PART A

CHAPTER I

INTRODUCTION

In the years after World War II the population in the western part of the Netherlands has increased steadily, quickest in the provinces of North and South Holland. The result of this increasing population is a rapidly growing urban agglomeration, the so-called "Randstad Holland".

Laying deep foundations brings to light many well preserved archaeological finds, which often lie below present mean sea level (N.A.P.). For the construction of roads through the area much sand is needed, and part of the former coastal barriers are used as sand quarries or leveled for the foundations of factories.

Furthermore the supply of fresh water is very important and the town of Amsterdam constructed large waterworks in the dune area near Bloemendaal to be certain of a regular fresh water supply. Here too archaeological finds are made but as the material is found above the present water-mark the conservation is not as good as in the former cases.

The bone material which was found in settlements dating from the Late Eneolithic to the Middle Ages and in barrows dating from the Bronze Age and Iron Age will be treated in this study.

As early as 1860 Rütimeyer discussed the animal remains found in settlements of successive periods in Switzerland; in 1949 Hescheler and Kuhn did the same again. Nobis (1955) discussed the changes in the composition of the animal world in Northwest Germany, Requate (1956) the animals of three small Middle Age sites in Schleswig-Holstein. Hartman-Frick (1960, 1961) studied the animal remains of the successive settlements from the Eneolithic to Iron-age on the Eschner Lützengüetle and from the Late Neolithic till La Tène on the Borscht in Liechtenstein. Boessneck (1958) discussed Bavarian sites from the Middle Neolithic till the Middle Ages while Bökönyi (1959) did the same for Hungarian sites of the Early, Middle and Late Neolithic, Eneolithic and Bronze Age. This enumeration shows that there are still many gaps in our knowledge about stock-breeding in Europe. In this work an attempt has been made to fill this gap for the western Netherlands.

The absence of prehistoric bone finds in the sandy soils and acid bogs in the higher parts of the Netherlands was an added reason to study the animal world (domesticated and wild) in the coastal area as it developed under the influence of man in the different periods.

The archaeological phenomena of adjacent areas are reflected in the Dutch archaeological material, but in the Netherlands they often occur somewhat later and in a form adapted to local circumstances.

The provinces of North and South Holland form a part of the delta of the Rhine, Maas and Scheldt and are thus situated on the important route from central Europe to England. This narrow strip of land was inhabited for the first time in the Late Eneolithic period[1], when a system of coastal barriers had been formed, bordered in the west by sandy tidal-flat areas, in the east by clayey salt marshes and the sea (Pons, Jelgersma, Wiggers & De Jong, 1963). This coastal region could be reached along the large rivers or by following a sea route along the coast. The settlement sites have been found on the slightly raised banks of creeks or on the coastal barriers.

The first Neolithic people reaching the Netherlands belonged to the cultures of the Danubian complex[2], people who decorated their pottery with band-like ornaments (Bandkeramik culture). At the end of the fifth millenium B.C. people of this Bandkeramik culture spread over central Europe keeping to the loess soils, reaching the most north-western point of their distribution in Limburg. They settled in the loess area in the south of the province of Limburg (Modderman & Waterbolk, 1960). They lived in villages formed of several large houses (28–36 m long), cultivating cereals and keeping domesticated animals. In the decalcified loess of South Limburg no bones have been preserved. At the nearby Belgian site of Rosmeer[3] circumstances were slightly better. The few bone fragments that could be collected there indicate that domesticated cattle, small ruminants, and pig were kept, while traces of the probably wild horse were found. The recently studied bone remains of central German Bandkeramik settlements give the same results, although remains of wild animals were found; these formed only a small percentage of all the bones (Müller, 1964).

After some 400 years the Bandkeramik people vanished, leaving no traces.

There are indications in the pollen-diagrams of the northern parts of the Netherlands that about 3000 B.C. small parts of the land were cultivated (Van Zeist, 1959) by archaeologically unknown people. The farmers that left the first traces in this area, mainly in the province of Drenthe, belong to the TRB (Trichterbecher Kultur) culture. In Belgium the Michelsberg culture occurs.

The people of the TRB culture were mixed farmers who combined the cultivation of crops with stock-breeding. The most conspicuous feature of their culture is the use of large Megalithic community graves. A grave belonging to a pre-Megalithic phase has been found under the Megalithic tomb of Odoorn (Van Giffen, 1961[a]). In

1. For the nomenclature see chapter IV.
2. If not cited otherwise the work of De Laet and Glasbergen (1959), De voorgeschiedenis der Lage Landen is followed mainly.
3. The author is grateful to Dr. Roosens of the Belgian State Survey of Archaeology, who enabled her to study the animal remains found at the excavations at Rosmeer.

the Netherlands settlements have not yielded bone remains. From the settlement Bundsø in Denmark (Degerbøl, 1939) and Dümmerlohausen in Germany (Vogel, 1939; Nobis, 1955) it is known that people kept domestic cattle, sheep, goat, pig, dog and probably horse; several wild animals like red deer, wild boar, roe deer, elk, wild cattle and beaver were hunted, but these were of minor importance for the meat supply. The TRB culture people lived in the Northern Netherlands from 2700–2400 B.C.

Around 2400 B.C. people of another beaker-culture arrived, the PF-beaker culture[1]. It is supposed that they were swift moving herdsmen, spreading from the Russian plains to the west, reaching their most western point in the settlement of Zandwerven in the province of North Holland. Although cattle breeding may have been their most important occupation, they cultivated cereals to some extent (Waterbolk, 1954; Van Zeist, 1959). At Anlo a cattle-*kraal* belonging to this culture was discovered (Waterbolk, 1960). The only known settlement is the one of Zandwerven where remains of the PF-beaker culture and the Vlaardingen culture (see below) were found together.

The last to arrive were the people of the Bell-beaker culture; they reached the Netherlands about 2000 B.C. Settlement traces are known from the provinces of North and South Holland. At Vlaardingen they lived at the same place as the people of the Vlaardingen culture but at a later date (Glasbergen a.o., 1962/63). At Oostwoud their settlement is on the bank of a creek as in Vlaardingen. In the following Bronze Age two large barrows were erected at the same place (Van Giffen, 1961/62).

The Late Eneolithic Vlaardingen culture has been discovered only recently; it was described by Glasbergen (1961) and named by him after the most important findspot in the province of South Holland: Vlaardingen. At Hekelingen and Zandwerven the Vlaardingen culture has been found too. At Vlaardingen and Hekelingen people who must have practised mixed farming originally, took to a large extent to hunting, fishing and fowling in surroundings highly unsuitable for farming but very well suited to hunting, fishing and fowling, while at the same time those who settled in Zandwerven practised cattle breeding with additionally fowling and probably fishing.

In the Bronze Age various Eneolithic groups were united into one culture. As bronzes in graves are very scarce in the Netherlands, it is only possible to divide the Bronze Age into three periods, Early (1600–1400 B.C.), Middle (1400–1000 B.C.) and Late (1000–650 B.C.). During the Bronze Age the land was opened up intensively, and many Bronze Age barrows lie on arable land with marks of ploughing still preserved below them as in Oostwoud (Van Giffen, 1961*b*/62) and Wervershoof (Van der Waals, 1961) in North Holland.

1. The PF-beaker culture is the Dutch variety of the Corded Ware culture.

From the Middle Bronze Age large farm houses are known in the province of Drenthe (Waterbolk, 1961). The fact that the quarters probably used as cow sheds were as large as the dwelling parts indicates intensive cattle-breeding, although cereals were also cultivated. Large houses from the Middle Bronze Age are also found near Deventer (Modderman, 1955) in the province of Overijssel. In South and North Holland settlements have been found near Vogelenzang (Groenman-van Waateringe, 1961) and Zwaagdijk (Modderman, 1964), but it was impossible to find traces of houses.

In the Bronze Age the dead were buried in barrows with a large variety of peripheral structures. In the beginning tree trunk coffins were used for inhumation, later cremation became the custom. In the north the graves were family graves usually, in the south single graves.

At the end of the Early Bronze Age a new element came into the Netherlands showing strong influences from England. People who cremated their dead and interred the ashes in large urns – named Hilversum urns after the first place where they were found, near Hilversum – penetrated into the coastal area from the south after crossing the Channel. The settlement of Vogelenzang belongs to the Hilversum culture (Groenman-van Waateringe, 1961). If one excludes the settlement of Zwaagdijk, which shows no definite cultural affinities, the cultures of the provinces of Holland in the Bronze Age were orientated towards the south.

Towards the end of the Bronze Age, people who cremated their dead, burying the ashes in urns under small barrows surrounded by a ditch, penetrated into the northern part of the Netherlands. In the south Hallstat warriors settled as overlords, leaving richly furnished graves.

On the sandy soils in the north the improved methods of land cultivation which started in the Bronze Age gave rise to a dense population at the end of this period (Waterbolk, 1959). This was the cause that in the deforested land about 500 B.C. sanddunes were formed and settlements and fields got covered with sand (Waterbolk, 1959). As a result the population emigrated to the north where just at that time the tidal flat area had became habitable for the first time. A close connection with the sandy soils becomes apparent in the pottery of the Ruinen-Wommels type of the Zeijen culture, as this pottery has been found in both regions (Waterbolk, 1962). The same type of pottery is also found in North and South Holland in the settlements of the "Spanjaardsberg" near Santpoort (Modderman, 1961) and Alphen aan de Rijn (Modderman, private communication).

The direct cultural contacts between North Holland and the northern coastal area are explained by the fact that a dry land connection then existed between the present province of Frisia and West Frisia, part of the province of North Holland (Pons, Jelgersma, Wiggers and De Jong, 1963; map IV).

About the beginning of our era the Romans colonized Holland south of the Rhine.

After some attempts to expand the empire to the Elbe, the lower Rhine was the definite north frontier of the Roman Empire. In order to defend the frontier a system of castella was built on the southern bank of the Rhine of which the "Oude Rijn" was the main course then. One of the castella was the one found under the present village of Valkenburg in South Holland. According to Van Giffen (1949/1953) it corresponds with the Praetorium Agrippinae of the Tabula Peutingeriana.

On both sides of the frontier the local inhabitants were farmers, living on the peat like the people in Vlaardingen, or in the dune region like those in Velsen (map IV).

About 240 A.D. the Romans withdrew their defences southward into Belgium, still maintaining the lower Rhine as a political frontier.

For two centuries after the fall of the Roman Empire in 499 no written sources about Holland are known. At this time the people living in the tidal flat area in the provinces of Frisia and Groningen, who had alraedy been connected with the people in Holland in the pre-Roman Iron Age, had expanded as far south as Brugge and north as far as the Weser in Germany (Lewis, 1958). This area is called Frisia when written reports are available again. In Merovingian and Carolingian times the Franks met the Frisians when they tried to enlarge their Frankish Kingdom to the north. Pepin the Short and Charles Martel already conquered parts of the Frisian realm, but Charlemagne was the first to succeed in capturing the whole of Frisia definitely, expanding his Empire as far north as the Eider in Germany.

At this time the first town since Roman times developed, Dorestad. After the destruction of Dorestad by the Vikings, towns like Dordrecht, Tiel and Utrecht took its place. The settlements of Rijnsburg, situated on the bank of a broad creek in direct connection with the "Oude Rijn", which was the main tributary of the Rhine in those days, goes back to Carolingian times. The place was inhabited till the twelfth century when the abbey of Rijnsburg was founded on the same spot.

According to Slicher van Bath (1960) the three field rotation system of agriculture became customary in densely populated areas in Western Europe in the eighth century, as a result of which the production of food for human beings increased. In the tenth century (Slicher van Bath, 1960) harnessing of horses was improved, enabling people to use horses for ploughing instead of oxen. The improvement of these energy sources made it possible for the population to increase from the 11th till the 13th century. Then it was necessary and possible to reclaim the low lying peat regions in Holland.

By digging ditches at regular distances, good drainage of the land and a low water level was obtained. Independent of the reclaiming of the peat area in Holland dikes were constructed to defend the land against the sea. One of the first dikes lay in the vicinity of Vlaardingen probably (recorded in 1018) (Slicher van Bath, 1960).

The increase of the population resulted in the development of the existing towns

and in the founding of new ones too. Amsterdam was founded on a favourable spot where a dam had been built in the Amstel.

Shipping and commerce were expanding, at strategic places along the large rivers tolls were founded, like the Castle Huis te Merwede on the southern bank of the Merwede in the vicinity of Dordrecht. As castles and towns were rivals, the Castle was not rebuilt after its destruction by the St. Elisabeth flood in 1421 (Renaud, 1947).

CHAPTER II

DESCRIPTION OF THE SITES

In this chapter a description will be given of the sites which are lettered A–V. These letters will be used in the Diagrams I, X, XXXI, XLIII, LXI, LXII.

Sites A–C are Eneolithic, site D is transition Eneolithic/Bronze Age, sites E–H are Bronze Age, sites J–N are pre-Roman Iron Age, sites O–Q from Roman time, R–S–T dates from the Early Middle Ages, U–V Late Middle Ages.

To the description of each site a table with the number of bones identified for each species and the estimated minimum number of individuals has been added, as well as a table with the numbers of the individual bones per species (Part II).

The situation of the sites in their geological environment is given in maps I–V drawn after Pons, Jelgersma, Wiggers and De Jong (1963).

In Tables 40, 41 and Diagram I the percentages of the six most important domesticated animals, cattle, sheep and goat, pig, dog and horse are given, calculated for the number of bones and the estimated minimum number of individuals, as well as the percentages of domesticated animals and wild animals.

The Institutes which excavated or collected the animals bones are the following.

A.W.(W.)N. – Archeologische Werkgroep Nederland, formerly Archeologische Werkgroep West Nederland.
B.A.I. – Biologisch-Archaeologisch Instituut, State University at Groningen.
G.D. – Geologische Dienst, Haarlem.
I.P.P. – Instituut voor Prae- en Protohistorie, University of Amsterdam.
R.O.B. – Rijksdienst voor het Oudheidkundig Bodemonderzoek (State Service for Archaeological Investigations), Amersfoort.

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The investigation was carried out at the "Biologisch-Archaeologisch Instituut". The manuscript was typed by Miss M. Bierma, the tables by Mrs. J. Steenhuisen-Cazemier. The bones were numbered by Mr. J. Smit and Mr. H. Zwier.

A. VLAARDINGEN

gem. Vlaardingen, province of South Holland

Excavated A.W.(W.)N., 1958
I.P.P. (Glasbergen), 1959[1], 1960

Dated C 14 GrN–2303 4330±60, 2380 B.C.
GrN–2480 4190±70, 2240 B.C.
GrN–2304 4250±75, 2300 B.C.
GrN–2487 4280±100, 2330 B.C.

Literature:

ALTENA, J.F. VAN REGTEREN, J.A.BAKKER, A.T.CLASON, W.GLASBERGEN, W.GROENMAN-VAN WAATERINGE & L.J.PONS,
1962. The Vlaardingen Culture, *Helinium* II, pp. 3–35, 97–103, 215–243.
1963. The Vlaardingen Culture, *Helinium* III, pp. 39–54, 97–120.
GLASBERGEN, W., *et al.*, 1961. *In het voetspoor van A.E.van Giffen*, pp. 42–65.

At Vlaardingen traces of a Late Eneolithic settlement have been found about three meters below present mean sea level (N.A.P.). People lived there on the narrow banks of a creek in rectangular houses.

Behind the bank of the creek extended a swamp, which must have been more or less wooded especially at the margins, forming a suitable biotope for red deer and wild boar. For the large aurochs this biotope was less suitable probably since no remains of this animal have been found. The large number of remains of beaver and pike points to fresh running water.

The animal remains (Tables 1, 2) show that the inhabitants of the Vlaardingen site, living in a landscape with many creeks and swamps much like the present day Biesbos, south of Dordrecht, had adapted themselves to a large extent to their surroundings. Since probably wild animals were to be obtained easily in large quantities they were specialized hunters, fishermen and fowlers; 76% of the bones of mammals are of wild species (Table 44). Of the 24% remains of domesticated animals those of cattle are the most numerous, followed by pig, sheep, goat and dog. Since the bones (those of the dog excluded) belong to animals of all ages, it is suggested that they were locally bred. The age at which pigs were slaughtered (Table 43) indicates that there was an autumn peak, in November (Chapter III, 15, 16).

Red deer and wild boar were the most important wild animals. The age at which red deer were caught shows that the site was inhabited throughout the year (Table 44).

1. The bones found in the subsequent excavations will be discussed in a later paper.

Apart from being a stock-breeder and a hunter, Vlaardingen man was a fisherman and a fowler. Sturgeon and mallard were the species most frequently caught, the dalmatian pelican was the most exotic one. Vlaardingen man also roamed the shores in search of large stranded whales; the smaller whales like common porpoise and bottle-nosed dolphin may have been hunted.

B. HEKELINGEN

gem. Hekelingen, province of South Holland

Excavated R.O.B. (Modderman), 1950

Dated C 14 GrN–254 4200 ± 120, 2250 B.C.
GrN–684 4080 ± 85, 2130 B.C.

Literature:

MODDERMAN, P.J.R., 1953. Een neolithische woonplaats in de polder Friesland onder Hekelingen (Eiland Putten) (Zuid-Holland), *Berichten van de Rijksdienst voor het Oudheidkundig Bodemonderzoek* IV, pp. 1–10, with appendices.

