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*Anser eldaricus* sp. nova from Upper Sarmatian Hipparion fauna of Eldar

[Pp. 67—78, pl. XV and 4 text-figs.]

*Anser eldaricus* sp. nova z górnosarmackiej hipparionowej fauny Eldaru

*Anser eldaricus* sp. nova в верхнесарматской гиппарионовой фауне Эльдарской степи

Abstract. This paper is a description of a new goose species, *Anser eldaricus* sp.n., from the Upper Sarmatian fauna of Eldar in the border region between Georgia and Azerbaydzhan. The description is based on the proximal part of the right humerus (holotype), the parasternal part of the right coracoid, a fragment of the ulnar diaphysis and a fragmentary radius. In size this bird resembled the swan.

I. INTRODUCTION

In 1913 a Hipparion fauna of Upper Sarmatian age was discovered by B. S. DOBROWOLSKI in outcrops of the Eldar-Ougi Ridge, on the right bank of the River Yora 10—15 km west of the village Kasaman on the boundary between Azerbaydzhan and Georgia. So far 21 species of mammals, 2 species of birds and 1 turtle species have been identified in this fauna (GADZYEY, 1961).

The present paper gives a description of several small bone fragments from the right wing of a goose found during an excavation carried out by D. V. GADZYEY, who stood at the head of an expedition of the Museum of Natural History, Azerbaydzhan S.S.R. Academy of Sciences, in 1952. These remains of the goose were discovered among numerous remains of mammals in a lens of fossil bones in calcareous sandstone excavated in the left slope of the River Yora valley. In addition to these bones, the sandstone contained some Upper Sarma-

tian molluscs of the species *Mastra bulgarica* and *Mastra caspia*, which indicates that we are concerned here with a littoral marine facies of deposits with a Hipparion fauna (BELAYEVA, 1948; GADZYEV, 1958, 1959 and 1961).

## II. DESCRIPTION

Order: *Anseriformes* WAGLER  
 Family: *Anatidae* VIGORS  
 Subfamily: *Anserinae* VIGORS  
 Genus: *Anser* BRISSON 1764  
 Species: *Anser eldaricus* species nova

Holotype: caput humeri dextri ad. with an adjacent portion of diaphysis.  
 Additional material: a parasternal fragment of coracoideum dextrum ad.  
 a fragment of diaphysis ulnae ad.  
 a fragment of radius ad.

Age: Upper Sarmatian. Littoral marine facies of calcareous sandstone. Hipparion fauna. Lens of bony material.

Locality: Eldar steppe, Eldar-Ougi Ridge.

Excavation: Museum of Natural History, Azerbaydzhan S.S.R. Academy of Sciences, at Baku.

Diagnosis. This is a goose which considerably exceeds the modern members of the genera *Anser*, *Cygnopsis* and other geese in size, in which it resembles the genus *Cygnus*, being only somewhat smaller. The features characteristic of the genus *Anser* and not those of *Cygnus* prevail in the structure of the head of the humerus<sup>1</sup>. The outline of the head is oval and not lenticular. The length of the lateral edge of the posterior surface of the head (to the summit of the curvature) is two-thirds of the length of the medial edge of this surface. The proximo-distal width of the anterior surface of the head is slightly larger than half the width of its posterior surface. The medial part of the posterior surface of the head is somewhat flattened, just as it is in the genus *Cygnopsis*.

### Description and comparison

Humerus. (Plate XV: A, Table I, Figs. 1 and 2)

The head of the humerus under study most resembles the corresponding portion of this bone in the geese of the genus *Anser*, from which it however differs in its greater size; it outsize *Cygnopsis* and approaches a small swan in this

<sup>1</sup> For description the humerus is so positioned that its dorsal side with the fossa for the brachial muscle is turned to the front, the lateral part with the lateral crest and radial trochlea is at the top and the medial part with the medial crest and ulnar trochlea at the bottom.



respect. The contour of the postero-inferior margin of the articular surface of the head is identical with that in the genus *Anser*; the heads themselves are convex to the same degree, when their proximal edge is viewed from behind or from in front. However, in *Anser eldaricus* the rounded distal prominence of the posterior half of the head is considerably less sharply marked than it is in modern wild and domestic geese of the genus *Anser*. The passage from the inferodistal edge of the head to the supero-distal seems to be a little gentler than it is in

