



A New Middle Miocene Starling (Sturnidae Rafinesque, 1815) from Kardam (NE Bulgaria)

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Abstract. A specimen of a slab from drilling operation at Konkian deposits (MN 5-8) is described as *Dobrosturnus kardamensis* gen. et sp. nov. based on a partial skeleton with preserved coracoids, ulna, scapula, femur, and sternum, and corresponding to the first Neogene sturnid described for the Balkan region. It is similar in size to the recent starlings (*Sturnus* s. l.), differing by the lacking of a depression at the base of the acrocoracoid on the medial side of the processus acrocoracoideus; the more caudal inception of processus lateralis; the lower distally drawn processus lateralis; the shorter and blunter processus procoracoideus and the less developed sulcus m. supracoracoidei of coracoid.

Key words: Neogene birds, Miocene avifauna, Sturnidae, Fossil passerines, Konkian, Kardam locality.

Introduction

The Miocene avian fossil record in Bulgaria is not abundant. Until now nine paleontological sites revealed fossil birds: Hadzhidimovo, Kalimantsi, Gorna Sushitsa, Hrabarsko, Troyanovo, Azmaka, Kremikovtsi, Kardam, and Stanyantsi. Several new taxa have been described from these Miocene localities – two genera (*Euroceros* Boev & Kovachev 2007 – Bucerotinae (Bonaparte, 1854) of Bucerotiformes, and *Eremarida* Boev, 2012 – Alaudidae Vigors, 1825 of Passeriformes), and seven species - *Anser thraceiensis* Burchak-Abramovich & Nikolov, 1982; *Buteo spassovi* Boev & Kovachev 1998, *Circaetus rhodopensis* Boev, 2012 (Accipitriformes), *Euroceros bulgaricus* Boev & Kovachev 2007 (Bucerotiformes), *Falco bulgaricus* Boev, 2011 (Falconiformes), *Melanocorypha serdicensis* Boev, 2012, *Eremarida xerophila* Boev, 2012 (Passeriformes), and *Phasianus bulgaricus* Boev, 2020. The Kardam locality is the second Bulgarian site of Miocene passeriform birds.

The last two species – the Dry-loving rock-steppe lark and the Serdica lark, have been described from Hrabarsko locality (Sofia Region; BOEV, 2012). Here we describe a new genus and species of a starling (Sturnidae) based on an incomplete skeleton of Konkian (MN 5-8) from NE Bulgaria. The examined find (NMNHS 1626-1633) represents a partial articulated skeleton included in a limestone slab (Fig. 1). Six skeletal elements have preserved articular endings, useful in identification: two coracoids, ulna, scapula, femur, and sternum. The find remained unstudied for about 40 years and first data on it were published by BOEV (1988, 1992). No other fossils were found in the site and the examined specimen is the only find from that locality. The site has been destroyed soon after its discovery.

Material and Methods

Abbreviations: Anatomical: dex. - dextra; dist. – distal; prox. - proximalis; sin. – sinistra; Institutional: NHML – Natural History Museum, London; NHMT – Natural History

Museum, Tring; NMNHS - National Museum of Natural History (Bulgarian Academy of Sciences), Sofia; PIN - Paleontological Institute, Russian Academy of Sciences, Moscow; NMNHW - National Museum of Natural History, Washington; UCBL - Université Claude Bernard, Lyon.

All measurements are given in millimeters (Tables 1, 2; Fig. 2). The taxonomy follows MLÍKOVSKÝ (2002) and DICKINSON & CHRISTIDIS (2014). The osteological terminology is after BAUMEL & WITMER (1993) and TOMEK & BOCHENSKI (2000).

In 1986 at NHML jointly with Dr. Cyril Walker (1939-2009) the specimen (before bone extracting) was tentatively referred to Sturnidae. In 1987 at PIN the scapular part of the left coracoid was extracted from the matrix and seven morphological features were chosen for its comparison with the representatives of 45 modern families of Passeriformes.