FEEN, P.J. VAN DER & G. KORTENBOUT VAN DER SLUYS, 1953. Les vertébrés des fouilles de Hekelingen (Pays Bas), *Mammalia* XVII, pp. 346–353.

ALTENA, J.F. VAN REGTEREN, J.A. BAKKER, A.T. CLASON, W. GROENMAN-VAN WAATERINGE, W. GLASBERGEN & L.J. PONS,
1962. The Vlaardingen Culture, *Helinium* II, pp. 3–35, 97–103, 215–243.
1963. The Vlaardingen Culture, *Helinium* III, pp. 39–54, 97–120.

At Hekelingen just as at Vlaardingen, settlement traces have been found on the northern bank of a former creek about 60 m wide approximately. The remains were found between 2.10–2.20 m below present mean sea level (N.A.P.). Behind the bank there must have been a swamp area. The general picture obtained is the same as in Vlaardingen; people who had completely adapted themselves to their surroundings, and who relied for their meat supply to a large extent on the wild animals to be caught in the surroundings (Tables 3, 4). But they kept domesticated animals as well. Domesticated cattle were the most important, followed by pig, sheep and goat. Of two bones it can not be said with certainty whether they belonged to a large dog or a wolf. The horse remains are too few to conclude to wild or domesticated animals, but as the biotope was unsuitable for horses, the conclusion may be that the latter were concerned.

Although not as many bones were found as in Vlaardingen, the scarcity of fowl and sturgeon remains attracts the attention. Even at Zandwerven 17 bird bones of four species have been found (Tables 5, 6).

C. ZANDWERVEN

gem. Opmeer former Spanbroek, province of North Holland

Excavated I.P.P. (Van Regteren Altena), 1957, 1958.

Dated C 14 GrN–2221 3990±65, 2040 B.C.

Literature:

ALTENA, J. F. VAN REGTEREN, 1958. Nieuwe opgravingen van de neolithische nederzetting te Zandwerven, gem. Spanbroek, *Westfrieslands Oud en Nieuw* 25, pp. 144–159.
1959. Idem II, *Westfrieslands Oud en Nieuw* 26, pp. 155–156.
1962. In: Altena, J.F.van Regteren, *et. al.* The Vlaardingen Culture, *Helinium* II, pp. 3–35, 97–103, 215–243.
ALTENA, J.F.VAN REGTEREN & J.A. BAKKER, 1961. De neolithische woonplaats te Zandwerven (N.H.). In: *In het Voetspoor van A.E.van Giffen*, pp. 33–40.
CLASON, A.T., 1962. De dierresten. Nieuwe opgravingen van de neolithische nederzetting te Zandwerven, gem. Opmeer, *Westfrieslands Oud en Nieuw* 29, pp. 210–219.
GIFFEN, A.E.VAN, 1930. *Die Bauart der Einzelgräber*, Leipzig, p. 160.

In the southernmost part of the sandy ridge on which Zandwerven is situated, already in 1927 traces of an Eneolithic settlement were found by J. J. Butter. During a first investigation in 1929 directed by Van Giffen (1930), followed much later by a second and third by Van Regteren Altena (1958, 1959) in 1957, 1958, the remains of two cultures were found, what is now known as Vlaardingen culture and the PF-beaker culture. It appeared to be impossible to separate the two cultures. The bone remains, however, were found in the lower layers of two pits, which contained no PF-beaker material, so it is probable that they belong to the Vlaardingen culture (Van Regteren Altena, 1959). According to Van Regteren Altena the settlement may have been inhabited during one or more periods between 2500 and 2200 B.C.

During the excavations in 1957–1958 some hundred bones were found. In a pit, diameter 1.5, deep 0.5 m layers of mussels were observed, divided by a clayey band. The bones were found among the mussel shells, which circumstance explains the preservation of the bones in the sandy environment. The layers of shells consisted of very small fragments.

Van Giffen (1930) also reported a layer of mussel shells (Mytilus edulis) and he concluded that the inhabitants of Zandwerven must have been fishermen and hunters.

Domesticated cattle, small ruminants, and pig can be expected here. The surrounding land was open and the bogs to the east must have been inaccessible for large animals. The remains of fish and common porpoise point to fishery along the coast, those of birds to fowling. Mallard, grey lag-goose and white-tailed eagle must have been common.

As the mussel shells have not been preserved it is impossible to form an opinion about the role the mussel had in the food supply of the inhabitants of the settlement. The picture obtained at present is that of farmers breeding cattle, while they increased their meat supply by hunting, fishing and fowling, but to a smaller extent than the people in Vlaardingen and Hekelingen did.

D. LANGEVELD NEAR LISSE

gem. Noordwijkerhout, province of North Holland

Collected K. VAN DE VELD, 1958.

The Langeveld near the village of Lisse is an old beach plain, later grown over by peat. The bones discussed here were collected after the peat had been dug out and no exact find level is known.

An attempt was made to date the bones palynologically. Two peat samples were taken from two different bones. The pollen spectra obtained suggest that the bones are from the end of the Eneolithic or from the beginning of the early Bronze Age (Van Zeist, private communication). As all the bones are of the same colour and conservation it is assumed that they belonged together (Table 7).

The remains of domestic cattle are the most numerous. Important is the presence of nine horse bones. Among the three mandibulae there was one of a young foal. Most of the horse bones had been broken, which may indicate that they are the remains of meals.

E. VOGELENZANG

gem. Bloemendaal, province of North Holland

Excavated I.P.P. (Groenman-van Waateringe) 1959, 1960.

Dated C 14 GrN–2997 3140±70, 1190 B.C.

Literature:

GROENMAN-VAN WAATERINGE, W., 1961. Nederzettingen van de Hilversumcultuur te Vogelenzang (N.H.) en den Haag (Z.H.). In: *In het Voetspoor van A.E. van Giffen*, pp. 81–92.

Vogelenzang is a settlement belonging to the early Bronze Age Hilversum culture, the one of two of which bones have been preserved. The settlement was situated in a field called "De Duintjes" (the small dunes) and was part of the old coastal barrier

of the Zilk, belonging to the coastal barrier system of Vogelenzang–Hillegom–Lisse. For a long time the dunes had been used as a sandquarry. At the time of the habitation there must have been grassland between the barriers, while the sea was only one km to the west. Thus the settlement was situated favourably for cattle breeding and hunting along the beach.

During the excavation two refuse pits came to light in which bones were found. They were badly damaged by the roots of beach-grass and decalcification. Yet it was possible to observe that most bones had been broken, in the way that was commonly done to obtain the marrow.

Altogether 103 bones could be identified with certainty. They belonged to domesticated cattle, pig, goat and/or sheep, and horse (Tables 8, 9). Dog remains were not found, most probably on account of the small number of bones. Cattle were the most important, followed by pig as in the Eneolithic settlements of Vlaardingen and Hekelingen, with the small ruminants and the horse in the third and fourth places (Tables 40, 41). Wild animals were of no importance. Five teeth of a grey seal and the cartilage shield of a sturgeon indicate hunting and fishing along the beach.

F. ZWAAGDIJK

gem. Wervershoof, province of North Holland

Excavated R.O.B. (Modderman), 1961.

Dated C 14 GrN–4243 3310±60, 1360 B.C.

Literature:

MODDERMAN, P. J. R., 1964. Bijzettingen en bewoningssporen uit de Bronstijd te Zwaagdijk, gem. Wervershoof, *West-Frieslands Oud en Nieuw* XXXI, pp. 209–227, with supplements.

MODDERMAN, P. J. R., 1964. Middle Bronze Age graves and settlement traces at Zwaagdijk, gemeente Wervershoof, Prov. North Holland; with appendices by J. Huizinga, J. J. Butler, A. T. Clason. *Berichten van de Rijksdienst voor het Oudheidkundig Bodemonderzoek.* pp. 27–52.

Zwaagdijk is situated in an area that was inhabited for the first time in the late Eneolithic or early Bronze Age. The oldest traces of human habitation have been found at Oostwoud nearby, where two Bronze Age barrows are situated on ploughed soil containing Bell-beaker sherds (Van Giffen, 1961, 1962).

When the excavation started the main part of the Bronze Age settlement had already been disturbed by previous sandquarrying. Only a few post-holes and ditches were exposed in which the animal bones were found.

All the bones are more or less broken.

Domesticated cattle were the most important animals followed by sheep and goat in the second place and pig in the third. The percentage of domesticated cattle is considerably higher than in Vogelenzang, which site was located in the dune area. It is noteworthy that the percentage of the small ruminants, most probably sheep, is higher than that of the pig. This phenomenon will be found again at all the other sites till the Middle Ages.

The remains of wild boar, roe deer and fox may indicate a certain amount of hunting, but that was not of much importance. According to Van Zeist (cf. Modderman, 1964) the landscape around Zwaagdijk must have been natural open grassland.

G. WERVERSHOOF

gem. Wervershoof, province of North Holland

Excavated I.P.P. (Van Giffen, Van Regteren Altena, Van der Waals), 1953, 1954.

Dated C 14 GrN–2359 3015±55, 1065 B.C.
GrN–2168 2965±45, 1015 B.C.

Literature:

WAALS, J.D. VAN DER, 1961. De zool van tumulus XIII bij ,,De Ark", gemeente Wervershoof, *West-Frieslands Oud en Nieuw* XXVIII, pp. 53–80, with supplements.

The bones of Wervershoof were found in the second ringditch of a complicated barrow erected in the Middle Bronze Age. Van der Waals (1961) described it as follows (abridged): Not long after the West Frisian area fell dry, immigrants in the new country erected an enormous oval of posts on the flank of a ridge formed by the filling up of a previous creek, a barrow was not constructed. Perhaps the posts were used for other purposes after some time. After plants had overgrown this spot an inhumation took place in a shallow grave and a mound was erected surrounded by a post-circle. In the following period the barrow was used at several occasions, and twice the barrow was surrounded by a ringditch. Archaeologically the bones can be dated to the Middle Bronze Age.

With the exception of one all the bones belonged to domesticated cattle; this single one, an astragalus, belonged to a small ruminant (Table 12). The cattle bones were certainly of two, possibly of three individuals. A humerus showed a pathologically thickened shaft, probably the result of the healing of a fracture (Plate XIX, *b*).

H. OOSTWOUD

gem. Medemblik, province of North Holland

Excavated I.P.P. (Van Giffen) 1956, 1957.

Dated C 14 GrN–797 3025±80, 1075 B.C.

Literature:

GIFFEN, A. E. VAN, 1961. Settlement Traces of the early Bell Beaker Culture at Oostwoud (N.H.). *Helinium* I, pp. 223–228.

GIFFEN, A. E. VAN, 1962. Grafheuvels uit de Midden-Bronstijd met nederzettingssporen van de Klokbekercultuur bij Oostwoud. *West-Friesland Oud en Nieuw* XXIX, pp. 198–209.

During the excavations of two Bronze Age barrows in the vicinity of Oostwoud in 1956/57 directed by Van Giffen, not only a number of human skeletons were found, but animal bones as well. The way in which these bones have been broken indicates that they are the remains of meals.

As the barrows were situated on a culture layer with remains of the Bell-beaker culture (Van Giffen, 1961[b,c], 1962) and the topmost layers of the barrows yielded much material dating from the Middle Ages up to the present, in a number of cases it was impossible to attribute the bones with certainty (Table 13).

In the Bell-beaker layer the remains of domesticated cattle, pig, sheep/goat, horse and beaver were discovered. In all probability the worked fragment of the canine from the lower jaw of a pig can be reckoned to date to the Bell-beaker time, as in Eneolithic Vlaardingen and Hekelingen such fragments were found too.

In the barrows remains of domesticated cattle, pig, red deer, beaver and hare have been found. Most of the bones of the domesticated cattle were found in a pit of barrow II and in two pseudo post-holes and one real post-hole from barrow I. These bones are less damaged than the other bones found in the barrow or on the old surface. This may indicate, that these bones have something to do with the barrow while the other fragments could have come into the barrow accidentally. According to Van Giffen in the central grave of the barrow the skeleton of a hare was found beside the skeleton of the dead. Unfortunately the hare bones are lost, so that it was impossible to describe them. Here it was clearly a grave gift, which probably had something to do with the expectation of new life. On the continent it is still a popular tale that the hare brings the Easter eggs. The bones of the Middle Ages up to the present are from cattle, sheep/goat, pig, horse and man, most have been badly preserved. A cattle astragalus was worked.

I. ALPHEN AAN DE RIJN

gem. Alphen aan de Rijn, province of South Holland

Excavated R.O.B. (Modderman) 1961.

Literature:

MODDERMAN, P.J.R., 1961. Opgravings- en vondstberichten in het kort. *Westerheem* X, pp. 63

The bones were found during the laying of a sewer in the Kievitstraat, east of the "Oude Rijn". Sherds found together with the bones belong to the Ruinen-Wommels type of pottery of the Zeijen culture (private communication, Modderman) and may be dated to a period from the fifth to the third century B.C.

Remains were found of domesticated cattle, horse, wild boar and elk (Table 14).

J. HOOGKARSPEL

gem. Hoogkarspel, province of North Holland

Excavated I.P.P. (Bakker, Glasbergen), 1958.

Literature:

BAKKER, J.A., 1959. Opgravingen te Hoogkarspel I. Het onderzoek van tumulus I en naaste omgeving. *West-Frieslands Oud en Nieuw* XXVI, pp. 159–174.

FEEN, P.J. VAN DER, 1959. Vondstbeschrijving. In: Opgravingen in Hoogkarspel I. *West-Frieslands Oud en Nieuw* XXVI, pp. 175–178.

Near Hoogkarspel on old arable land, where a former ditch formed an angle, a more or less rectangular barrow had been erected with a central cremation grave.

No archaeological objects were found and exact dating of the barrow was not possible. The more or less rectangular form of the ditch and the cremation burial without grave-goods may indicate that the barrow was erected in the pre-Roman Iron Age, from which period similar rectangular ditches around barrows have been found in the northern part of the Netherlands (Waterbolk, 1962).

According to Bakker (1959) the barrow and its surroundings could be divided stratigraphically into eight parts

I. youngest arable soil under the tumulus
II. sod core of tumulus
III. sand mantle of tumulus
IV. rapidly silted portion of the filling of the ring-ditch

the same way as the people in Krommenie did. The peasants at Krommenie cultivated cereals and broad beans; various weeds also point to agriculture (Van Zeist, 1956).

N. SPANJAARDSBERG NEAR SANTPOORT
gem. Velsen, province of North Holland

Excavated A.W.(W.)N. (Wieland Los and De Boone), 1951/1952.
R.O.B. (Modderman), 1955.

Literature:

MODDERMAN, P.J.R., 1961. De Spanjaardsberg; voor- en vroeghistorische boerenbedrijven te Santpoort. *Berichten R.O.B.* 10–11, pp. 210–262.

The Spanjaardsberg is part of the so-called old dune landscape consisting of a coastal barrier system along the coast. At least six occupation levels were found, separated by thin layers of sand. For the greater part the bones were found in the first two layers; the first layer showed marks of ploughing, the second beside such marks also traces of a fairly large house.

Most bones[1] belonged to domesticated animals. Domesticated cattle take the first place, followed by small ruminants. According to the number of bones the horse comes in the third place, but the situation is represented better in the estimated minimum number of individuals; the pig take the third place with seven individuals, the horse the fourth place with three. Of the dog ten bones were found.

Among the bones belonging to small ruminants there were parts of the skeletons of two sheep, while the goat could not be identified with certainty.[2]

The 38 horse bones belong to three individuals at least, one of them 2–2½ years old, another was a stallion of approximately five years old.

The mandibula fragment of a dog belonged to an animal of the middle group (Chapter IV, 4). An atlas was damaged so much that it was impossible to take measures, but it corresponds with the atlas of a wolf recently bred in a zoo, which is in the B.A.I. collection. This may be an indication for the existence of the wolf as are the two bones found at Hekelingen (Tables 22, 23).

1, 2. Owing to a misunderstanding I received only part of the bone material from Spanjaardsberg at first. When I recently received the other part it was too late to include the numbers and measurements of the bones in the tables. The following species were found in the second part: dog 2; pig 10; red deer 2; roe deer 1; sheep/goat 41 (sheep 1/goat 3); cattle 262. In general it does not alter the picture much, goat and roe deer were not found in the first part of the material.

An antler fragment belonging to a red deer and worked into a ring was found.

There was also the fragment of a Cetacea vertebra, that may have belonged to a large toothed whale like the pilot-whale or killer. Part of a scapula of a domesticated ox was worked into a piercer.

A number of these bones has already been described by Loose (1961).

O. VALKENBURG

gem. Valkenburg, province of South Holland

Excavated B.A.I. (Van Giffen) 1942–43 and 1946–50.

Literature:

GIFFEN, A.E. VAN, 1949–1953. De Romeinse Castella in de dorpsheuvel van Valkenburg aan de Rijn (Z.H.) (Praetorium Agrippinae). II. De opgravingen in 1942/43 en 1946/50. *33e–37e Jaarverslag van de Vereniging voor Terpenonderzoek*, with supplements.

CLASON, A.T., 1961. Some remarks on the faunal remains from the Roman Castellum at Valkenburg, prov. of South Holland. *Palaeohistoria* VIII, pp. 139–147.

