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Golden Jackal (*Canis aureus*) in Ukraine: Modern Expansion and Status of Species

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Golden Jackal (*Canis aureus*) in Ukraine: Modern Expansion and Status of Species. — Zagorodniuk, I. — The golden jackal (*Canis aureus*) refers to species that are unknown in fauna surveys of Ukraine at any time, and therefore it formally can be regarded as an adventive species. All available sources of current appearance and features of the expansion of this species in Ukraine are analyzed. This species was first recorded in 1998 in the Danube Delta, whence it has spread into adjacent areas of Northern Black Sea. Further ways of the jackal's expansion were investigated by using cartographic materials, which were indexed by the dates of the first registration of the jackal. Such analysis suggests three independent directions and waves of the jackal's expansion in Ukraine: Danube-to-Polissia (the most powerful), Don-to-Donets (average power), and Zakarpattia (the weakest). The species "passed" all the territory of Ukraine during 10–15 years, and today the general outline of its reconstructed area covers more than 50 % of the country. Analysis of ancient sources suggests that the species is not new for the fauna of Ukraine, and it was in its composition during the Cossack era, at least in the 16th–18th centuries. Key diagnostic features of the species that are important for the diagnosis of samples in the field are presented.

Key words: golden jackal, *Canis aureus*, expansion, Ukraine.

Introduction

Mammal fauna of Ukraine includes 152 species, known for the last three centuries in wild conditions and regularly presented in nature. Among them there are 22 alien species (including 7 domesticated), 14 extinct in historical times and 5 phantom species (probably absent) [27]. The golden jackal is known in the modern composition of the fauna of Ukraine, but not mentioned in any of the previous reviews [5, 7, 8, 15, 16, 18 etc.]. During the last decade, this species demonstrated extensive invasion in Ukraine.

The main purpose of this article is the analysis of tempos and directions of the golden jackal's expansion and the discussion of the status of this species in Ukraine.

Material

This research includes the analysis of different literature and other sources that concern records of the golden jackal in Ukraine both its real finds in the modern period and its mentions in old historical sources. The main task was the reconstruction of the map of species' distribution with the details of the time (years) of its appearance in different regions during the last decades (in fact since 1999 till now). In addition, data on species records were collected by using inquiries of colleagues and active members of hunting forums. To analyze the status of the species, the jackal's status was estimated in scale of subdivision of the total list of mammals of Ukraine into 7 categories. The main of them is the «basal» group, which status has no cardinal changes during the three last centuries [26]. The acronym of the collection is NMNHU (National Museum of Natural History of Ukraine).

Diagnostic features in field

There are several features, which can help to register the species in field conditions. Most of them concern the finds of dead animals killed by hunters or roadkills. Jackals too often become "victims of roads", because they prefer to hunt other "victims of roads" (dogs, cats, birds etc.). There are also some lifetime characteristics, important to identify the species. Thus, the main field features are the following:

- 1) very specific howl, often referred as "baby crying", which can be heard from river valleys, scrub and other places of daily rest of this predator;

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- 2) the fur is tough and thick usually with reddish or brown color, with a strong grayish bloom (see: Fig. 1), in summer it's shorter and grayish;
- 3) the tail is comparatively short, no longer than 30 cm, covered with thick and relatively long fur (see: Fig. 1);
- 4) the pads of the medial toes of forelegs are connated in the back (Fig. 2); it should be noticed that such connateness is also typical for the raccoon-dog, *Nyctereutes procyonoides*;
- 5) the morphology of lower carnassial (Fig. 3) is significant when analyze dead animals. To document the finds, it is important to take a picture in the plane of the lateral surface of the teeth.

Records

The first records of the jackal in Ukraine appeared in 1998 in the Lower Danube region [22, 23]. Since 2000, the species became widespread and formed stable populations in the NW Black Sea region of Ukraine, mainly in the floodplains of the Odesa Reg. [12, 13]. In the same time (2002–2009), this species was registered in Crimea [20] and the mainland of Ukraine, in the North of the Donetsk Reg. [19] and Biriuchy Island, where a stable population was found [2]. In 2006, the species was registered in the easternmost areas of Ukraine, in the Luhansk Reg. [25].

