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History of herons of the Western Palaearctic

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Abstract. Fossil remains of herons are scarce in the Western Palaearctic - so far 5 species have been described, 4 of them in the extinct genera. The oldest is *Proardea amissa* from the Upper Eocene to Upper Oligocene of France. Most of the remains come from the Miocene. The oldest extant genus, *Nycticorax*, has survived since the Oligocene. Quaternary remains belong to 11 extant species only. In a few cases the Quaternary records suggest that the distribution of the species was formerly wider than the recent one. This applies to *Botaurus stellaris, Nycticorax nycticorax, Butorides striatus, Egretta garzetta, E. alba, Ardea cinerea* and *A. goliath.*

Key words: Ardeidae, fossils, Western Palaearctic, history.

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I. INTRODUCTION

In the recent bird fauna of the world the Ardeidae are represented by somewhat more than sixty species, most of which live in aquatic and marshy habitats. Despite the small size of this group, its systematics differs rather considerably in presentations given by various authors. Without going into the evaluation of individual systems, here I have assumed a general system treating Balaenicipitidae and Scopidae as separate families (employed e.g. by MORONY et al. 1975 and by HOWARD & MOORE 1991).

It is striking that the remains of fossil herons are incomparably rarer than those of many other groups of water-and-marsh birds. For instance, CHENEVAL (1989) mentions above 9000 bony fragments of birds of the genus *Palaelodus* related to the recent Flamingo and only three fragments of the heron bones among the remains from the Miocene locality at Saint-Gérand-le-Puy. It is also striking that many of the remains previously described as herons have later been removed to other families and orders of birds.

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II. FOSSIL TAXA

In his Catalogue BRODKORB (1963, 1971) listed 18 fossil species of herons and among them 11 from the Western Palaearctic. Besides them he placed *Ardea rupeliensis* VAN BENEDEN, 1873, among Aves Incertae Sedis, whereas *Ardea effosa* LEPSIUS, 1887, *A. latipes* LEPSIUS, 1887, and *A. formosa* MILNE-EDWARDS, 1871, are listed as nomina nuda (BRODKORB 1978). Later on various systematic reshuffles induced by revisions of the fossil material were done (BRODKORB 1980; HARRISON 1979; OLSON 1985). Remains from Central Europe were reviewed by MLÍKOVSKÝ (1992). The results can be briefly recapitulated as follows.

Referring to the 11 taxa mentioned above HARRISON (1979) stated that the Eocene *Proherodias oweni* LYDEKKER, 1891, belonged in the Anseriformes and *Goliathia andrewsi* LAMBRECHT, 1930, in the Pelecaniformes. BRODKORB (1980), however, placed the latter species in Balaenicipitidae and OLSON (1985) accepted that statement. According to HARRISON (1979) *Ardea piveteaui* BRUNET, 1970, is not a heron either and can be assigned only to aves incertae sedis. BRODKORB (1980) found that the Miocene *Ardea brunhuberi* VON AMMON, 1918, was a cormorant, *Phalacrocorax brunhuberi*; then OLSON (1985) synonymized the remains of *Botaurites avitus* VON AMMON, 1918, with the same species of cormorant. The Pliocene *Ardea lignitum* GIEBEL, 1860, was removed by BRODKORB (1980) to the genus *Bubo* and OLSON (1985) stated that the Miocene *Ardea perplexa* MILNE-EDWARDS, 1868, was also a large owl. *Botaurites similis* (FRAAS, 1870) restudied by OLSON (1985) has been removed to the gallinacean family Phasianidae. *Ardeacites molassicus* HAUSHALTER, 1855, not being a heron should be assigned to aves incertae sedis (BRODKORB 1980). On the contrary, the Oligocene *Anas basaltica* BAYER, 1882, was restudied by MLÍKOVSKÝ & ŠVEC (1989) and found to be an indeterminate heron of Ardeini.

In spite of the fact that two fossil herons not included in BRODKORB's Catalogue were described later, according to the present state of science, there are hardly 5 fossil species of herons known from the Western Palaearctic (within the limits accepted after CRAMP & SIMMONS 1977). Four of them represent four extinct genera. Besides them a few finds were identified to genus level only. They are all presented in Table I.

The oldest of these birds is *Proardea amissa* from the widely known Phosphorites du Quercy in SW France, dated to a period from the Upper Eocene to the Upper Oligocene. Table I shows also that contrary to other regions, no heron palaeospecies have been as yet described from the Pliocene and Pleistocene of the Western Palaearctic. The distribution of the localities is illustrated by a map (Fig. 1).

Most of the localities are grouped in western Europe; as regards the eastern part of this continent, we know only *Ardeagrandis* from the Upper Miocene of Moldova. *Zeltornis* found in Libya in North Africa is older, as its remains are referred to the Middle Miocene. In one case only, the remains of a fossil heron described from the Western Palaearctic, i.e. of *Proardeola walkeri*, are known from more than one localities: besides the type locality Chaveroches it has been identified also from St-Gérand-le-Puy as well as from Thailand (CHENEVAL 1984; CHENEVAL et al. 1991). HARRISON (1979) describing *Proardeola walkeri*, pointed to its similarity to the recent Squacco Heron; it is interesting that wide areal of this Tertiary species is generally similar to the breeding distribution of the genus *Ardeola*. Unfortunately, the Oligocene remains of herons from El Fayum in Egypt have not been closely determined. Anyway, they are the oldest finds of an extant genus of heron (*Nycticorax*) in the Western Palaearctic.

Table I

Fossil genera and species of herons described from the Western Palaearctic (after BRODKORB 1963, BALOUET 1981, CHENEVAL 1984, HARRISON 1979, KUROCHKIN & GANEA 1972, RASMUSEN et al. 1987 and revisions of HARRISON 1979, BRODKORB 1980, OLSON 1985 and MLÍKOVSKÝ & ŠVEC 1989)

Genus and species	Geological age	Locality
+*Proardea amissa* (MILNE-EDWARDS, 1892)	Upper Eocene//Upper Oligocene	France: Phosphorites du Quercy*
+*Proardeola walkeri* HARRISON, 1979	Upper Oligocene/Lower Miocene Lower Miocene	France: Chaveroches France: St-Gérand-le-Puy
+*Ardeagrandis arborea* KUROCHKIN & GANEA, 1972	Upper Miocene	Moldavia: Golbochika, near Kishinev
+*Zeltornis ginsburgi* BALOUET, 1981	Middle Miocene	Libya: Djebel Zelten
Ardea +aurelianenis MILNE-EDWARDS, 1871	Upper Miocene	France: Suèvres
Nycticorax sp.	Oligocene	Egypt: El Fayum
Ardeini indet.	Oligocene	Czech Rep.: Varnsdorf
Ardeidae gen.et sp.indet.	Oligocene	Egypt: El Fayum

* Locality name "Chaux" cited by BRODKORB (1963) is a mistake because it is not a locality name but means "lime" (MOURER-CHAUVIRÉ oral comm).

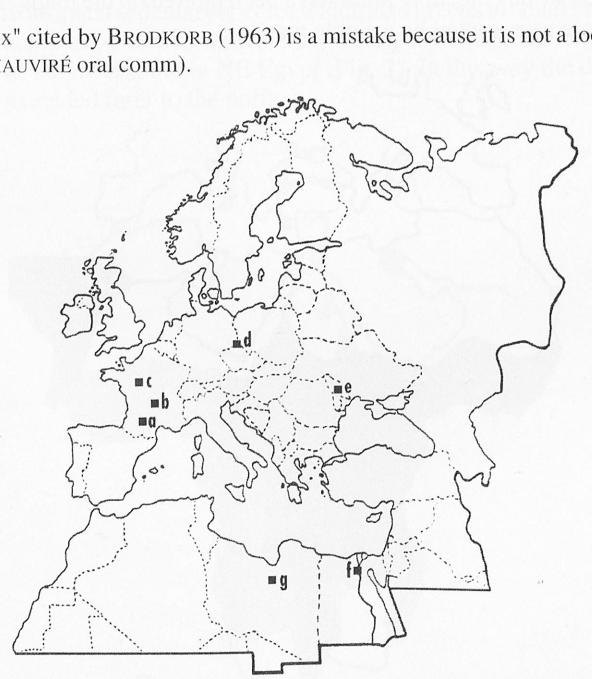

Fig. 1. Tertiary localities of fossil herons in the Western Palaearctic: a – Phosphorites du Quercy, b – St-Gérand-le-Puy and Chaveroches, c – Suèvres, d – Varnsdorf, e – Golbochika, f – Fayum, g – Djebel Zelten. Data on fossil taxa, localities and their geological age are given in Table I.

