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# Postglacial fossil Great Auk and associated avian fauna from the Biscay Bay

## Fosil postglaciar de Alca Grande y avifauna asociada procedente del Golfo de Bizkaia

**KEY WORDS:** Sea birds, Great auk, Palaeobiogeography, Palaeoethnography, Holocene, Basque Country.

**PALABRAS CLAVE:** Aves marinas, Alca grande, Paleobiogeografía, Paleoetnografía, Holoceno, País Vasco.

Mikelo ELORZA \*  
Antonio SANCHEZ MARCO\*\*

### SUMMARY

Sea bird remains found in a new Atlantic stage settlement located in the Basque coast have yielded conclusive data concerning the human consumption on these birds, and the anthropic influence on their present geographical distribution.

### RESUMEN

Varios restos de aves marinas halladas en un nuevo yacimiento del Golfo de Bizkaia, situado en el estadio Atlántico, han proporcionado datos que ponen en evidencia el consumo humano de aves marinas y su influencia en su actual distribución geográfica.

### LABURPENA

Bizkaiko golkoko aztarnategi berri batean aurkitutako itsas-hegaztien aztarnak, Atlantiar garaian koka daitezkeenak, gizonaren elikadurarako erabiliak izan zirela ziurtatu dute, eta kontsumorako erabilpen honek, hegazti hauen gaurko zabalkunde geografikoan eduki duen eragina adierazi dute.

### INTRODUCTION

As a consequence of a rescue excavation undertaken in a layer —threatened with imminent destruction by building works— containing remains of human occupation, a relevant collection of bird fossil bones was exhumed. Radiometric analysis and lithic artifacts studies conclude that the settlement is to be attributable to the early Neolithic.

Special importance of this locality lies in the set of seabirds species present. Particularly remarkable is the occurrence of the great auk —*Pinguinus impennis*(L., 1758)—.

Together with the fossil remains, mammal ones as well as pollen, foraminifera and lithic tools have been found at Herriko Barra, which yield a comprehensive scene of the local environment conditions and the corresponding human behaviour.

### SITE DESCRIPTION AND STRATIGRAPHY

The site, known as Herriko Barra, is located on the Bay of Biscay, in the town of Zarautz, Basque Country coast (Fig. 1), lat. 43.17 N, long. 2.10 E. The local holocene sediments extend on an area of ca. 2 km<sup>2</sup> opened to the Cantabrian sea and fairly delimited by a series of three minor hills.

An unique fertile layer appears included in a stratigraphic profile where ALTUNA et alii (in press) distinguished six sedimentary beds (Fig. 2): from A, on the base, to F, on the top. Inquiries into the depositional processes of the sediments have revealed signs of two marine transgressions in under and overlaying beds A and E, which have been respectively identified with the transgressive episodes Flandrian and Dunkerian. The remains, the subject of this work, were exhumed from the stratum labeled C, which shows a regular thickness of ca. 40 cm. Sediments of this stratum show a blackish color owing to their richness of organic materials. Traces of edaphic processes can be also observed here (ALTUNA et alii, in press).

\* Dpto. de Arqueología Prehistórica. Sociedad de Ciencias Aranzadi. 20003 Donostia. Spain.

\*\* Museo Nacional de Ciencias Naturales. J. Gutiérrez Abascal, 2. 28006 Madrid. Spain.