The present village of Valkenburg is situated on an artificial mound consisting of seven successive Roman castella and a Medieval occupation layer.

Van Giffen found that the first castellum, erected 42 A.D., was probably used in the invasion of Engeland in 43 and had room for two cohorts (1948). The third castellum can be identified with the Praetorium Agrippinae of the Tabula Peutingeriana.

Whereas the first four castella had been wooden constructions, the main building of the fifth, about 100 A.D., had been erected in stone as were those of the succeeding castella.

The site was occupied by the Romans till about 240 B.C. So the total duration of the occupation is about 200 years. Many layers of different periods made it extremely difficult to decide to which period the bones belonged. Most pits and the filling of the later moats contained material of more than one period. Morover the site was inhabited again at an early date in the Middle Ages. So the possibility that some of the bones date from Medieval layers must be taken into account, although the number of find-groups that could contain Medieval material is small.

Of the domesticated animals cattle were the most important, followed by pig, sheep and goat, dog, horse and cat (Tables 24, 25). This is different from the situation found at contemporary native settlements (P, Q) in- and outside the territory of the Roman Empire. There the small ruminants outnumber the pig, as was the case in the

preceding periods. So it seems that the native stock-breeding was independent of the Roman demand for animals. The large number of pig remains fits in with the well-known fact that pork was the favourite meat of the Romans (Hintze, 1934; Zeuner, 1963). It is possible that in addition to the animals they obtained from the local farmers, they consumed pigs that were reared at the castellum.

Domesticated cattle, sheep, goat and pig were slaughtered at the castellum as the finds of the useless bones, like horn cores and phalanges indicate. Horse, dog and cat were not consumed probably. It is possible that the skeleton of the domesticated cat is Merovingian, and that only that of the wild cat belongs to the Roman period.

The Romans kept domestic fowl, and geese; a few bones of mallard may have belonged to domesticated birds, but it cannot be proved; anyhow the duck was not kept in great numbers. Likewise at the two native settlements only remains of domestic fowl and geese were found.

The Romans liked hunting as the remains of a number of wild species show. The most important game were red deer and wild boar. It is known that the Romans appreciated fish as a cheap food, and at an early date they started to keep fish in fishponds (Zeuner, 1963). At Valkenburg the remains of sturgeon and pike could be identified. The remains of large cetaceans probably indicate large stranded animals. The Romans were very fond of oysters and they formed artificial oyster banks at an early date (Zeuner, 1963). It is likely that for transport the animals were kept in big containers filled with sea-water (Hinze, 1934) and thus sent everywhere inland. The many oyster shells found at Valkenburg probably belonged to animals collected somewhere in the neighbourhood. Other molluscs like whelks and cockles were also eaten. The internal skeleton of an inkfish may indicate that at that time the Roman soldiers occupying Valkenburg consumed these animals, since it was as common in Italy at that time as it is at present.

The large number of bird bones indicates that fowling was important.

P. VLAARDINGEN

gem. Vlaardingen, province of South Holland

Excavated A.W.(W.)N. (Vermeer).

Literature:

VERMEER, K., 1962. Opgraving- en vondstberichten in het kort. *Westerheem* XI, pp. 17.

In the Broekpolder near Vlaardingen traces of a native settlement from Roman times were found. The settlement was situated on the sandy-clay bank of a creek.

Of the domesticated animals cattle are the most important, followed by small ruminants and pig. Relatively many horse remains have been found (Tables 40, 41). Two bones belonging to domesticated fowl were found and eleven to the goose, which was domesticated in all likelihood (Tables 26, 27).

One bone of red deer points to hunting.

One cartilage shield of a sturgeon has been found and one piece of a fish, which has not yet been identified.

Together it is the same form of stock-breeding as occurred in the same area in the preceding pre-Roman Iron Age, very different from the one in Eneolithic Vlaardingen.

Q. VELSEN

gem. Velsen, province of North Holland

Excavated A.W.(W.)N. (Calkoen and Schotman), 1961/1962.

Literature:

CALKOEN, H. J., 1964. Opgravings- en vondstberichten in het kort. *Westerheem* X, p. 35.

At the site of the blast-furnaces and steel-works at Velsen settlement traces dating from the first three centuries A.D. have been found. The settlement was situated in the area of the old dunes.

Among the animal remains those of domesticated cattle were the most important, followed by those of the small ruminants and the pig in the second and third place respectively. No bones of domestic fowl or other domestic birds were found.

The bone of a roe deer indicates occasional hunting. Three pieces of a large cetacean indicate that the beach was not too far away (Tables 28, 29).

In general the same pattern of stock-breeding was followed as at Vlaardingen during Roman times and the preceding periods.

R., S., T. RIJNSBURG

gem. Rijnsburg, province of South Holland

Excavated R.O.B. (Halbertsma), 1961.
I.P.P. (Van Regteren Altena), 1962/63.
B.A.I. (Van Es), 1963.

Literature:

Opgravings- en vondstberichten in het kort. *Westerheem* X, pp. 66.

Traces of a Carolingian settlement were found in Rijnsburg at the place where in the thirteenth century the Abbey of Rijnsburg was erected. On the sandy-clay bank of a creek the remains of two farms, both with their own fences were found. The creek was some 100 m wide and communicated with the "Oude Rijn", the main course of the Rhine. During the following centuries the habitation continued till the building of the Abbey.

On the basis of the archaeological finds the material has been divided into three groups. R would be the bones which are in any case older than the Abbey (Tables 30, 31). S would be the bones found in the creek, which are likely to have belonged to animals from the old farms (Tables 32, 33). T would be the bones which may have belonged to the old farms (Tables 34, 35). When studying the percentages of the five most important domesticated animals (diagram I) of the three groups, it becomes evident that they are very much alike. This indicates that the division of the bones into three groups on archaeological evidence is artificial and that each is a sample taken at random out of the same material ranging from the 9th till the 12th century.

Domesticated cattle were the most important animals, followed by pig, sheep and goat (Tables 40, 41).

Leaving the Valkenburg excavation out of consideration this is the first instance of a post- Bronze Age settlement where the small ruminants are outnumbered by the pig. For all periods between 300 and 1100 Lewis (1958) mentions woollen cloth as the most important merchandise of the Frisian traders, a result of sheep keeping.

Beside those of domesticated animal remains have been found belonging to beaver, elk, sand seal and a large cetacean. Red deer antlers were collected as is indicated by a few worked pieces and a waste one.

As no written documents exist mentioning whale fishing at the coast in these early times, it must be assumed that the whale remains belong to a stranded animal. Remains of sturgeon and other fish indicate fishery to a certain extent.

U. HUIS TE MERWEDE

gem. Dubbeldam, province of South Holland

Excavated Monumentenzorg (Renaud) 1941.

Literature:

RENAUD, J. G. N., 1947. Het middeleeuwse kasteel en de archaeologie. In: *Oudheidkundig bodemonderzoek in Nederland,* Meppel, pp. 427–444.

The late Medieval castle "Huis te Merwede" – 14th. century – is situated near the town of Dordrecht, on the southern bank of the river Merwede.

According to Renaud (1947) there must have been two successive buildings. The first building was damaged seriously by one of the large floods of the fourteenth century. The second building was destroyed during the "St. Elisabeth" flood in 1421, but one of the walls is still to be seen east of Dordrecht.

The bones were found in the moat of the second building at the south-east side, where probably the kitchen compartments had been. The bones can be dated to a period between 1350 and 1421.

Huis te Merwede is the only site where all the domesticated animals, except the horse, that could be expected at that time were found (Tables 36, 37).

Domesticated cattle were the most important, followed by pig in the second place, sheep and goat, dog, horse, cat and rabbit. No young pigs were slaughtered at the castle (Diagram X), probably pigs were kept but not bred at the castle. Of the domestic birds domestic fowl, duck, goose, swan and pigeon were found.

The remains of wild animals are a bone of a hare and the antler of a red deer. The last piece still shows the nail-holes by means of which it must have been fixed to the castle.

The jackdaw is a bird characteristic of large buildings, so it is not surprising that it was found here.

V. AMSTERDAM

gem. Amsterdam, province of North Holland

Excavated I.P.P. (Van Regteren Altena), 1958.

Literature:

ALTENA, H. H. VAN REGTEREN, 1966. Stadkernonderzoek van Amsterdam. Groningen.
CLASON, A. T., 1966. Pluimveeteelt en jacht. In: H. H. van Regteren Altena. 1966. *Stadskernonderzoek van Amsterdam*, pp. 77–94.

At the site of the former St. Pietersgasthuis (hospital), the later Binnengasthuis, pottery and bones were found during an excavation. The pottery sherds made it possible to date the largest part of the bones as belonging to a period between 1373 and 1420, prior to the erection of the St. Pietersgasthuis. Only a small number of the bones may have belonged to the refuse of this hospital, or they cannot be dated at all. The latter two groups will not be discussed. The bones were found on a refuse-heap outside the old Amstel dike, mixed with the waste of a cobbler's workshop and of sheep-shearing. Of the domesticated animals (Tables 38, 39) only remains of the horse are lacking; obviously this animal was not consumed. Domesticated cattle, pigs, small ruminants,

domestic fowl, ducks, geese, and swans were kept in town as well as brought down to town by the peasants on market day.

In the Middle Ages both the slaughtering of animals and the sale of meat was very strictly regulated in towns. Unger (1916) mentions that in the Middle Ages the slaughtering of sheep in Amsterdam and other towns was as much as possible restricted. This is probably the explanation for the fairly scanty sheep remains; young pigs were not slaughtered in November as was also the case in the castle Huis te Merwede (diagram X). The reason is perhaps that the animals were kept but not reared in town. Only ♂ ♂ mandibulae and maxillae were found.

People in Medieval Amsterdam consumed a large number of birds, not only domesticated but also birds that could be obtained only in the marshy surroundings of Amsterdam. In the Middle Ages woods where the heron could nest were planted, to ascertain a regular supply of herons. About the spoon-bill it is known that the young birds were captured alive and shipped to England (Thijsse, 1965) to revive the diminished population of these birds, which were rigorously hunted when fully grown. At present spoon-bills are not found in England. When Duke Albert's wife visited Amsterdam (1420) she was offered nineteen herons and fifteen pikes.

Fishing for fresh water fish was important in Medieval Amsterdam. The fishery in the Voor- and Achterburgwallen (canals) was presented to the trainbands of the citizen soldiery in 1394, but later let on lease by the town itself. Remains of pike could be identified.

Unger (1916) mentions that the sale of mussels was very strictly regulated because of the perishable nature of this food. Owners of an oyster bank were privileged where the sale was concerned. Of other edible marine molluscs the remains of cockles and periwinkles were found.

CHAPTER III

DESCRIPTION OF THE ANIMALS

More than a century ago the basis for the research into the ancestry and development of the domesticated animals was laid by the Swiss Rütimeyer (1860), who discussed the well preserved animal remains from the then newly discovered prehistoric settlements along the borders of the Swiss lakes in a now classic work "Untersuchung der Tierreste aus den Pfahlbauten der Schweiz".

Rütimeyer and later investigators created a number of races for the different domesticated animals. Their origin was thought to lie outside Europe, mainly in Asia. Later most of the races were combined again to one.

The variations and differences in stature of the species are at present explained in several ways. First by the fact that the wild ancestors have proved to be more variable than was thought previously and could often be divided into geographical races, secondly by the fact that the populations of domesticated animals consisted of males and females at any rate (Boessneck, 1958; Von Leithner, 1927; Reitsma, 1932; Nobis, 1954). Furthermore castration must have been known and practised and the possible presence of castrated animals must be taken into account.

Since Von Leithner (1927) described the great sexual dimorphism of the aurochs it is taken for granted that the large and small domesticated cattle generally found are identical with the larger bulls and smaller cows, while the picture is often obscured by the existence of male and female castrates (Nobis, 1954). At present it is generally accepted that the ancestor of domesticated cattle was the aurochs (La Baume, 1947; Nobis, 1954; Boessneck, 1958) and not a smaller hypothetical wild cattle species which older authors saw next to the aurochs as the ancestor of the domesticated cattle.

The opinion prevailing nowadays is that sheep and goat were domesticated in the Near East (Boessneck, 1955; 1958; Reed, 1960) and taken to Europe by the first Neolithic farmers. In all probability the wild ancestor of the goat is Capra aegagrus Erxleben. The wild ancestor of the sheep should be sought among the wild Asiatic sheep species; which one is still uncertain (Boessneck, 1955; 1958; Pölloth, 1959).

The domesticated pig descended of the European wild boar, Sus scrofa, as was clearly demonstrated by Reitsma (1935) and not of the Indian wild boar, Sus vitatus, as was sometimes thought. Pigs of Sus vitatus blood were first introduced into Europe about 150–100 years ago (Zeuner, 1963), and are now mixed to a high degree with the domesticated European pigs.

There is still much discussion about the ancestry of the dog and the horse. It can be assumed that the dog descends from a Canide at any rate, in a narrower sense Canis s.str. (Boessneck, 1958). Whether this could be either the ancestor of the dingo (Zeuner, 1963) or a small wolf remains to be proved as Zeuner (1963) already stated. Ancestor of the domestic horse is the Equus caballus przewalski according to Nobis (1955); Zeuner (1963) on the other hand thinks that Equus caballus gmelini anticus, the tarpan, is ancestor of the domestic horse.

Because of its nature it is improbable that the European wild cat (Felis sylvestris) is the ancestor of the domesticated cat; the Lybian cat (Felis sylvestris lybica) is thought to be the most likely ancestor. The rabbit was domesticated at a late date and did not reach West and North-western Europe before the Middle Ages; its wild form lived in Spain.

Of the domesticated birds only the domestic fowl must have come from Near Asia, where the Burman wild fowl, its ancestor, still lives in the woods (Gandert, 1953).

Little is known about the domestication of ducks, geese, swans and pigeons; even at present the wild forms of the first three are still common birds in the Low Countries.

Generally it is taken for granted that while the first domestication took place in the Near East and domesticated animals were imported into Europe, later domestication took place in different parts of Europe too, when the right wild species were obtained easily, as was for instance the aurochs in the Hungarian plain (Bökönyi, 1962).

The bones are well preserved generally, except those found at Zandwerven and Vogelenzang. Most bones are the rests of meals and are broken as brains (Cranium) and marrow (lower jaws and long bones) were consumed too.

At the Late Eneolithic site of Vlaardingen a large number of bones of several species was used for the manufacture of tools (Walvius, 1961*b*), at sites from later periods a few worked red deer antler fragments are found at most.

Owing to the fact that most bones were broken it was possible in few cases only to take length measurements; most of the measurements could only be taken of part of the bones. The measurements are mostly taken according to Duerst (1930) and noted in mm. For the small mammals and small birds the measurements were taken with an accuracy of 0.1 mm; the circumference at the base and the length of the horncores with an accuracy of 1 mm; all the other measurements were taken with an accuracy of 0.5 mm. For the measuring a calliper and a tape-measure were used. In order to calculate the percentages a slide-rule was used.

The teeth in the upper and lower jaw are numbered backwards using small letters for the deciduous teeth and capitals for the permanent ones. So $p_1p_2p_3$ indicate the milk molars of the lower jaw, while $P^1P^2P^3P^4M^1M^2M^3$ indicate a full set of premolars and molars of the upper jaw.

The minimum number of individuals is estimated by the number of lower jaws. These are the most numerous generally and give a possibility to estimate the age at which the animals were slaughtered. If no lower jaws were found, other bones were used. Species of which only a few bones were found are always overrated among the estimated minimum number of individuals.

Of the vertebrae only atlas and epistropheus are mentioned, if they were the only pieces found of a species the other vertebrae are also mentioned. The ribs were not identified. The total of the unidentified vertebrae and ribs is mentioned in every case.

In all cases there remained a number of bones, mostly small pieces, which were so badly damaged that they could not be identified. They are not mentioned.

The measurements of the bones found at the different sites are marked in the tables (Part II) with the letter given to the site where they were found in Chapter II.[1]

The numbering of the bones is according the system used by the different excavators.

Recently Prof. J. Boessneck of München and his students have issued a number of publications on the subject of the domesticated animals found at the Celtic Oppidum of Manching and other prehistoric sites. In these works they have collected and discussed most of the literature known on the subject of domestication and domesticated animals.

Table 49 gives a list in English, Russian and Dutch, of the names of species described or discussed.

The drawings were made by Mr. B. Kuitert, Mr. H. Roelink, and Miss A. Faber, the diagrams by Mr. Jac. Klein of the "Biologisch-Archaeologisch Instituut". The photo's were taken by the "Centrale Fotodienst" of the Groningen University.

A. MAMMALIA

In Table 47 and Diagram LXI the numbers of bones of each identified species at each site is given. In the diagrams of the measurements I, II, III, IV, V and VI stand for Eneolithic, Bronze Age, pre-Roman Iron Age, Roman Age, Early Middle Ages and Late Middle Ages.

1. *Oryctolagus cuniculus* (*L.*)

Only one bone of a rabbit, the proximal end of a tibia, has been found in the kitchen refuse of the Medieval castle Huis te Merwede. The bone, proximal width 13.7, is too small to belong to a hare (Pl. I*a*).

1. The author acknowledges gratefully the cooperation of Mr. and Mrs P.H. Jewell, who kindly provided the correct English for the description of the measurements.