It seems expedient to end this short review with a mention on a tibiotarsal fragment of a very big heron, found by HOCH (1977) among materials excavated on south coast of the Persian Gulf and dated to 5000 years BP. It was distinctly bigger than *Ardea goliath* (the biggest recent heron of the Palaearctic). The paper (HOCH 1977) does not contain a formal description of a new species, but the name *Ardea bennuides* is proposed (it does not seem to be a typical nomen nudum as a photograph of the specimen is published). The locality, Umm an-Nar, is situated to the east of the eastern boundary of the Western Palaearctic adopted in present paper from CRAMP & SIMMONS (1977) but, generally, it is inside the region proposed by HARRISON (1982). On the other hand, HOCH (1977) suggests that some of herons depicted by ancient Egyptians may represent this big bird.

III. EXTANT SPECIES OF HERONS IN QUATERNARY DEPOSITS

After an interval of at least several million years the next data about herons of the Western Palaearctic come from a period between the Lower Pleistocene and the Late Holocene and concern still existing species. Literature provides data on 11 species (for data and citations see the Appendix). The records have been analysed against the background of their present distributions on the basis of data from "The Birds of the Western Palaearctic" (CRAMP & SIMMONS 1977), a little simplified, modified and corrected or completed acc. to the maps given in local literature (BAUER & GLUTZ VON BLOTZHEIM 1966; TOMIAŁOJĆ 1990; ŠŤASTNÝ et al. 1987; DVORAK et al. 1993; GOODMAN & MEININGER 1989; BROWN et al. 1982). The majority of the sites of these finds lie either within the present continuous breeding range of particular species or, if these areas are discontinuous and scattered, the sites may occur amongst them. Only the sites lying outside the general limits of present-day breeding areas have been plotted on the maps. The localities situated close to each other are represented by a single mark.

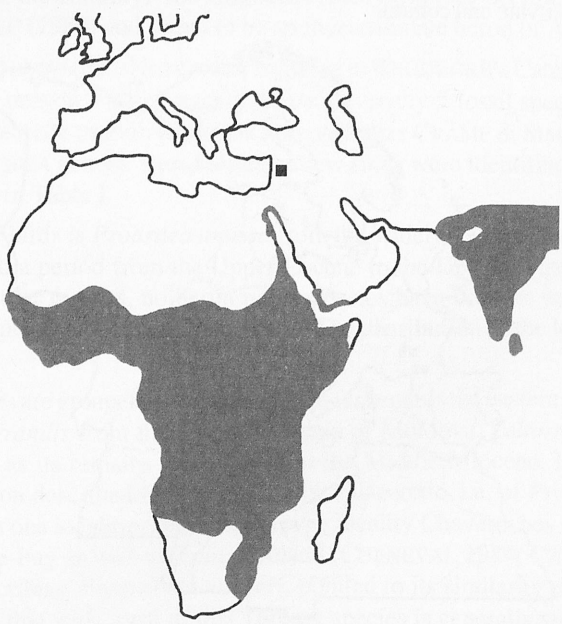

Fig. 2. Situation of the locality 'Ubeidiya (black square) where the Early Pleistocene *Butorides* was found, against the present breeding distribution of *Butorides striatus* in Africa, Arabia and the Indian peninsula (grey areas) compiled from CRAMP & SIMMONS (1977), BROWN et al. (1982) and GOODMAN & MEININGER (1989).

In most Western Palaearctic species of herons at least a part of the population are migrants, their winter quarters being generally situated south of the breeding areas. This further obscures the picture of possible changes in the distribution, for, theoretically, the fossil remains may well belong to migrating birds. For this reason the changes of distribution may be inferred above all for sedentary species and also in the case of migrants provided the fossil sites lie outside the breeding area, in the direction opposite to that of their migrations and winter quarters.

Sedentary species

Butorides striatus (LINNAEUS, 1758)

This is one of the sedentary species. Its systematics differs in the opinions of various authors. According to WOLTERS (1976), HANOCK & ELLIOTT (1978) and HOWARD & MOORE (1991) the genus *Butorides* comprises a single polymorphic species, widely distributed, for instance, in Africa and S Asia, while MORONY et al. (1975) split it in 3 species, raising to species rank 2 subspecies from North America and the Galapagos Islands. A fossil fragment was mentioned as "*Butorides* sp., aff. *B. striatus*" by TCHERNOV (1980) from 'Ubeidiya in the Jordan Valley (Fig. 2). The age of deposits in which the bone fragment was found TCHERNOV (1980) determined as early Middle Pleistocene (the Mindel glaciation). TYRBERG (in litt.) however states that it is older (from the Early Pleistocene: 1 - 1.4 Ma). Although the exact species determination is not certain, the finding of a member of this genus far from its main Afrotropical range and even north from the northern most insular breeding site on the Sinai Peninsula, extends its distribution to the north and may suggest that in the Pleistocene there was a connection between its recent African and Asiatic breeding areas.

Ardea goliath CRETSCHMAR, 1826

This is a typical Afrotropical sedentary species which also breeds in small numbers in the region of Basra in Iraq. It was found by BOESSNECK (1986) among the Holocene remains dated between 600 BC and 200 AD at Tell Maskhuta in NE Egypt (Fig. 3). In this way the distribution range of this species was also extended farer to the north.

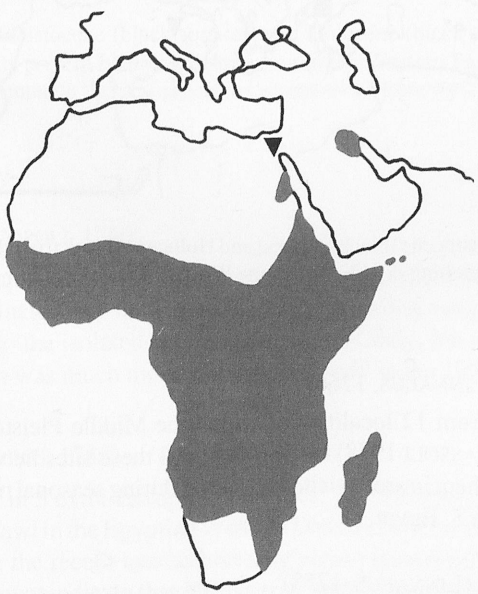

Fig. 3. Situation of the locality Tell Maskhuta (black triangle) where the Holocene remains of *Ardea goliath* were found against its present breeding distribution (grey areas).

Migratory or partially migratory species

Botaurus stellaris LINNAEUS, 1758

Remains of the partly migratory Eurasian Bittern have been found in 28 localities in deposits dating from the Middle Pleistocene to the Middle Ages. The oldest are the Middle Pleistocene fragments collected at Torre in Pietra and at Loreto a Venosa, both in Italy (CASSOLI 1978), which like many other localities lie within the limits of the general recent breeding distribution of the Bittern. The only sites outside the modern breeding range are two (Pleistocene and Holocene) localities in the SW British Isles, the Early Holocene site at Cabeco da Amoreira in Portugal (HERNANDEZ 1993) and the Middle/Late Holocene site at Demircihüyük in Anatolia (BOESNECK & DRIESCH 1987) (Fig. 4). This last is situated in the area of winter quaters of the Bittern.

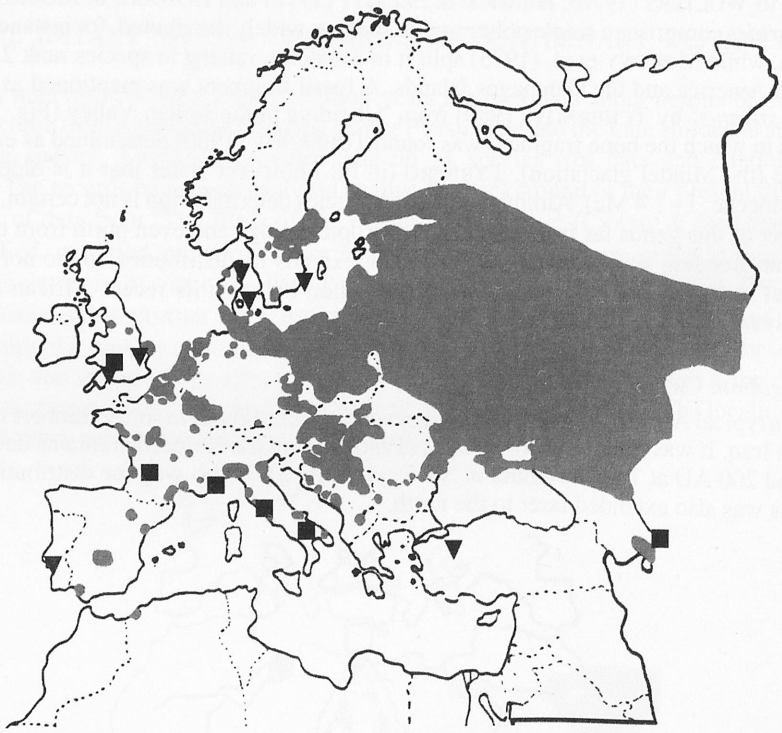

Fig. 4. Distribution of the Pleistocene (black squares) and Holocene (black triangles) sites of *Botaurus stellaris* lying outside its present breeding distribution in the Western Palaearctic (grey areas).

