalis; trochlea cartilaginosis tibialis (tibiotarsus) without deep furrow; trochlea metatarsi II smaller and trochlea metatarsi III broader; trochlea metatarsi IV without well developed Sehnenhalter; proximal phalanges of the fourth toe longer.
- Falconidae and Accipitridae in: crista bicipitalis of humerus smaller; crista deltopectoralis (humerus) more round-

The following abbreviations have been used to indicate collections in which the specimens are deposited:

BSP = Bayerische Staatssammlung für Paläontologie und Historische Geologie (München, Germany),
 WN = Collection M. DANIELS (Clacton-on-Sea, Essex, England).

ed and smaller; trochlea metatarsi II smaller; trochlea metatarsi III broader; tuberculum flexorium of claws smaller; proximal phalanges of fourth toe longer.

Tynskya eocaena n. sp.

Text-figs 1-6

Etymology: The specific name refers to the geological age of the species.

Holotype: BSP 1997 I 6 - incomplete articulated skeleton deposited in the Bayerische Staatssammlung für Paläontologie und Historische Geologie, München/Germany (text-fig. 1).

Type locality: "Tynsky Quarry", Wyoming, USA.

Type horizon: Upper Lower Eocene (Fossil Butte Member of the Green River Formation).

Tentatively referred specimen: WN 96939 – several isolated bones found associated in the Lower Eocene London Clay of Walton-on-the-Naze, Essex/England (text-fig. 6).

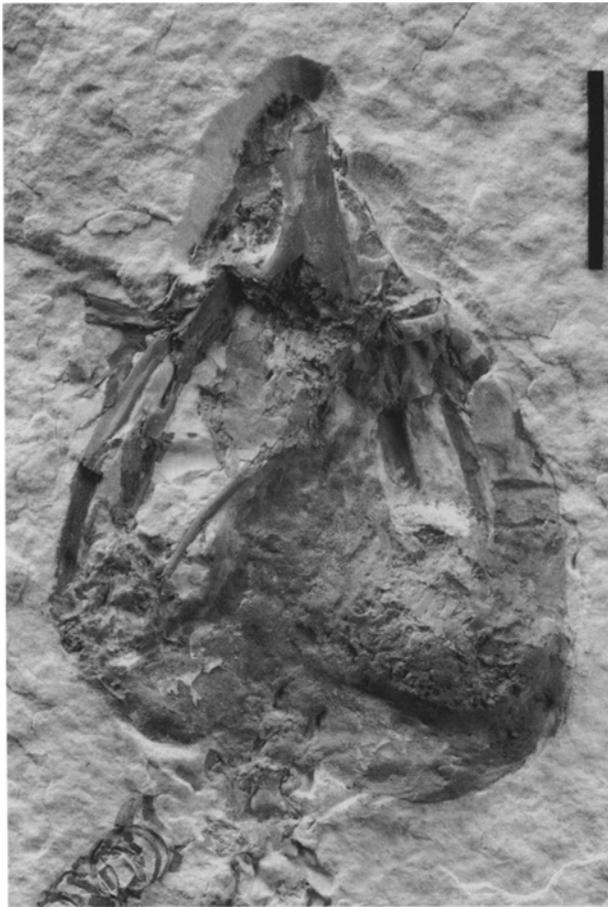
Dimensions (in mm): Humerus: 36.6 (l). Ulna: 40.0 (l)/~39.4 (r). Carpometacarpus: 20.1 (l)/20.1 (r). Tibiotarsus: 42.0 (l). Tarsometatarsus: 21.6 (r). Pedal phalanges: II: ~9.3; III: 8.8; II4: ~6.9; IV1: 4.5; IV2: 4.1; IV3: 4.1; IV4: 7.3; IV5: 6.6.

Diagnosis: Single named species of the genus, therefore the diagnosis is the same as for the genus. In its size and in the relative length of the limb elements *Tynskya eocaena* n. sp. corresponds well with *Otus scops* (Strigiformes).

Remarks: The skeleton is exposed from its dorsal side. Although it looks quite complete at first sight, most parts of the cranium and the trunk (furcula, sternum, pelvis, proximal end of right tibiotarsus) are not preserved and the slab has been painted in these areas. The shaft of the right humerus is fractured which might have caused the death of the bird.

Text-fig. 1. Holotype of *Tynskya eocaena* n. gen. n. sp. (BSP 1997 I 6). The skeleton is exposed from its dorsal side. Note that most parts of the cranium and the trunk (furcula, sternum, pelvis, proximal end of right tibiotarsus) are not preserved and that the slab has been painted in these areas. – Scale = 10 mm.





