

## **The first record of birds from Mill (The Netherlands)**

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1 figure

### **Abstract**

Presented here is the first record of birds from the gravel pit Langeboom, in Mill, The Netherlands. Langeboom is considered to be of Pliocene age and therefore, this would be the earliest known fossil record of modern-type birds and the only ones from deposits earlier than Pleistocene. Two specimens, an isolated ulna and a fragment of a tarsometatarsus, resemble those of *Lagopus* sp. and *Anas platyrhynchos*. The third specimen, an undetermined fragment, is described as *Aves* indet. Owing to its fragmented state a reliable assignment to any of the recent families is not possible.

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## **1. Introduction**

Fossil birds are rare in The Netherlands. The majority of fossils from The Netherlands consists of Ice Age material. In contrast with the overwhelming amount of fossil material from woolly mammoth, woolly rhinoceros, reindeer and horse retrieved from the bottom of the North Sea or dredged from wet sandpits, remains of birds are found occasionally. Therefore, palaeo-ornithology in The Netherlands has never been subject to systematic study. This is due to several reasons. Avian remains are smaller and less robust than mammalian bones. In addition, for efficient flight, birds need to be as light as possible; their bones show several adaptations to reduce their weight. The compact bone is thin and often the epiphyses are heavily pneumatized. Together with an increased amount of minerals like calcium, bird bones are easily damaged or broken, and therefore have a decreased chance on becoming fossilized. In addition, fossils of avian origin are easily overlooked because of more spectacular fossils present at a certain site. Small bones are often considered 'not interesting' and thereby not collected. This 'missampling' caused fossil birds from The Netherlands to be hardly known.

The fossil record for birds in The Netherlands starts at the early Pleistocene. The first bird to be described was a white-tailed eagle, *Haliaeetus albicilla* (Linnaeus, 1758) by Junge (1953). The bones were found in Tegelen, which was dated at the Tiglien. In 1964, avian remains were found near the little town of Bunde. The bones were determined as belonging to *Gallus gallus domesticus* (Linnaeus, 1758) en *Corvus* sp. by Clason (1968) and Erdbrink (1964, 1968) and being of Holocene age. Remains of the Giant Auk from several sites are described by Van Wijngaarden-Bakker (1978) and Kompanje & Kerkhoff (1991). Van Kolfshoten (1985) described some avian remains from the Belvédère quarry which is dated at Saalien. Other finds of fossil birds have been recorded by Bosscha-Erdbrink (1993) and De Jong (1998), unfortunately without clear description and age determination. Meijer (2002, 2003) described 18 avian species, among which *Anas platyrhynchos* (Linnaeus, 1758) *Gavia stellata* (Pontoppidan, 1763) and *Haematopus ostralegus* (Linnaeus, 1758) from the Late Pleistocene site of Holt und Haar, on the Dutch-German border, dated at the Weichselien period. This renewed attention for fossil birds, causing previously overlooked specimens in private collections to be noticed again, has yielded the first avian remains of Pliocene age.

## **2. The site**

The material has been retrieved from a wet sandpit, Langeboom, in the municipality of Mill. Langeboom is a wet sandpit that has been used for the dredging of sand and gravel for over 20 years. Since 1996, sand and gravel are exclusively dredged from glauconitic layers of Middle to Upper Pliocene age. The site is known for its large quantities of shark teeth (*i.e.* *Carcharocles megalodon* (Agassiz, 1843)) mollusks (*i.e.* *Glycymeris*, *Nordica* and *Astarte*) and bone material (Ahrens, pers. comm.). The majority of the material is in an excellent state of preservation; few bones show signs of transport or reworking. The bone material consists mainly of marine mammals like dolphins, baleen whales and seals. Remains of terrestrial mammals are less common. The large number of marine mammals present, in addition with the presence of fossilized wood, indicates a lagoon-like environment at the time of deposit (Ahrens, pers. comm.).

## **3. Material and methods**

The material consists of two diaphyses and an epiphysis of bird bones. All three bones are heavily fossilized. The conservation is excellent; the bones show quite some details and little damage. There are no signs of transport. It is noted however that the two diaphyses are flattened dorsoventrally; this might be the result of fossilization. The material has been determined by comparison with recent material housed in the collection of the Nationaal Natuurhistorisch Museum (Naturalis), Leiden, The Netherlands.

## **4. Systematic palaeontology**

### **4.1. *Lagopus* sp.**

Order Galliformes (Linnaeus, 1758)  
Family Tetraonidae (Vigors, 1825)  
Genus *Lagopus* (Brisson, 1760)  
*Lagopus* sp.

The first fragment, measuring 4.4 cm in length and 0.6 cm in width, consists of the proximal epiphysis and diaphysis of a right ulna (figure 1). The distal epiphysis is missing. The shaft is concave and is dorsoventrally flattened. The papillae, or quill knobs, on the lateral side are visible though not distinctively

developed. The proximal epiphysis shows several pneumatic foramina and has three concave facets, with the olecranon process missing.