Ixobrychus minutus (LINNAEUS, 1766)

Remains are known from 12 localities of which the Middle Pleistocene (Riss glaciation) at Torre in Pietra in Italy (CASSOLI 1978) is the oldest. All these sites lie within the recent breeding areas or not very far from them in areas visited regularly during seasonal migrations, e.g. the locality Elephantine on the Nile in S. Egypt.

Nycticorax nycticorax (LINNAEUS, 1758)

In his Catalogue BRODKORB (1963) mentiones the Night Heron only from American sites. Since that time it has been reported from 10 Western Palaearctic localities, of which seven are situated

in or close to the recent insular breeding areas of the Night Heron in Southern Europe and Egypt. The remaining 3 sites lie outside today's breeding range (Fig. 5), Bir Tarfawi in the Egyptian Western Desert, dated to ca 135000 BP (BOCHEŃSKI 1993a), being the oldest of them. The remains found at Bir Tarfawi are interesting because they represent both adult and young birds and so it is supposed that they derive from a breeding colony. An alluvial site on the Middle Dniepr River in the Ukraine (VOINSVENSKIY 1967) and the London finds from the 16th century (HARRISON 1980) are both located to the north of the present breeding areas.

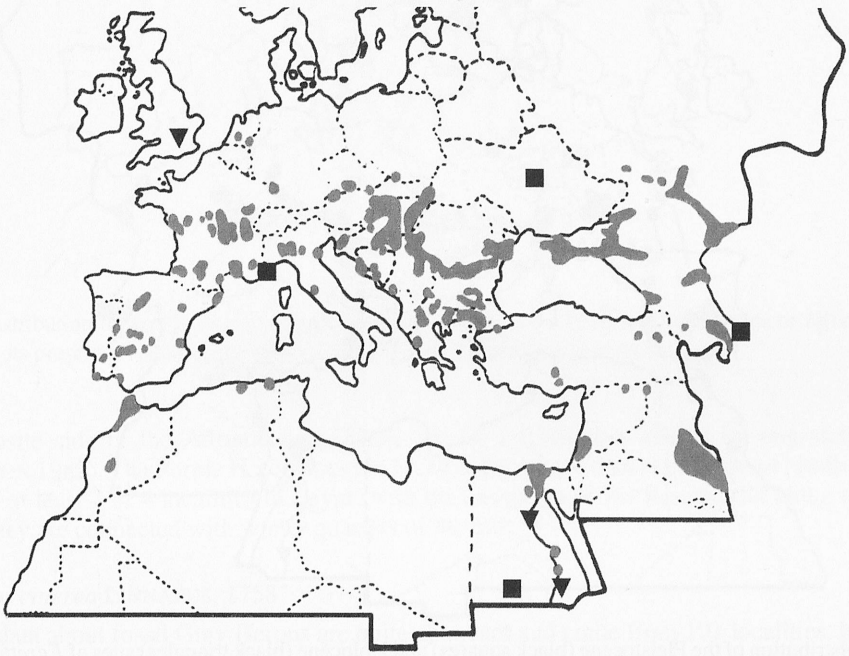

Fig. 5. Distribution of the Pleistocene (black squares) and Holocene (black triangles) sites for *Nycticorax nycticorax* lying ouside its present breeding distribution in the Western Palaearctic (grey areas). Notice: breeding distribution presented in Egypt was acc. to GOODMAN & MEININGER (1989) actual in the beginning of the 20th c.

Ardeola ralloides (SCOPOLI, 1769)

The remains of the Squacco Heron have been identified in materials coming from two places only, which are both situated not far from the recent breeding range (Italian site at Buca del Bersagliere is not close to the isolated breeding site in NW Italy, but acc. to CRAMP & SIMMONS (1977) the Squaco Heron was much more numerous in Italy in the 19th c.).

Bubulcus ibis (LINNAEUS, 1758)

Remains were found in 5 extra-European localities. The Pleistocene sites at Binagady on the Caspian Sea and Bir Tarfawi in the Egyptian Western Desert as well as three Holocene ones situated also in Egypt, lie among the recent insular breeding areas situated to the north of the continuous Afrotropical area. They may indicate that NE African and W Asiatic territories were inhabited by the Cattle Egret for a long time before the colonisation of SW Europe and the Volga Delta, which took place in this century (DEMENTEV & GLADKOV 1951; YEATMAN 1971).

Egretta garzetta (LINNAEUS, 1766)

Fossil remains of the Little Egret are known from 13 localities, of which Přezletice in the Czech Rep., referred to the Middle Pleistocene (JÁNOSSY 1983), is the oldest. It is also the only site indicating that the distribution of this species extended further to the north in the Pleistocene (Fig. 6). All the other localities are situated inside the present range of the discontinuous breeding distribution of the Little Egret or in its winter quarters in Egypt.

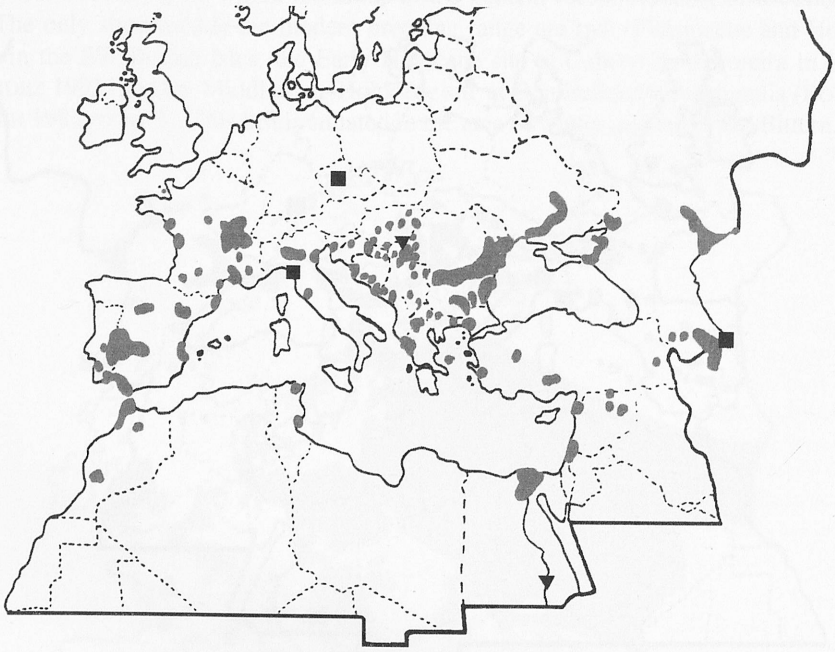

Fig. 6. Distribution of the Pleistocene (black squares) and Holocene (black triangles) sites of *Egretta garzetta* lying outside its present breeding distribution in the Western Palaearctic (grey areas). Notice: breeding distribution presented in Egypt in the Nile Delta acc. to GOODMAN & MEININGER (1989) could be actual in the beginning of the 20th c. – at present it breeds mainly near Aswan and on Lake Nasser.

Egretta alba (LINNAEUS, 1758)

In BRODKORB's (1963) Catalogue remains of the Great White Egret are recorded only from American sites. Later, this heron has been mentioned from 10 Western Palaearctic localities. The only Pleistocene site is that at Binagady on the Caspian Sea (BURCHAK-ABRAMOVICH 1962) – the others are younger. Of these sites only three Hungarian ones can be regarded as situated within the recent European discontinuous breeding range of the Great White Egret. The others lie far from it and suggest that the species was more widely distributed in the past especially in the Ukraine (Fig. 7) – the northernmost locality at Valkenburg in Holland is doubtful, because the fragment of a young bird described by CLASON (1967) most probably belonged, according to PIEHLER (1976), to a Grey Heron.

Ardea purpurea LINNAEUS, 1758

Remains of fossil Purple Herons were found in 16 localities. The oldest of them is 'Ubeidiya in Jordan Valley; previously dated to the Mindel glaciation (TCHERNOV 1980) is considered now as the Lower Pleistocene (TYRBERG in litt.). Of S. European sites only the Romanelli, Vitinia and Levanzo, all in S.Italy, are situated far from the recent breeding territories (the nearest ones lie on

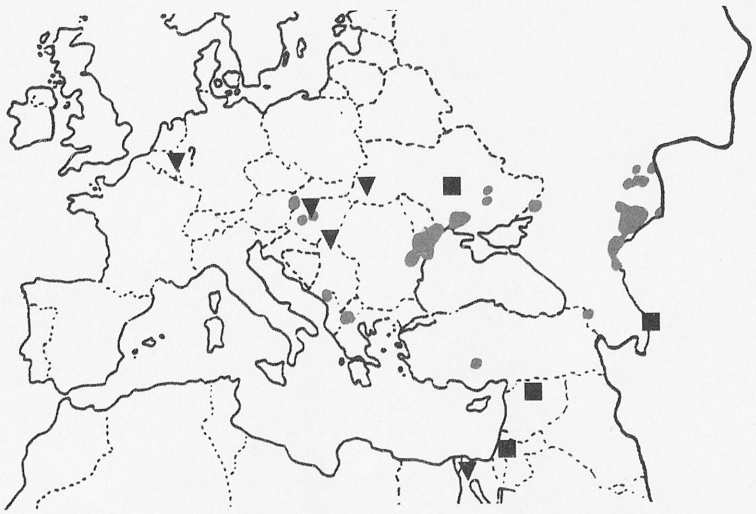

Fig. 7. Distribution of the Pleistocene (black squares) and Holocene (black triangles) sites of *Egretta alba* outside its present breeding distribution in the Western Palaearctic (grey areas).

the opposite side of the Adriatic Sea). These places are however visited by migrating birds (HARRISON 1982). The Purple Heron does not breed in Egypt nor does it throughout North Africa; however at least 3 of 4 localities in Egypt (with the exception of Bir Kiseiba) lie along the Nile and so they are connected with winter quarters of the bird.