In 1990 the find (incl. extracted coracoid) was compared at the NMNHW with some species of four modern families of Passeriformes - Mimidae, Irenidae, Vangidae and Duculidae. Each feature was graded in 3 grades: "+" - the feature is presented; "-" - the feature is lacking; "±" - the feature is unclearly developed. Each "+" was evaluated with one point, while each "±" - with 0.5 points and each "-" - with zero points. Thus all compared families received digital values for their similarities in terms of the 7 chosen features. The comparison with the three species of family Mimidae is interesting as it gives rather different results: *O. montanus* - 0, *M. graysoni* - 4, *T. rufum* - 6. Perhaps this high similarity reflects a morphological convergence within the large order of Passeriformes. The highest similarity of the all 45 families was found in: Zosteropidae (5), Sittidae (4.5), Drepaniidae (5.5), Mimidae (5), and Prunellidae (4.5).

For our comparison at NMNHW we used comparative skeleton material of the following species: *Dulus dominicus* (Linnaeus, 1766) (Duculidae), *Leptopterus charbet* (Müller, 1776) (Vangidae), *Irena puella crinigera* Sharpe, 1877 (Irenidae), *Oreoscoptes montanus* (Townsend, 1837) (Mimidae), *Mimus graysoni* Lawrence, 1871 and *Toxosoma rufum* (Linnaeus, 1758) (Mimidae).

In 1995 at UCBL the proximal (sternal) part of the left coracoid was extracted from the

matrix. Then we found that the processus lateralis starts laterally instead medially on the coracoid's diaphysis. This forced us to make a second comparison with some families of Passeriformes. Thus, the left coracoid was compared again at the UCBL with species of 11 families: Sturnidae, Turdidae, Prunellidae, Sittidae, Timaliidae, Ploceidae, Pycnonotidae, Icteridae, Fringillidae, Estrildidae and Emberizidae. In 1995 we extracted also almost the whole coracoid dex. and scapula prox. dex. The specimen demonstrated highest similarity to Sturnidae again.

Due to their belonging to other extra-Palaearctic ornithofaunistic complexes the specimen was not compared with the members of the following families: Hyposittidae (from Madagascar) and Conopophagidae, Rhynchocryptidae, Oxyruncidae, Cathamblyrhynchidae and Pytotonidae (from South America), Ptilogonatidae (from North and South America), Atrichornithidae and Menuridae (from Australia), Epthianuridae (from New Guinea, New Zealand) and Acanthisittidae (from New Zealand).

Comparisons with Oriolidae (*Oriolus oriolus* (Linnaeus, 1758)) show significant differences: much less protruding and more distally reaching facies articularis humeralis and narrower portion of humeral epiphysis.

Using perfect relief offprint of the left coracoid we reconstructed its total maximal length (measurement "h"; Table 1) from the tip of the acrocoracoideum to the angulus lateralis.

Systematic Paleontology

Order: Passeriformes Linnaeus, 1758

Family: Sturnidae Rafinesque, 1815

Dobrosturnus, gen. nov.

Type species: *Dobrosturnus kardamensis*, sp. nov.

Included species: only the type species.

Etyymology: after the first part of the name Dobrotitsa (old Bulgarian name of the present Dobrudzha, a historical region of NE Bulgaria), and *Sturnus*, the Latin name of "starling".

Diagnosis: A sturnid of similar size to the recent starlings (*Sturnus* s. l.), differing by the lacking of a depression at the base of the acrocoracoid on the medial side of acrocoracoid; the more caudal inception of processus lateralis; the lower distally drawn processus lateralis; the shorter and blunter

processus procoracoideus and the less developed sulcus m. supracoracoidei.

Preservation of the holotype: coracoid sin. dist. - NMNHS 1627 is of perfect preservation without damages (Fig. 4 – C, D). The preserved extracted fragment (pars humeralis) is broken, but pars sternalis remained unextracted and it is also completely preserved. The morphological comparison of the osteological features is given on Table 1.

Locality: Vicinity of the Kardam village (Dobrich District; north-eastern Bulgaria; 43°45' N, 28°28' E).

Horizon and Chronostratigraphy: The find was extracted through drilling operations during sounding at 102 m depth. It was handed to Dr. IVAN NIKOLOV (1927-1982; NMNHS) in the 1950-s and dated Konkian (MN 5-8). After ZUBAKOV (1990), the Konkian of the Eastern Parathetys is dated 14.3-13.6 Mya, but JONES & SIMMONS (1997) dated it 12.5-10.5 Mya (middle Miocene).

Dobrostrurnus kardamensis sp. nov.

Holotype: coracoid sin. dist. - NMNHS 1627 (Fig. 4 – C, D).