Till Roman times the wild rabbit did only occur in Spain. Poulain (1958) mentions rabbit remains from Neolithic and Bronze Age layers in France, but suggests that in these layers at a later date the animals burrowed holes, in which they died. This may also be the explanation of the rabbit remains found in England at a Maglemosian site (King, 1962).

The Romans were the first to keep wild rabbits in enclosures as an easy supply of meat. After the fall of the Roman Empire wild rabbits were still kept, mostly on small artificial islands, as a supply of small game. Under these circumstances the animals bred freely and retained their wild character (Zeuner, 1963). Van der Feen (1963) refers to a poem by Jacob van Maerland, who lived in Flanders some time before 1270, in which he gives a good description of the habits of the wild rabbit, thus showing that in this area the wild rabbit was known in the Middle Ages.

Domesticated rabbits were first mentioned in 1149 when the Abbot of the Benedictine monastry of Corvey on the Weser asked the Abbot of Solignac in France to send him two pairs of rabbits.

In 1366 in the town of Deventer in the province of Overijssel, a so-called "rabbit mound" was constructed, where the animals were fed in winter (Baudet, 1904). Whether the rabbits were wild or domesticated is not mentioned.

It cannot be said whether the one rabbit bone from the castle Huis te Merwede belonged to a wild or a domesticated animal. That wild and domesticated rabbits were still much alike in the Middle Ages is shown by the regulation in Medieval The Hague, that the right back foot of a domesticated rabbit on sale in the market had to be cut off (Unger, 1916).

2. *Lepus europaeus Pallas* (*Table 50*)

Evidence of the existence of the hare has been found in three cases. Van Giffen reported that the skeleton of a hare had been found in the central grave of a Bronze Age barrow near Oostwoud. Apparently the dead had been presented with the hare when he was interred. Unfortunately this skeleton got lost before it could be described.

Fragments of a mandibula and a tibia were found among the bones in the Roman Castellum at Valkenburg, and a femur in the Medieval castle Huis te Merwede.

Remains of hares are scarce in the refuse of the settlements of prehistoric Europe. Rütimeyer (1860) thought that the few hare bones found in the Swiss lake dwellings indicated that the inhabitants did not like hares. Boessneck (1958), however, pointed out that the hare is an animal which lives in open country with copses to hide in. So the dense woods that covered prehistoric Europe at that time were hardly a place to expect hares. It was only when the land came under tillage that the number of hares increased.

The Romans kept hares in so-called Leporaria – walled gardens in which caught

animals were kept – in order to have a constant supply of these animals for the kitchen (Zeuner, 1963).

3. Castor fiber L. (Table 51)

Remains of the beaver were found abundantly at Eneolithic Vlaardingen and Eneolithic Hekelingen. In the Bronze Age barrows of Oostwoud, in the Roman Castellum at Valkenburg, and at Early Medieval Rijnsburg only a few bones were found. Most bones were badly damaged, of the skulls only small fragments were found. In a few cases the length of the bones could be measured. The material is too scanty to conclude whether a sexual dimorphism existed or not. The diagrams VI, VII and the irregularity of the other diagrams showing two peaks, may be a positive indication in this direction. The measurements of the mandibula found at Valkenburg and the femur found at Rijnsburg fall within the limits of the Neolithic ones (diagram II–IX).

The fore limb was cut off at the proximal end of the humerus, as is demonstrated by the fact that all humeri have the proximal end cut off above the deltoid tuberosity. The manus was cut off just above the distal ends of radius and ulna. Humeri, radii and ulnae show many traces of carving and gnawing. The manus and pes were probably not used as only a single calcaneum has been found. Of the hind limb only the lower part was cut off, in some cases by cutting off the distal end of the femur, in other cases the proximal end of the tibia. The distal end of the tibia is in many cases cut off too, in that case the remaining diaphyses are more heavily gnawed than the ones with the distal end still intact. Perhaps the tibia without the pes were thrown to the dogs as their part of the catch.

All the mandibulae have a complete set of teeth except one in which P_1 was erupting.

The beavers were caught for their meat as well as their furs, and perhaps also as happened in historical times, for the castor, the substance of two glands, situated in the vicinity of the anus. The castor was a medicine much in demand for many ailments (IJsseling & Scheygrond, 1950).

In historical times the beaver still abounded in many places. In the Middle Ages, the towns of Deventer and Zutphen in the province of Overijssel even put a premium on captured animals. The last beaver in the Netherlands was caught in 1827 in the vicinity of Zalk on the river IJssel near Zwolle (IJsseling & Scheygrond, 1950).

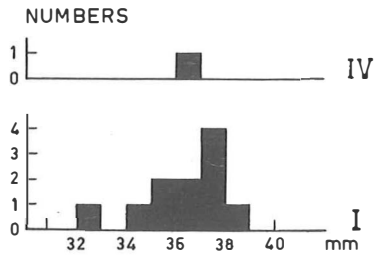


Diagram II. Beaver.
Mandibula, length of the teeth row.

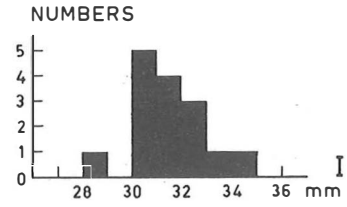


Diagram III. Beaver.
Humerus, distal width.

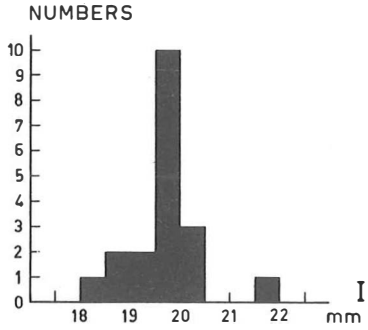


Diagram IV. Beaver.
Humerus, width of the
lower articular surface.

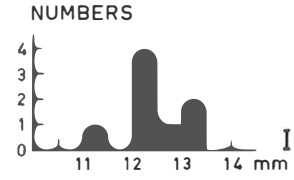


Diagram V. Beaver.
Radius, proximal width.

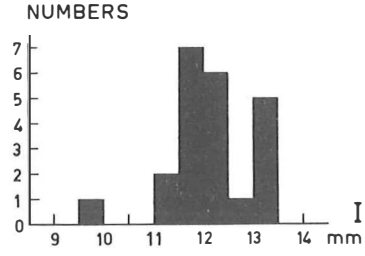


Diagram VI. Beaver.
Ulna, width of the articular surface.

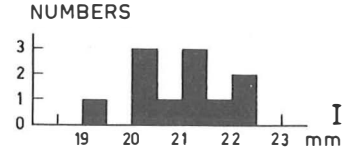


Diagram VII. Beaver.
Pelvis, length of the acetabulum.

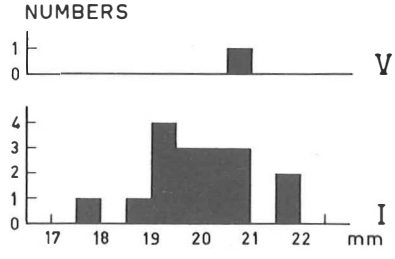


Diagram VIII. Beaver.
Femur, minimum width of the
diaphysis.

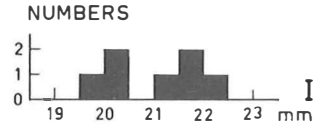


Diagram IX. Beaver.
Tibia, distal width.

4. Canis familiaris L. (Table 52)

Dog remains are not numerous. Most bones have been found in the Roman Castellum at Valkenburg. Although the material is not extensive it is just large enough to

show that in Holland the dog developed in the same way as elsewhere in Europe.

Most discussions on the ancestry of the dog and the subsequent development of breeds are based on long descriptions and numerous measurements of the skulls and mandibulae. Therefore the skulls and mandibulae will be discussed here shortly. No attempt will be made to link the skulls with any of the many breeds described up to the present; after the example of Oberdorfer (1959) only groups will spoken of here.

From Eneolithic Vlaardingen two skulls without muzzles, three fragments of a third and an immeasurable fragment of a fourth are known (fig. 1, 2). One skull and a mandibula got lost before they could be measured. A damaged skull and mandibula dating from the end of the Eneolithic are known from the Langeveld near Lisse. The Bronze Age site at Zwaagdijk (fig. 3, *a*, *b*, *c*, *d*) yielded three skulls and the pre-Roman Iron Age site at Vlaardingen two very much damaged and a mandibula (fig. H/5). The larger part of the material has been found at Roman Valkenburg, where eleven more or less damaged skulls were found, five of them with mandibulae, and two loose mandibulae (fig. 4–14). From Early Medieval Rijnsburg two damaged skulls are known.

The Valkenburg material will be considered first, as these finds are the most numerous.

If one studies the measurements which were taken of the skulls, in the first place the length measurements, it appears that the material consists of four groups. The smallest and the largest skull each stand alone, the remaining nine skulls belong to two groups.

The smallest skull is a very peculiar one, at the first glance it can easily be taken for the skull of a cat, but it is somewhat larger. If studied closer it appears to be the skull of a dog, from which the face is missing unfortunately. The cranium is domed without a parietal crest, each parietal bone clearly showing still (fig. 4*a*). The length of the cranium is 64.0, while the same measurement of the smallest skull belonging to the second group (O/751) is 82.5. The frontal bones do not form a supra-orbital proces and they go straight down to the (missing) nasal and maxillar bones of the face. Combined these features are typical for the skull of a small thoroughbred or a miniature dog.

The numbers O/751, O/1409 and O/2503 (fig. 4*b*, 5, 6) form a group with skull lengths of 151.0, 154.5, 157.0 and basal lengths of 129.5, 131.5, 139.0. The numbers O/3146 and O/3394 (fig. 7, 8) of which the face bones are missing form a transition to the next group comprising the numbers O/2329, O/1620 and O/2501 (fig. 9, 10, 11), with total lengths of 178.5, 178.5 and 196.0, basal lengths 153.5, 158.0 and 174.5.

The largest skull with teeth well worn down (fig. 12), belonging to an old individual, has a total length of 229.0 and a basal length of 202.0. The Eneolithic skulls from Vlaardingen correspond closely with the second group from Valkenburg. The skull

from the Langeveld near Lisse and the skulls from Bronze Age Zwaagdijk as well as those from pre-Roman Iron Age Vlaardingen correspond with the third group from Valkenburg. The early Medieval skulls from Rijnsburg correspond with the third and fourth group from Valkenburg.

The mandibulae found at Valkenburg can also be divided into groups. A mandibula that could belong to the dwarf form was not found. In itself the material discussed is so small that the division into four groups could easily be an artificial one; during the last years, however, studies on a larger material from the Celtic Oppidum of Manching in Bavaria have been published. Oberdorfer (1959) studied the remains excavated in 1955/56 and Petri (1961) those found in 1957/58.

Oberdorfer (1959) found that the Manching material consists of a dwarf dog with a calculated basal length of the skull of 106.6, a small second group with basal lengths 115–130, and a third group with basal lengths 136–190 mm. This third group is not homogeneous and by the diagrams it can be divided roughly to a smaller group with basal lengths 136–155 and a larger group with basal lengths 155–190. Petri (1961), working on the material excavated later, found the same, a group of dwarf forms, a group of small dogs, a third group of larger dogs, which might be divided into two groups.

Another recent work on dogs is by Nobis (1960) who studied the dog remains from Haithabu, an early Medieval town in Schleswig-Holstein. On the basis of the mandibulae found there, he calculated the basal lengths of the skulls belonging to these mandibulae, and arrived at the same groups.

At a much earlier date already Van Giffen (1925, 1927) distinguished three groups in his studies on the dog remains of the 'Terpen' in the provinces of Frisia and Groningen in the north of the Netherlands, from which the dwarf form is missing.

It is interesting to see that material from three different periods, from three different places in Europe gives the same picture and is linked by the Terpen dogs, as these comprise the period from 500 B.C. till 1000 A.D. in all probability.

The scanty Eneolithic material which falls into the range of the second group, the group of the small dogs, corresponds with what was found elsewhere in Europe, especially in the lake-dwellings in Switzerland. For example it compares very well with the material from the Eneolithic settlement of Seeberg Burgäschisee-Süd described by Jéquier (1963).

However, already from the Eneolithic Swiss lake-dwellings and from Denmark remains of large dogs are known too. Beside the remains discussed here, at Hekelingen a calcaneum and a first phalanx was found and at Spanjaardsberg near Santpoort an atlas, corresponding with those of a wolf in the B.A.I. collection, that had been bred recently in a zoo. It is impossible to say whether these bones belong to a large dog or to a wolf.