Table I

A comparison of the measurements (in mm) of the head of the humerus in *Anser eldaricus* sp. nova and some modern *Anatidae*. The manner of measuring is shown in Fig. 1

Species	a	b	c	d	e	Index: $\frac{b}{a} \times 100$
<i>Anser eldaricus</i> sp. nova	23.6	15.0	16.0	ca 12.0	ca 14.0	63.5
<i>Cygnus olor</i> (rec.)	28.6	17.5	17.8	ca 13.5	15.2	61.2
<i>Cygnus cygnus</i> (rec.)	—	14.1	14.1	—	—	—
<i>Chenopsis atrata</i> (rec.)	22.5	14.5	14.5	10.5	14.0	64.4
<i>Anseranas semipalmata</i> (rec.)	16.5	9.1	8.5	ca 5.5	10.0	55.1
<i>Branta ruficollis</i> (rec.)	16.0	9.0	8.2	ca 7.5	8.5	56.7
<i>Anser albifrons</i> (rec.)	15.0	9.0	9.5	7.0	8.4	60.0
<i>Anser erythropus</i> (rec.)	16.0	9.5	9.5	ca 7.5	ca 8.5	59.4
<i>Anser domesticus</i> (rec.)	22.5	12.5	15.0	ca 11.5	12.5	55.5
<i>Chen caerulescens</i> (rec.)	19.0	11.0	10.5	ca 10.0	9.0	57.9
<i>Eulabeia indica</i> (rec.)	19.0	11.5	11.0	ca 10.5	11.0	60.6
<i>Cygnopsis cygnoides</i> (rec.)	21.0	12.8	12.5	8.5	13.0	43.3
<i>Cereopsis novaehollandiae</i> (rec.)	20.2	14.1	14.0	ca 18.0	ca 14.5	69.8
<i>Chauna chavaria</i> (rec.)	19.8	14.1	13.5	—	15.2	71.2

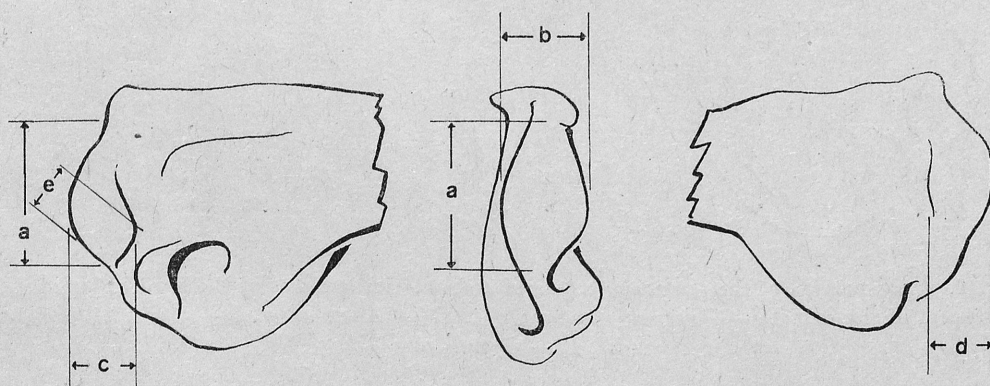


Fig. 1. Measurement methods for the head of the humerus in the goose (used in Table I). a — length of head (from top downwards), b — greatest width of head (antero-posterior), c — greatest width of posterior part of head (proximo-distal), d — greatest width of anterior part of head (proximo-distal), e — length of lower edge of posterior part of head