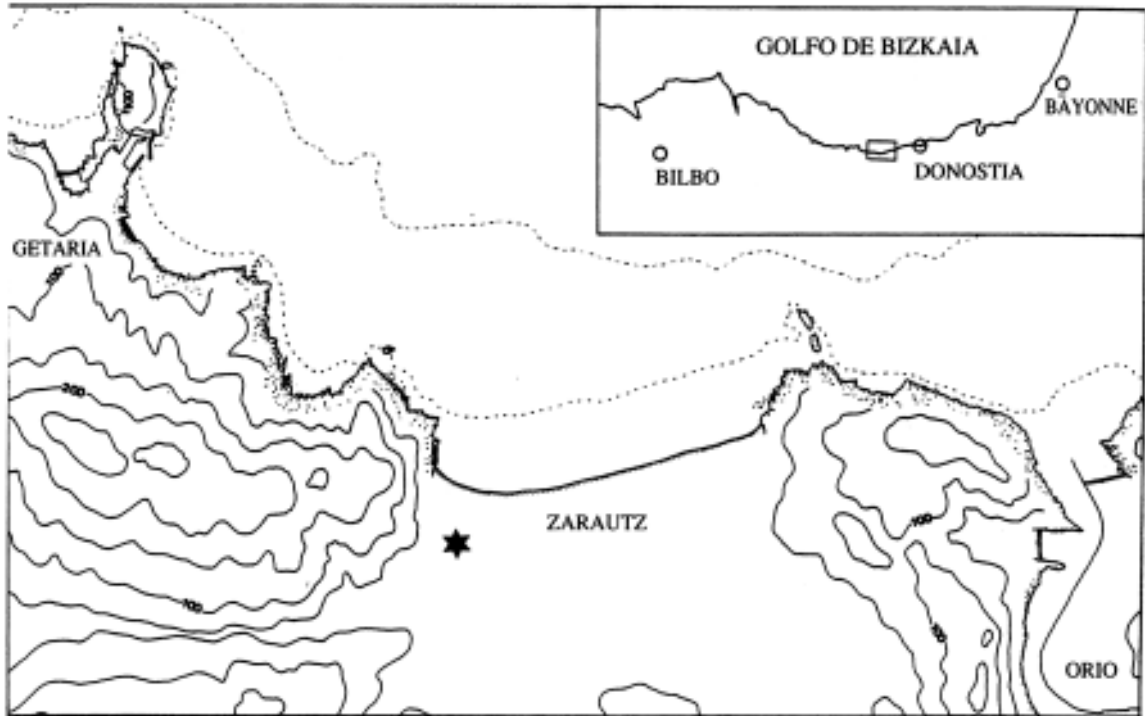


Figure 1. Geographical location of the deposit of Herriko Barra.