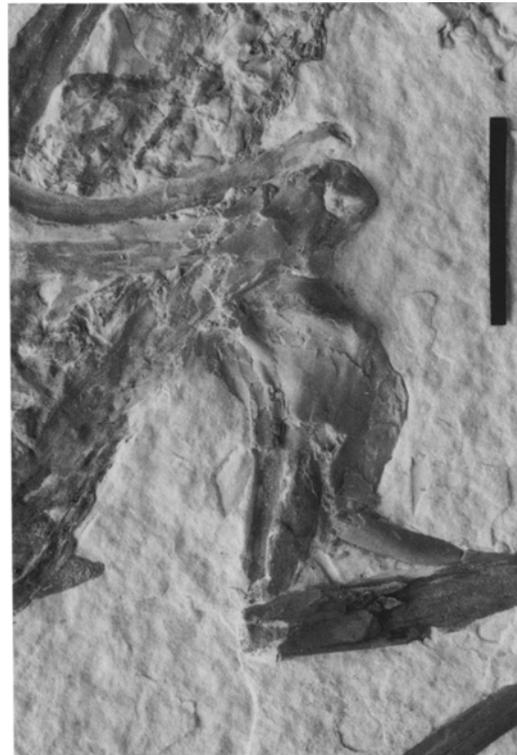
Text-fig. 2. *Tynskya eocaena* n. gen. n. sp. (holotype), skull. For comments see text-fig. 1. – Scale = 10 mm.

Description and comparison

Skull (text-fig. 2): The skull is slightly smaller than that of *Otus scops* (Strigiformes). Unfortunately no details of the cranium can be recognized and only the upper jaw allows some comparisons: It is short (measuring less than one third of the total length of the skull) and approximately as wide at its base as it is long. The culmen is curved, the dorsal bar of the os nasale is medio-laterally broad (wider than in strigiform birds). The narial openings are more than half as long as the beak and appear to have been oval-shaped (their ventral margin is not visible). As far as comparable the upper jaw therefore most closely resembles that of accipitrid birds (e. g. *Accipiter nisus*), but neither the tip of the praemaxilla nor the crista tomialis are visible. A slender bar which can be seen on the left side of the skull most likely is the left epibranchiale of the hyobranchial apparatus (it appears to be too thin for the pterygoid). Several ossified tracheal rings are preserved.

Vertebrae: Most vertebrae have been lost and the few short cervical vertebrae which remain on the slab are too fragmentary to allow a detailed comparison.

Coracoid: Only the proximal end of the right coracoid is preserved, most of which is covered by the acromion of the



Text-fig. 3. *Tynskya eocaena* n. gen. n. sp. (holotype), proximal end of right humerus. – Scale = 10 mm.

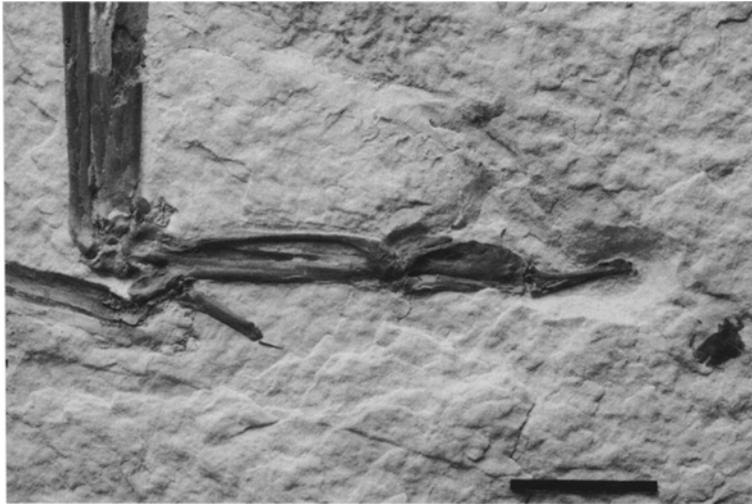
scapula. The facies articularis clavicularis is well developed. The processus procoracoideus seems to be short, but is not clearly visible.

Furcula: The original bony substance of the furcula has been lost and merely a U-shaped impression is preserved. An impression of the apophysis furculae cannot be seen and the scapus claviculae seems to have had a constant width.

Scapula: The moderately long and blunt acromion bears a small projection on its dorsal side. The blade of the scapula is not preserved.

Ribs: Five stout sternal ribs can be counted, the most caudal being two times longer than the most cranial one; vertebral ribs are not preserved.