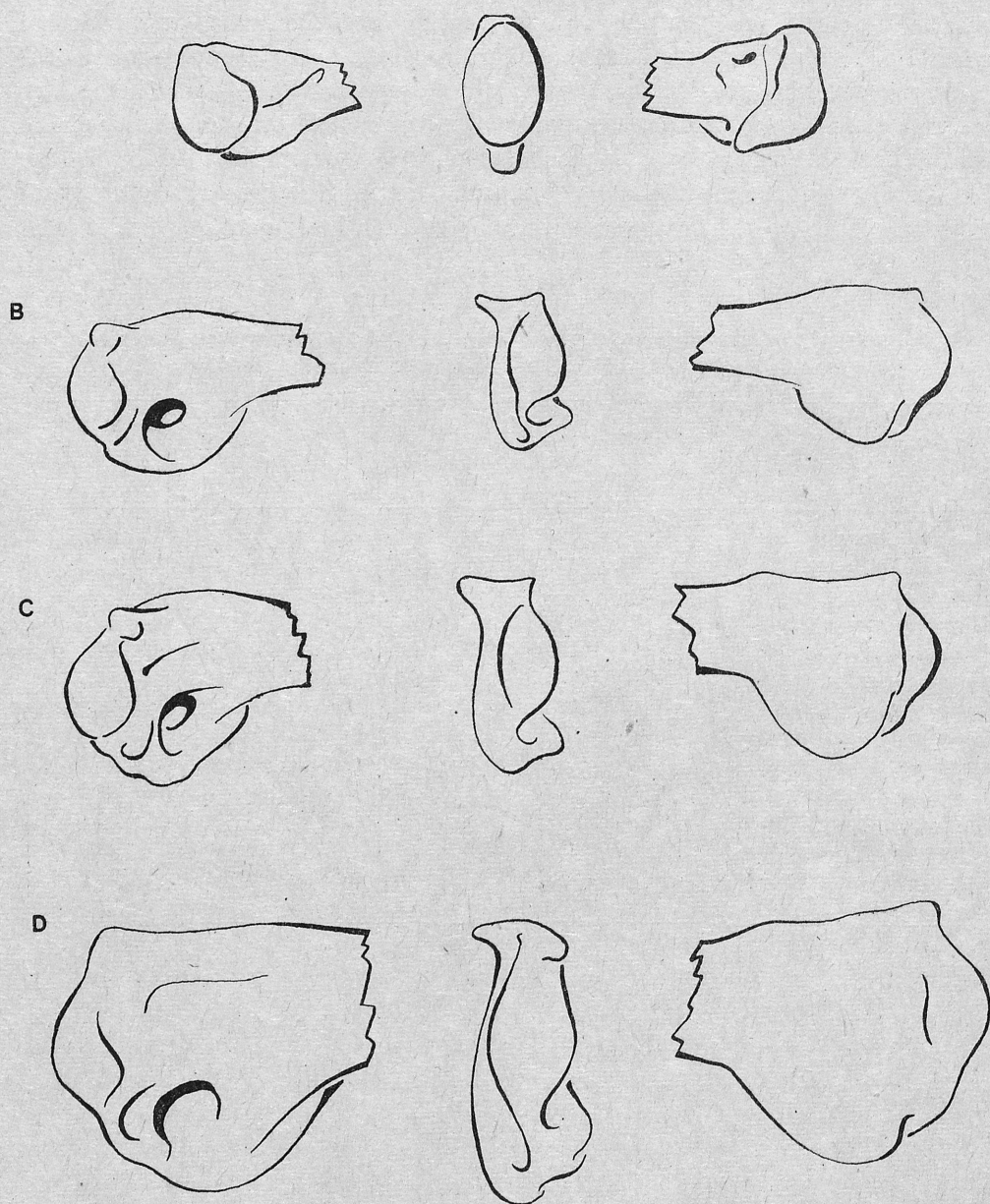


Fig. 2. A comparison of the posterior, proximal and anterior surfaces of the head of humerus in respect of shape in: A — *Anser eldaricus* sp. nova, B — *Anser anser*, C — *Cygnopsis cygnoides*, D — *Cygnus olor*

some modern species of the genus *Anser* and, in consequence, in *A. eldaricus* the latero-distal edge of the posterior half of the head is directed upwards somewhat less proximally, forming a more obtuse angle with the medio-distal edge. A shallow depression, separating the articular surface proper from the rougher distal



part, extends from the top downwards on the lateral part of the posterior surface of the head. In many, but not all, humeri of wild and domestic geese examined by us this depression is more distinct than in *Anser eldaricus*, in which it almost disappears in the lower (medial) half of the head and, besides, it runs somewhat more distally.

