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First palearctic fossil record of *Polysticta stelleri* (Pallas) 1769

Primer registro fósil de Polysticta stelleri (Pallas) 1769 en el Paleártico

KEY WORDS: Fossil record, *Polysticta stelleri*, late glacial, Palaeartic, Bay of Biscay.
PALABRAS CLAVE: Registro fósil, *Polysticta stelleri*, tardiglacial, Paleártico, Golfo de Vizcaya.

Mikelo ELORZA*

ABSTRACT

A fossil record of Steller's Eider (*Polysticta stelleri*) from a late glacial settlement of the Biscay Bay is reported. A first approach about the climatic and paleoethnographic signification of the remains, as well as the bird fauna of Santa Catalina is given.

RESUMEN

Se da cuenta del hallazgo de Eider de Steller *Polysticta stelleri* en el tardiglacial del Golfo de Bizkaia. Se ofrece una primera aproximación al significado climático y paleoetnográfico de los restos, así como de las aves de Santa Catalina.

LABURPENA

Bizkaiko golkoko glaziare berantiarrean Eider de Steller-ek egindako aurkikuntzaren berri ematen da. Lan honetan, hasierako hurbilpen bat eskaintzen da hondakinen eta Santa Katalinako hegaztien esanahi klimatiko eta paleoetnografikora.

Evaluated as a globally threatened bird with the category Least Concern (BirdLife International, 2000; 2004), *Polysticta stelleri* shows a declining worldwide population estimated at 220.000 birds. *P. stelleri* is an arctic diving duck that lives in near-shore marine swallow waters, protected bays or lagoons, as well as along low-lying rocky coasts. In summer, the breeding grounds are located on moss-lichen tundra, as far as 90 km inland and close to fresh water areas including deltas, rivers, streams, ponds and bogs (CRAMP AND SIMMONS, 1977; del HOYO *et al.*, 1992).

Three breeding populations of *P. stelleri* are recognized, two in arctic Siberia from the Yamal Peninsula to the Kolyma Lowland and a small one

in Alaska (Fig.1). The Kathanga River is postulated to be the dividing line of the Russian population (KERTELL, 1991). The western stock winters with stable-increasing numbers in Barents and Baltic Seas. To the east of the Kathanga Gulf, the majority of the population, in apparent decline, moves to its wintering quarters in northern Pacific, where it reaches in decreasing numbers the Commander and Kurile Islands (PIHL, 1999). The Alaskan population, in regression (USFWS, 2002), winters within the Aleutian Islands and western Alaska.

The site of Santa Catalina, located at Lekeitio (43,35° N; 2,48° W) (Fig.1), is a small cave on a coastal cliff, 30 m above current sea level. The

* MIKELO ELORZA. Departamento de Arqueología Prehistórica, Sociedad de Ciencias Aranzadi. Alto de Zorroaga. 20014 Donostia.
 E-mail: concholis@yahoo.com arkeozoologia2@aranzadi-zientziak.org



Fig.1. Distribution of breeding and wintering areas of *Polysticta stelleri*. North Pole Lambert Azimuthal Projection.

excavations, done during 1982-2000, were directed by E. BERGANZA and exposed three late glacial occupations assigned to the Azilian, Late Magdalenian and Upper Magdalenian cultural phases (BERGANZA & RUIZ IDARRAGA, 2002). The lithic and bone artifacts, portable art and faunal assemblages of the deposit are now under study. Radiocarbon ^{14}C dating shows a cave occupation extent between 9.100 and 12.400 years BP (BERGANZA, pers. com., 2004). The bird fauna is well diversified with more than 2100 bones attributed to 70 species.