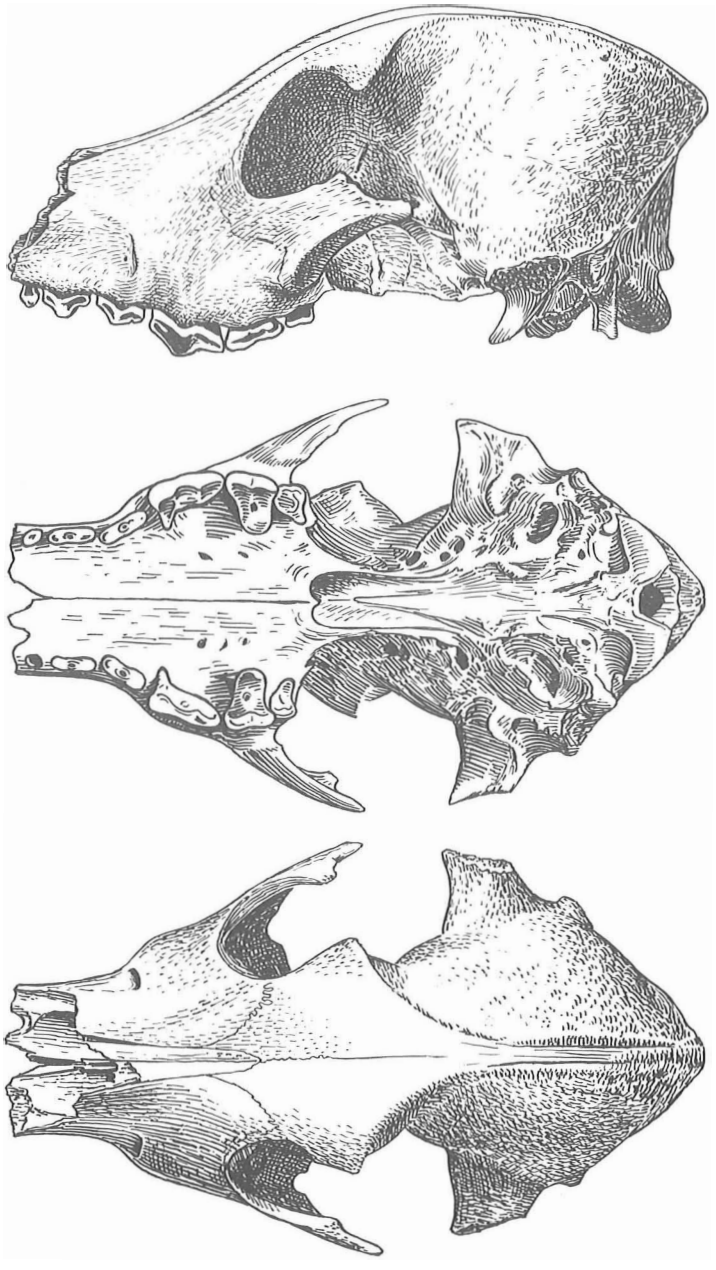


Fig. 1. Canis familiaris – skull: A/G $18^{a,b}$ 2 : 3

Fig. 2. Canis familiaris – skull: A/G 17^{c}. 2 : 3

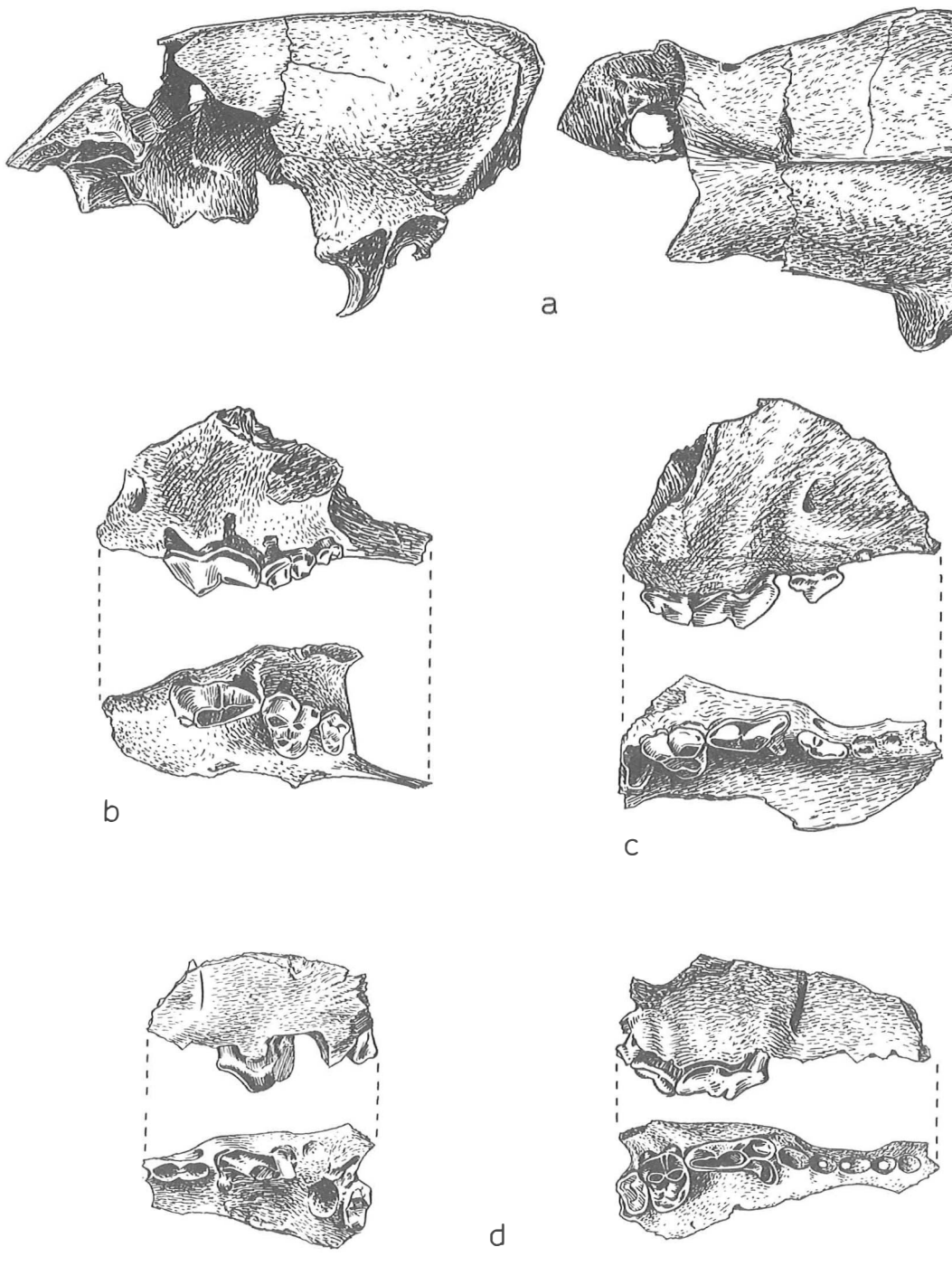


Fig. 3. Canis familiaris – skull: *a*, *b*, *c*, F/3 + 10; *d*, F/15. 2 : 3

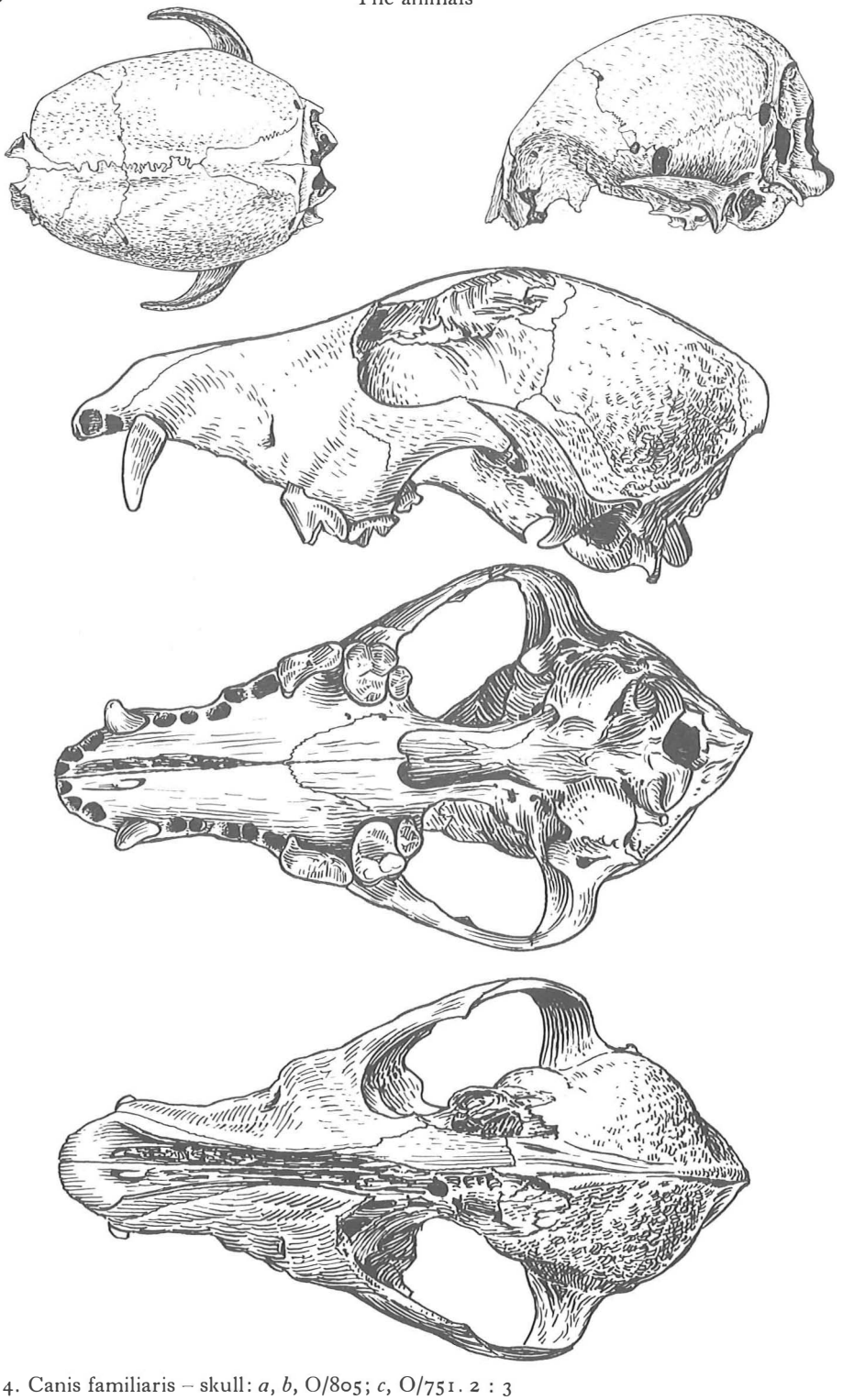


Fig. 4. Canis familiaris – skull: *a*, *b*, O/805; *c*, O/751. 2 : 3

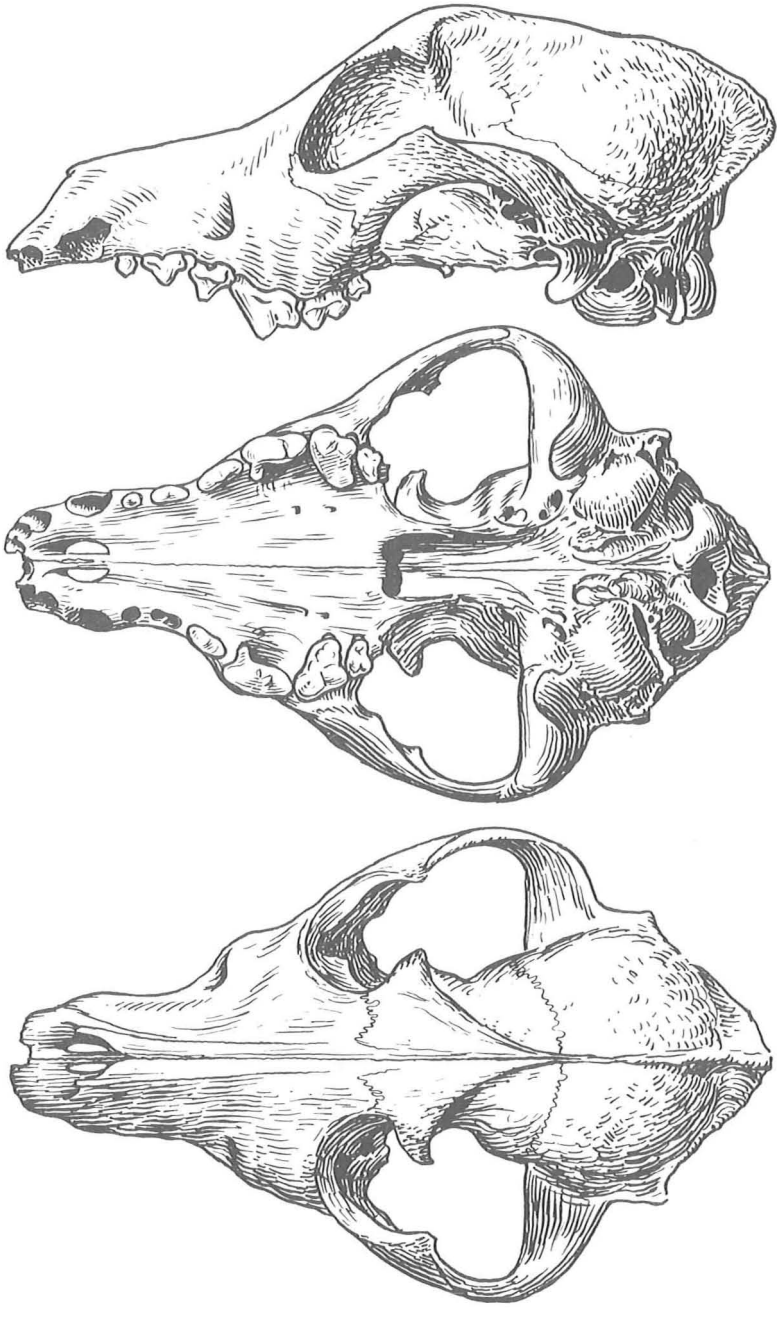


Fig. 5. Canis familiaris – skull: O/1409. 2 : 3

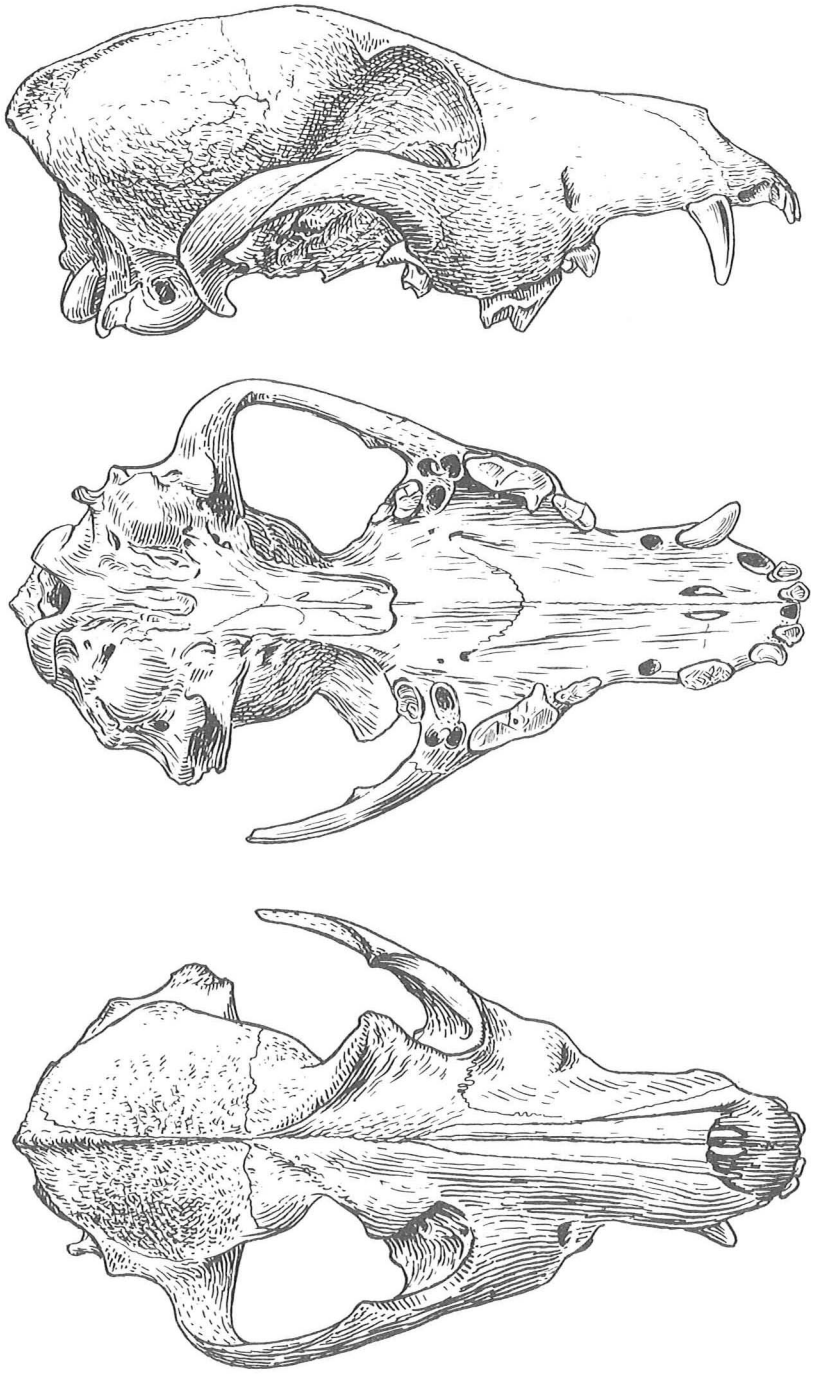


Fig. 6. Canis familiaris – skull: O/2503. 2 : 3

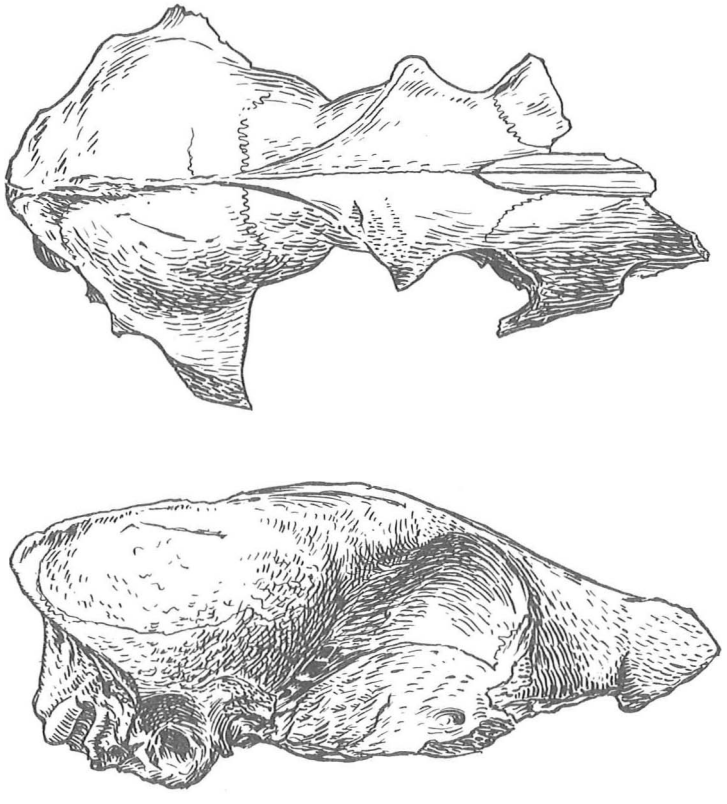


Fig. 7. Canis familiaris – skull: O/3146. 2 : 3

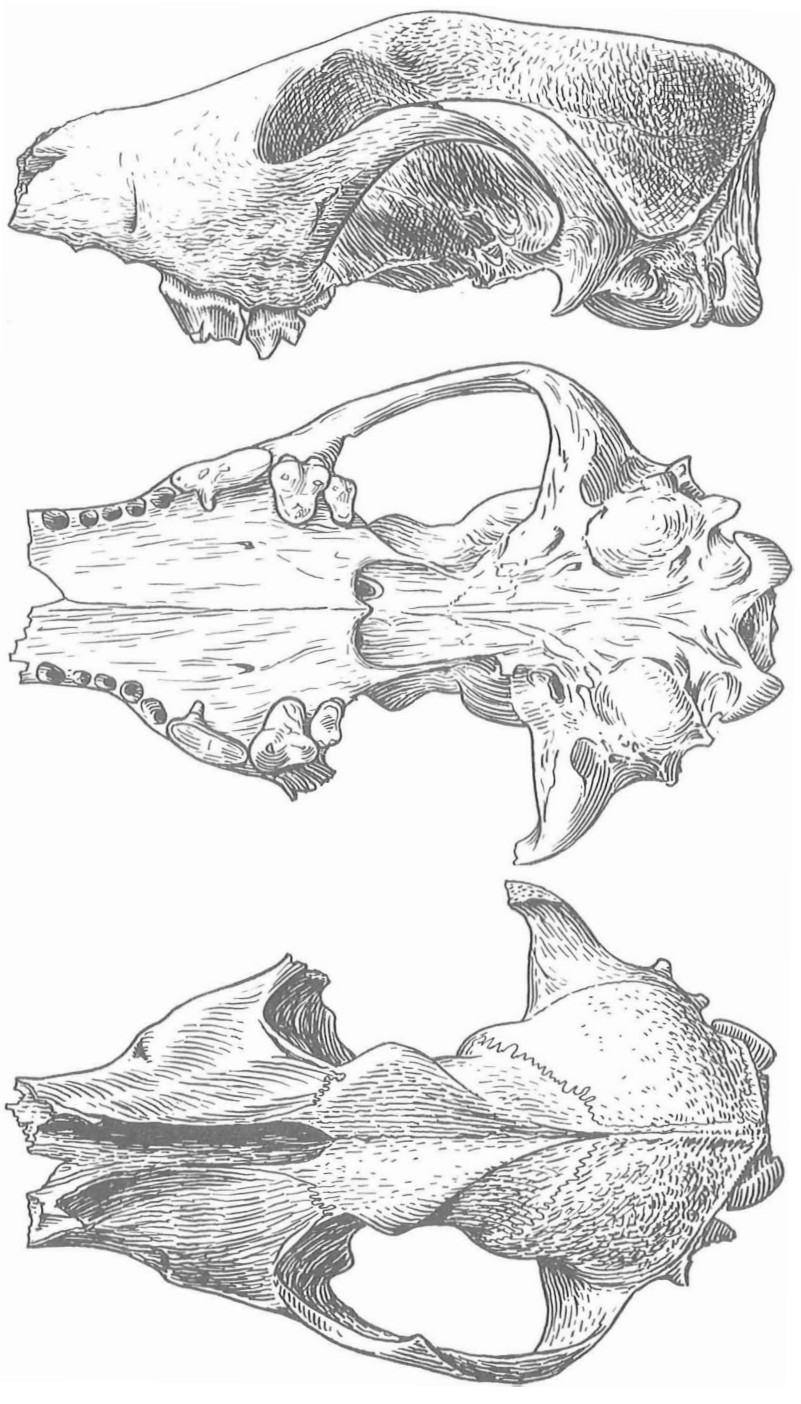


Fig. 8. Canis familiaris – skull: O/3394. 2 : 3

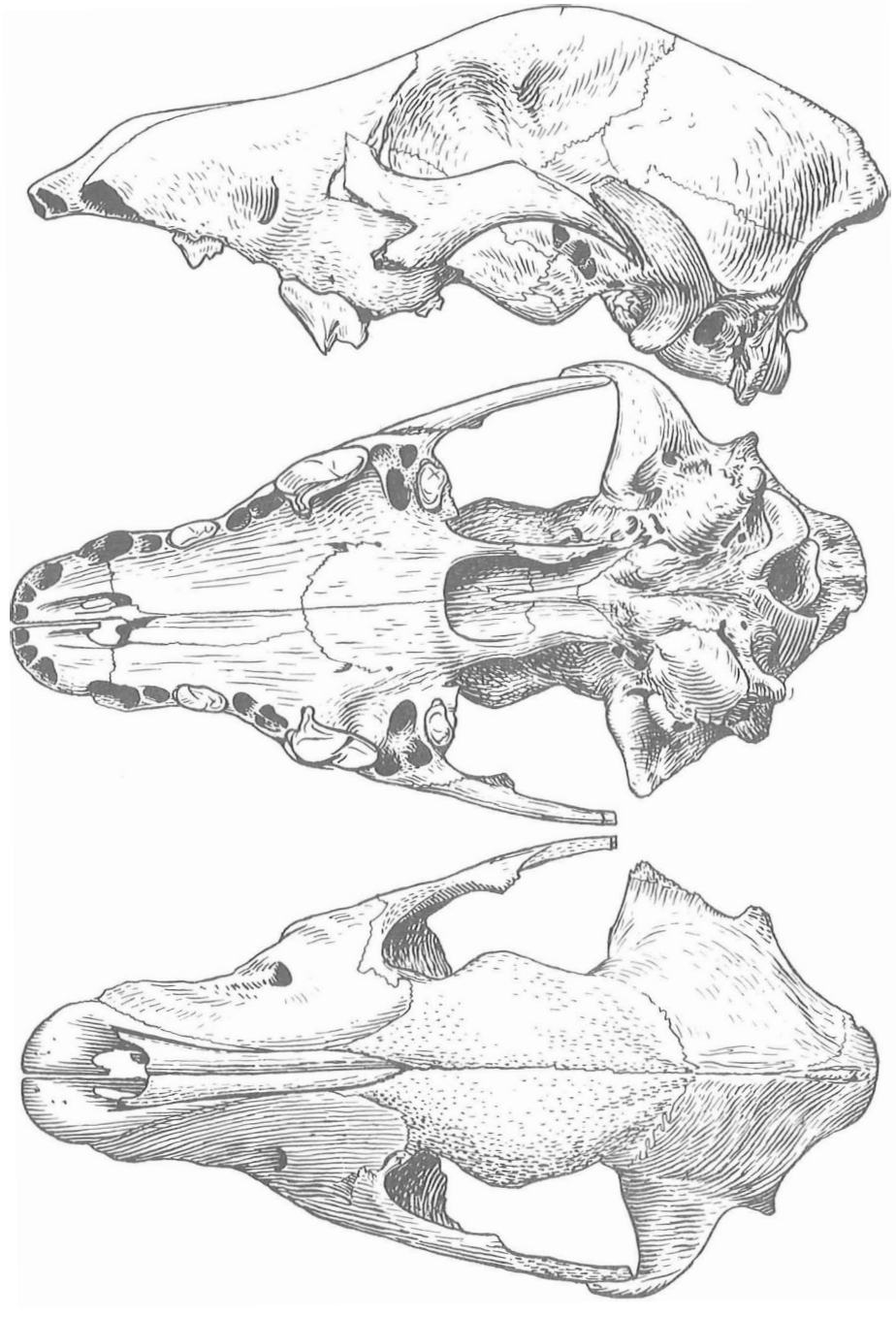


Fig. 9. Canis familiaris – skull: O/2329. 2 : 3

Fig. 10. Canis familiaris – skull: O/145. 2 : 3

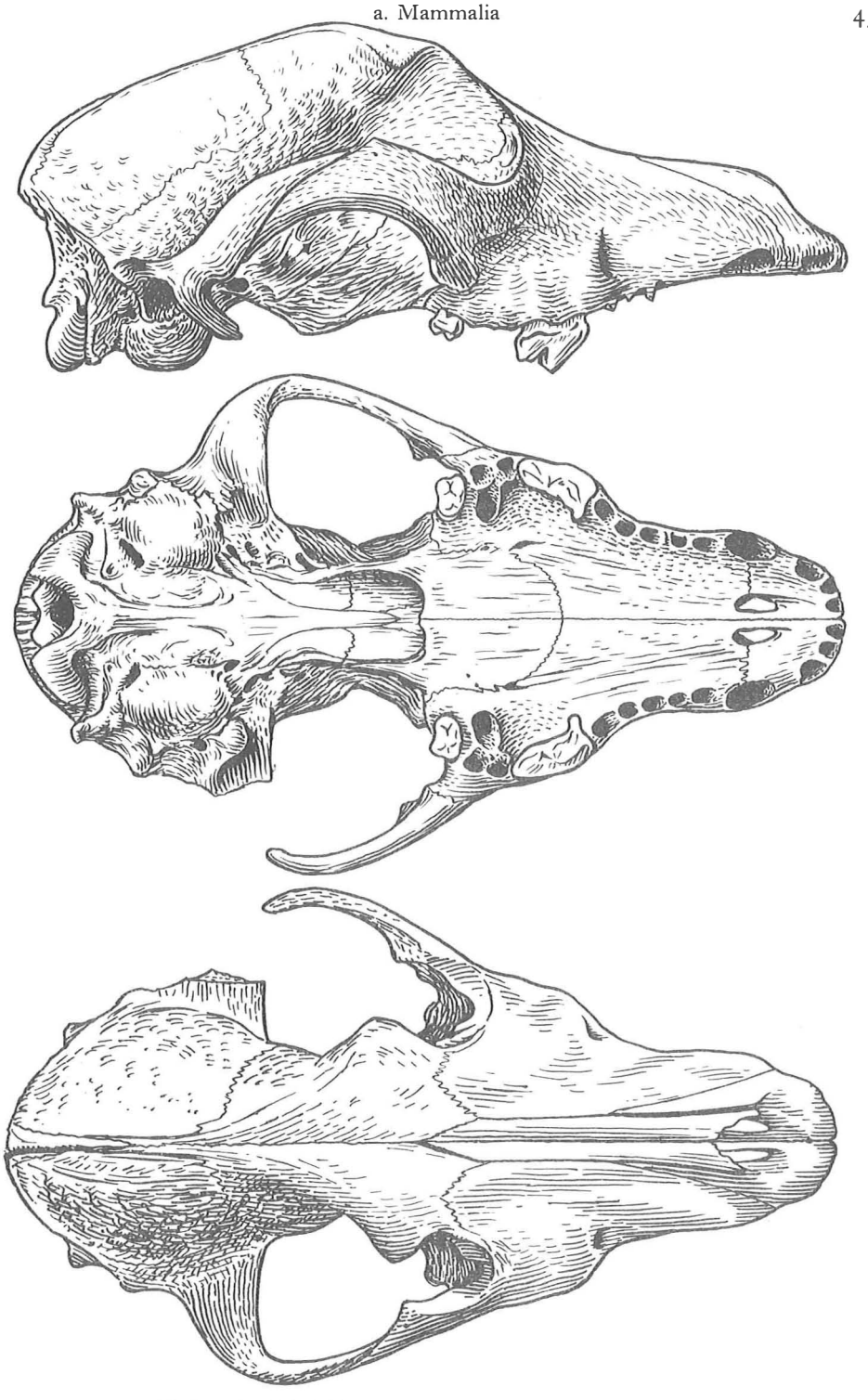


Fig. 11. Canis familiaris – skull: O/1620. 2 : 3

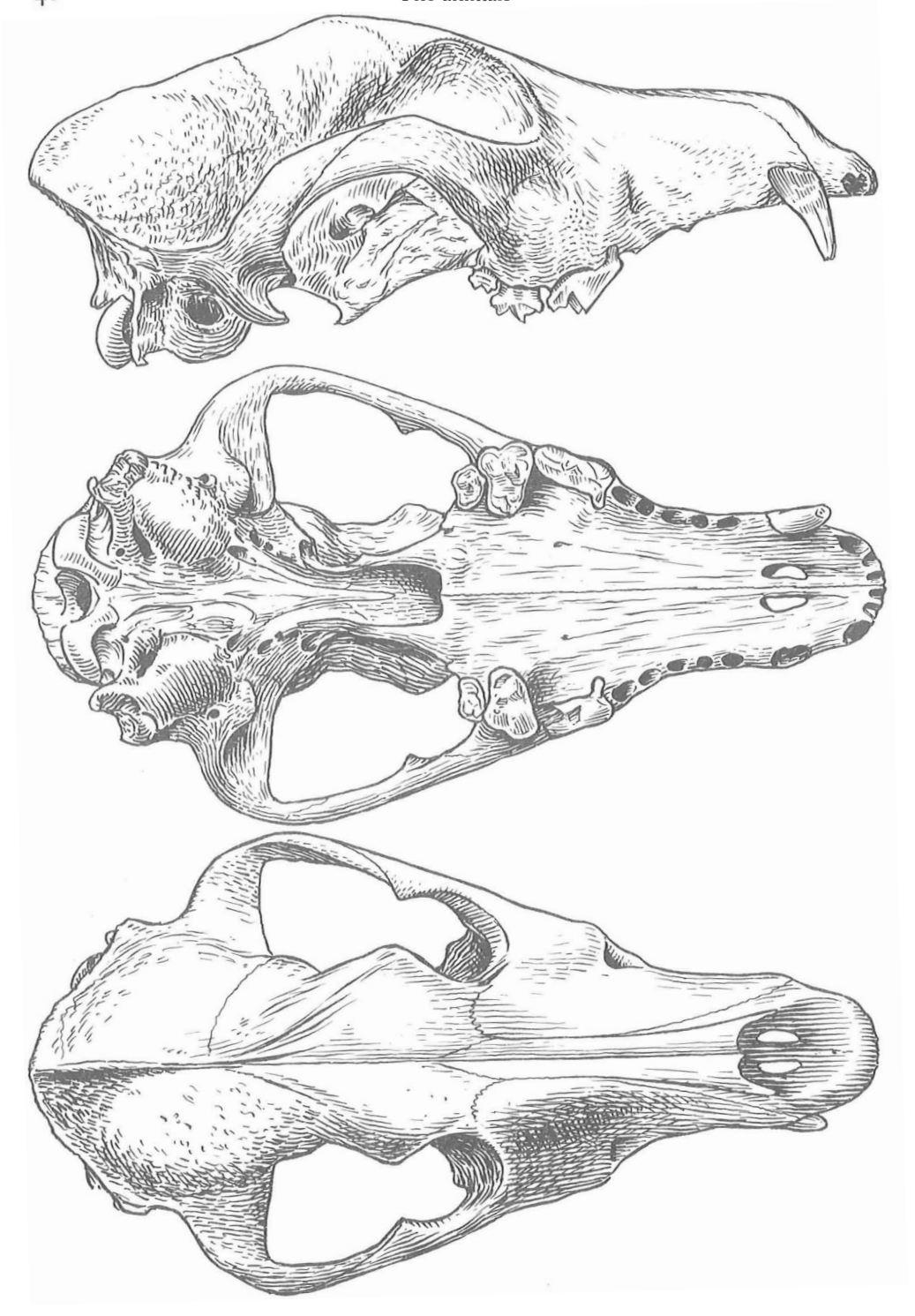


Fig. 12. Canis familiaris – skull: O/2501. 2 : 3

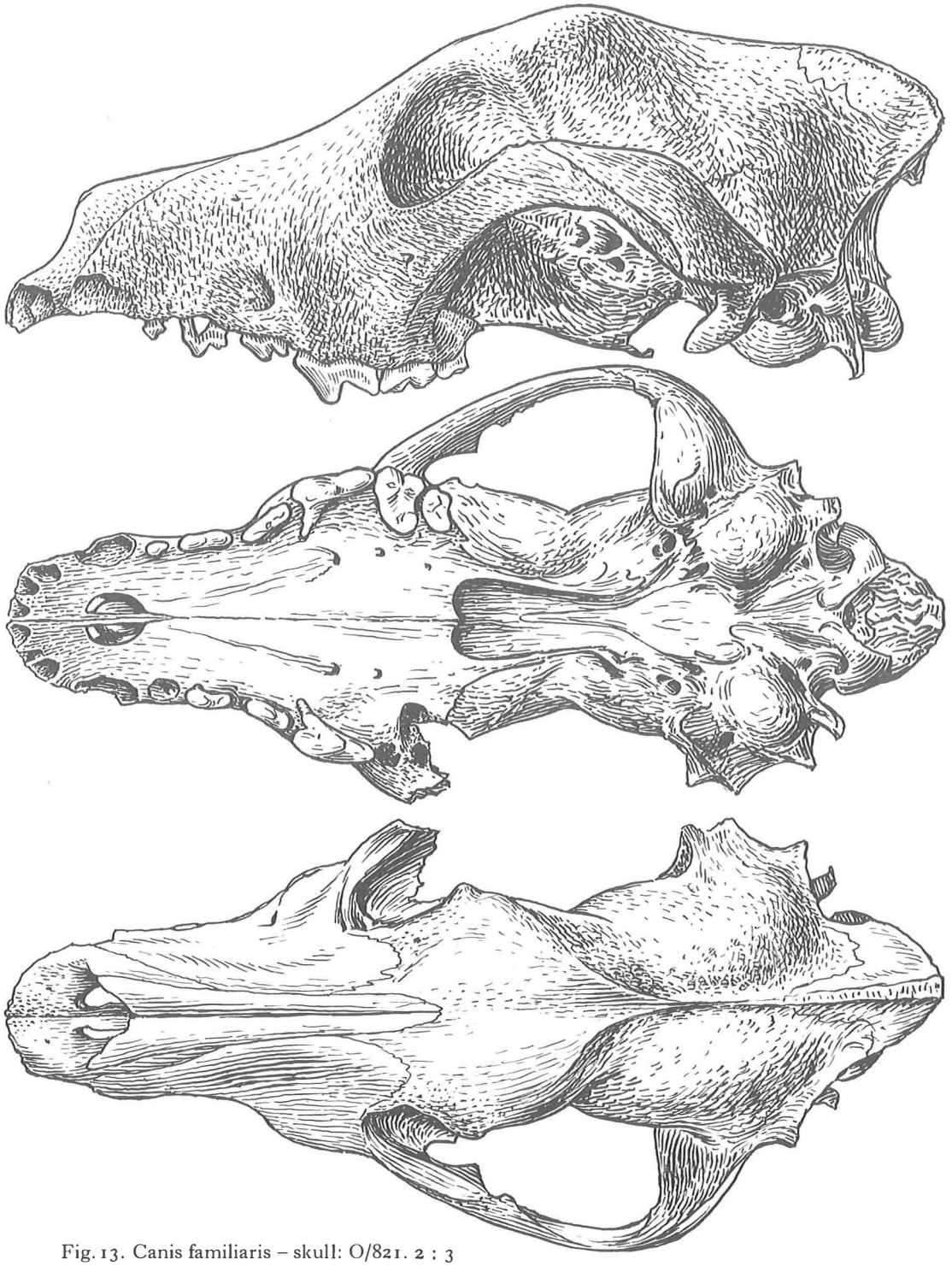


Fig. 13. Canis familiaris – skull: O/821. 2 : 3

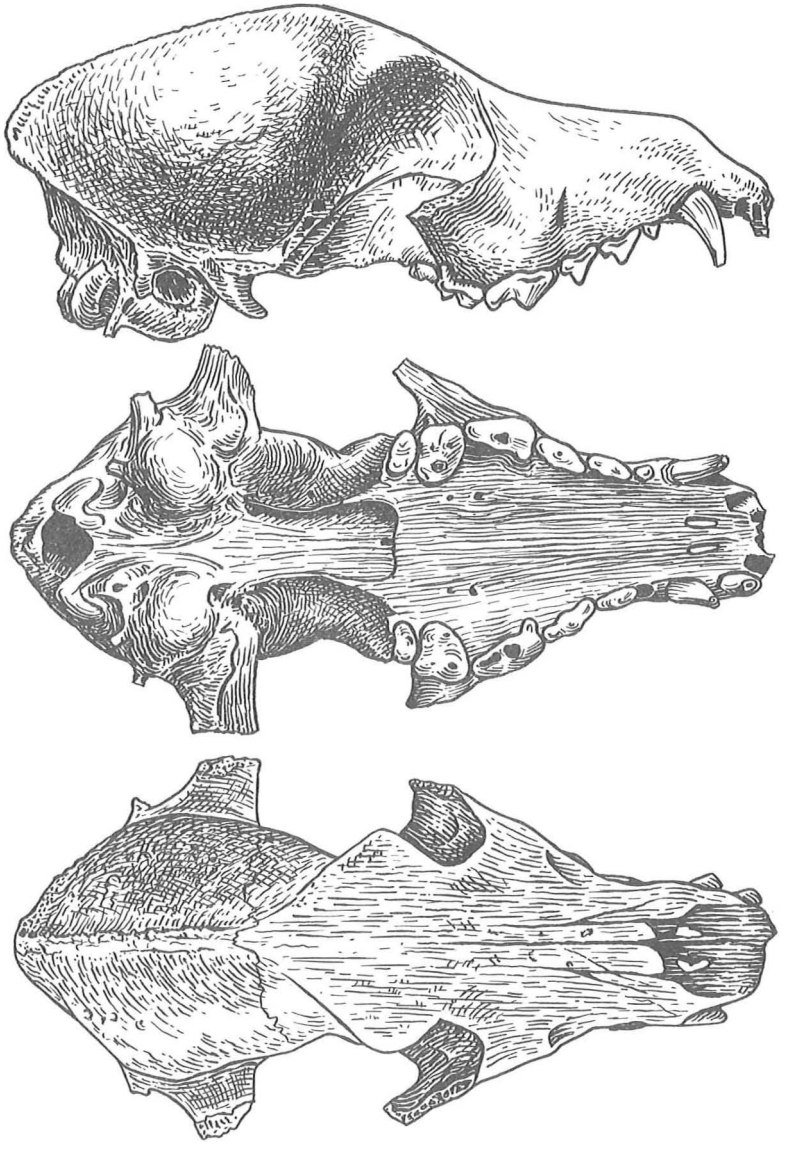


Fig. 14. Canis familiaris – skull: O/61. 2 : 3

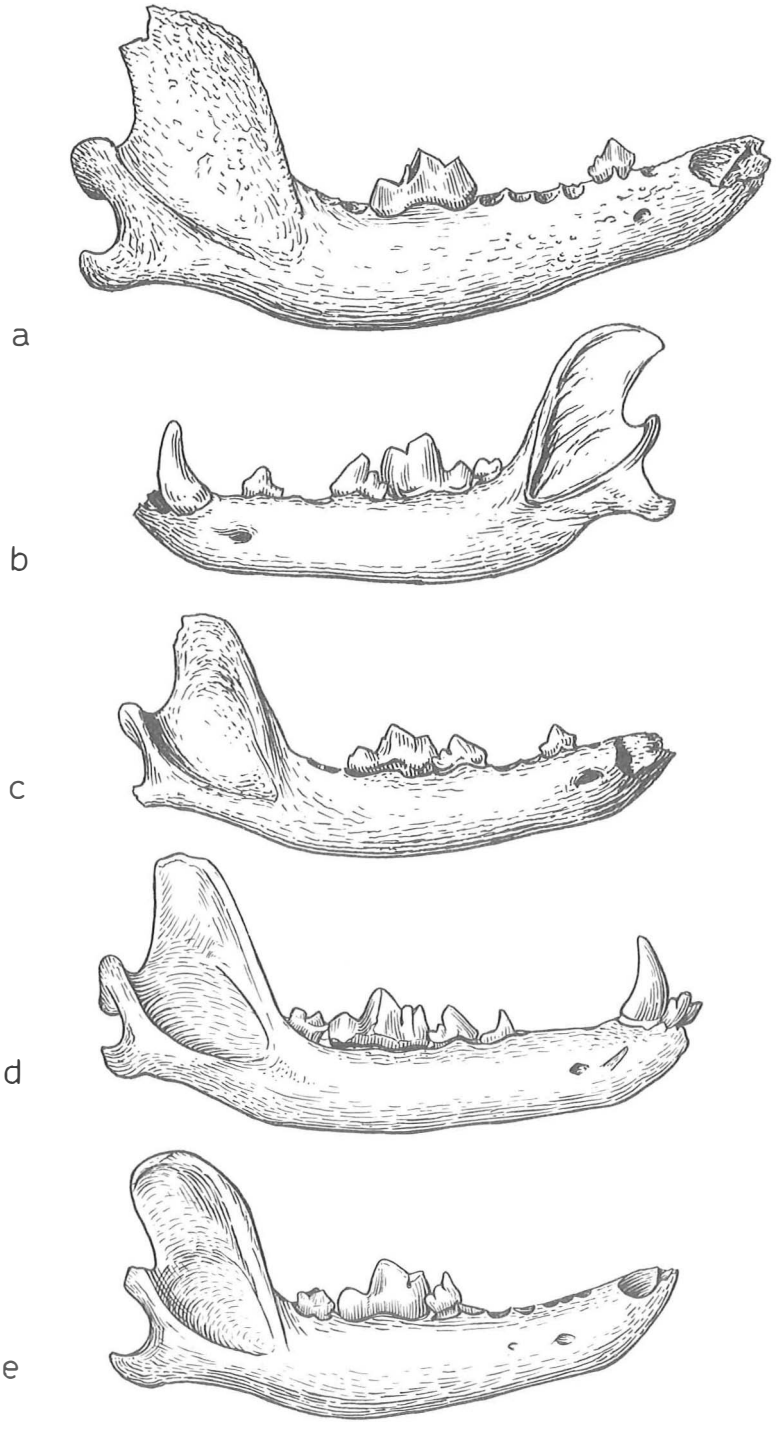


Fig. 15. Canis familiaris – mandibula: *a*, K/13; *b*, O/751; *c*, O/3508; *d*, O/2503; *e*, O/3297. 2 : 3

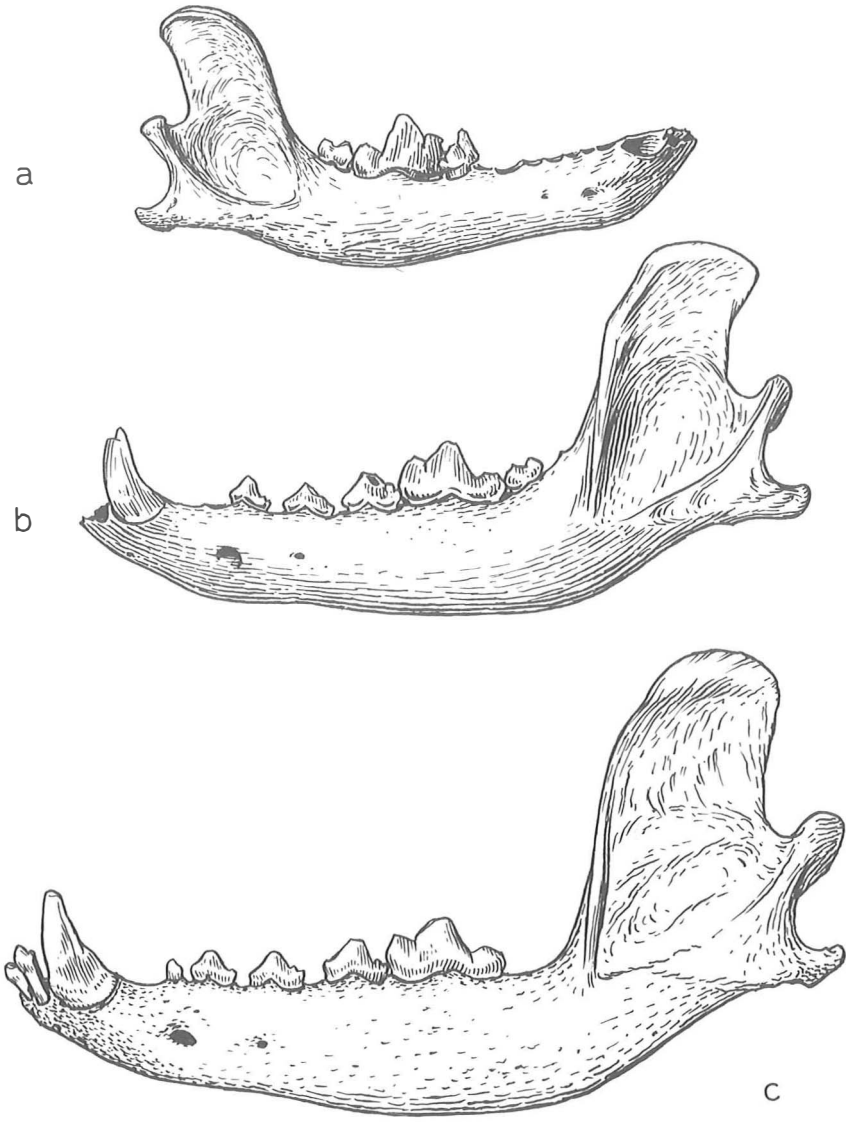


Fig. 16. Canis familiaris – mandibula: *a*, O/3297; *b*, O/2510; *c*, O/821. 2 : 3

5. Vulpes vulpes (L.) (Table 53)

Of the fox only a few remains have been found. In Bronze Age Zwaagdijk a humerus and pelvis, in pre-Roman Iron Age Vlaardingen a mandibula and at Roman Valkenburg a humerus.

6. Ursus arctos L. (Table 54)

Six bone fragments belonging to the brown bear are known. At Eneolithic Vlaardingen a cranium, maxilla, mandibula and a loose M^1, at Eneolithic Hekelingen and Roman Valkenburg both a loose C were found. At Hekelingen there was also a metacarpal that may have belonged to a brown bear.

The cranium was discovered together with a small coffin of birch bark (Glasbergen, 1962; Hooyer, 1962) (Pl. III*b*).

The maxilla and mandibula belong to the same individual. The loose C from Hekelingen was worked into a pendant (Van der Feen & Kortenbout van der Sluys, 1953).