Etymology: after the name of the Kardam village (Dobrich Region; NE Bulgaria) where the find originates from.

Paratypes: coracoid dex. dist. - NMNHS 1626 (Fig. 4 – A, B), cscapula sin. prox. - NMNHS 1629 (Fig. 4 - E), scapula dex. - NMNHS 1628, femur sin. - NMNHS 1629, ulna sin. prox. (Fig. 4 - F), sternum - pars sin. - NMNHS 1630 (Fig. 4 - G), sternum, tabula sterni dex. - NMNHS 1632, cranium and vertebrae cervicales - NMNHS 1631 (Fig. 4 - H), as well as 12 fragments of the long bones of limbs - NMNHS 1633.

Comparison: See Tables 1, 2.

Measurements of the holotype: Table 1; Fig. 2 A, B.

Measurements of the paratypes: Table 2; Fig. 2 C, D, E.

Diagnosis: as for the genus.

Locality, Horizon, and Chronology: as for the genus.

Results and Discussion

Comparison with recent medium-sized passeriforms

Cranium

The preserved part of the cranium (neurocranium) is damaged, flattened and heavily

broken. The imprints of the brain hemispheres are relatively well shaped but the orbital sections aren't preserved. The skull is relatively big, but corresponds to general proportions of other sturnids.

Cervical vertebrae

The atlas, axis and the following 5 (6) cervical vertebrae are also damaged and could not be used for the comparative analysis.

Coracoid

The fossil from Kardam is medium-sized passeriform bird having typical coracoid for Passeri Linnaeus, 1758. – straight shaft (diaphysis) of more or less round section, strongly curved processus acrocoracoideus, high inception of the sterno-coracoidal impression.

It differs from similar-sized Corvidae (*Cyanopica cyanus* Pallas, 1776 - UCBL 301/1) by the depression at the base of the acrocoracoid, more medially bended hook and the blunter acromion.

It also differs from both compared species of Zosteropidae (*Zosterops lateralis caeruleus* (Latham, 1801) and *Z. maderaspatanus* (Linnaeus, 1766)) by the slightly wider bend of the hook of processus acrocoracoideus (feature 3; Fig. 5) in medial direction and by the larger dimensions. By this bend it differs from Sittidae, but resembles by the shape of processus lateralis. In cranial view processus lateralis (i. e. its base on the diaphysis) in Zosteropidae starts from the middle of diaphysis, while in Sittidae and Prunellidae it starts more distally. All these peculiarities distinguish specimen (NMNH 1627) from Zosteropidae and approach it to Sittidae and Prunellidae. It differs from Zosteropidae by the more proximally positioned processus procoracoideus (6), and the wider sulcus supracoracoidei (5) and the lacking of edge (6) in the section of the thickness of the diaphysis. Processus lateralis (7) joints to diaphysis without edge (6) and gradually becomes shallower splices, although out of the diaphysis range rises sharply. This also categorically distinguishes it from Zosteropidae. In caudal view the connection of (6) is a protruding edge. This feature also distinguishes it from Zosteropidae. In NMNHS 1627 there are no any edges at all at that place.

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The specimen distinguishes from Sittidae and Prunellidae by the last two features the same way. Proc. lateralis starts from the caudal side without an edge, while in Zosteropidae, Sittidae and Prunellidae it starts from the medial side.

From *Leistes militaris* Vigors, 1825 (Icteridae) it differs metrically and by the longer and more curved hook and the more caudal inception of the processus lateralis.

It differs from *Sturnus vulgaris* Linnaeus, 1758, *S. unicolor* Temminck, 1820 and *Pastor roseus* (Linnaeus, 1758) by the lacking of a depression at the base of the acrocoracoid and the more caudal, instead medial inception of processus lateralis, blunter processus procoracoideus and lesser angle between it and the diaphysis axis, longer hook, which is sharply curved caudally. It shows more similarities with *Acridotheres melanopterus* Daudin, 1800. The angle is the same and the depression is also shallow and unclearly shaped. On the other side, the specimen differs by the more "right", rather obtuse angle (2). Here again, the main differences is the more caudal inception of the proc. lateralis.

