

spotted eggs. On July 30th, however, Davies and I took a nest on a big jheel containing three fresh eggs of a dullish yellow-green, faintly but distinctly stippled and speckled with dull light brown. Only two of the eggs were thus marked, the other being practically normal. I am curious to know whether any one else has come across eggs of this genus marked in any way. The eggs of this bird frequently perish from lying so much in water, in spite of the great gloss, which one would think would protect them.

ARDEA CINEREA. Common Heron.

*Hind.* [*Lucknow*]: Chanak.

On July 17th, in a perfect deluge of rain, I got two nests containing 4 (set) and 2 (fresh) eggs respectively. The nests were in a high pipal-tree, and beside them a pair of the Large White Egrets (*A. alba*) had a nest; but, owing to the rain, we could not get the men to climb the slippery branch on which it was placed.

NETTAPUS COROMANDELIANUS. Cotton-Teal.

*Hind.* [*Lucknow*]: Ghirria.

On July 30th Davies and I found a nest containing four broken and two whole fresh eggs. The two birds kept flying to and fro, uttering their cry of "Fix bayonets!" and it was by the female going to look at her treasures that I found them. The nest was a collection of bents and grass at the bottom of a great hole in a pipal-tree, just a little deeper than my arm could reach, and about 15 feet from the ground.

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XXVIII.—*On some Remains of Birds from the Lake-dwellings of Glastonbury, Somersetshire.* By C. W. ANDREWS, B.Sc., F.Z.S.

IN 1892 Mr. Arthur Bulleid of Glastonbury discovered in the neighbourhood of that town the remains of an ancient lake-village, at that time only recognizable as a series of nearly obliterated mounds marking the sites of the houses.

This discovery was of the greatest interest to archæologists, and, thanks to the energetic action of Mr. Bulleid and others, extensive excavations have been carried out, resulting in the discovery of the remains of sixty or seventy dwellings, and of many utensils and ornaments of various kinds, as well as of bones of man and of numerous wild and domestic mammals and birds.

The various remains thus unearthed have been described in several journals\*; and it is generally agreed that the village in question was a Celtic settlement dating from shortly before the Roman occupation.

A considerable number of the remains of mammals and birds have already been determined by Prof. Boyd Dawkins, F.R.S. Omitting the domestic forms, his list includes the following:—

MAMMALS.	BIRDS.
<i>Felis catus ferus.</i>	Crane.
<i>Lutra vulgaris.</i>	Swan.
<i>Canis lupus.</i>	Heron.
<i>Sus scrofa ferus.</i>	Diver.
<i>Castor fiber.</i>	Mallard.
<i>Cervus elaphus.</i>	Grebe.
— <i>capreolus.</i>	
<i>Arvicola amphibius.</i>	

Some time ago I received from Mr. Bulleid for determination a quantity of bird-remains and a few mammal-bones which enable me to add several species to this list. One of the birds, *Pelecanus crispus*, is specially interesting because at the present day it does not occur in North-western Europe †.

\* See paper by Arthur Bulleid in Proceedings of the Somersetshire Archæological and Natural History Society, 1894, also an abstract of an address delivered by Prof. Boyd Dawkins at the Nottingham meeting of the British Association, 1893, printed in 'Natural Science,' vol. iii. (1893), p. 344. These and several other papers dealing with the subject have been reprinted in a pamphlet issued by the Glastonbury Antiquarian Society (published by Barnicott & Pearce, Taunton, 1896).

† [According to Mr. A. C. Chapman, the Pelican is still to be found wild in West Jutland. See Ibis, 1894, p. 348.—EDD.]

The present paper deals especially with the bird-remains, but a list of the mammals will be given at the end.

PELECANUS CRISPUS Bruch.

The first account of the occurrence of the remains of a Pelican in England was given by Prof. A. Milne-Edwards in a paper published in 1867\*. In this he described in detail a left humerus preserved in the Woodwardian Museum, Cambridge, to which his attention had been drawn by Prof. Alfred Newton (P. Z. S. 1868, p. 2). He further pointed out that the bone belonged to a young bird, which probably had been bred in the Fens and was not a mere accidental visitor.

In 1871 a second specimen, curiously enough also a left humerus, from Feltwell Fen, Norfolk, was presented to the University Museum of Zoology by Mr. J. H. Gurney; this was described by Prof. Newton (P. Z. S. 1871, p. 702), who, on account of its large size, came to the conclusion that it belonged to the Crested Pelican (*P. crispus*), and not to the Common Pelican (*P. onocrotalus*).