When the brown bear was exterminated in the Netherlands is not certain. In charters dating from 943, 944, 1006 and 1025 about the hunting rights of the Bishop of Utrecht in the province of Drenthe the brown bear was still mentioned (IJsseling & Scheygrond, 1950).

7. Putorius putorius (L.) (Table 55)

Remains of the polecat have been found at the Eneolithic site of Vlaardingen: five skulls, three mandibulae, one humerus, one pelvis, one femur and one tibia.

Four skulls are badly damaged. In three cases the braincase is missing. On the muzzle there are carving traces which run from the orbitae to the middle of the skull, indicating that the animals were carefully skinned. The long bones show no carving traces or other damages. Obviously the only purpose in hunting the polecat was the skin.

In a preliminary report on part of the carnivores of Vlaardingen Van Bree (1960, 1961) is of opinion that two of the skulls (number A/F 17^a (1) (fig. 17*b*, Pl. IV*c*) and A/F $18^{a'}$ (fig. 17*a*, Pl. IV*b*) belonged to the European mink. According to Miller (1912) the skull of the European mink is as large as that of the ♀ polecat. Gaffrey (1953), however, gives the same variation for the length of the toothrow of the maxilla for both species.

According to Gaffrey the male of the mink must be larger than the female as is the case with the polecat.

According to Miller the dorsal profile of the European mink skull must be less convex throughout and in particular less bent downward anteriorly, than that of the

polecat. Gaffrey finds that the notch at right angles at the back of M^1 is typical for the European mink. According to Miller (1912) "the auditory bullae of the European mink are moderately inflated, irregularly almond shaped in outline, its width barely half its length, the meatus slightly projecting but not tubular".

If the five skulls are studied more closely it appears that skull A/F 17^a(1) (fig. 17*b*, Pl. IV*c*) (of an European mink according to Van Bree) has the less convex and less bent downward profile mentioned by Miller. The anterior point of the auditory bulla projects slightly over the pterygoid but is not flattened. The width of the auditory bulla is $\frac{2}{3}$ of the length. The right M^1 has the notch at right angles mentioned by Gaffrey. Skull A/F 18^a, the second