In 2008, one specimen was killed by hunters in the Krutoyaryvske forestry in the Zaporizhia Reg. [21] (right bank of the Dnipro, between Marganets and Zaporizhia). In 2011, the species was registered near the Black Sea Biosphere Reserve, in the vicinity of vil. Korsunka (Krynka Forestry, Tsiurupynsk Distr.) in the Kherson Reg., and was shot by hunters on August 14, 2011 [21]¹. Later, this species was registered in the Mykolaiv Reg. [11], between known localities in the Odessa and the Zaporizhia Reg., where this species had appeared earlier. These records connected the two main parts of the jackal's ranges in Ukraine, both of the east and west banks of the Dnipro river.

Now this species is known from several regions both of eastern [19, 25] and western Ukraine [10, 28]. The northernmost record has come from the Polissian Nature Reserve [30]. The first record of the jackal in Podillia was recently, in 2009, which was mentioned in the review of Podillian mammals [28]. The first stages of the jackal's invasion/expansion in Ukraine were analyzed in the review made by M. Rozhenko and A. Volokh [14].

Model of expansion

The ways of the jackal's expansion in Ukraine were investigated by using cartographic materials, which were indexed by the dates of first registrations of the species in each known locality of its occurrence. Trends in the jackal's invasion in Ukraine were plotted on the map, (Fig. 4) and such analysis had shown three independent routes of the jackal's expansion in Ukraine:

- a) Danube-to-Polissia eco-corridor (the most powerful), since 1998,
- b) Don-to-Donets eco-corridor (average power), since 2002,
- c) Pannonia-to-Zakarpattia eco-corridor (the weakest), since 2005.

Earlier there was proposed a bit different model, which includes 4 ways of invasion. Among them a route from the Kuban Delta [through the Kerch channel] to the Crimea and further to the Kherson Reg., and one more way from the Zakarpattia Reg. (Pannonia Upland) [through the Carpathian Ridges] to the Chernivtsi Reg. (Bukovyna and Southern Podillia) [21]. The new model proposed here seems more probable in biogeographic viewpoint and because it is supported by the dates of species' appearances in different regions.

Now records of the species are known in many regions of Ukraine, particularly in 10 of 25 administrative regions. In the South, the species is registered in the Odesa Reg., Mykolaiv Reg., Kherson Reg., Zaporizhia Reg., and Crimea. In the West it is known in the Zakarpattia Reg. and Khmelnytsky Reg., in the East in the Donetsk Reg. and Luhansk Reg. Recently it was registered in the Northern part of Ukraine, in the Zhytomyr Reg. (see: Fig. 4).

¹ Skull and skin stored in the NMNHU.



Fig. 1. Golden jackal killed by hunters in December, 2009 on the border between Khmelnytsky Reg. (vil. Novokostiantyniv) and Vinnytsia Reg. (vil. Osichok). Photo by Oleh Hulko, 13.12.2012.

Рис. 1. Шакал, здобутий мисливцями у грудні 2009 р. на межі Хмельницької (с. Новокостянтинів) та Вінницької областей (с. Осічок). Фото Олега Гулька, 13.12.2012.



Fig. 2. Connate pads of the medial toes on the jackal's forelimb from the Donetsk Reg. Photo by Alexander Bronskov.

Рис. 2. Зрілі середні пальцеві подушечки («мозолі») на передній лапі шакала з Донеччини. Фото Олександра Бронскова.

Fig. 4. Distribution and trends of expansion of *Canis aureus* in Ukraine. Map was compiled using available data from different publications. The numbers indicate the years of registration. A — registration in the Middle Donets region (vil. Triokhizbenka) in about 1945–1950 (V. Timoshenkov, pers. com. after old-timer residents).

Рис. 4. Поширення і напрямки експансії шакала в Україні. Карта скомпонована на основі доступних даних з різних публікацій. Числа вказують на роки реєстрації. А — реєстрація в Середньому Приднін'ї (с. Трьохізбенка) близько 1945–1950 рр. (В. Тимошенко, особ. повід. за розповідями місцевих старожилів).