The Kardam specimen resembles *Sturnia pagodarum* (Gmelin, 1789) by the right angle (2). From *S. sinensis* (Gmelin, 1788) it distinguishes metrically (Table 1) and by the lacking of the depression at the base of the acrocoracoid, the bigger and curved hook. Differences from *Lamprotornis splendidus* (Vieillot, 1822): lacking of the depression at the base of the acrocoracoid and the sharper angle between the proc. procoracoideus and the diaphysis axis. In the same time it completely resembles *L. splendidus* by the inception of the processus lateralis on the diaphysis. Facies articularis humeralis and processus acrocoracoideus are similar to these of NMNHS 1627.

The compared specimen differs from *Lamprotornis superbus* (Rüppel, 1845) by the lacking of a depression at the base of the acrocoracoid, thicker hook and more proximal inception of the base of processus lateralis. Thus, based on all comparisons above, the Kardam bird much approaches to genera *Spreo* and *Lamprotornis*.

It differs from *Gracula religiosa* Linnaeus, 1758 by the lacking the depression at the base of the acrocoracoid, metrically (it is smaller) and by the more caudal inception.

In comparison with *Spodiopsar cineraceus* Temminck, 1835 we found a clear difference. The Kardam specimen lacks a deep and well-shaped deep depression at the base of the acrocoracoid.

Thus, based on all comparisons above, the Kardam bird much approaches to genera *Spreo* and *Lamprotornis*.

Sternum

Sternum (Table 2; Fig. 2 - C): Left half of the bone is well preserved (Fig. 4 - G). Processus craniolateralis, trabecula lateralis, processi costalis and pila coracoidea and the left horn of manubrium sterni are clearly seen. All these details show the general construction plan of family Sturnidae. The compared specimen differs from *Lamprotornis* by the larger incisurae intercostales, i. e. the wider sterno-costal joints. It differs from *Sturnus* by the bigger size and the lacking of ribbing in the base of processus craniolateralis along the lateral prolongation of pila coracoidearticularis. It differs from *Spreo* by the larger size and the lacking of ribbing of processus craniolateralis along the lateral prolongation of pila coracoidea articularis. From *Gracula* the specimen differs by its smaller size and the longer horns of the manubrium sterni in relation of the smaller sternum. The Kardam bird differs from *Temenuchus* (now submerged in *Sturnus*) by the longer horns of the manubrium sterni, as well as its bigger size.

Scapula

Scapula (Table 2; Fig. 2 - D): Scapula sin. is preserved, but its prox. articular ending is damaged. (Fig. 4 - E). Corpus scapulae, facies lateralis, extremitas caudalis, margo dorsalis and collum scapulae are in good preservation. On the contrary, only prox. articular ending of the scapula dex. is partly preserved together with the facies articularis humeralis and facies articularis clavicularis, which complete the missing information of the scapula sin. The specimen differs from *Lamprotornis* by the more rounded facies articularis clavicularis, the wider scapula (caudal end of corpus scapulae). It differs from *Sturnus* a by the more rounded facies articularis humeralis. It is significantly smaller than all species of *Gracula* (Table 2).

Femur

Femur (Table 2): The total length of femur is 29.4 mm. The whole length of the lateral surface of

diaphysis and the prox. and dist. epiphyses are preserved. This allows to measure the total length of the bone – the measurement “h”. The diaphysis is flatten and no thickness at the middle could be measured. It differs from the compared genera of Sturnidae by the lacking of foramen pneumaticus in the prox. part of the bone.

Comparison with fossil sturnids

Until recently the Neogene record of sturnids in Europe was unknown (BOCHENSKI, 1997; MLÍKOVSKÝ, 2002). KESSLER (2010) listed *Sturnus* sp. from Polgardi 4, Hungary (MN 13). Later this author described *Sturnus kretzoi* Kessler, 2012 from Rudabanya 2, Hungary, late Miocene (MN 9) (KESSLER, 2012). The holotype of that species is proximal left carpometacarpus, which makes it incomparable with the Kardam starling. In other publication KESSLER (2013)

described *Sturnus brevis* KESSLER 2013 from Polgárdi 4, 5; late Miocene (MN 13). The holotype of that species is a coracoid, but as mentioned in its diagnose, “On dorsal side of coracoid..., the acroracoracoid ... has slightly asymmetrical blunt conical shape. Processus accessorius ... is hooklike with cut-off end. Edge of sulcus m. supracoracoidei ... forms strongly concave line. Edge of facies articularis humeralis ... is straight. Processus procoracoidei ... is well developed.” (p. 76). These differences from the Kardam specimen and the considerable chronostratigraphic difference don't allow referring it to *S. brevis*. In the same paper the author describes two other Neogene starlings: *Sturnus pliocaenicus* Kessler 2013 and *Sturnus baranensis* Kessler 2013, both from Beremend 26, Pliocene (MN 15-16). No coracoids are available for comparison of both species.