European mink skull according to Van Bree, is convex and bent downwards anteriorly, its M^1 lacks the notch at right angles altogether, the auditory bullae are missing (fig. 17*a*). Of skull A/F 17^a(2) (fig. 17*d*) the dorsal profile is convex and bent downwards anteriorly, M^1 lacks the notch at right angles and only half the anterior top of the auditory bulla is projecting over the pterygoid. The skulls A/G 19^d, and A/G 21^a have the convex dorsal profile and are bent down anteriorly, their M^1 have the notch at right angles (fig. 17*c*; 18, 2; Pl. IV*a*, *d*). The auditory bulla of A/G 21^a has the same form as that of A/F 17^a (2).

The anterior point of the auditory bulla of A/G 19^d is slightly grown over by the pterygoid.

Looking at the measurements in general one can distinguish two groups, three small skulls A/F 17^a(1) and (2) and A/F 18^c, and two large ones A/G 19^d and A/G 21^a. Since Gaffrey (1951) mentions a sexual dimorphism for the European mink and the female polecat is much smaller than the male (IJsseling & Scheygrond, 1950), it can be assumed that the three smaller skulls are of ♀ ♀ and the two larger of ♂ ♂. Since these five skulls proved variable in the characteristics ascribed to one as well as to the other species, and insufficient recent material is available for comparison, it is difficult to decide whether the five skulls are from one species, or from two. The skull A/F 17^a (1) shows the different characters described by Miller (1912) and Gaffrey (1953) for the European mink the most clearly. So this skull may be that of a European mink. The auditory bullae of the skulls A/G 21^a and A/F 17^a (2) are intermediary between those of A/G 19^d and A/F 17^a (1), while both have the notch at right angles in M^1, which the M^1 of A/F 17^a (2) and F 18^c miss. Skull F 18^c missing the auditory bulla does not show any of the other characteristics of the European mink that have been mentioned.

Recapitulating one can say that four skulls (2 ♀ ♀ and 2 ♂ ♂) certainly belong to the polecat while a fifth skull may be that of a European mink, but this has to be proved by more extensive material for comparison.

Of the mandibulae one belongs to a female and two belong to males. Just as was the case with the long bones, it is impossible to say whether they belong to one or two species.