Ardea cinerea LINNAEUS, 1758

The data about fossil Grey Herons are quite abundant and come from 101 localities, but only 17 of them are definitely of Pleistocene age. The oldest remains seem to be those from Arabka in the Ukraine as dated to the "homicen" included by VOINSTVENSKIY (1967) in the Upper Pliocene. In the sixties and seventies, however, Ukrainian geologists (e.g. DUBROVO & KAPELIST 1979) accepted the boundary between the Pliocene and Pleistocene at about 700 000 years BP and so "homicen" interpreted as the Antropogen (or the beginning of Antropogen) should be included in the Lower Pleistocene. The locality Arabka as well as the Middle Pleistocene Hundsheim in Lower Austria are situated within the recent breeding area of the Grey Heron. Also the majority of the other finds lie wthin the general recent breeding range of this species (Fig. 8). In a case of insular distribution in Western and Central Europe the localities can occur among extant breeding areas, suggesting their presence in the Holocene. The Holocene Spanish, Middle East and Egyptian sites lie in winter quarters or places visited during migrations of these birds. Only the site at Bir Tarfawi in the Egyptian Western Desert (BOCHEŃSKI 1993a) may evidence breeding on a Last Interglacial lake situated between the Palaearctic breeding area and the present Afrotropical one.

IV. CONCLUSIONS

The above presented data permit the following conclusions:

1. The oldest paleospecies known from the Western Palaearctic is *Proardea amissa* from the Phosphorites du Quercy. The oldest member of the extant genus is the Oligocene *Nycticorax* sp. from Fayum.

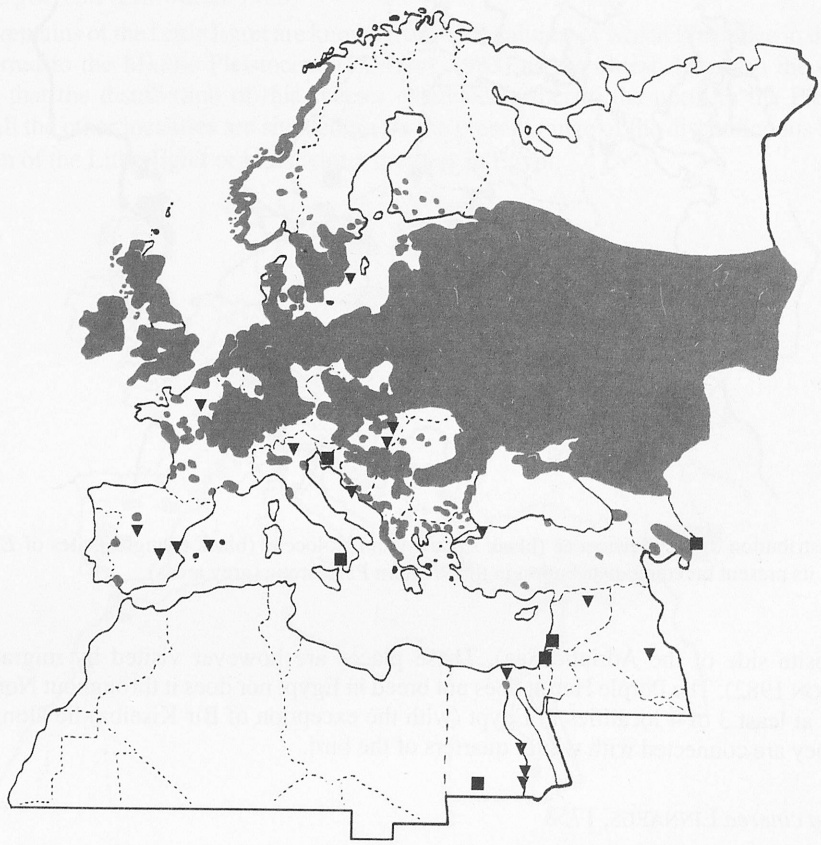

Fig. 8. Distribution of the Pleistocene (black squares) and Holocene (black triangles) sites of *Ardea cinerea* outside its present breeding distribution in the Western Palaearctic (grey areas). Notice: the map of breeding distribution (CRAMP & SIMMONS 1977) has been a little changed (see p. 346). The breeding place near Giza (Egypt) concerned one pair only and refers to twenties (GOODMAN & MEININGER 1989).

2. Pliocene remains have not been described from the Western Palaearctic until now - Lower and Middle Pleistocene remains are almost as rarely encountered as Tertiary ones.

3. It is not before the Late Pleistocene and the Holocene and, above all, the Late Holocene that these remains become more numerous. That is in particular true of bigger species, such as the Bittern, Grey Heron and Purple Heron. This seems to be due to their falling victim to man (see: BOCHEŃSKI 1983).

4. It is hard to ascertain whether the herons were hunted by man to provide food - historical records indicate use of their feathers as embellishments, and a custom of hunting them with falcons from the Middle Ages on. This may be responsible for the relatively considerable quantity of remains of the Grey Heron collected at European sites from that period.

5. The location of the Pleistocene and Holocene finds of herons indicates distinct biotopic changes accounted for by human activity and consisting of a drastic decrease in the area of aquatic and swamp environments in Europe.

REFERENCES
(Text and Appendix)

ALTUNA J., EASTHAM A., MKARIEZKURRENA K., SPIESS A., STRAUS L. 1991. Magdalenian and Azilian hunting at the Abri Dufaure, SW France. Archaeozoologia, **4** (2): 87-108.

BALOUET J-C. 1981. *Zeltornis ginsburgi* n.g., n.sp. (Ardeidae, Aves), Héron géant du Miocđne inférieur du Djebel Zelten (Libye). C. R. Acad. Sc. Paris, **293** (Série II): 235-239.

BAUER K. M., GLUTZ VON BLOTZHEIM U. N. 1966. Handbuch der Vögel Mittel-europas. Bd.**1**.

BOCHEŃSKI Z. 1983. Water and marsh birds from Polish archaeological sites – their status and interpretation. [In:] GRIGSON C., CLUTTON-BROCK. (Eds). Animals and Archaeology: 2. Shell Middens, Fishes and Birds. BAR Intern. Series, **183**: 143-149.

BOCHEŃSKI Z. 1993a. Bird fauna from Bir Tarfawi. [In:]F.WENDORF, R. SCHILD, A. E.CLOSE (Eds). Egypt during the Last Interglacial. Plenum Press, New York, p.: 159-185.

BOCHEŃSKI Z. 1993b. Catalogue of fossil and subfossil birds of Poland. Acta zool. cracov., **36** (2): 329-460.

BOESSNECK J. 1986. Vogelknochenfunde aus dem alten Ägypten. Ann. Naturhist. Mus. Wien, **88/89** (B): 323-344.

BOESSNECK J. 1988. Tierknochenfunde aus der Spätzeit (6.-4. Jh. v. Chr.) aus Minshat Abu Omar (Ägypten). Fontes Archeol. Posn., **36**: 217-220.

BOESSNECK J., VON DEN DRIESCH A. 1979a. Die Tierknochenfunde aus der neolitischen Siedlung auf dem Fikirtepe bei Kadiköy am Marmarameer. München, 81 pp + 9 Pl.

BOESSNECK J., VON DEN DRIESCH A. 1979b. Die Tierknochenfunde mit Ausnahme der Fischknochen. [In:] J. BOESSNECK, A. VON DEN DRIESCH, L. STENBERGER (Eds.) Eketorp. Befestigung und Siedlung auf Öland/ Schweden. Die Fauna. 24-421 pp.

BOESSNECK J., VON DEN DRIESCH A. 1987. Analyse der Vogel-, Reptilien-, Amphibien- und Fischknochen. [In:] M. KORFMANN (Ed.): Demircihüyük, die Ergebnisse der Ausgrabungen 1975-1978. Bd. II. Naturwissenschaftliche Untersuchungen. Verl. Ph.v.Zabern, Meinz, p.: 43-52.

BOESSNECK J., VON DEN DRIESCH A. 1989. Vogelknochenfunde aus dem Tal der Königinen. Spixiana, **11** (3): 279-302.