Recently Mr. Sydney F. Harmer has described † some wing-bones from Burnt Fen, Littleport, near Ely, which seem to belong without doubt to *P. crispus*, and, as the author remarks, these together with the previously recorded specimens go far to prove that the Pelican was really a native of the Fen Country.

In the present collection Pelican bones are numerous, and portions of the skeletons of at least five individuals, but probably many more, occur. Many of the bones are greatly broken and the ends much abraded, and in several instances they must have belonged to young birds. This latter circumstance appears to indicate that these birds bred in the neighbourhood, and that they were probably used for food by the inhabitants of the village.

In determining the species to which these remains belong

\* Ann. Sci. Nat. (Zoologie), ser. v. vol. viii. (1867), p. 285.

† Trans. Norfolk & Norwich Naturalists' Society, vol. vi. (1898), p. 363; reprinted in Geol. Mag. dec. 4, vol. v. p. 417 (1893).

it will be necessary to compare them with *Pelecanus onocrotalus* and *P. crispus* only. The latter of these is the larger, and in the skeletons I have examined the bones of the wing are longer in proportion to those of the leg than in *P. onocrotalus*, in which the tibia and metatarsus are in some cases as long as those of *P. crispus*, while the wing-bones and femora are considerably shorter; even the tibia and metatarsus, however, can be distinguished, those of *P. onocrotalus* being somewhat the more slender.

Among the specimens are a left humerus and left ulna, quite unbroken, and a right metacarpus wanting only a portion of the third metacarpal. These bones agree very closely with those of *P. crispus*, as is shown in the following table:—

	Glastonbury specimens.	<i>P. crispus</i> .	<i>P. onocrotalus</i> .
	mm.	mm.	mm.
Length of humerus . . . .	363	363	304
Width of distal end of humerus . . . .	52	53	47
Length of ulna . . . . .	410	413	350
Length of metacarpus ..	176	178	145

Several specimens of the coracoid are preserved, and of these two specimens belonging to fully adult birds are smaller than the coracoids of *P. crispus* that I have measured, and are of about the same size as those of *P. onocrotalus*; they may, however, have belonged to a female of the former species. The other specimens, which are clearly immature, are slightly smaller than those of *P. crispus*.

	Glastonbury specimens.	<i>P. onocrotalus</i> .	<i>P. crispus</i> .
	mm.	mm.	mm.
Length of coracoid	120	122	131
from inner inferior	122		
angle to top of acro-	127		
coracoid . . . . .	128		

In the dimensions of the bones of the hind limb the Glastonbury birds show a considerable range of variation, even allowing for differences of age; for instance, one metatarsus measures 12.5 cm. in length, while another, apparently fully adult, is only 10.9 cm. long; this latter may have

belonged to a hen-bird. As already mentioned, the tibia and metatarsus of *P. onocrotalus* are almost of the same length as those of *P. crispus*, and in fact, in the two skeletons from which the measurements of the wing-bones given above are taken, the metatarsus of *P. onocrotalus* is actually the longer. At the same time, both it and the tibia are easily distinguishable, both from those of *P. crispus* and of the Glastonbury Pelicans, by their more slender build.

The lengths of the metatarsi in millimetres are given below :—

Glastonbury specimens (9).	<i>P. crispus.</i>	<i>P. onocrotalus.</i>
mm.	mm.	mm.
110		
122		
124		
124	126	128
124		
125		
125		
126		
127		

It will therefore be seen that so far as length is concerned there is no reason for regarding the fossil metatarsi as other than those of *P. crispus*, which they closely resemble in all respects.

Most of the tibiæ are those of young birds, but one adult specimen agrees very closely with a tibia of *P. crispus* with which it was compared, and in both bones the extensor bridge was incompletely ossified; in another, rather smaller specimen from Glastonbury the bridge is complete.

	Glastonbury bird.	<i>P. crispus.</i>	<i>P. onocrotalus.</i>
	mm.	mm.	mm.
Length, exclusive of } cnemial crest .. }	186	187	183

The femur of *P. crispus*, like the wing-bones, is both longer and stouter than that of *P. onocrotalus*. Most of the fossil specimens are intermediate in size between the two, but nearer to *P. crispus*. One imperfect specimen seems to have been fully as large as the femur of *P. crispus*.

Length of femora :—

Glastonbury specimens.	<i>P. crispus.</i>	<i>P. onocrotalus.</i>
mm.	mm.	mm.
130	137	116
125		

Of the skull the only remains are the occipital regions of two specimens. Comparison of these with the skulls of the recent forms shows that in the greater degree of development of the supra-foraminal ridge, and of the mammillary processes, they approach most nearly to that of *P. crispus*. It must, however, be remarked that, in the absence of a considerable series of skulls of the different species, it is difficult to determine what may be mere individual variations and what specific differences.