*Anser albifrons* and *Anser erythropus*. The head of the humerus is considerably smaller (especially that of *A. erythropus*) but very similar in shape. Viewed from the proximal side, the outlines of the head in these species are more or less regularly ovably convex. This is also true of the outline of the proximal convexity of the head. The distal edge of the posterior surface of the head in *A. eldaricus* is distinctly more convex and has a sharper passage of the medial part of the edge into the lateral. In this respect *A. albifrons* more resembles *A. eldaricus* than does *A. erythropus*. The articular sulcus of both modern species is relatively deeper than in *A. eldaricus*.

Genus *Cygnus*. The overall dimensions of the head of the humerus are somewhat greater. The convexity of the proximal edge of the head is gentler than in *A. eldaricus*. The postero-inferior edge of the articular surface of the swan runs more steeply upwards (more sharply proximally) and in consequence the rounded passage of the postero-inferior edge of the head into the postero-superior is very gentle, forming a more obtuse angle. A shallow depression extends from the top downwards throughout the posterior half of the head in both the swan and *A. eldaricus*, but in the swan it is shallower.

*Chenopsis atrata*. The size of the head of its humerus is smaller than in *A. eldaricus*. The general outlines of the head are similar but in *Chenopsis* the postero-medial edge of the surface of the head is positioned like that in *Cygnus*. Nevertheless, it lies more proximally and the bend of the posterior edge in this species seems to be gentler than it is in *A. eldaricus*. The rounded posterior prominence, present in *A. eldaricus*, is invisible here. The concavity in the posterior aspect of the head is indistinct as in *A. eldaricus*. The proximal convexity of the head is also similar.

*Cereopsis novae-hollandiae*. The head of the humerus is considerably smaller than in *A. eldaricus* and its general outlines are different. In *A. eldaricus* the proximal convexity of the head is somewhat smaller and the medio-posterior edge of its surface is placed clearly more distally, i.e. more gently. The outline of the distal edge of its head is more rounded, whereas in *Cereopsis* it is distally more narrowed. The depression in the posterior surface of the head is very poorly seen in both these species.

*Anseranas semipalmata*. The humerus of this species differs from that of *A. eldaricus* in its smaller size and in shape. The lateral slope of the proximal convexity of its head is distinctly steeper and the head is less dilated (antero-posteriorly) and seems larger than in *A. eldaricus*. The prominence of the postero-distal edge of the head is less slanting and the concavity in its posterior surface more distinct than in *A. eldaricus*.

*Eulabeia indica*. In comparison with *A. eldaricus* its head of the humerus is

considerably smaller, the proximal convexity of the head and its general outlines are similar, but the postero-medial edge of the head surface is directed somewhat more steeply latero-distally. Generally speaking, the whole distal edge of the posterior half of the head also forms a stepped passage from the head to the shaft of the bone. In the place of the passage of the postero-medial edge into the postero-lateral there is also a prominence, though somewhat less sharp than in *A. eldaricus*. In *Eulabeia* the depression in the posterior surface of the head is less conspicuous.

*Cygnopsis cygnoides*. The head of the humerus is somewhat smaller than in *A. eldaricus*. The two edges (lateral and medial) of the proximal convexity of the head are equally steep and long, whereas in *A. eldaricus* the lateral edge is longer than the medial. The medial edge is more or less equally steep in both species but the lateral edge is much steeper in *Cygnopsis*. The postero-medial edge of the head of *A. eldaricus* is directed much more latero-distally, while the postero-lateral edge runs more or less analogously in both species. As a result, the postero-distal prominence of the head is sharper in *A. eldaricus* than in *Cygnopsis*. The steep, nearly perpendicular rough wall under the postero-medial edge of the head is higher in the latter genus. As far as can be judged on the basis of a damaged bone fragment, the articular sulcus of *A. eldaricus* is much finer than it is in *Cygnopsis*. In the outline of the head of *Cygnopsis*, viewed from the proximal side, the posterior edge is distinctly more convex than the anterior, while the medial and especially the lateral narrow part of the oval end bluntly and angularly, which is not observed in *A. eldaricus*.