BOESSNECK J., KOKABI M. 1981. Tierknochenfunde I. Serie. [In:] B. HROUDA (Ed.) Isin - Isan Bahriyat II. Die Ergebnisse der Ausgrabungen 1975-1978. Bayerische Ak. Wiss., Phil.-hist. Kl., Abh. Neue Folge, München, **87**: 131-155 + Pl.45-48.

BONFIGLIO G.M., CASSOLI P.F., MALLEGNI F., PIPERNO M., SOLANO A. 1986. Neanderyhal parietal, vertebrate fauna and stone artefacts from the Upper Pleistocene deposits of Contrada Ianni di San Caliogero (Catanzaro, Calabria, Italy). Am. J. Phys. Ant., **70**: 241-250.

BREWER D. J. 1989. A model for resource exploitation in the prehistoric Fayum. [In] KRZYŹANIAK L., KOBUSIEWICZ M. (Eds): Late prehistory of the Nile Basin and the Sahara. Studies in African Archaeology, Poznan Archaeol. Mus., **2**: 127-137.

BRODKORB P. 1963. Catalogue of fossil birds. Part 1 (Archaeopterygiformes through Ardeiformes). Bull. Florida St. Mus. Biol. Sci., **7**(4): 179-293.

BRODKORB P. 1971. Catalogue of fossil birds. Part 4 (Columbiformes through Piciformes). Bull. Florida St. Mus. Biol. Sci., **15** (4): 163-266.

BRODKORB P. 1978. Catalogue of fossil birds. Part 5 (Passeriformes). Bull. Florida St. Mus. Biol. Sci., **23** (3): 139-228.

BRODKORB P. 1980. A new fossil heron (Aves: Ardeidae) from the Omo Basin of Ethiopia, with remarks on the position of some other species assigned to the Ardeidae. Contrib. Sci. Natur. Hist. Mus. Los Angeles County, **330**: 87-92.

BROWN L.K., URBAN E.K. & NEWMAN K. (Eds). 1982. The birds of Africa. Academic Press, London, **1**.

BURCHAK-ABRAMOVICH N. I. 1962. Novye dannye o binagadinskikh ptitsakh. Ornitologiya, **4**: 458-464.

BULGARELLI G. M. 1972. Il paleolitico della Grotta di Torre Nave (Praia a Mare - Cosenza). Quaternaria, **16**: 149-188.

CALOI L., CUGGIANI M.C., PALMARELLI A.,PALOMBO M.R. 1983. La fauna a vertebrati del Pleistocene medio e superiore di Vitinia (Roma). Boll. Serviz. geol. Ital., **102**: 41-76.

CASSOLI P.F. 1978. L'avifauna pre-würmiana di Torre in Pietra. Quaternaria, **20**: 429-440.

CASSOLI P.F. 1980. L'avifauna del pleistocene superiore delle Arene Candide (Liguria). Mem. Inst. Italiano Paleont. Umana, **3**: 155-234

CASSOLI P. F., TAGLIACOZZI A. 1982. La fauna della grotta di Cala Genovesi a Levanzo. Riv. Sc. preist., **37**: 124-133.

CHENEVAL J. 1984. Les oiseaux aquatiques (Gaviiformes a Anseriformes) du gisement Aquitanien de Saint-Gérand-le-Puy (Allier, France): révision systématique. Palaeovertebrata, **14** (2): 33-115.

CHENEVAL J. 1989. Fossil bird study, and paleoecological and paleoenvironmental consequences: example from the Saint-Gérand-le-Puy de-posits (Lower Miocene, Allier, France). Palaeogeogr., Palaeoclimatol., Palaeoecol., **73**: 295-309.

CHENEVAL J., GINSBURG L., MOURER-CHAUVIRE C. 1991. The Miocene avifauna of the Li Mae Long locality, Thailand: systematics and paleoecology. J. SE Asian Earth Sci., **6** (2): 117-126.

CHURCHER C. S. 1972. Late Pleistocene vertebrates from archaeological sites in the plain of Kom Ombo, Upper Egypt. Royal Ontario Mus., Life Sci. Contr., **82.**

CLASON A.T. 1967. Animal and man in Holland's past. Palaeohistoria, **13** [cited after PIEHLER 1976]

CRAMP S. & SIMMONS K. E. L. (Eds). 1977. The birds of the western Palearctic. Oxford University Press, **1**: 722 pp.

DELPECH F. 1983. Les faunes du Paléolithique superieur dans le sud-ouest de la France. Cahiers Quat., Bordeaux, **6**: 453 pp.

DEMENTEV G.P., GLADKOV N.A. (Eds). 1951. Ptitsy Sovetskogo Soyuza. Sevetskaya Nauka, **2**: 480 pp.

DRIESCH, VON DEN, A. 1972. Osteoarchäologische Untersuchungen auf der Iberischen Haqlbinsel. Studien über frühe Tierknochenfunde von der Iberischen Halbinsel, München, **3**: 267 pp.+ 16 Pls.DRIESCH A. VON DEN, BOESSNECK J. 1989. Abschlußbericht über die zooarchäologischen Untersuchungen an Tierknochenfunden von der Heuneburg. Römisch-germanische Forsch., **45**: 131-157.

DUBROVO I.A., KAPELIST K.V. 1979. Katalog mestonakhozdenij tretichnykh pozvonochnykh USSR. Izd. "Nauka", Moskva.

DURING E. 1986. The fauna of Alvastra. Ossa, **12** (Suppl. 1).

DVORAK M., RANNER A., BERG H-M. 1993. Atlas der Brutvögel Österreichs. Wien. 522 pp.

FISCHER K. 1991. Vögel und Grosssäugetiere aus dem Eem-Interglazial von Schönfeld, Kr. Calau (Niederlausitz). Natur und Landschaft in der Niederlausitz Sonderheft: 169-176.

GAUTIER A. 1984. Archaeozoology of the Bir Kiseiba region, Eastern Sahara. [In:] A.E. CLOSE (Ed.) Cattle-keepers of the eastern Sahara. Inst. for the Study of Earth & Man, Southern Methodist Univ., Dallas, p.: 49-72.

GOODMAN S. M., MEININGER P. L. (Eds.). 1989. The birds of Egypt. Oxford, 551 pp.

HANOCK J., ELLIOTT H. 1978. The herons of the world. London Editions, 304 pp.

HARRISON C. J. O. 1979. The herons (Ardeidae) of the old world Lower Tertiary. Tert. Res. Sp. Pap. **5**: 11-17.

HARRISON C. J. O. 1980. A Re-examination of British Devensian and Earlier Holocene bird bones in the British Museum (Natural History). Journal archaeol. Sci., **7**: 53-68.

HARRISON C.J.O. 1982. An atlas of the birds of the Western Palaearctic. Collins, London, 322 pp.

HARRISON C. J. O. 1987. Pleistocene and prehistoric birds of South-west Britain. Proc. Univ. Bristol spelaeol. Soc., **18** (1): 81-104.

HEINRICH H.-D. 1977. Untersuchungen an Vogelresten aus dem fossilen Tierbautensystem von Pisede bei Malchin. Teil II: Paläoökologische und faunengeschichtliche Auswertung des Fundgutes. Wiss. Ztsch. Humboldt-Universität Berlin, Math.-Nat. R. **26** (3): 347-364

HERNANDEZ F. 1993. Catalogo provisional de los yacimientos con aves del cuaternario de la Peninsula Iberica. Archaeofauna, **2**: 231-275.

HOCH E. 1979. Reflections on prehistoric life at Umm an-Nar (Trucial Oman) based on faunal remains from the third millenium BC. Papers from the Fourth Int. Conference of South Asian Archaeologists in Western Europe. South Asian Archaeology, **1977**: 589-638.

ISBERG O. 1950. Ett subfossilt hägerfynd i Skane. Svensk faunistik Revy, **12**: 16-20.

JÁNOSSY D. 1965. Vogelreste aus den altpleistozänen Ablagerungen von oigstedt in Thüringen. Paläont. Abh. Abt.A Paläozoologie, **2**: 337-35..

JÁNOSSY D. 1974. Die mittelpleistozäne Vogelfauna von Hundsheim (Niederösterreich). Stzb. Österr. Ak. Wiss., Math.-nat. Kl., Abt.I., **182** (6-8): 211-257.

JÁNOSSY D. 1980. Plio-Pleistocene bird remains from the Carpathian Basin. V. Podicipediformes, Ciconiiformes, Otidiformes, Columbiformes, Piciformes. Aquila, **86** (1979): 19-33.

JÁNOSSY D. 1983. Die mittelpleistozäne Vogelfauna von Prezletice bei Prag (CSSR). Schriftenr. geol. Wiss., **19/20**: 247-269.

JÁNOSSY D. 1985. Wildvogelreste aus archäologische Grabungen in Ungarn (Neolithicum bis Mittelalter). Fragm. miner.palaeont., **12**: 67-103

JÁNOSSY D. 1994. Hungary [news about activity from the members of SAPE] Society of Avian Paleontology and Evolution Information Letter, **8**: 13.