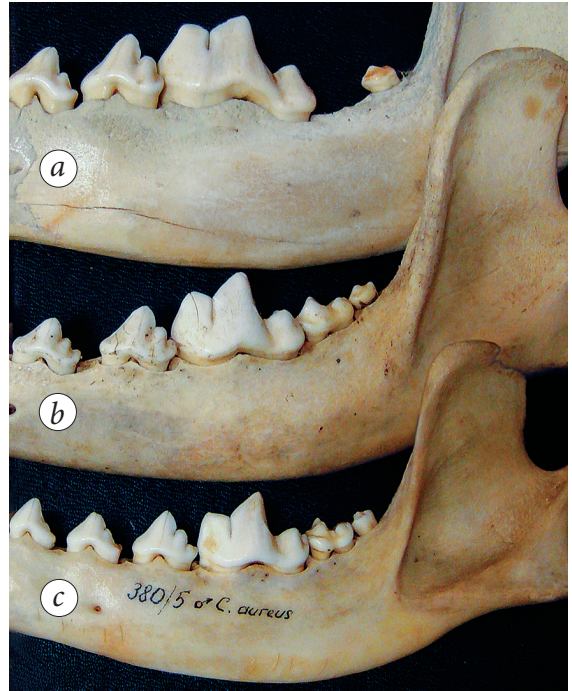
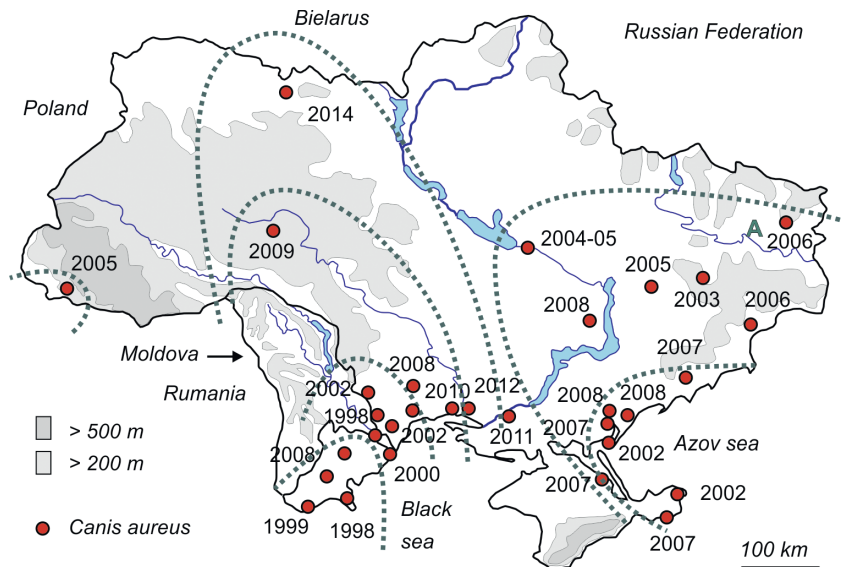


Fig. 3. Mandibles of three *Canis* species known in the fauna of Ukraine: wolf (a), dog (b), jackal (c). In a wolf and a dog, the anterior portion (paraconid) of the lower carnassial (M1) is massive and higher than the nearest premolar (P4), in a jackal it is narrow and lower than the main peaks of M1 and P4, and it has a vertical front edge (detailed description see: [17]). Samples in NMNHU.

Рис. 3. Нижні щелепи трьох видів *Canis*, відомих у фауні України: вовка (a), пса (b), шакала (c). У вовка і пса передня частка (параконід) нижнього хижого зуба (M1) масивна і вища за суміжний премяляр (P4), у шакала — вузька, нижча за основні вершини M1 та P4 і має вертикальну передню грань (детальний опис є у: [17]). Зразки з ННПМ.

The species “passed” all the territory of Ukraine during 10–15 years, and the general outline of its area covers more than 50 % of the country. The jackal’s records in Transcarpathia, Podillia, Polissia and Slobozhanshchyna are fragmentary and do not confirm the existence of stable populations in those regions. Actually there are stable populations just in the coastal regions, from the Danube and the Dnister to the Bug and the Dnipro, mainly in floodplains and delta areas of these rivers, as it was described earlier [13].

Species status

Earlier the golden jackal was classified in the set of Ukrainian fauna as an adventive (alien) species [23, 24, 27]. The analysis of older sources suggests that the jackal is not new for Ukraine and it probable was in its fauna at least in the Cossack era, about the 16th–18th centuries. The old descriptions of the fauna (for ex. [8, 9, 29]) have no information about direct observation or collected specimens of the jackal.