*Chen caerulescens*. The head of the humerus is considerably smaller than in *A. eldaricus*. The outline of the proximal convexity of the head is the same in both species. The distal edge of the posterior surface of the head is similar in them, but the posterior prominence of the convexity of this edge in the snow-goose seems to be sharper and more protruding above the surface of the bone. In the medial half of the posterior surface of the head (somewhat nearer the medial edge) in *Chen caerulescens* there is a distinct indent, which does not exist either in *A. eldaricus* or in *Cygnopsis*.

#### Coracoideum (Plate XV: B, Table II, Figs 3 and 4)

Only a parasternal part of the right coracoid bone is preserved. In its overall dimensions it corresponds to this bone in a big goose or small swan. The characters of the genus *Anser* prevail in structural details, but there are also a few characters of the swan. It resembles the bone of *Cygnus* in the difference in the heights of the position of the inner and outer articular surfaces for the sternum: in *Cygnus* the inner surface is situated much higher (further towards the dorsum) than the outer surface, whereas in the genus *Anser* this difference is distinctly smaller (cf. Table II, dimensions f and g). In the coracoid of *A. eldaricus* the medial surface is relatively broader than in the modern members of the genera *Anser* and *Cygnus*. This surface is particularly strongly narrowed in the coracoid of *Cygnus olor*. On the external part of the surface articulating with the sternum



Table II

A comparison of the measurements (in mm) of the coracoid in *Anser eldaricus* sp. nova and some modern *Anatidae*. The manner of measuring is shown in Fig. 3

Species	a	b	c	d	e	f	g	Difference in depth: g—f
<i>Anser eldaricus</i> sp. nova	9.6	15.2	16.0	6.1	ca 2.5	ca 3.8	ca 6.5	ca 2.7
<i>Cygnus olor</i> (rec.)	10.6	20.0	34.0	7.4	ca 2.5	ca 5.0	8.0	ca 3.0
<i>Cygnus cygnus</i> (rec.)	12.8	22.8	33.0	9.4	ca 3.0	ca 4.5	7.2	ca 2.7
<i>Chenopsis atrata</i> (rec.)	10.0	17.4	27.5	6.9	ca 2.5	ca 3.0	ca 6.5	ca 3.5
<i>Philacte canagica</i> (rec.)	8.0	12.0	24.0	5.0	3.0	3.0	5.5	2.5
<i>Anser albifrons</i> (rec.)	7.0	13.0	20.0	5.2	2.2	3.2	4.6	1.4
<i>Anser fabalis</i> (rec.)	8.2	12.0	23.0	5.6	2.0	3.8	6.0	2.2
<i>Anser anser</i> (rec.)	8.2	14.0	25.0	5.0	2.0	3.5	5.8	2.3
<i>Anser domesticus</i> (rec.)	9.8	16.0	26.0	6.2	3.8	4.0	ca 5.0	ca 1.0
<i>Cygnopsis cygnoides</i> (rec.)	8.0	13.0	23.0	5.2	—	ca 3.0	5.5	ca 2.5