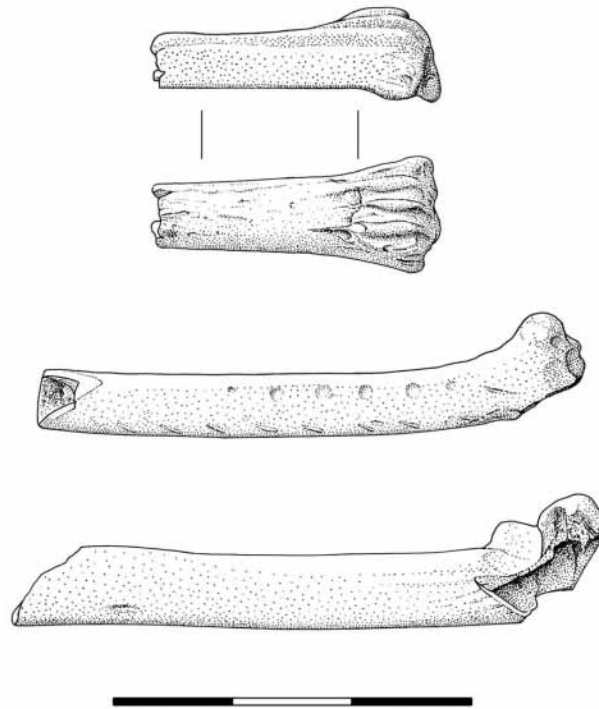


Figure 1. From top to bottom. Tarsometatarsus *Anas platyrhynchos* in two aspects (left lateral and anterior respectively). Middle: ulna *Lagopus* sp. in dorsolateral aspect. Bottom: humerus *Aves* indet. in dorsolateral aspect. Drawings by A.M. Hense.

#### 4.2. *Anas platyrhynchos*

Order Anseriformes (Wagler, 1830)  
 Family Anatidae (Vigors, 1825)  
 Genus *Anas* (Linnaeus, 1758)  
*Anas platyrhynchos* (Linnaeus, 1758)

*Anas platyrhynchos* is represented here by a proximal epiphyses of a tarsometatarsus (figure 1). The fragment measures 2.3 cm in length. The largest width of the epiphysis is 0.95 cm and the diameter of the shaft is 0.5 cm. This fragment has a more eroded appearance, probably due to transport. The proximal surface consists of two cotyles separated by an intercotylar prominence. The mesial cotyle is slightly more elevated than the lateral one. The proximal foramen, located distally of the intercotylar prominence on the anterior surface, is wide and deep. The proximal foramen is continuous with a ridge on the anterior surface of the diaphysis. On the posterior surface, a group of several proximodistally orientated ridges, the hypotarsal ridges, can be seen. The four hypotarsal ridges and the three canals formed by the ridges are typical of Anseriformes (Gilbert *et al.*, 1981).

#### 4.3. *Aves* indet.

This bone, consisting of a diaphysis and epiphysis, shows a dorsoventrally orientated flattening over the entire length (figure 1). The fragment measures 4.9 cm in length and 0.6 cm in width. The part present suggests an identification as a part of humeral head. However, the flattening of the bone does not correspond with any known humerus and thus it is classified as *Aves* indet.

### 5. Discussion and concluding remarks

The three bird bones described above constitute the first birds known from the wet sandpit Langeboom, Mill, The Netherlands. Both *Lagopus* sp. and *A. platyrhynchos* are known from surrounding countries and their

presence in The Netherlands adds more information to the biographical distribution and variation of both species. The earliest record of the genus *Lagopus* comes from the Early Pliocene; *Lagopus lagopus* (Linnaeus, 1758) was found at several Pliocene sites throughout Europe (Mlíkovský, 2002). *Lagopus mutus* (Montin, 1781) however has no record earlier than the Middle Pleistocene, but this species was abundant in Late Pleistocene deposits throughout Europe (Tyrberg, 1998). The fossil record for *A. platyrhynchos* extends back to the Late Pliocene or Early Pleistocene (Mlíkovský, 2002). The first record comes from the Late Pliocene of Italy. In the Pleistocene, *A. platyrhynchos* becomes widely distributed throughout the mainland of Europe and the isle of Great Britain and is known from a great number of places. Both birds were already present during the Pliocene and are nowadays found throughout the palearctic up to even the arctic regions. As for habitat requirements, both species prefer a temperate climate with abundant vegetation and the presence of water (Voous, 1960) like forest areas, grasslands, tundra's and mountain regions.

Mill is considered to be of Pliocene age and is part of the Oosterhout formation. At Langeboom, the glauconitic layers are close beneath the surface and are known to extend 30 meters in depth. Below the Pliocene layers are even older layers from the Miocene and possibly Oligocene (Ahrens, pers. comm.). Although Langeboom being a gravelpit, the majority of fossils retrieved from Langeboom indicate a warm, marine environment, inhabited by several whale species, molluscs and sharks. Therefore it is thought that Langeboom represents a lagoon with warm and shallow waters. However, the presence of some terrestrial species like oxes suggest that a second ecosystem might have been present. The bird remains described here support that theory, as both bird species are not known to inhabit coastal ecosystems. In addition, *A. platyrhynchos* as well as *Lagopus* sp. are palearctic faunal elements, inhabiting temperate regions (Voous, 1960). This is in contrast with the idea of the Pliocene era as being a 'warm' period. In addition, the presence of *A. platyrhynchos* and *Lagopus* sp. adds more support to the idea of a second, terrestrial, ecosystem.

## **6. Acknowledgements**

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