Table 1. Measurements of coracoid in fossil and recent Sturnidae (Ref. to Fig. 2 – A, B). Descriptions of some measurements: a – width of humeral epiphysis; b – length of processus acroracoracoideus; c – width of diaphysis in the middle; d – thickness of diaphysis in the middle; e – width of facies articularis humeralis; h – maximal length of the bone (Fig. 3).

Species	a	b	c	d	e	f	g	h
Fossil - <i>Dobrosturnus kardamensis</i> gen. et sp. nov.								
NMNHS 1627- Kardam	4.5	4.2	1.45	1.7	1.85	2.4	1.8	22.0
Recent								
<i>Sturnus vulgaris</i> UCBL 414/1	5.15	c.4.0	1.6	1.9	1.8	2.2	1.8	25.6
<i>Sturnus vulgaris</i> UCBL 414/2	5.3	c.4.3	1.0	1.8	1.95	2.3	1.85	27.7
<i>Sturnus vulgaris</i> UCBL 414/3	-	-	1.7	1.6	1.9	2.3	1.95	26.6
<i>Sturnus vulgaris</i> UCBL 414/4	4.85	3.9	1.7	1.7	1.8	2.1	1.8	25.7
<i>Sturnus vulgaris</i> UCBL 414/5	4.95	3.8	1.6	1.8	1.9	2.25	1.8	25.9
<i>Sturnus vulgaris</i> UCBL 414/6	4.5	3.6	1.7	1.6	2.0	2.3	1.8	26.7
<i>Sturnus vulgaris</i> UCBL 414/7	5.2	4.3	1.7	1.8	1.95	2.3	1.8	26.7
<i>Sturnus vulgaris</i> UCBL 414/8	5.0	4.95	1.6	1.7	2.1	2.3	1.9	27.4
<i>Sturnus unicolor</i> UCBL 415/1	5.45	4.2	1.7	1.8	2.2	2.4	1.9	29.7
<i>Pastor roseus</i> UCBL 416/1	4.4	3.9	1.6	1.6	2.0	1.95	1.7	24.5
<i>Pastor roseus</i> UCBL 416/2	4.8	4.0	1.5	1.6	1.9	2.25	1.8	25.2
<i>Sturnus sinensis</i> UCBL	3.9	3.0	1.15	1.3	1.4	1.7	1.3	20.4
<i>Sturnus sinensis</i> UCBL	3.9	3.2	1.2	1.4	1.4	1.8	1.4	21.9
<i>Sturnia pagodarum</i> UCBL	4.2	3.45	1.4	1.7	1.6	1.9	1.6	23.1
<i>Acridotheres melanopterus</i> UCBL	4.7	4.1	1.7	1.7	1.9	2.6	1.8	25.9
<i>Acridotheres melanopterus</i> UCBL	4.8	3.9	1.7	1.6	2.0	2.7	1.8	25.45
<i>Acridotheres melanopterus</i> UCBL	4.4	3.9	1.8	1.7	1.7	2.3	1.8	25.9
<i>Lamprotornis splendidus</i> UCBL	4.4	3.8	1.5	1.65	1.9	2.2	1.5	25.0
<i>Lamprotornis superbus</i> UCBL	4.3	3.7	1.8	1.7	1.7	2.1	1.7	25.45
<i>Gracula religiosa</i> UCBL	7.0	6.5	2.5	2.7	2.3	3.35	2.7	34.75
<i>Leistes militaris</i> UCBL	3.65	3.2	1.3	1.4	1.4	1.95	1.45	23.2
<i>Leistes militaris</i> UCBL	3.9	3.2	1.3	1.4	1.6	1.9	1.5	22.4
<i>Leistes militaris</i> UCBL	4.0	3.6	1.6	1.35	1.5	2.0	1.65	24.5

Table 2. Measurements of sternum, scapula, ulna and femur in fossil and recent Sturnidae (Ref. to Fig. 1 – C, D, E). Measurements descriptions: a – width of the thinnest part tangentially towards bend; b – length of the left horn of manubrium sterni; c – total length; d – width of corpus scapulae; e – larger diameter of facies articularis humeralis; f – distance between the cranial edge of facies articularis humeralis and olecranon ulnae; g – smaller diameter of facies articularis humeralis (measured perpendicularly of measurement “e”); h – total length of femur).