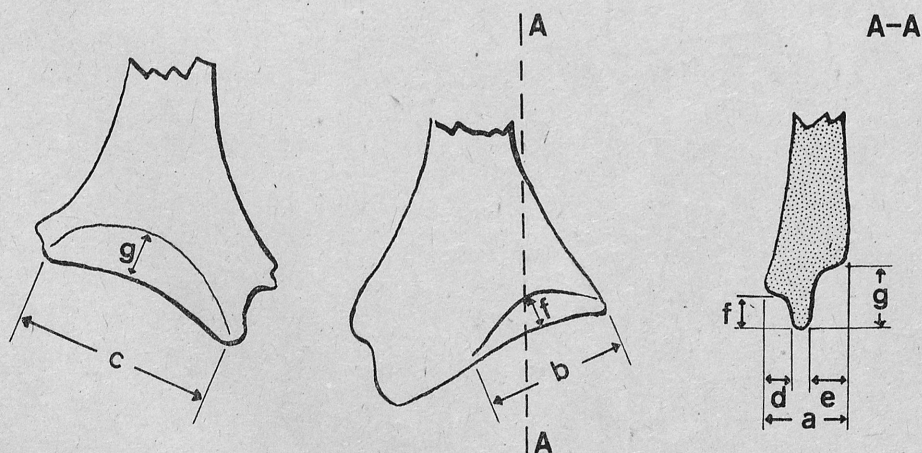


Fig. 3. Measurement methods for the parasternal part of the coracoid in the goose (used in Table II). a — greatest thickness (medio-lateral) of parasternal part of bone, b — length of outer (lateral) surface articulating with sternum, c — length of inner (medial) surface articulating with sternum, d — greatest width of outer (lateral) articular surface, e — greatest width of inner (medial) articular surface, f — depth (height) of outer (lateral) articular surface, g — depth (height) of inner (medial) articular surface, A—A — section line and section through bone

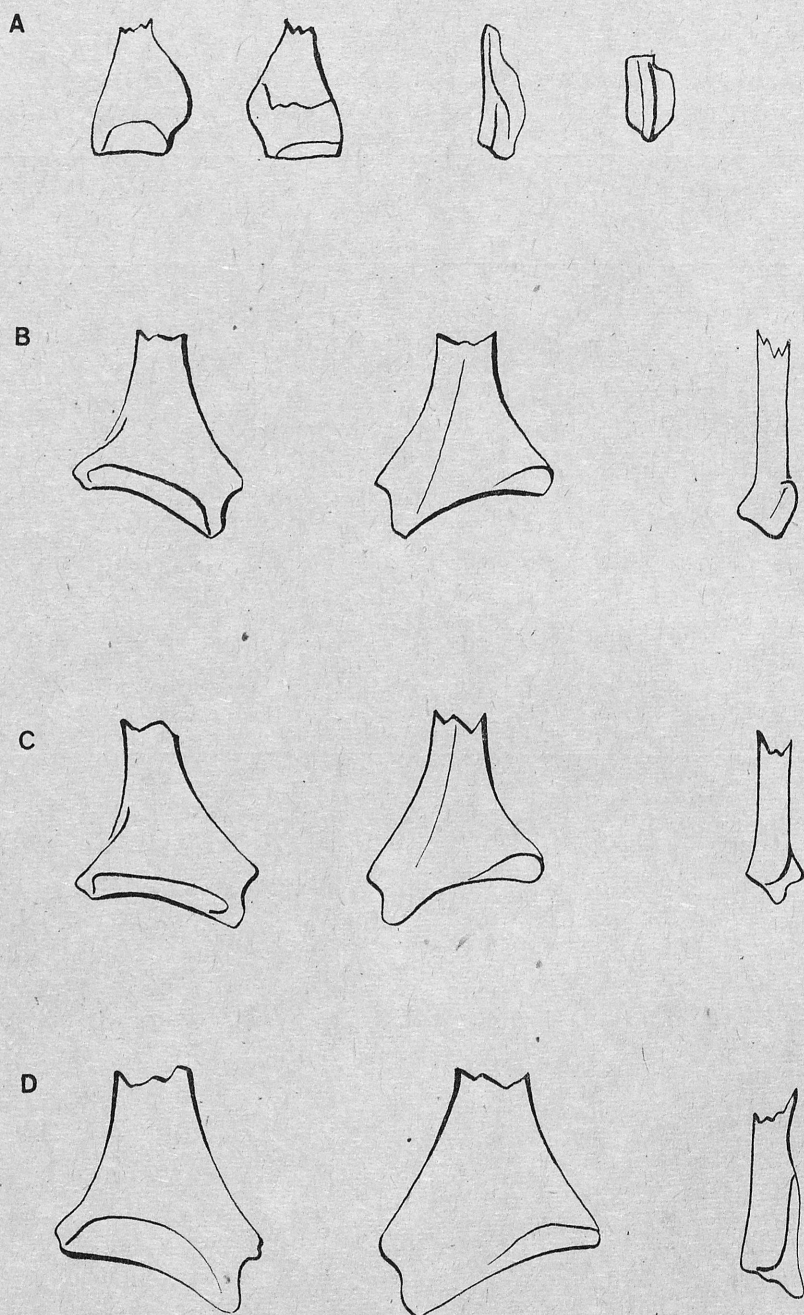


Fig. 4. A comparison of the shape of the parasternal part of the coracoid in A — *Anser eldaricus* sp. nova, B — *Anser anser*, C — *Cygnopsis cygnoides*, D — *Cygnus bewickii*