Humerus (text-fig. 3): The humerus has similar proportions like that of *Upupa epops* (Upupidae), but bears a shorter and more rounded crista deltopectoralis. Its shaft is only slightly curved, the proximal end of the bone is rather broad. The tuberculum dorsale is small. The crista deltopectoralis measures approximately $\frac{1}{3}$ of the entire length of the bone and is low and convex. The caput humeri is only slightly inflected towards the cranial side of the bone; a foramen pneumaticum is absent. The ectepicondylus of the distal end bears two distinct adjacent depressions. The sulcus scapulotricipitalis is shallow, but the sulcus humerotricipitalis appears to have been deeply excavated. The processus flexorius reaches less far distally than the condylus ventralis.



Text-fig. 4. *Tynskya eoacaena* n. gen. n. sp. (holotype), right manus. Note the long claw on the phalanx digiti alulae. – Scale = 10 mm.

Ulna: The ulna is longer than the humerus and resembles the corresponding bone of psittaciform birds in its proportions, the olecranon is blunt.

Carpometacarpus (text-fig. 4): The carpometacarpus is slender, the os metacarpale minus is hardly curved and runs parallel to the os metacarpale majus, both are of equal length. The trochlea carpalis is large and proximo-caudally extended; the processus pisiformis is centrally positioned with its tip pointing in ventral direction. The os metacarpale alulare resembles that of *Otus scops*. The sulcus tendineus is shallow.



Text-fig. 5. *Tynskya eoacaena* n. gen. n. sp. (holotype), right tarsometatarsus. – Scale = 10 mm.

Other elements of the wing: The blade of the phalanx proximalis digiti majoris is narrow and bears a shallow fossa ventralis. The distal end of the phalanx distalis digiti majoris is widened. Both the phalanx digiti alulae and the phalanx distalis digiti majoris bear a rudimentary claw which measures 1.7 mm and 0.6 mm respectively (a survey on the occurrence of vestigial claws in recent birds has been conducted by STEPHAN 1992). The phalanx digiti minoris is slender and small. Os carpi radiale and os carpi ulnare are similar to the corresponding bones of *Otus scops*. The latter is small with a rather narrow incisura metacarpalis, crus breve and crus longum have approximately the same length.

Tibiotarsus: The tibiotarsus is the longest limb bone and even exceeds the ulna in length. The cristae cnemiales appear to have been small. The trochlea cartilaginis tibialis is low and shallow. The fibula reaches $\frac{2}{5}$ of the length of the tibiotarsus but might have been longer originally, since the distal end seems to be incomplete.

Tarsometatarsus (text-fig. 5): The tarsometatarsus of *Tynskya* measures slightly more than half the length of the tibiotarsus and is a distinctive bone. The shaft has nearly the same width over most of its length and only widens at its proximal and distal ends. The hypotarsus resembles that of the Strigiformes and some Falconiformes (Accipitridae and Falconidae): It exhibits a large crista medialis hypotarsi and a smaller crista lateralis hypotarsi (specimen WN 96939) which border a wide sulcus. The hypotarsus encloses no canal (WN 96939). The crista medialis hypotarsi passes into a crista medianoplantaris which runs along half the length of the tarsometatarsus. The fossa infracotyleris dorsalis is deep (WN 96939). The foramen vasculare distale is small (WN 96939). The fossa metatarsi I is large and situated rather high at the beginning of the distal third of the shaft. In distal view the trochleae metatarsorum are arranged on a curve. The trochlea metatarsi II is very small, compared to the broad trochlea metatarsi III. Both the trochlea metatarsi II and the trochlea metatarsi IV are shorter than the trochlea metatarsi III. The trochlea metatarsi IV reaches even less far distally than the trochlea metatarsi II and resembles the corresponding trochlea of turacos (Musophagidae) in that the articulation



Text-fig. 6. *Tynskya* cf. *eocaena* n. gen. n. sp., referred tarsometatarsus from the Lower Eocene London Clay of Walton-on-the-Naze, Essex/England (WN 96939). – Left, dorsal side; right, plantar side. – Scale = 5 mm. Photograph: M. DANIELS.

surface for the fourth toe directs somewhat laterally. Therefore *Tynskya* might have been able to spread the fourth toe in lateral direction. A well developed Sehnenhalter, however, seems to be absent (contrary to the Pseudasturidae MAYR 1998 and strigiform birds).

Toes: The toes are long, the third toe is the longest and exceeds the tarsometatarsus in length. The fourth toe is distinctly shorter and approximately as long as the tarsometatarsus. The three proximal phalanges of the fourth toe are shorter than the fourth phalanx, but not as abbreviated as in the Strigiformes and many Falconiformes; the second and third phalanges are slightly more abbreviated than the first one. The hallux (visible at the right foot) is of average length, its proximal phalanx measures almost half the length of the

tarsometatarsus. In both size and shape, the moderately curved claws correspond well with those of *Otus scops*, the tuberculum flexorium is rather low and situated far distally. The os metatarsale I bears a long processus articularis tarsometatarsalis and is similar to the corresponding bone of turacos (Musophagidae).