In one of the specimens the cerebellar prominence is more marked than in *P. crispus*, approximately to that seen in *P. onocrotalus*.

The only other portions of the skeleton preserved are a few cervical vertebræ, more or less imperfect, and some pieces of the sternum.

From these facts there can be no doubt that *P. crispus* inhabited the West of England in considerable numbers, and that it not improbably bred there and was used for food by the people of the lake-dwellings.

According to Dresser\*, this species now ranges through Southern and South-eastern Europe, Northern Africa, and Southern Asia as far as India. It has not been recorded from Great Britain, France, Spain, Portugal, or Italy, and is rare in Transylvania, though abundant on the Lower Danube; in North Germany a single occurrence is recorded.

In Southern Russia it is widely distributed, and in the spring passes northward in large flocks. In the breeding-season it occurs fairly far north in Russia, and specimens have been seen in the Government of Kasan and near Ekaterinburg, localities lying several degrees to the north of those in which the remains of this bird have been found in this country.

\* 'Birds of Europe,' vol. vi. p. 199.

Recently Dr. Herluf Winge has called my attention to a paper\* in which he has recorded the occurrence of remains of *Pelecanus crispus* in kitchen-middens of the Stone Age at Havnoe, on the north side of the Mariager Fjord, on the eastern coast of Denmark. This discovery is particularly interesting, because it supplies a further proof that in former times the area of distribution of this bird extended much more widely in North-western Europe than at present †.

The other species of birds of which remains occur in this collection are:—

CORVUS CORONE L. Carrion-Crow.

Tibia, humerus, and metacarpus.

ASTUR PALUMBARIUS (L.). Goshawk.

Left tibia.

HALIAËTUS ALBICILLA (L.). White-tailed Sea-Eagle.

Left tibia. This is closely similar to the tibia from superficial deposits of Walthamstow, Essex, which has been referred by Lydekker to *H. pelagicus*.

MILVUS ICTINUS Sav. Kite.

Left tarso-metatarsus.

STRIX FLAMMEA L. Barn-Owl.

Two specimens of the tibio-tarsus.

PHALACROCORAX CARBO (L.). Cormorant.

Numerous bones.

ARDEA CINEREA L. Common Heron.

A portion of a skull.

BOTAURUS STELLARIS (L.). Common Bittern.

Right femur.

#### DUCKS (*Anatidæ*).

As might be expected in such a locality, by far the greater number of the remains belong to various Anserine birds.

\* "Fuglene ved de danske Fyr i 1894: 12te Aarsberetning om danske Fugle," Vidensk. Meddel. fra den naturh. Foren. i Kjöbenhavn, 1895, pp. 59-60.

† [See also, on this point, footnote, p. 352.—EDD.]

In many cases it is impossible to determine Ducks from isolated bones, and in the following list species about which there is any doubt are marked with a note of interrogation:—

Cygnus musicus.	? Spatula clypeata.
Anser, sp. indet.	? Mareca penelope.
Anas boscas.	Fuligula cristata.
? Clangula glaucion.	— marila.
Querquedula crecca.	Mergus serrator.
? Dafila acuta.	

PUFFINUS, sp. indet.

Humerus.

GRUS. Common Crane.

Skull (wanting only quadrates and bones of palate), mandible, and many limb-bones.

FULICA ATRA L.

Very numerous bones, including pelves and sterna.

CREX. Corn-Crake.

Left humerus and portion of right tibia.

TACHYBAPTES FLUVIATILIS (Tunst.). Little Grebe.

Right humerus.

This assemblage of species indicates the existence of a district of marsh and mere, haunted by flocks of Pelicans and Cranes, and in winter by swarms of wild fowl, which furnished the inhabitants of the pile-dwellings with food. Probably the birds were killed with the sling, for great quantities of pellets of clay, well adapted for use with that instrument, have been found. From time to time a stray sea-bird made its way to the spot, and the White-tailed Sea-Eagle, no doubt, found there a good hunting-ground.

The mammals cannot be noticed here in detail, but many of them likewise are aquatic. The collection includes remains of

Lutra vulgaris.	Castor fiber.
Mustela martes.	Arvicola amphibius.
— putorius.	— agrestis.
Felis catus.	Erinaceus europæus.



Andrews, Charles William. 1899. "XXVIII.—On some Remains of Birds from the Lake-dwellings of Glastonbury, Somersetshire." *Ibis* 5(3), 351–358.

<https://doi.org/10.1111/j.1474-919x.1899.tb01484.x>.

**View This Item Online:** <https://www.biodiversitylibrary.org/item/36067>

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