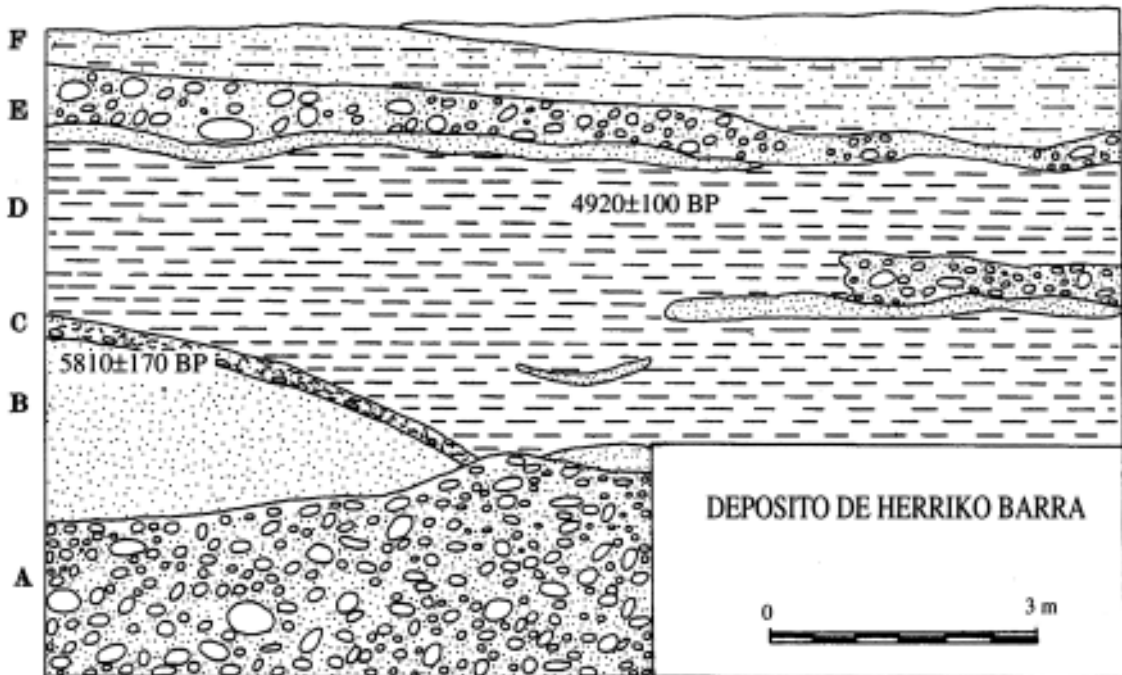


Figure 2. Section-diagram of the deposit of Herriko Barra showing the stratigraphic sequence analysed and the radiocarbon dating carried out.

Absolute datations have been calculated by the laboratory Teledyne Isotopes (New Jersey, USA) on the proportions of <sup>14</sup>C in vegetal material carried out from the underlying bed B, just from a point very close to the layer C. The results offer a chronology of 5.810 ± 170 BP.

Some characters of the unit C, e.g. the abundance of plant fragments as well as traces of bioturbation, might be interpreted as evidence of holocene pedogenetic processes. These sediments have revealed themselves as a very good conservative medium for grains of pollen. Among the trees, which always maintain a proportion of not less than 50% non-arborescent plants, the dominant species are *Alnus*, *Corylus*, *Pinus* and secondarily *Quercus*. Study of the pollen points to the Atlantic stage (ALTUNA et alii, in press).

The mammal fauna remains consist predominantly of *Cervus elaphus*, with occurrence of other ungulates as the roe deer, wild boar and aurochs as well as carnivores and insectivores: bear, wolf, badger and hedgehog. The occurrence of a fawn aged one month should indicate that the site was occupied at least at the end of the spring and the beginning of the summer (ALTUNA et alii, in press).

**AVIAN SURVEY**

The layer C of Herriko Barra has recorded a taxonomically and biotypically homogeneous portion of the contemporaneous ornithofauna. The fossil material is displayed in table 1, where following abbreviations are used:

- |                       |                 |
|-----------------------|-----------------|
| hum - humerus         | sin -left       |
| uln -ulna             | dex - right     |
| rad -radius           | dia - diaphysis |
| cmc - carpometacarpus | pro - proximal  |
| cor - coracoid        | dis - distal    |
| str -sternum          | cra -cranial    |
| fur -furcula          | cau -caudal     |
| tbt - tibiotarsus     | juv -juvenile   |
| pha -phalange         |                 |

A complete carpometacarpus of *Fulmarus glacialis* has been recorded (measurements in Table 2), which shows a distinctive feature respecting *Puffinus*, *Pterodroma* and *Laridae*, having the facets for digits II and III at the same level. Likewise, the inner edge of the carpal trochlea has a peculiar sinuosity.

Table 1. List of species and remains found at Herriko Barra

<i>Fulmarus glacialis:</i>	cmc dex (burnt?)
<i>Puffinus puffinus:</i>	cmc sin dis
<i>Grus grus:</i>	tbt sin dis juv
<i>Rissa tridactyla:</i>	cor sin
<i>Pinguinus impennis:</i>	hum sin pro hum sin dis hum dex juv uln dex dis cmc sin
<i>Alca torda:</i>	hum sin dis uln sin pro cor sin cau cor dex cau (burnt) 3 str cra
<i>Uria aalge:</i>	4 hum dex pro 3 hum dex dia hum sin pro 5 hum dex dis 3 hum sin dis 5 hum sin dia 2 hum sin pro 2 uln dex pro uln sin pro uln dex dis fur cor sin cra 3 cor dex cra (2 burnt) 2 cor dex cau cor sin cau tbt sin pro tbt sin dis tbt dex dis pha 1 (a) digit major dex
<i>Fratercula arctica:</i>	2 hum dex pro hum dex dia (burnt) uln sin pro rad sin pro cmc dex pro cor sin

Table 2. Measurements of *F. glacialis* (taken after MOURER-CHAUVIRÉ, 1975).