JENKINSON R.D.S. 1984. Ceswell Crags. Late Pleistocene sites in the East Midlands. BAR, British Series, **122.**

KATZMANN L. 1990. Tierknochenfunde aus Elephantine in Oberägypten (Grabungsjahre 1976 bis 1986/87) Vögel, Reptilien, Fische und Mollusken. Inaug.-Diss. ... der Ludwig-Maximilians-Universität, München.138 p.KUROCHKIN E.N., GANEA I.M. 1972. Ptitsy srednego Sarmata Moldavii. Pozvonochnye neogena i pleistotsena Moldavii, p.: 45-70.

LAMBRECHT K. 1933. Handbuch der Palaeornithologie. Gebrüder Borntraeger, Berlin, 1024 pp.

LEPIKSAAR J. 1967. The bones of birds, amphibia and fishes found at Skedemosse. [In:] HAGBERG U.A. (Ed.). 1967. The archaeology of Skedemosse I. The excavations and the finds of an Öland Fen., Sweden: 109-128.

LEPIKSAAR J. 1977. New bird-, amphibian- and fishfinds from Skedemosse IV. The Iron Age settlements of the Skedemosse area on Öland, Sweden: 135-141.

LEPIKSAAR J. 1982. Djurrester fran den tidigatlantiska boplasten vid Segebro nära Malmö i Skane (Sydsverige). [In:] LARSSON L. 1982. Segebro – en tidigatlantisk boplats vid Sege as mynning. Malmöfynd, **4**: 101-128.

LEPIKSAAR J. 1983. Animal remains from the mesolithic bog site at Ageröd V in central Scania. [In:] LARSSON L. 1983. Ageröd V. An Atlantic bog site in central Scania. Acta archaeol. lund., Ser. in 8o, **12**: 159-167.

MALATESTA A., SURIANO F. 1970. Avifauna pleistocenica di Alghero (Sardegna). Boll. Serviz geolog. d'Italia, **91:** 149-158.

MALEZ V. 1988. Pleistocenska ornitofauna iz Vindije u sjeverozapadnoj Hrvatskoj. RAD Zav. znan. rad JAZU, Varazdin, **2**: 31-203.

MALEZ-BAČIC V. 1979. Pleistocenska ornitofauna iz Sandalje u Istri te njezino stratigrafsko i paleoekolosko znacenje. Palaeont. jugosl. **21**: 1-46.

MALEZ-BAČIC V. 1980. Holocenska avifauna iz Markove spilje na otoku Hvaru. Larus, **31-32**: 163-183.

MITTELHAMMER R. 1982. Die Tierknochenfunde von der Burg Alt-Schellenberg Fürstentum Liechtenstein. Inaug.-Diss. ... der Ludwig-Maximilians-Universität, München.159 p.+ 7 Pl.

MLÍKOVSKÝ J. 1992. The present state of knowledge of the Tertiary birds of Central Europe. Sci. Ser. Nat.Hist.Museum Los Angeles County, **36**: 433-458.

MLÍKOVSKÝ J., ŠVEC P. 1989. Review of the Tertiary waterfowl (Aves: Anseridae) of Czechoslovakia. Cas. Mineral. Geol., **34**: 199-203.

MORELLI N. 1891. Resti organici rinvenuti nella caverna delle Arene Candidi. Atti della Soc. ligustica di Scienze nat. e geogr., **2**: 40-81.

MORONY J. J., BOCK W. J., FARRAND J. 1975. Reference list of the birds of the world. Am.Mus.Nat.Hist. New York, 207 pp.

MOURER-CHAUVIRÉ C. 1975. Les oiseaux du Pléistocđne moyen et supérieur de France. Docum. Lab. Géol. Fac. Sci. Lyon., **64** (1-2), 624 pp.

MÜLLER E. C. 1989. Tierknochenfunde aus dem Gelände einer Herberge in der Colonia Ulpia Traiana bei Xanten am Niederrhein. I. Nichtwiederkäufer. Inaug.-Diss. ... der Ludwig-Maximilians-Universität, München. 111 pp.

NEWTON O. T. 1922. List of avian species identified from Aveline's Hole, Burrington. Proc. Univ. Bristol Spelaeol. Soc. **1** (3): 119-121.

OLSON S. L. 1985. The fossil record of birds. [In:] D.S.FARNER, J. R. KING, K.C.PARKES (Eds): Avian Biology, **8**: 79-238.

PICHON J. 1984. L'avifaune natoufienne du Levant, systématique, paléoécologie, palethnozoologie. Thèse de 3e cycle, Université Pierre et Marie Curie (Paris VI), **1-2**.

PICHON J. 1985.Etude préliminaire de l'avifaune de Hatoula. [In:] LECHEVALLIER M. & RONEN A. 1985. Le site natoufien-khiamien de Hatoula prŝs de Latroun, Israel. Cahiers du Centre de recherche francais de Jerusalem I : 99-101.

PIEHLER H-M. 1976. Knochenfunde von Wildvögeln aus archäologischen Grabungen in Mitteleuropa (Zeitraum: Neolithicum bis Mittelalter) Inaug.-Diss. ... der Ludwig-Maximilians-Universität, München, 179 p.

RASMUSSEN D.T., OLSON S.L., SIMONS E.L. 1986. Fossil birds from the Oligocene Jebel Qatrani Formation, Fayum Province, Egypt. Smiths. Contr. Paleobiol., **62**: 1-20.

STAHL U. 1989. Tierknochenfunde vom Hassek Hüyük (Südostanatolien). Inaug.-Diss. ... der Ludwig-Maximilians-Universität, München, 181p.

ŠŤASTNÝ K., RANDIK A., HUDEC K. 1987. Atlas hnízdního rozšíření ptáku v ČSSR 1973/77. Praha, 483 pp.

TCHERNOV E. 1962. Paleolithic avifauna in Palestine. Bull. Res. Counc. of Israel, **11**: 95-125.

TCHERNOV E. 1980. The Pleistocene birds of 'Ubeidiya, Jordan Valley. The Pleistocene of the Central Jordan Valley - the excavations at 'Ubeidiya, Jerusalem, 83 pp.

TOMIAŁOJĆ L. 1990. Ptaki Polski: rozmieszczenie i liczebność. PWN, 462 pp.

TUGARINOV A. Ya. 1937. Die Vögel der Krim aus der Zeit der Würmvereisung. INQUA Soviet Sec., **1**: 97-114. [In Russian, German summ.].

UERPMANN H-P. 1971. Die Tierknochenfunde aus der Talayot-Siedlung von S'Illot (San Lorenzo/Mallorca). Studien über frühe Tierknochenfunde von der Iberischen Halbinsel, München, **2**: 110 pp.

VADET A., VILETTE P. 1986. Les ossements animaux du Puits S. 14, à Douai. Mém. Soc. Acad. Boulonnais, **1** (3): 98-159.

VERESHCHAGIN N. K. 1953. Zakhoronienye ostatkov verkhnepleystotsenovykh zhivotnykh i rasteniy u seleniya Nizhne Karmalki na yuge Tatarskoy ASSR. Zool. zhurn., **32** (5): 999-1013.

VILETTE P. 1986. Les oiseaux sauvages. [In:] BLIECK G., VADET A. 1986. Vaisselle et nourriture au XVIème siècle à Lille (Nord). Revue archéol. de Picardie, **1986**: 148-150.

VOINSTVENSKIY M. A. 1967. Iskopaemaya ornitofauna Ukrainy. Prirodnaya obstanovka i fauny proshlogo, **3**: 3-76.

VOISIN C. 1991. The herons of Europe. T. & A. D. Poyser, London, 364 pp.

WINGE H. 1903. Om jordfundne Fugle fra Danmark. Vidensk. Medd. naturh. For. Köbenhavn, **1903**: 61-109 + 1 Tbl.

WOLTERS H. E. 1976. Die Vogelarten der Erde. Paul Parey, Hamburg u. Berlin. Lief. 2.

YEATMAN L.J. 1971. Histoire des oiseaux d'Europe. Bordas, 363 pp..

APPENDIX

Extant species of herons (in systematic order) represented by bone remains from excavations in the Western Palaearctic. In the case of data cited after synthetic papers (BOCHEŃSKI 1993b; BRODKORB 1963; BURCHAK-ABRAMOVICH 1962; HARRISON 1987; HERNANDEZ 1993; JÁNOSSY 1985; LAMBRECHT 1933; PIEHLER 1976; VOINSTVENSKIY 1967) no other references are given. Uncertain identifications (in the above-mentioned papers marked with "?" or "cf.") are marked with a question mark in brackets (?) placed before the age; asterisk after dating (*) indicates its correction acc. to TYRBERG (in litt.).