Among the anatid material, 11 bones showed morphological characters which fit those of an eider while other characters seem more close to pochards and other seaducks (LIVEZEY, 1986; LIVEZEY, 1995; WOOLFENDEN, 1961). The skeletal morphology of *Polysticta* is characteristic, due to the high autapomorphy of the genus (LIVEZEY, 1995). However, without available recent osteological material, the bones were set apart. A clear adscription to *Polysticta stelleri* was done at the bird collections of the Laboratorio de Arqueozoología, Universidad Autónoma de Madrid and finally all material was confirmed with the collections of the Bird Group, Natural History Museum at Tring. The biometry is given in Table 1 and the material comprises: 2 incomplete furcula, 3 complete coracoids, 3 craneal scapulae, 1 distal humerus and 2 complete femora.

In the fossil record *Polysticta stelleri* had never been cited in the Palaeartic (TYRBERG, 1998; 2004). There is a subfossil mention of a *Clangula hyemalis* / *Polysticta stelleri* in Sweden (LILJEGREN, 1977). Subfossil material of *P. stelleri* is cited in St. Lawrence Island and Cape Prince of Wales at the Bering Strait, and Kodiak and Little Kiska in the Aleutians Islands (BRODKORB, 1964). The fossil record from Fossil Lake, Oregon (SHUFELDT, 1913) was incorrect as stated by H. HOWARD (1946; BRODKORB, 1964). According to these data, the presence of *Polysticta stelleri* in the late glacial settlement of Santa Catalina, Bay of Biscay, would be the first fossil record of the species.

The presence of *Polysticta stelleri* in the Bay of Biscay, points out to colder conditions during the late glacial than today's. We can not refuse its presence as a breeder, although it is more likely that the rocky coast of Santa Catalina constituted a wintering ground for the species. Currently, the worldwide wintering areas of *P. stelleri* are not far from the maximum sea ice extent, and their open sea surface temperature are about $5\text{ }^{\circ}\text{C}$, against a $12\text{ }^{\circ}\text{C}$ mean (January to March) in the Bay of Biscay.

One third of the bird taxa of Santa Catalina are Anseriformes. They include a swan, geese, a shelduck, tufted ducks, pochards and sea ducks (Table 2). The presence of *P. stelleri* and the colder climatic conditions previously mentioned,

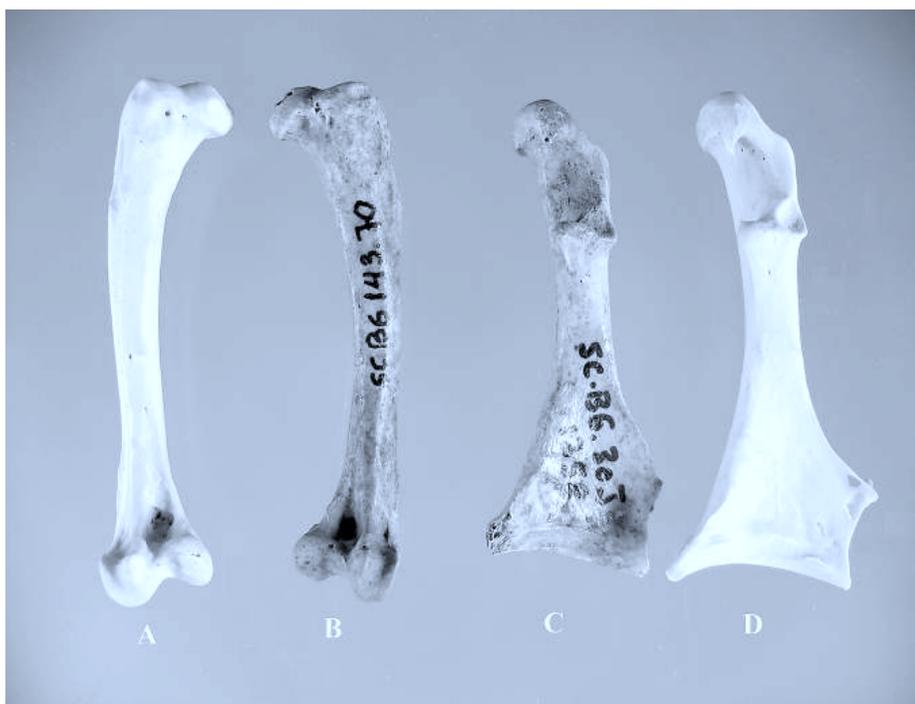


Fig. 2. *Polysticta stelleri*. Santa Catalina: femur (B) and coracoid (C). B.2237 University of Bergen, Museum of Zoology: femur (A) and coracoid (D).