1	3	4	5	6
60.0	4.3	7.2	4.6	3.6

The bones of *F. glacialis* and *Rissa tridactyla* (measurements in Table 3) from Herriko Barra constitute the earlier finds of these species from the Iberian Peninsula.

Table 3. Measurements of *R. tridactyla* (taken after MOURER-CHAUVIRÉ, 1975).

	1	3	6
	33.4	8.3	4.4

The occurrence of the extinct great auk (*Pinguinus impennis* (L., 1758)) in any outcrop is of major importance. Five fragments of fossilized bones have been recovered from the settlement of Herriko Barra (Tabs. 1, 4 and Fig.3).

Table 4. Measurement in mm of *P. impennis* (taken after MOURER-CHAUVIRÉ, 1975). excepting 2b: from the ventral tubercle to the pectoralis impression, and 6b: depth (orthogonal to 6). BMNH are specimens of the British Museum (Nat. Hist.), D.T. corresponds to the Devil's Tower's specimen.

	1	2	3	4	5	6	6a	6b
*hum*		2a	2b					
HB(juv)	102.4	23.0	20.7	9.3	14.4	10.3	10.9	4.8
HB	—	26.5	23.2	11.2	13.3	—	10.5	5.0
BMNH(1)	161.3	25.4	—	—	11.3	11.0	12.1	—
BMNH(2)	167.8	26.2	—	11.7	10.7	—	12.8	—
D.T.	—	—	—	—	16.0	—	—	—
*uln*								
HB	—	—	—	—	9.9	6.4	—	—
BMNH(1)	—	—	—	—	9.7	—	—	—
BMNH(2)	—	—	—	—	10.1	6.3	—	—
*cmc*								
HB	42.4	12.5	—	4.9	8.3	4.7	4.2	—
BMNH(1)	41.5	—	—	4.7	8.6	4.9	3.8	—
BMNH(2)	43.7	12.7	—	6.2	9.0	4.8	4.0	—

### PALAEOETHNOGRAPHIC INTEREST

Varios facts support the thesis that birds were incorporated into the diet of the human group that frequented the Herriko Barra site: (1) It is difficult to explain the observed avian taphocaenoses in an open air settlement otherwise than by accepting human interference. (2) The major representation of skeletal elements lies on those limb bones bearing the most voluminous muscles, with the highest nu-

tritional value. This kind of representation characterizes the remains of animals used as food in human settlements (cf. MOURER-CHAUVIRÉ, 1983). (3) Two cut-marks can be observed on the humerus of the juvenile great auk, (Fig.4) situated between the foramen nutritium and the inner crest, probably made with a sharpened tool in flint. (4) It is also to be noticed the existence of evidence of burning on four bones, maybe on five (see Tab. 1).

It is historically and archaeologically well documented that until modern times seabirds—including the great auk until its definitive extinction— have been used as food (e.g. GREENWAY, 1967 and SERJEANTSON, 1988). At the mesolithic site of Tévéc (PÉQUART et alii, 1937), among the kitchen scraps—molluscs and crustaceans mostly— abandoned there, a noteworthy number correspond to seabirds, which seem to have been exploited as food resources. The capture of great auks is likewise the interpretation suggested in the study of Figueira Brava (cf. MOURER-CHAUVIRÉ & ANTUNES, 1991).

The inhabitants of Herriko Barra consumed these birds as a complement of mammals. There is no evidence that man's avian preys included other than seabirds, indubitably present in the surroundings. This offers an interesting specialization in this area of South Europe.