Country	Age	Locality	Reference
Botaurus stellaris (LINNAEUS, 1758)			
Sweden:	Holocene, Iron Age	Öland, Skedemosse	LEPIKSAAR (1967, 1977)
Great Britain:	Holocene * Holocene * Holocene * Holocene Holocene, Iron Age Pleistocene	Cambridgeshire Urwell Fens Reach Fens Glastonbury Meare Lake Aveline's Hole, Somerset	BRODKORB (1963) LAMBRECHT (1933) LAMBRECHT (1933) HARRISON (1980) HARRISON (1987) NEWTON (1922)
Danmark:	Holocene * Holocene? (uncertain) Holocene	Maglemose Bodals Mose Verup Mose	WINGE (1903) WINGE (1903) PIEHLER (1976)
Holland:	Holocene, Neolithic Holocene, Middle Ages	Vlaardingen Amsterdam	PIEHLER (1976) PIEHLER (1976)
France:	Pleistocene, Flageolet I	Dordogne	DELPECH (1983)
Germany:	Holocene, Meso-Neolithic Holocene, 2000-1800 BC Holocene, 11th-12th cc.	Rüde Heidmoor Neu-Niekör	PIEHLER (1976) PIEHLER (1976) PIEHLER (1976)
Poland:	Pleistocene/Holocene	Rocksh. above Niedostępna	BOCHEŃSKI (1993b)
Czech Rep.:	Holocene, 8th-9th cc.	Pohansko	PIEHLER (1976)
Portugal:	Holocene, 7000 BP	Cabeco da Amoreira	HERNANDEZ (1993)
Italy:	Pleistocene, Riss Pleistocene ~11000 BP *, Mesolithic Pleistocene Pleistocene Middle Pleistocene	Torre in Pietra Arene Candide Gr.d.Fossellone, Lazio Gr.d.Madonna, Calabria Loreto a Venosa	CASSOLI (1978) CASSOLI (1980) CASSOLI (1980) CASSOLI (1980) CASSOLI (1980)
Russia:	Pleistocene	Nizhnye Karmalki, Tatar AR	VERESHCHAGIN (1953)
The Ukraine:	Pleist./Early Holocene Pleist./Early Holocene	Middle Dniepr Lower Dniepr	VOINSTVENSKIY (1967) VOINSTVENSKIY (1967)
Azerbaidjan:	Pleistocene	Binagady	BURCHAK-ABRAMOVICH (1962)
Turkey (Anatolia):	Holocene	Demircihüyük	BOESSNECK & DRIESCH (1987)

Ixobrychus minutus (LINNAEUS, 1766)			
Germany:	Pleistocene, Eemian	Schönfeld	FISCHER (1991)
Hungary:	Holocene, Hallst./LaTene	Sopron-Krautacker	JÁNOSSY (1985)
Italy:	Pleistocene Pleistocene, Riss Pleistocene (unc.) Pleistocene	Buca del Bersagliere Torre in Pietra Arene Candide Torre Nave, Calabria	BRODKORB (1963) CASSOLI (1978) MORELLI (1891) BULGARELLI (1972)
The Ukraine:	Pleist./Early Holocene Pleist./Early Holocene	Middle Dniepr Lower Dniepr	VOINSTVENSKIY (1967) VOINSTVENSKIY (1967)
Azerbaidjan:	Pleistocene	Binagady	BURCHAK-ABRAMOVICH (1962)
Egypt:	Holocene, 5000 BC Holocene, Early Holocene	Merimda Fayum Elephantine	BOESSNECK (1986) BREWER (1989) KATZMANN (1990)
Nycticorax nycticorax (LINNAEUS, 1758)			
Great Britain:	Holocene, Roman Age	London	HARRISON (1980)
France:	(?)Pleistocene (Middle)	Lazaret	MOURER-CHAUVIRÉ (1975)
Hungary:	Holocene, 16th c.	Erd-Ofalu	JÁNOSSY (1985)
The Ukraine:	Pleist./Early Holocene	Middle Dniepr	VOINSTVENSKIY (1967)
Russia:	Pleist./Holocene	Alluvials of Don r.	VOINSTVENSKIY (1967)
Azerbaidjan:	Pleistocene	Binagady	BURCHAK-ABRAMOVICH (1962)
Egypt:	Pleistocene, 135000 BP Holocene, 5000 BC Holocene, (mummy) Holocene	Bir Tarfawi Merimda Tuna el-Gebel Elephantine	BOCHEŃSKI (1993a) BOESSNECK (1986) BOESSNECK (1986) KATZMANN (1990)
Ardeola ralloides (SCOPOLI, 1769)			
Italy:	Pleistocene	Buca del Bersagliere	BRODKORB (1963)
The Ukraine:	Pleist./Early Holocene	Middle Dniepr	VOINSTVENSKIY (1967)
Ardeola sp. (*ralloides* ?)			
Croatia:	Pleistocene, Würm	Vindija	MALEZ (1988)
Bubulcus ibis (LINNAEUS, 1758)			
Azerbaidjan:	Pleistocene	Binagady	BURCHAK-ABRAMOVICH (1962)
Egypt:	(?)Pleistocene, 135000 BP Holocene, 100BC-400AD Holocene, (mummy) Holocene	Bir Tarfawi Theby Tuna el-Gebel Elephantine	BOCHEŃSKI (1993a) BOESSNECK & DRIESCH (1989) BOESSNECK (1986) KATZMANN (1990)

Butorides aff. *striatus* (LINNAEUS, 1758)			
Israel:	Early Pleistocene 1-1.4 MA *	'Ubeidiya	TCHERNOV (1980)
Egretta garzetta (LINNAEUS, 1766)			
Czech Rep.:	(?)Middle Pleistocene	Přezletice	JÁNOSSY (1983)
Hungary:	Holocene: 11th-12th cc.	Opusztaszer,	JÁNOSSY (1985)
Italy:	Pleistocene	Buca del Bersagliere	BRODKORB(1963)
The Ukraine:	Pleist./Early Holocene	Lower Dniepr	VOINSTVENSKIY (1967)
Russia:	Pleist./Holocene	Alluvials of Don r.	VOINSTVENSKIY (1967)
Azerbaidjan:	Pleistocene	Binagady	BURCHAK-ABRAMOVICH (1962)
Israel:	Pleistocene, Late	Mallaha	PICHON (1984)
Syria:	Pleist./Early Holocene	Tell Mureybet	PICHON (1984)
Jordan:	Early Holocene	Beidha	JÁNOSSY (1994)
Egypt:	Holocene, 600BC-200AD Holocene, 1800-1500BC Holocene, 5000 BC Holocene	Tell Maskhuta Tell el-Dab'a Merimda Elephantine	BOESSNECK (1986) BOESSNECK (1986) BOESSNECK (1986) KATZMANN (1990)
Egretta alba (LINNAEUS, 1758)			
Holland:	??Holocene, Roman Age	Valkenburg	PIEHLER (1976)[1]
Hungary:	Holocene, Neolithic Holocene, Neolithic Holocene, Middle Ages	Maroslele-Pana Oszentivan Esztergom	JÁNOSSY (1985) JÁNOSSY (1985) JÁNOSSY (1985)
The Ukraine:	Pleist./Early Holocene Holocene, 400BC-600AD	Middle Dniepr Olbia	VOINSTVENSKIY (1967) VOINSTVENSKIY (1967)
Azerbaidjan:	Pleistocene	Binagady	BURCHAK-ABRAMOVICH (1962)
Israel:	Pleist./Early Holocene	Hatula	PICHON (1985)
Syria:	Pleist./Early Holocene	Tell Mureybet	PICHON (1984)
Egypt:	Holocene, 600BC-200AD	Tell Maskhuta	BOESSNECK (1986)
Ardea purpurea LINNAEUS, 1766			
Hungary:	Holocene, Neolithic Holocene, Neolithic Holocene, Neolithic	Erdröl Röszke-Ludvar Polgar-Csösz	JÁNOSSY (1985) JÁNOSSY (1985) JÁNOSSY (1985)

[1] PIEHLER (1976) listed this fragment after CLASON (1967), but commented that most probably it belonged to *Ardea cinerea*.