		Range	Mean	SD	%CV
Cor-GL	N=2	44.52 - 44.86	44.69	0.24	0.13
Cor-Lm	N=3	38.29 - 41.17	39.99	1.51	5.68
Cor-Hw	N=3	6.40 - 6.76	6.62	0.19	0.56
Cor-Sw	N=3	4.43 - 4.80	4.56	0.21	0.95
Sca-Dic	N=2	10.14 - 10.78	10.46	0.45	1.96
Hum-Bd	N=1	- >11.58	-	-	-
Fem-GL	N=2	43.04 - 45.70	44.37	1.88	7.97
Fem-Lm	N=2	41.23 - 44.06	42.65	2.00	9.39
Fem-Bp	N=2	8.72 - 10.75	9.74	1.44	21.17
Fem-Dp	N=1	- 7.14	-	-	-
Fem-Bd	N=2	7.84 - 9.60	8.72	1.24	17.76
Fem-Dd	N=1	- 8.11	-	-	-
Fem-SC	N=2	3.65 - 3.88	3.77	0.16	0.70

Table 1. Measurements in mm of *Polysticta stelleri* from Santa Catalina. Measurements follow von DEN DRIESCH, (1976) and FITZGERALD (1991).

<i>Cygnus cygnus</i>	<i>Anas crecca</i>	<i>Aythya fuligula</i>	<i>Melanitta nigra</i>
Anser anser	Anas platyrhynchos	<i>Somateria mollissima</i>	Melanitta fusca
Branta leucopsis	<i>Anas querquedula</i>	<i>Somateria spectabilis</i>	<i>Bucephala clangula</i>
Tadorna sp.	Anas clypeata	Polysticta stelleri	Mergus serrator
<i>Anas acuta</i>	<i>Aythya ferina</i>	Clangula hyemalis	

Table 2. Anseriformes of Santa Catalina. Taxa with burned or butchering marks in bold

are congruent with the association of species given in Table 2. At present, most of these waterfowl species are winter visitors in the Iberian Peninsula (DE JUANA, 1998). *A. platyrhynchos* and *A. ferina* are resident, *A. querquedula* is a passage bird, while *C. cygnus* and *S. spectabilis* are winter rarities. The southernmost accidental record of *P. stelleri* in the western palearctic is a male seen in France in 1855 (CRAMP & SIMMONS, 1977)

Nearly one third of the bird species of Santa Catalina provides evidence of regular bird exploitation by the occupants of the cave, given the burned bones and butchering marks found on them. That is the case of *Polysticta stelleri*, of which two bones show cutmarks made by stone tools. A complete coracoid shows in ventral shaft 3 longitudinal cutmarks and a distal humerus shows 4 cutmarks on both laterals of the shaft anterior surface at right angles to the axis of the bone. At present, hunting is not considered a primary threat for the decline of Steller's Eider (PIHL, 1999, USFWS, 2000) and factors like lead poisoning or increased predation during breeding are being considered. Nonetheless, the reasons of decline are not well known, since *P. stelleri* spend the majority of its annual cycle on the sea and little is known about its biology at that time.

In addition to the mentioned sea ducks, the seabird list of Santa Catalina includes a diver, a grebe, shearwaters, gannet, cormorants, charadriids, scolopacids, a tern, gulls and alcids. Many

of these species go to land out of breeding season only in case of strong storms. If we assume that part of them were not breeders, the human groups of Santa Catalina had the technology to hunt them on the sea or did they just gathered dead birds on the seashore?

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