### PALAEOBIOGEOGRAPHY

The seabirds found in Herriko Barra are current wintering and birds of passage in the Cantabric coast. Solely *Rissa tridactyla* breeds, *Uria aalge* persevere in a recessive breeding, and breeding of *Fulmarus glacialis* has still to be confirmed (BARCENA, TEIXEIRA & BERMEJO, 1984). In the Bay of Biscay some of them (RIOFRIO, 1988) can be observed during migration and western storms, but they do not breed in the Basque Country.

The settlement was frequented at least at the end of spring and the beginning of summer (ALTUNA et alii, in press). Some of these species, concretely *Fulmarus glacialis*, *Uria aalge*; *Alca torda* and *Rissa tridactyla*, often breed jointly (Voous, 1960). This fact opens the possibility that these species held breeding status at the time of human's settlement.

As said, absolute datations and palinological evidences (ALTUNA et alii, in press) place the settlement in the Atlantic stage, so we can reject the possibility of a colder climatic situation that pushed these birds to breed more southerly than their current breeding places in Europe, which are north to 45° N. The explanation of their presence in Herriko Barra is given by the literature generated by *Pinguinus impennis*'s findings.

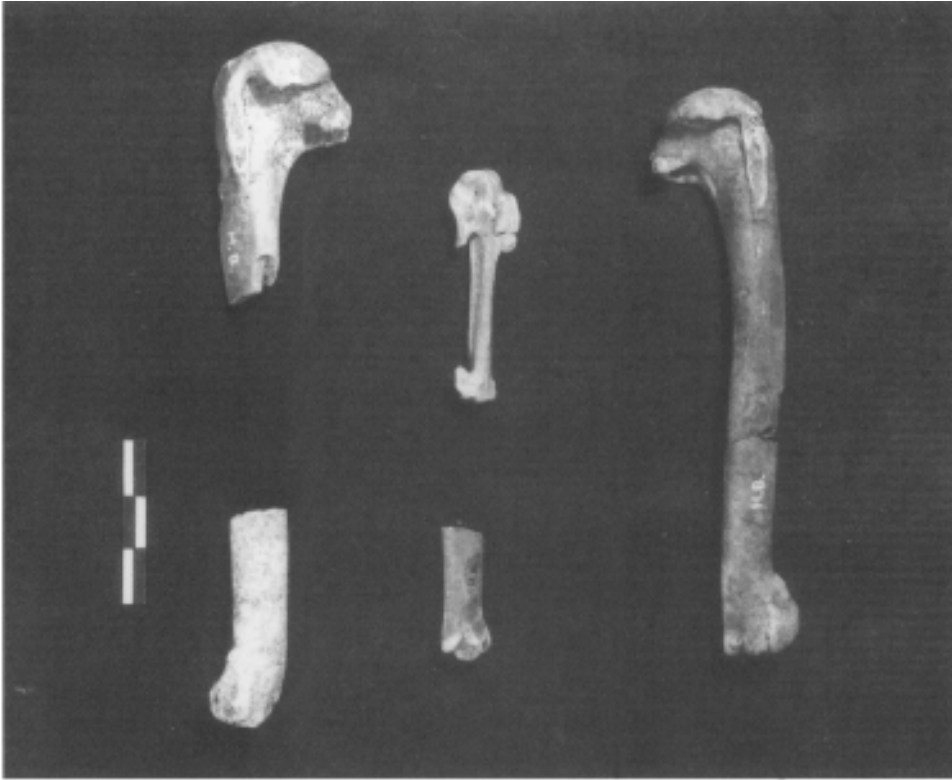


Figure 3. Remains of *Pinguinus impennis* from Herriko Barra.