Species	a	b	c	d	e	f	g	h
Fossil - <i>Dobrostrurnus kardamensis</i> gen. et sp. nov. - Kardam								
NMNHS 1630	1.35	4.0	-	-	-	-	-	-
NMNHS 1628	-	-	c.29.	2.2	-	-	-	-
NMNHS 1629	-	-	-	-	-	-	-	29.2
Recent								
<i>Sturnus vulgaris</i> UCBL 414/1	1.2	4.3	32.3	2.1	2.8	5.6	2.6	-
<i>Sturnus vulgaris</i> UCBL 414/5	-	-	31.2	2.1	2.6	5.3	2.5	24.4
<i>Sturnus vulgaris</i> UCBL 414/6	1.1	4.0	31.5	2.2	2.7	5.0	2.5	25.5
<i>Sturnus vulgaris</i> UCBL 414/7	1.2	4.0	30.4	2.1	2.8	5.5	2.6	24.7
<i>Sturnus vulgaris</i> UCBL 414/8	1.2	4.2	32.7	2.2	2.7	5.5	2.6	26.0
<i>Sturnus unicolor</i> UCBL 415/1	-	-	36.4	2.3	3.0	6.3	-	27.7
<i>Pastor roseus</i> UCBL 416/2	-	-	30.5	2.0	2.4	5.0	2.4	27.3
<i>Pastor roseus</i> UCBL 416/3	1.2	4.0	30.9	2.0	2.4	5.0	2.4	26.2
<i>Sturnia pagodarum</i> UCBL	1.2	3.0	26.6	1.8	2.4	4.4	2.0	25.0
<i>Sturnus sinensis</i> UCBL	0.85	2.8	22.8	1.8	2.2	4.2	1.75	22.2
<i>Sturnus sinensis</i> UCBL	1.0	2.3	21.9	1.6	2.1	3.95	1.8	21.1
<i>Sturnia pagodarum</i> UCBL	1.2	3.0	26.6	1.8	2.4	4.4	2.0	25.0
<i>Acridotheres melanopterus</i> UCBL	1.1	3.3	29.2	2.65	2.8	5.4	2.6	29.8
<i>Acridotheres melanopterus</i> UCBL	1.2	3.3	29.5	2.2	2.7	5.1	2.4	29.7
<i>Acridotheres melanopterus</i> UCBL	1.2	2.2	30.4	2.6	2.8	5.4	2.45	29.1
<i>Acridotheres melanopterus</i> UCBL	1.2	2.5	29.7	2.4	2.7	5.0	2.4	30.0
<i>Lamprotornis splendidus</i> UCBL	1.1	3.3	22.3	2.05	2.65	5.0	2.3	21.4
<i>Lamprotornis superbus</i> UCBL	1.15	2.5	28.9	1.9	2.7	5.25	2.3	22.7
<i>Gracula religiosa</i> UCBL	1.6	3.3	38.3	3.6	3.6	6.8	3.15	34.3
<i>Leistes militaris</i> UCBL	1.15	1.8	27.0	2.0	2.5	4.4	2.0	26.2
<i>Leistes militaris</i> UCBL	1.0	2.4	26.6	1.9	2.5	4.5	2.1	26.0
<i>Leistes militaris</i> UCBL	1.1	2.5	25.5	2.0	2.4	4.5	2.1	25.7



Fig. 1. *Dobrostrurnus kardamensis* gen. et sp. nov., NMNHS. General view of the find. Photograph of 1988 before extracting of some long bones from the matrix. Photo: Viktor Hazan.