However, in the review by A. Nordmann [8] there is a special fragment about the jackal, where this researcher indicates the former presence of the species in the Black Sea Region (“Bessarabia and Novorossia”) and its modern (for him) presence in the easternmost regions, beyond the Don and Kuban rivers. Petro Pallas also noted jackal only from the Don and Caucasus [9]. Another author, D. Yavornytsky [3] quotes an old descendant of Cossacks who mentioned the former abundance of “wolves, foxes, badgers, “wild goats” [roe dears], “chokalkas” [jackals], and otters” (this could be the end of the 1700s). However, Yavornytsky didn’t notice where was the Cossack actually from (it’s possible that Cossack was from Kuban, not Zaporizhia).

Currently, the number of this species is growing everywhere. It has become very common in all administrative districts of Bulgaria [4], and now it is quite usual in Romania [1], where took place the next major wave of dispersion to the North. Similarly, the jackal has become usual and numerous species far in the southeast from Ukraine, from the side of the Caucasus, particularly near Novorossiysk (D. Ivanoff, pers. comm.). Very soon, the jackal may become the most widespread and the most numerous species of the large carnivores in the South of Ukraine, and then its status should be clarified.

As a species that grows in number, it does not require a conservation status. The needs of regulation of jackal’s number should be determined by hunting specialists. Now jackal is explicitly mentioned in two game laws: “Rules for testing of hounds for their hunting skills on rabbits, foxes and jackals” (since 26.02.2009) and “Law of Ukraine on Hunting Economy and Shooting” [6].

The current status of the jackal can be determined as most likely an aborigine species being in the process of re-colonization of its former geographical range.

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Шакал (*Canis aureus*) в Україні: сучасна експансія та статус виду. — Загороднюк, І. — Шакал (*Canis aureus*) відноситься до видів, які не відомі в оглядах фауни України будь-якого часу, а тому формально може розглядатися як вид-вселенець. Проаналізовано всі доступні джерела щодо сучасної появи та особливостей розселення виду на території України. Вид перше зареєстровано 1998 року у Дельті Дунаю, звідки він розселився на прилеглі ділянки Північного Причорномор'я. Подальший характер розселення виду з'ясовано шляхом аналізу картографічних матеріалів, з індексацією знахідок за датами першої реєстрації шакала. Такий аналіз дозволяє говорити про три незалежних хвилі й напрямки експансії виду в Україні: Дунайсько-Поліський (найбільш потужний), Донсько-Донецький (середньої потужності), Закарпатський (найменший). Вид «пройшов» всю територію України за 10–15 років, на сьогодні загальний контур його реконструйованого ареалу охоплює понад 50 % території країни. Аналіз давніх джерел дозволяє говорити, що вид не новий для фауни України і

був у її складі у період козацької доби, принаймні у 16–18 ст. Наведено ключові діагностичні ознаки виду, важливі для діагностики матеріалу в польових умовах.

Ключові слова: шакал, *Canis aureus*, експансія, Україна.

Шакал (*Canis aureus*) в Україні: современная експансія и статус вида. — Загороднюк, И. — Шакал (*Canis aureus*) относится к видам, не известным в обзорах фауны Украины любого времени, а потому формально может рассматриваться как вид-вселенец. Проанализированы все доступные источники по современному появлению и особенностям расселения вида на территории Украины. Вид впервые зарегистрирован в 1998 году в Дельте Дуная, откуда он расселился на прилегающие участки Северного Причерноморья. Дальнейший характер расселения вида выяснен путем анализа картографических материалов, с индексацией находок по датам первой регистрации шакала. Такой анализ позволяет говорить о трех независимых волнах и направлениях экспансии вида в Украине: Дунайско-Полесский (наиболее мощный), Донско-Донецкий (средней мощности), Закарпатский (наименьший). Вид «прошел» всю территорию Украины за 10–15 лет, на сегодня общий контур его реконструированного ареала охватывает более 50 % территории страны. Анализ давних источников позволяет говорить, что вид не нов для фауны Украины и был в ее составе в период казачества, по крайней мере в 16–18 вв. Приведены ключевые диагностические признаки вида, важные для диагностики материала в полевых условиях.

Ключевые слова: шакал, *Canis aureus*, експансія, Україна.

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