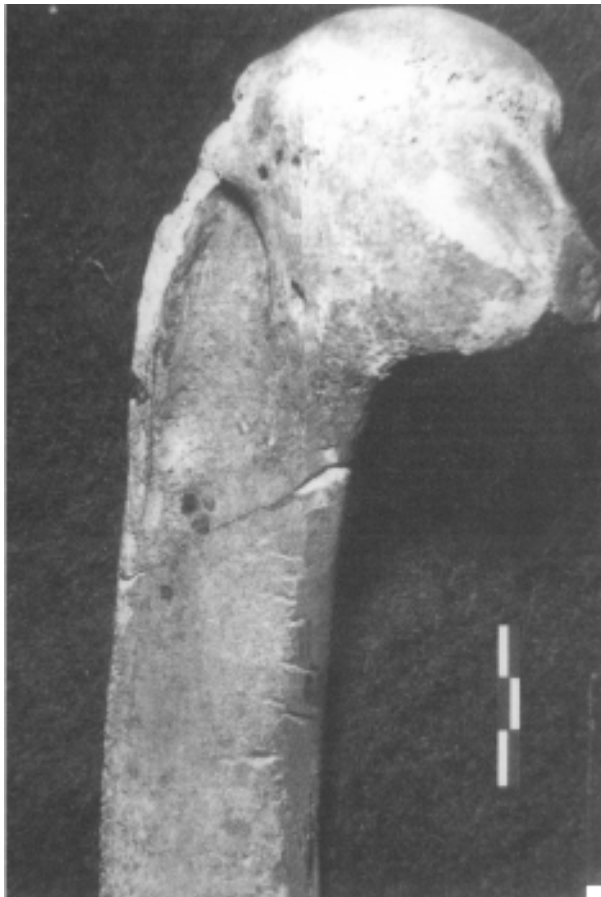


Figure 4. Cut-marks on the humerus of a juvenile *Pinguinus impennis* from Herriko Barra.

Direct vestiges of these extinct bird have been located at some sites of the southern part of the Iberian Peninsula. Thus, mousterian sediments of Devil's Tower yielded two fragments of humeri (BATE, 1928). Likewise, very close to this site, two specimens belonging to the great auk were recovered from a mousterian layer at Gorham's Cave (EASTHAM, 1968), as well as five fossil bones from the Epipaleolithic of Cueva de Nerja (BOESSNECK & DRIESCH, 1980) and one sternum from a magdalenian bed of this same local stratigraphy (EASTHAM, 1986). Iterative attention has been given to a drawing in the cave of El Pendo, province of Santander, considered as an earlier representation of the great auk (BREUIL, ALCALDE DEL RIO and SIERRA, 1912, GONZALEZ MORALES, 1980). Most recently, MOURER-CHAUVIRÉ and ANTUNES (1991) have published the finding of new remains—two fragments of two humeri—at Gruta da Figueira Brava (Serra da Arrábida, Portugal), in a sandy bed dated by  $^{14}\text{C}$  to  $30,930 \pm 700$  BP (ICEN-387) (fide ANTUNES et alii, 1989), which overlies marine layers ascribed to the Thyrrenian III.

At the time when the sediments of Devil's Tower were depositing, the great auk enlarged its geographical distribution eastwards and reached the region of Calabria (Southern Italy): a fragment of tibiotarsus was recorded at Archi (ASCENZI & SEGRE, 1971). Not far from there, in Grotta Romanelli (region of Puglia), BLANC (1927) reports this species—one humerus and one femur (LACORTE, 1990)—in levels da-

ted by  $^{14}\text{C}$  between 11,600 and 9,800 BP (fide CASSOLI, SEGRE & SEGRE, 1977). More recent—from a mesolithic, or possibly paleolithic, layer—is the radius identified at Arene Candide (region of Liguria) (CASSOLI, 1980). The most southerly point in the Palaearctic region is given by the occurrence of an sternum in Porto Santo (archipelago of Madeira) (PIEPER, 1985).

*Pinguinus impennis* has been considered an inhabitant of Holarctic northern seas. That is certain for the last centuries of its existence, but Figure 5 shows that this bird had a much more moderate climatic distribution. There are findings from the Holocene in Herriko Barra, Arene Candide and Nerja, places where a bird considered strictly arctic would not easily live. This thesis about great auk's southerly distribution was proposed by D.M.A. BATE (1928) in her comments on the Devil's Tower avifauna.