the coracoid of *A. eldaricus*, like that of *Cygnopsis cygnoides*, has a longitudinal depression, which is only very poorly seen, and in most of the modern members of *Anser* and *Cygnus* there is a very distinct groove here. Nevertheless, this



character is not quite distinctive, since in one specimen of *A. albifrons* (Collection of the Zoological Institute, U.S.S.R. Academy of Sciences, No. 3) there is no such groove and the difference in level between the articular surfaces is conspicuous, as in swans, and in another skeleton of *A. albifrons* (author's own collection) the groove in question is ill-seen. The antero-inferior end of the crest of the surface articulating with the sternum is blunted in *A. eldaricus*, as it is in other geese. In geese it lies nearer the middle longitudinal surface of the bone (in *Cygnopsis cygnoides* and *A. eldaricus* almost on the middle line) and in the genus *Cygnus* in the medial part of the articular surface and is pointed. The dorsal edge of the medial part of the facies sternalis in *A. eldaricus*, modern members of *Anser*, *Cygnopsis* and other geese forms a more or less even line, mostly only weakly bent dorsally. The middle crest of the facies sternalis is relatively broad (medio-laterally) in *A. eldaricus*, narrower in the genera *Anser* and *Cygnopsis* and particularly narrow and sharpened in the genus *Cygnus*.

### Ulna

This is the right bone of an adult specimen. Five fragments of the diaphysis with fresh cracks are preserved. The distal and proximal ends of the bone had however been broken off before it was embedded in rock. This is evidenced by the old fracture surfaces and crushes, as well as by sandstone gathered in the cracks. The diameter of the middle part of the diaphysis is 10.2 mm and the thickness of the bone wall in the place of fracture is about 1.2 mm.

### Radius

Five small fragments of a diaphysis are preserved, among them a part adjoining the top portion of the distal end of the bone with an old fracture. They are probably fragments of the right bone.

## III. DISCUSSION

It may well be that all the bone fragments under description belonged to one specimen of a fossil goose, just as they were found all together in the rock. The state of preservation of the bones and their dimensions do not deny this presumption. However, to be on the safe side, we designate only the humerus as the holotype, regarding the other fragments as supplementary material. Perhaps more complete materials of *Anser eldaricus* will be found in Eldar one day and then it will be possible to give a better grounded description. Then, it may appear necessary to erect a new genus for this goose. A number of structural

details of the humerus head and, especially, the coracoid, as well as the very large size of this bird suggest this.