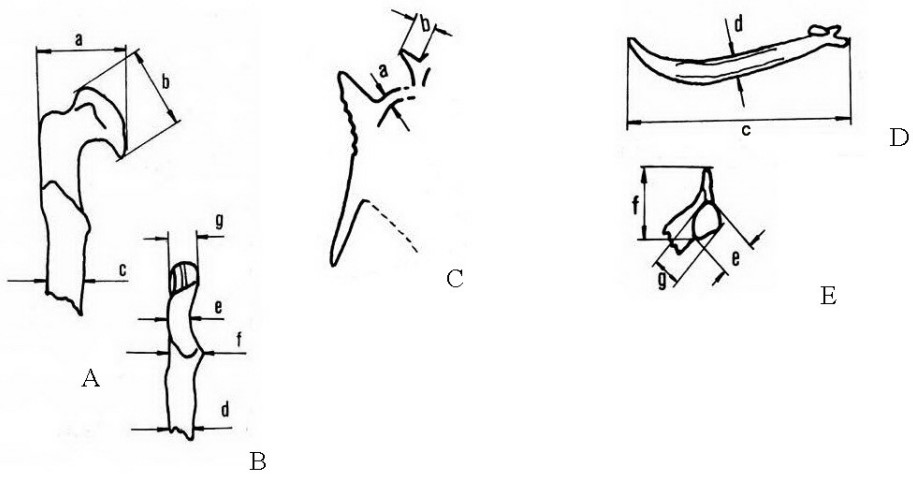


Fig. 2. Measurements: coracoid, humeral part (A, B), sternum (C), scapula (D, E). Drawings: Vera Hristova.

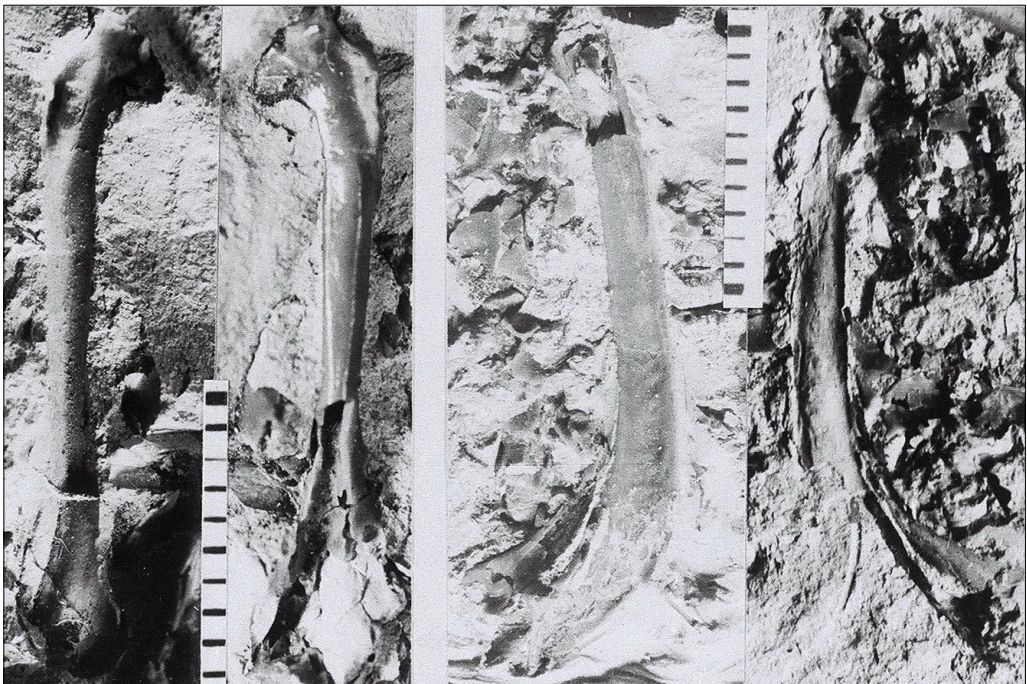


Fig. 3. *Dobrostrurnus kardamensis* gen. et sp. nov., NMNHS. Left to right: coracoid sin., imprint; coracoid sin., bone, NMNHS 1627; scapula sin., bone, NMNHS 1629; scapula sin., imprint. Photographs of 1988 before extracting of some long bones from the matrix. Scale bar – 1 cm.

Photo: Viktor Hazan.