Human predation on this flightless species probably caused its recession during the Holocene, until its extinction in Iceland. The influence of man upon seabirds and their eggs has caused throughout history a severe reduction of many bird populations: If we applied this fact, the avifauna found at Herriko Barra could therefore be considered as an indicator of a biogeographic past disturbed by human action.

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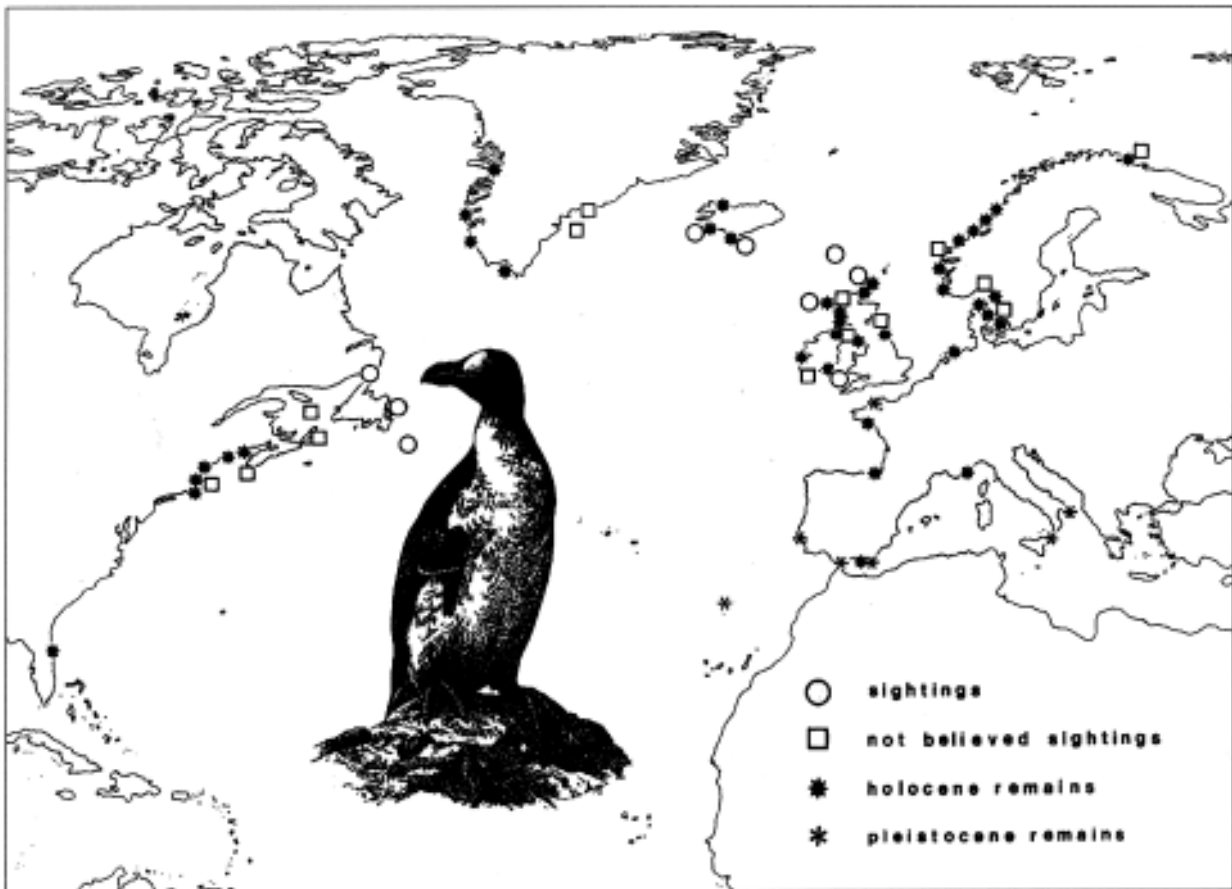


Figure 5. Sightings and remains of *Pinguinus impennis*. (See bibliography).

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