*Anser eldaricus* sp. nova differs distinctly from the fossil goose *Anser udabnensis* BURCHAK-ABRAMOVICH 1957, derived from the same period, in its markedly larger size. *Anser udabnensis* has been described from the proximal part of the elbow bone, which in *A. eldaricus* is unluckily heavily damaged and devoid of the proximal end, which does not allow any morphological comparisons (except in respect of size). *Anser eldaricus* differs from the genus *Cygnopterus* from the Middle Oligocene of Belgium in geological age and remote localities of finds; moreover, the humerus of *Cygnopterus* bears evident characters of the genus *Cygnus*, whereas the characters of the genus *Anser* prevail in the head of the humerus of *Anser eldaricus*. As regards *Cygnopterus*, only the upper part of the coracoid with swan features has been preserved, whereas a mixture of characters of the genera *Cygnus* and *Anser* occurs in its extant lower part in *Anser eldaricus*. The measurements of the coracoid indicate that *Cygnopterus* was somewhat larger than *Cygnus olor* and *Anser eldaricus* smaller. The genus *Cygnavus* LAMRECHT 1931 from the Lower Miocene of Germany differs from *Anser eldaricus* in geological age and in that this last species has distinct characters of the genus *Anser*. *Anser eldaricus* differs from the fossil species of the genus *Cygnus* in the structure of the humerus head and coracoid and in geological age. *Cygnus herrenthalsi* VAN BENEDEN 1871 from the Upper Miocene of Belgium comes nearest in age. *Anser eldaricus* differs from the Lower Pleistocene genus *Olor* WAGLER 1832 from North America in geological age, but the materials themselves cannot be compared, since *Olor* is known only from its tarsometatarsus. The relations between *Anser eldaricus* and the genus *Cyganter* KRETZOI 1957 from the Hipparion fauna of the Lower Pliocene of Hungary has not, as yet, been explained. The materials are incomparable because different bones have been found in the case of either form. However, the membership of the goose from Eldar in the genus *Cyganter* cannot be ruled out, the more so because they are geologically close to each other. The North American genera *Chenornis* PORTIS 1884 (from the Lower Miocene) and *Presbychen* WETMORE 1930 (from the Upper Miocene) differ from *Anser eldaricus* in geological age and geographical situation; besides, only the tibiotarsus of *Presbychen* and an impression of the postcranial part of the skeleton of *Chenornis* have been found. It seems that the membership of *Anser eldaricus* in other two genera of fossil geese from North America, *Eremochen* BRODKORB 1961 from the Lower Pliocene of Oregon and *Branta* SCOPOLI 1769 from Oregon and California must be excluded as impossible. BRODKORB (1964) mentions 7 fossil species of the genus *Anser* without including *A. udabnensis* BURCHAK-ABRAMOVICH 1957 described from Azerbaydzhan. Some of them are Pleistocene species, and thus *Anser eldaricus* differs considerably from them in geological age; in most cases also in its distinctly larger size. Only the species from the Upper Miocene, standing close to it in respect of age, must be treated more carefully, above all, *Anser cygniformis* (FRAAS, 1870) from Bavaria, where the coracoid, radius and ulna have been preserved among



other bones, and *Anser oeningensis* (MEYER 1965) from Switzerland, represented by humeri and coracoids. However, *Anser eldaricus* differs from them in structural details and its larger size (LAMBRECHT, 1933; WETMORE, 1952).

Translated into English  
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#### STRESZCZENIE

Praca zawiera opis nowego gatunku kopalnej gęsi *Anser eldaricus* sp. nova z górnosarmackiej, hipparionowej fauny Eldaru. Eldarska fauna hipparionowa reprezentowana jest przez 21 gatunków ssaków, 2 gatunki ptaków (struś *Struthio* sp. i opisywana gęś) i jeden gatunek gadów (*Testudo* sp.).

Szczątki gęsi składają się z kilku fragmentów kostnych prawego skrzydła (główki kości ramieniowej, przymostkowej części kości kruczej, fragmentów diafizy kości promieniowej i kości łokciowej). Wszystkie kości należą prawdopodobnie

do jednego osobnika. Holotypem jest główka kości ramieniowej (Pl. XV, tab. I). Gęś eldarska była znacznie większych rozmiarów niż wszyscy inni znani przedstawiciele rodzaju *Anser*, a zbliżona wielkością do niewielkich osobników łabędzia. Na podstawie szczegółów budowy kości gęś eldarska stoi najbliżej rodzaju *Anser* i została przez nas do tego rodzaju zaliczona.

## РЕЗЮМЕ

Описание нового вида ископаемого гуся *Anser eldaricus* sp. nova в составе верхнесарматской гиппарионовой фауны Эльдара. Эльдарская гиппарионовая фауна представлена 21 видом млекопитающих, 2 видами птиц (страус *Struthio* sp. и описываемый ископаемый гусь) и 1 видом рептилий (*Testudo* sp.).

Остатки гуся представлены несколькими фрагментами костей правого крыла (головка плеча, фрагмент нижней части коракоида, фрагменты диафиза радиуса и локтевой кости). Все кости вполне вероятно принадлежат одной особи. Голотип описания — головка плеча (таблица I). Эльдарский гусь по размерам был значительно крупнее всех известных представителей рода *Anser* приближаясь по величине к некрупным особям лебедя. Однако по особенностям строения изучаемые кости эльдарского гуся ближе всего стоят к роду *Anser* и нами к этому роду отнесены.

## Plate XV

*Anser eldaricus* species nova

A — The anterior surface of the head of humerus

B — The parasternal part of the coracoid





**A**



**B**

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