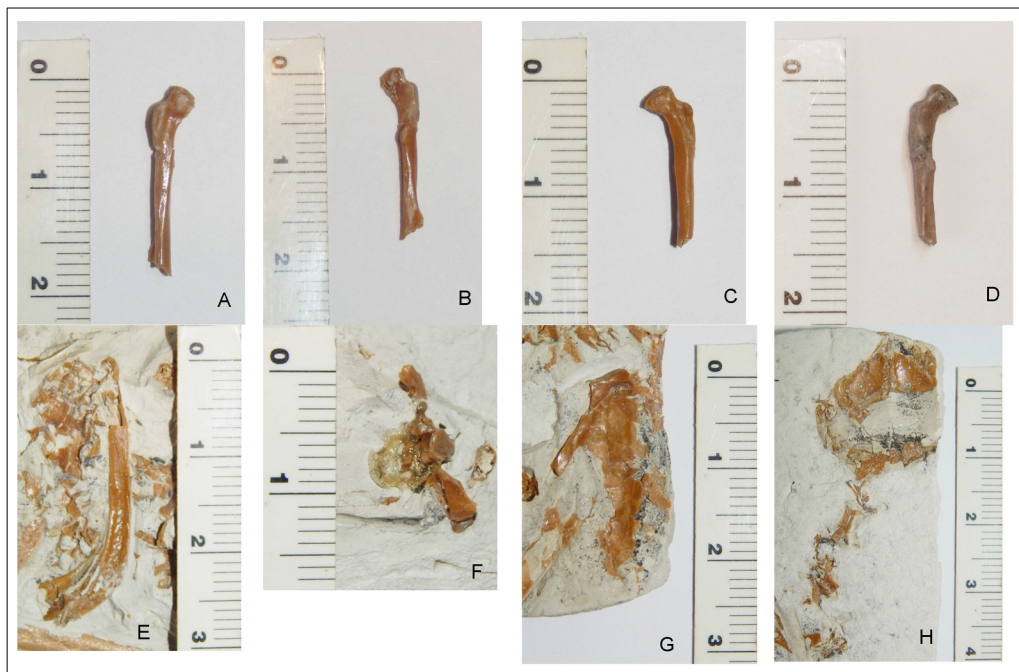


Fig. 4. *Dobrostrurnus kardamensis* gen. et sp. nov.: coracoid dex. - lateral view (A), and medial view (B); coracoid sin. - lateral view (C), and medial view (D); scapula sin., lateral view (E); ulna sin. prox., medial view (F); sternum, pars sin., dorsal view (G); cranium and cervical vertebrae (H). Scale bar – 1 cm. Photo: Zlatozar Boev.

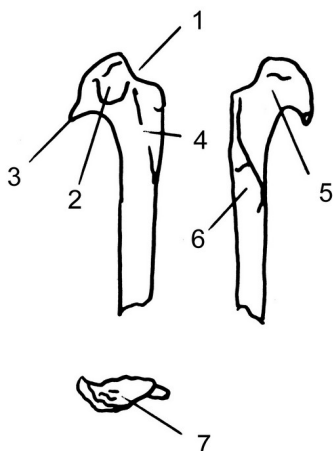


Fig. 5. Compared features of coracoid sin., humeral part in sturnids. Drawings: Vera Hristova.

The Pleistocene record is also extremely scant. Only two taxa are known: *St. vulgaris* from early Pleistocene of Hungary, Romania, England, and Czechia, and *Sturnus* sp. from early Pleistocene of Bulgaria (MLÍKOVSKÝ, 2002).

Conclusion

Comparisons lead to a medium-sized sturnid, showing highest similarity to genera *Lamprotornis* and *Sturnus* (inc. *Pastor* and *Temenuchus*), but differing from them. After all comparisons above, it is clear that the specimen of Kardam could not be referred to any of the compared genera of Sturnidae, besides its appurtenance to that family. We decide to distinguish it from all known recent genera and describe it into a new genus, instead to refer to any of them. This is the only possibility to indicate its morphological and chronostratigraphical peculiarities, and not to diminish them. The body size of the examined specimen is comparable to that of the modern *St. vulgaris* and probably lies in the range of 74-94 g (after data for the European (Common) Starling of CRAMP *et al.* (1994).

The Kardam “dobrostarling” is the oldest paleornithological find in Bulgaria. It marks the presence of the family Sturnidae on the Balkans for the first time even in the second half of the middle Miocen (Konkian). It is also the first Neogene sturnid on the Balkan Peninsula.

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