Spain:	(?)Pleistocene, Würm I	Gorhams Cave	HERNANDEZ (1993)
Italy:	Pleistocene	Grotta Romanelli	BRODKORB (1963)
	Pleistocene	Buca del Bersagliere	BRODKORB (1963)
	Pleistocene (Late)?	Cala Genovesi a Levanzo, Sicilia	CASSOLI,TAGLIACOZZI (1982)
	Middle Pleistocene	Vitinia, Lazio	CALOI et al. (1983)
The Ukraine:	Pleist./Early Holocene	Middle Dniepr	VOINSTVENSKIY (1967)
	Pleist./Early Holocene	Lower Dniepr	VOINSTVENSKIY (1967)
Azerbaidjan:	Pleistocene	Binagady	BURCHAK-ABRAMOVICH (1962)
Israel:	Early Pleistocene 1-1.4 MA *	'Ubeidiya	TCHERNOV (1980)
Egypt:	Holocene, 5000 BC	Merimda	BOESSNECK (1986)
	Holocene, Early Neolithic	Bir Kiseiba	GAUTIER (1984)
	Holocene, 1800-1500BC	Tell el-Dab'a	BOESSNECK (1986)
	Holocene	Elephantine	KATZMANN (1990)
Ardea cinerea LINNAEUS, 1758			
Sweden:	Holocene (Late)	Öland, Eketorp	BOESSNECK, DRIESCH (1979b)
	Holocene, Mesolithic	Skane, Segebro	LEPIKSAAR (1982)
	Holocene, Mesolithic	Skane, Ageröd V	LEPIKSAAR (1983)
	Holocene, Neolithic ?	Skane, Stora Herrestad	ISBERG (1950)
	Holocene, Neolithic	Götland, Dags mosse	DURING (1986)
	Holocene, 800-1100 AD	Skane, Löddeköpinge	TYRBERG (in litt.)
	Holocene, Late Iron Age	Skane, Västra Karaby	TYRBERG (in litt.)
Irland:	Pleist./Holocene *	Ballycotton	LAMBRECHT (1933)
	Pleist./Holocene *	Edenvale	LAMBRECHT (1933)
	Pleist./Holocene *	Newhall	LAMBRECHT (1933)
Great Britain:	Pleistocene	Clevedon	LAMBRECHT (1933)
	Holocene	Glastonbury	LAMBRECHT (1933)
	Holocene	Colchester	HARRISON (1980)
	Holocene, Iron Age	Meare Lake	HARRISON (1987)
	Pleistocene,	Ossiferous F.C8, Creswell	JENKINSON (1984)
	Pleistocene	Pin Hole Cave, Creswell	JENKINSON (1984)
Danmark:	Holocene *	Ertebölle	WINGE (1903)
	Holocene *	Maglemose	WINGE (1903)
	Holocene, Iron Age	Vejleby	WINGE (1903)
	Holocene *	Barsmark	WINGE (1903)
Germany:	Pleistocene	Hohlefels/Schelklingen	LAMBRECHT (1933)
	Holocene, Neolithic	Bregentwedt	PIEHLER (1976)
	Holocene, 2000-1800BC	Heidmoor	PIEHLER (1976)
	Holocene, Bronze Age	Buchau	PIEHLER (1976)
	Holocene	La Tène P., Manching	PIEHLER (1976)
	Holocene, Early Middle Ages	Haithabu	PIEHLER (1976)
	Holocene, 11th-12th cc.	Neu-Nieköhr	PIEHLER (1976)
	Holocene,11th-12th cc.	Hummerstried	PIEHLER (1976)
	Holocene, Neolithic	Wismar-Lattmoor	HEINRICH (1977)
	Holocene, Roman Age	Col. Ulpia Traiana	MÜLLER (1989)
	Holocene, Iron Age	Heuneburg	DRIESCH, BOESSNECK (1989)
	(?)Middle Pleistocene	Voigtstedt	JÁNOSSY (1965)

Poland:	Holocene, Neolithic	Ćmielów	BOCHEŃSKI (1993b)
	Holocene, Late Middle Ages	Poznań	BOCHEŃSKI (1993b)
	Holocene, Early Middle Ages	Gdańsk	BOCHEŃSKI (1993b)
	Holocene, Early Middle Ages	Szczecin	BOCHEŃSKI (1993b)
	Holocene, Early Middle Ages	Kałdus	BOCHEŃSKI (1993b)
	Holocene, Early Middle Ages	Wrocław	BOCHEŃSKI (1993b)
	Holocene, Early Middle Ages	Opole	BOCHEŃSKI (1993b)
	Holocene, Early Middle Ages	Santok	BOCHEŃSKI (1993b)
	Holocene, Early Middle Ages	Wolin	BOCHEŃSKI (1993b)
	Holocene, Early Middle Ages	Kołobrzeg	BOCHEŃSKI (1993b)
	Holocene, Early Middle Ages	Stare Drawsko	BOCHEŃSKI (1993b)
	Holocene, Early Middle Ages	Mała Nieszawka	BOCHEŃSKI (1993b)
	Holocene, Early Middle Ages	Koło	BOCHEŃSKI (1993b)
	(?)Holocene, Early Middle Ages	Kruszwica	BOCHEŃSKI (1993b)
	(?)Holocene, Early Middle Ages	Radacz	BOCHEŃSKI (1993b)
Czech Rep.:	Pleistocene	Čertova Dira	BRODKORB (1963)
	Holocene, 8th-9th cc.	Pohansko	PIEHLER (1976)
Slovakia:	Holocene, Bronze Age	Nitriansky Hrádok	PIEHLER (1976)
Switzerland:	Holocene, Neolithic	Moosseedorf	PIEHLER (1976)
	Holocene, Neolithic	Robenhausen	PIEHLER (1976)
	Holocene, Neolithic	Egolzwil 2	PIEHLER (1976)
	Holocene, Neolithic	Burgäschi	PIEHLER (1976)
	Holocene, Middle Ages	Wülfingen	PIEHLER (1976)
	Holocene, 12th-13th cc.	Burg Oberwangen	PIEHLER (1976)
	Holocene, 13th c.	Schwandiburg	PIEHLER (1976)
Lichtenstein:	Holocene, Middle Ages	Alt-Schnellenberg	MITTELHAMMER (1982)
Austria:	Pleistocene	Hundsheim	JÁNOSSY (1974)
Hungary:	Pleistocene	Puskaporos	BRODKORB (1963)
	Holocene, Neolithic	Erdröd	JÁNOSSY (1985)
	Holocene, Neolithic	Kötelek-Huszársarok	JÁNOSSY (1985)
	Holocene, Neolithic	Maroslele-Pana	JÁNOSSY (1985)
	Holocene, Neolithic	Röszke-Lúdvár	JÁNOSSY (1985)
France:	Holocene	Corbeil/Essonne	BRODKORB (1963)
	Pleistocene ?	Abri Dufaure	ALTUNA et al. (1991)
	(?)Pleistocene, Late Gl.	Fontarnaud	DELPECH (1983)
	Holocene	Puits S.14, Douai	VADET, VILETTE (1986)
	Holocene, 16th c.	Illot des Tanneurs	VILETTE (1986)
Spain:	Holocene, 2000-1000 BC	Redondo	DRIESCH (1972)
	Holocene, Iron Age	La Mota	HERNANDEZ (1993)
	Holocene, Neolithic	C.del Barranc Fondo	HERNANDEZ (1993)
	Holocene,1100-700 BC	S'Illot, Mallorka	UERPMANN (1971)
Italy:	Holocene	Castello nel Trentino	LAMBRECHT (1933)
	Pleistocene	Contrada Ianni	BONFIGLO et al. (1986)
Croatia:	Pleistocene, Würm	Vindija	MALEZ (1988)
	Holocene, 4500-2000 BP	Markova C. Hvar I.	MALEZ-BACIĆ (1980)

The Ukraine:	Early? Pleistocene ("homicen") Pleist./Early Holocene Pleist./Early Holocene Holocene, 11th-12th cc. Pleistocene, Late (?)	Arabka Middle Dniepr Lower Dniepr Voin Tsan-Koba, Krimea	VOINSTVENSKIY (1967) VOINSTVENSKIY (1967) VOINSTVENSKIY (1967) VOINSTVENSKIY (1967) TUGARINOV (1937)
Russia:	Pleistocene Pleist./Holocene Holocene, 9th-12th cc.	Lake Ladoga Aluvials of Don r. Popov on Don	LAMBRECHT (1933) VOINSTVENSKIY (1967) VOINSTVENSKIY (1967)
Azerbaidjan:	Pleistocene	Binagady	BURCHAK-ABRAMOVICH (1962)
Turkey (Anatolia):	Holocene, 5400-4200 BP Holocene, Neolithic	Hassek Fikirtepe	STAHL (1989) BOESSNECK, DRIESCH (1979a)
Syria:	Pleist./Early Holocene	Tell Mureybet	PICHON (1984)
Israel:	Pleistocene (Late) Pleistocene Late Pleist./Early Holocene	Kebara Mallaha Hatula	TCHERNOV (1962) PICHON (1984) PICHON (1985)
Iraq:	Holocene, 4000-3500 BP	Isin	BOESSNECK, KOKABI (1981)
Egypt:	Pleistocene, 135000 BP Pleistocene Holocene, 5000 BC Holocene, 1800-1500 BC Holocene, 2500 BP Holocene, 600BC-200 AD Holocene Holocene	Bir Tarfawi Kom Ombo Merimda Tell el-Dab'a Minshat Abu Omar Tell Maskhuta Karnak Nord Elephantine	BOCHEŃSKI (1993a) CHURCHER (1972) BOESSNECK (1986) BOESSNECK (1986) BOESSNECK (1988) BOESSNECK (1986) BOESSNECK (1986) KATZMANN (1990)
Ardea goliath CRETZSCHMAR, 1826			
Egypt:	Holocene, 600BC-200AD	Tell Maskhuta	BOESSNECK (1986)
Ardea sp.			
Italy:	Pleistocene (Late)	Cala della Calcina, Sardinia	MALATESTA, SURIANO (1970)
Croatia:	Pleistocene	Sandalja, Istria	MALEZ-BACIC (1979)