Discussion

Birds closely related to *Tynskya eocaena* n. gen. n. sp. were also collected by M. DANIELS in the Lower Eocene London Clay of Walton-on-the-Naze, Essex (text-fig. 6) and are listed as “owls” in FEDUCCIA (1996: tab. 4.1). They give a further example of the great similarity between the early Eocene avifauna of North America and Europe (see for example HOUDE 1988; MAYR 1998; MAYR & PETERS 1998). Similar birds have not been identified so far among the numerous bird skeletons found in the Middle Eocene of Messel (Hessen, Germany) which possibly indicates, that the genus *Tynskya* became extinct towards the end of the Lower Eocene.

The fact that the beak of *Tynskya eocaena* seems to resemble that of some falconiform birds, might suggest that this species also had a raptorial way of living. Yet, considerations concerning its diet remain very speculative, as long as the shape of the crista tomialis and the morphology of the mandible are unknown.

It has not been possible to find derived characters which convincingly support an assignment of *T. eocaena* to any of the recent or fossil higher avian taxa, but instead of creating a new monotypic “family” and thus moving the problem of classification merely to a higher systematic level, it seems to be more appropriate to leave *Tynskya* n. gen. incertae sedis concerning its higher systematic affinities.

In its overall morphology and in the relative length of the limb elements *T. eocaena* resembles the Lower and Middle Eocene Pseudasturidae MAYR 1998, which are represented in the Green-River-Formation by “*Primobucco*” *olsoni* FEDUCCIA & MARTIN 1976 (tab. 1). Due to preservation, however, most of the characters listed in the original diagnosis of this family are not visible in the type specimen of *T. eocaena* (e. g. the elongated processus supraorbitales, the marked de-

Tab. 1. Proportions of the limb elements of *Tynskya eocaena* n. gen. n. sp. in comparison with Pseudasturidae MAYR 1998 and Strigiformes (value in brackets: standard deviation).

	hum:uln	hum:cmc	hum:tbt	tbt:tmt	uln:tmt	hum:tmt	cmc:tmt
<i>Tynskya eocaena</i>	0.92	1.82	0.87	1.94	1.85	1.69	0.93
Pseudasturidae							
<i>Pseudastur macrocephalus</i> (n = 2)	0.86 [0.01]	1.95 [0.04]	1.00 [0.03]	1.95 [0.02]	2.26 [0.02]	1.94 [0.04]	1.00 [0.04]
“ <i>Primobucco</i> ” <i>olsoni</i> ¹	~0.90	~2.14	~0.84	~2.13	~1.97	~1.78	~0.83
Strigidae							
<i>Otus scops</i>	0.86	1.98	0.93	1.92	2.01	1.74	0.88

¹ measurements taken from the holotype

pressio radialis on the distal ulna, and the pleurocoelous thoracic vertebrae). Contrary to *T. eoacaena* all pseudasturid birds known so far exhibit a well developed Sehnenhalter and have thus been fully or at least facultatively zygodactyl (MAYR 1998). Moreover, these birds have a much more slender humerus than *T. eoacaena* (see also differential diagnosis of *Tynskya* n. gen.).

Tynskya eoacaena also shares features with strigiform and some falconiform birds (especially concerning the shape of the beak and the morphology of the hypotarsus). The mosaic distribution of strigiform and falconiform characters in this species and the Pseudasturidae could perhaps indicate, that Strigiformes and at least part of the Falconiformes are closer related than is obvious from most recent classifications. This (traditional) idea has recently been revived by CRACRAFT (1981, 1988) who listed the structure of the hypotarsus and several other features in order to support a monophyly of the Strigiformes and part of the Falconiformes (Accipitridae, Falconidae, Pandionidae). Yet, although outgroup comparisons with the palaeognathous Tinamiformes and Lithornithiformes HOUDE 1988 suggest, that the hypotarsus of *T. eoacaena* and that of strigiform and the above-mentioned falconiform birds

is derived within neognathous birds, it requires an extensive phylogenetic analysis including many higher avian taxa to show that it virtually is synapomorphic. True owls already occur in Paleocene and Lower Eocene deposits of North America and Europe (WETMORE 1938; MARTIN & BLACK 1972; RICH & BOHASKA 1976; MOURER-CHAUVIRÉ 1994), but there is no certain record of falconiform birds of comparable age (the bones described by HARRISON & WALKER 1979 and HARRISON 1982, 1984 from the Lower Eocene of England are too fragmentary to allow correct identification).

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