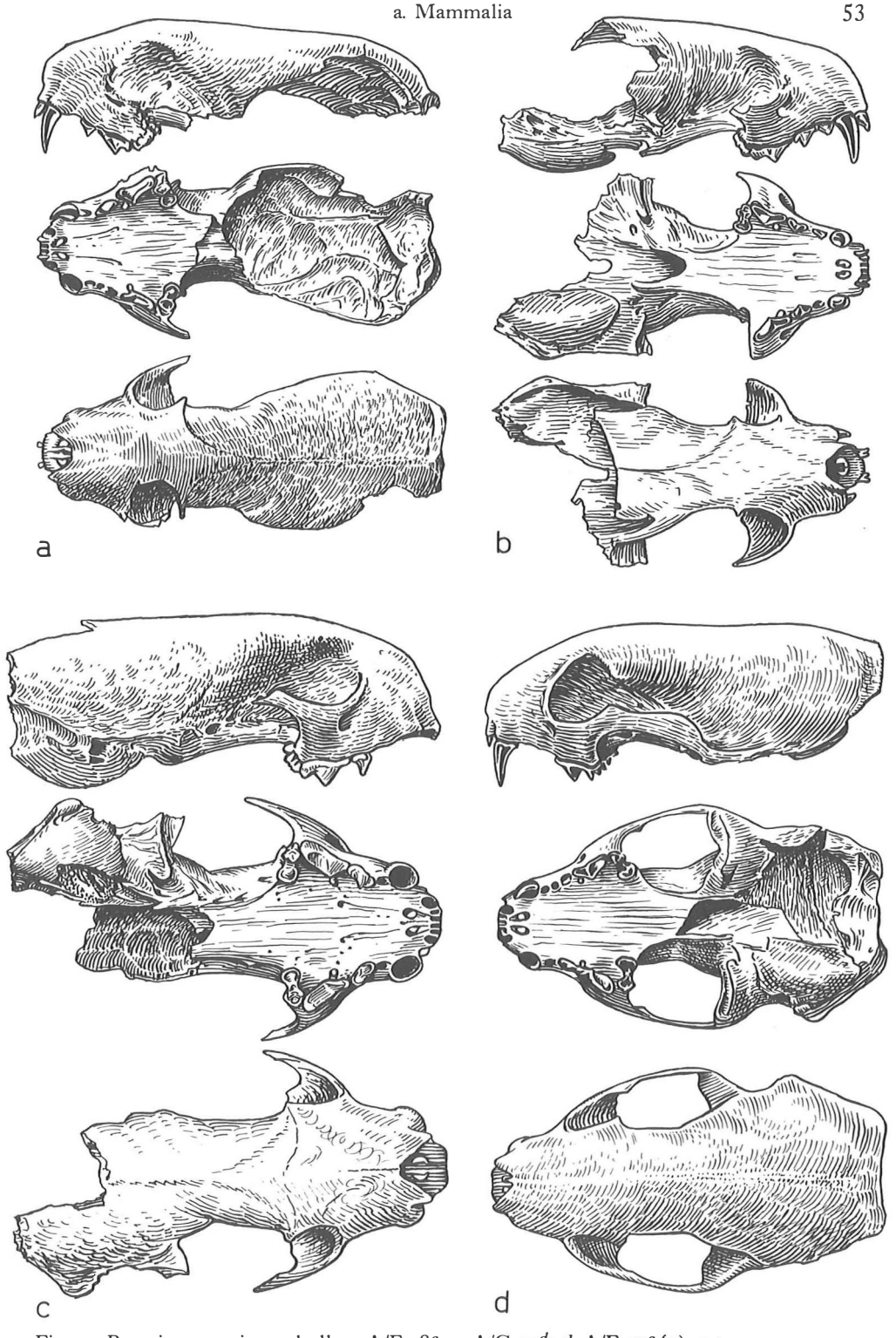


Fig. 17. Putorius putorius – skull: *a*, A/F 18[a]; *c*, A/G 19[d]; *d*, A/F 17[a] (2). 1 : 1
Putorius cf. putorius – skull: *b*, A/F 17[a] (1)

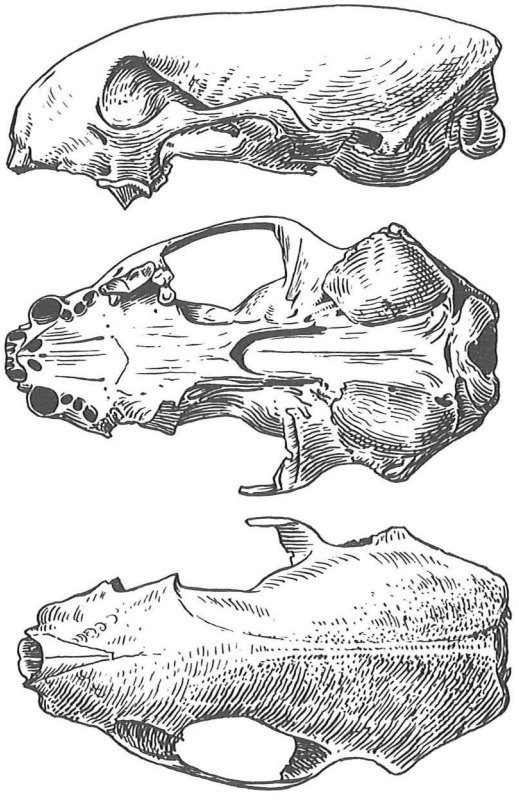


Fig. 18. Putorius putorius – skull: A/G 21[a]. 1 : 1

The polecat prefers the vicinity of man and water, which conditions were fulfilled at the Eneolithic site of Vlaardingen.

8. Lutra lutra (*L.*) (*Table 56*)

All the bones belonging to the otter, except one from Roman Valkenburg, were found at the Eneolithic sites of Vlaardingen and Hekelingen.

The Eneolithic settlements must have been situated in an optimal biotope for the otter, with fresh running water and a large fish supply.

Four skulls were found, three at Vlaardingen (Pl. V*b*), which were badly preserved and one at Valkenburg, which consisted of the muzzle only. The mandibulae were found at Vlaardingen (Pl. V*a*,*b*) and Hekelingen only. They are all damaged but show no signs of carving or gnawing. Number A/? belonged to an old animal, with only a stump of C and P_2 left, the other teeth were lost during life and the alveoli were closed. Number A/G 19^{a+b} had lost M_2 during life and the alveolus was closed.

Of the long bones a humerus had been deliberately broken, and both femora showed slight traces of gnawing at the distal end. All the other long bones were undamaged. The femora numbered A/G 19^{a+b} (2 ×) have been described erroneously as humeri (Van Bree, 1961[b]).

The measurements get near to those Degerbøl (1933) found for Mesolithic fish-otters in Denmark, while the Eneolithic bones found in Denmark are larger than the ones discussed here. The measurements of the length of the toothrow of mandibula and maxilla, given by Gaffrey (1953) for recent central European fish-otters show that the largest measurements from Holland are smaller than the smallest described there; they show a close resemblance, however, to those found for the fish-otter remains in Seeberg Burgäschisee-Süd (Jéquier, 1963).

Apart from meat fit for use the otter provides good fur.

9. Martes martes (*L.*) (*Table 57*)

Bones belonging to the pine marten have only been found at Eneolithic Vlaardingen and Hekelingen (Pl. V*a*, *b*).

In the frontal bone behind the orbital process two damaged skulls show a deformation of the bone, most probably as a result of a parasite contracted during life (Haltenorth, 1937). Skull A/I 17^{c} has the deformation in the left frontal, A/E 18d in the right frontal (Pl. V*b*). Both skulls clearly show cutting traces over the muzzle, most probably obtained when the animal was skinned. The long bones show no signs of carving and gnawing. Of a radius and a femur the distal epiphysis had not yet grown to the shaft.

The measurements are not different from those Degerbøl (1933) found for Eneolithic pine martens in Denmark, nor from those Jéquier (1963) found at Seeberg Burgäschisee-Süd in Switzerland.

10, 11. Felis silvestris Schreber and Felis catus L. (Table 58)

Remains of the wild cat have been found at Eneolithic Vlaardingen, at Hekelingen and at Roman Valkenburg. Remains of the domesticated cat have been found at Roman Valkenburg (see below), Early Medieval Rijnsburg, the Late Medieval castle Huis te Merwede and Amsterdam.

The cat remains from Vlaardingen consist of a badly preserved skull, a pair of mandibulae (Pl. VI*a*, *b*), two halves of mandibulae and some long bones. The mandibulae show carving traces. Two humeri and a tibia show traces of carving and gnawing. One humerus had been worked into a rough tool, probably a small piercer, which was damaged.

The Valkenburg material consists of the skeleton of a young cat almost complete (the epiphyses of the long bones had not yet grown to the shafts). Moreover, parts of the skeleton of an adult cat have been found. The large measurements of this animal indicate that it was a wild cat. A loose radius belongs probably to a wild cat too. Most remains from the Medieval sites are of young animals; this is an indication that they must have been domesticated (Pl. VII*b*).

The distinction between wild and domesticated cat is not very clear. Generally it is accepted that the wild cat is larger than the domesticated one, but the sizes overlap.

The remains of the wild cat found at Vlaardingen do not deviate much from those found in Denmark (Degerbøl, 1933), in Seeberg Burgäschisee-Süd in Switzerland (Jéquier, 1963), nor from the measurements of the present day wild cat in Central Europe (Gaffrey, 1953). The long bones from Vlaardingen are slightly longer than those from the Roman and Medieval sites. The distal end of the femur belonging to the skeleton number O/2412 from Valkenburg is like the one of a wild cat found at a Roman town near Klagenfurt which was sketched by Ehret (1964).

It is generally assumed that the domesticated cat is a descendant of the African wild cat (Felis silvestris lybica Forster) which was domesticated first by the Egyptians (Boessneck, 1953). In the New Kingdom the domestic cat was known and rapidly becoming popular, but it is doubtful whether it was known before. Later it spread from Egypt to Greece and to Rome at the time of the Empire. The Romans in their turn must have spread the cat over their Empire and brought it to Western and North-western Europe (Zeuner, 1963). There are no indications for the existence of the domestic cat in the Netherlands before the Roman occupation, i.e. excluding the cat from the Linderbeek, the dating of which is doubtful (Hooyer, 1947). The

remains of the domestic cat at Valkenburg were found together with Carolingian sherds, so that it may have lived in this period.

In the north of the Netherlands, in the provinces of Frisia and Groningen, the cat has been found in the "terpen,,(Tritsum, Ezinge) in layers most probably dating from the first centuries A.D.. Nobis (1955[b]) found remains of the domestic cat in the "Wurt" Tofting, most finds of which belong to layers dated to the first centuries A.D., although it comprises material dated as late as 1000 A.D.

At present the wild cat does not belong to the fauna of the Netherlands. In the mountainous regions of Belgium it is still to be found at present (IJsseling & Scheygrond, 1950).

12. Phoca vitulina (*L.*) (*Table 59*)

Two bones of the sand seal have been found: a proximal part of a tibia at the pre-Roman Iron Age layer in the Amsterdam waterworks, and a scapula fragment in early Medieval Rijnsburg.

It is remarkable that a species as the sand seal, which is at present a common animal found in the tidal flat areas along the coasts of the provinces of Frisia and Groningen in the north and the estuary of the great rivers Rhine, Maas and Scheldt in the south, was caught so rarely during the 3000 years discussed here, although it must be said that during the excavations of Eneolithic Vlaardingen in the summer of 1960 a bone of the sand seal was found too.

Clark (1952) mentions that seal hunting has been practised in Europe from Palaeolithic times up to the present and he describes a variety of methods to catch the animals used at different times and places. About their economic importance Clark (1952) states that seals were valuable for their blubber, skin, flesh, blood and bones.

As at the Eneolithic site of Vlaardingen remains of grey seal, bottle-nosed dolphin, rorqual and right whale have been found, active catching and collecting of some of the larger marine mammals is suggested. In this light the scarcity of sand seal remains may indicate that the animal was scarcer in those days than today.

13. Halichoerus grypus (*Fabricius*) (*Table 60*)

Three bones of the grey seal were found at Eneolithic Vlaardingen: a skull without muzzle, a humerus and a pelvis fragment (Pl. VIII). At the Bronze Age settlement of Vogelenzang five loose teeth were found. Van Giffen (1913) found a mandibula in the "terp,, of Marssum in the province of Frisia, which probably belongs to the second century A.D.

At present the species is found in the Baltic, on the Farne Islands, at the east coast of England and at the Norwegian coast. Although IJsseling & Scheygrond (1950)

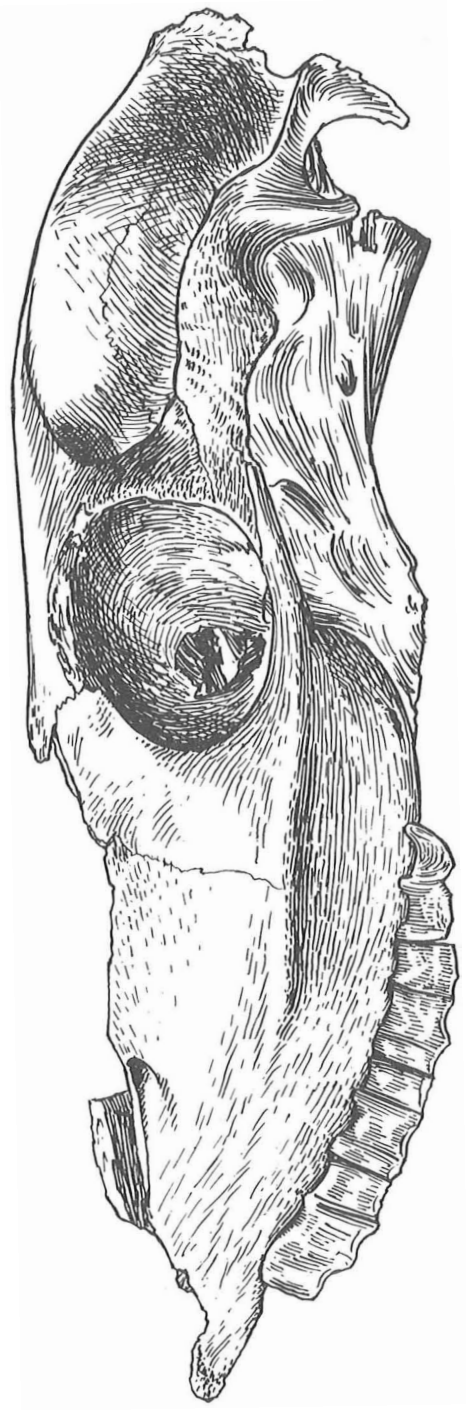


Fig. 19. Equus caballus – skull of a foal: O/3422. 1 : 2

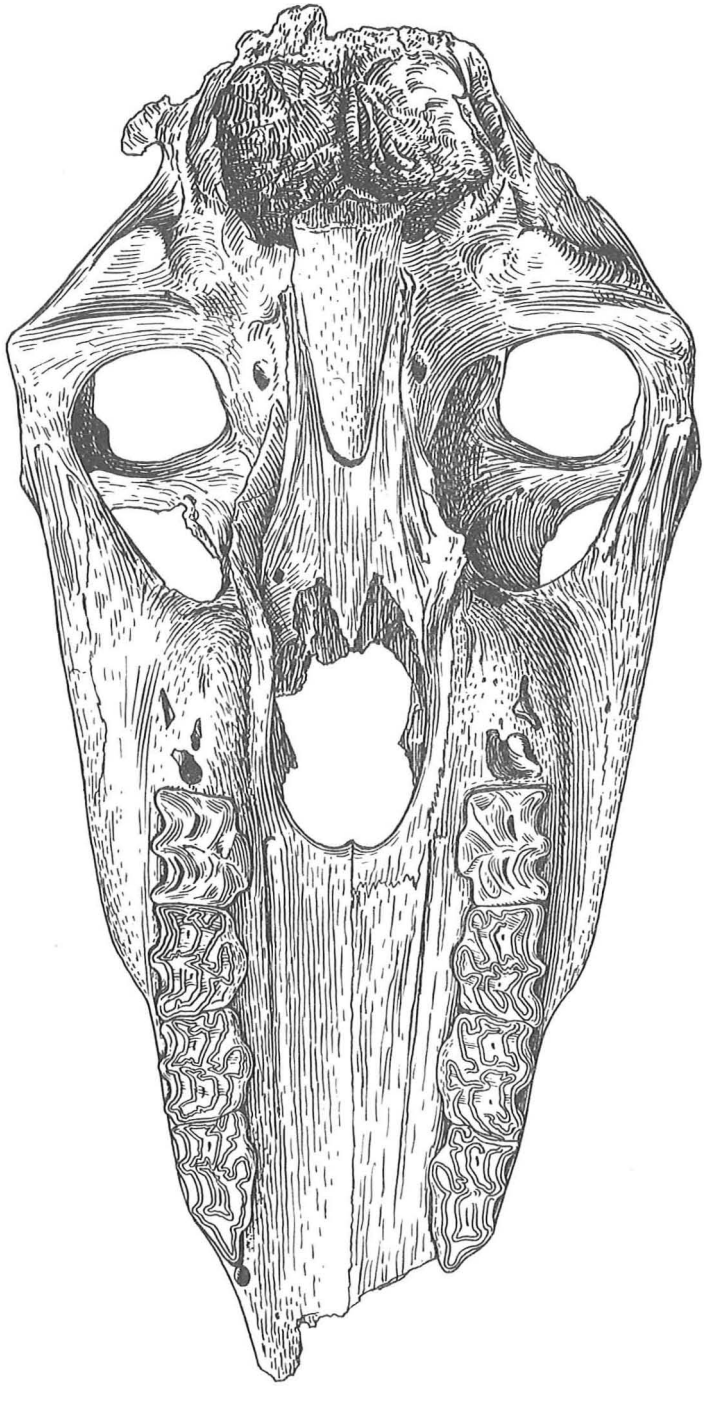


Fig. 20. Equus caballus – skull of a foal: O/3422. 1 : 2

state that the animal does not migrate, in Peterson's Field Guide (Van den Brink, 1955) the distribution map gives a migration route from England to Scandinavia (Denmark). In this connection an article in the newspaper "Algemeen Handelsblad" (Wijlhuizen, 1961) is interesting, as it is reported there that at present the grey seal is found in increasing numbers on the shores of the Netherlands.

14. Equus caballus L. (*Table 61*)

At sites of all periods, except the Late Medieval ones, horse remains have been found.

Generally it is accepted that in Europe in Eneolithic times the horse was tamed and kept to provide meat (Boessneck, 1956; Nobis 1955[c]) and the bones found at Hekelingen and at the Langeveld near Lisse – consisting of the mandibula of a foal half a year old and broken bones with traces of carving (Pl. IX*b*) – are a strong indication that in Eneolithic Holland horses were kept for this purpose.

In the following Bronze Age and the pre-Roman Iron Age the horse was consumed too. The Romans at Valkenburg, however, did not use their horses for consumption, as most bones are undamaged.

That horse remains from the Middle Ages are scarce and even lacking in the Medieval castle Huis te Merwede and Amsterdam may be due to the fact that the Roman Catholic Church was opposed to the consumption of horse-flesh. The popes Gregorius III (732) and Zacharias I sent word to Bonefacius that he had to forbid the newly converted natives the consumption of horse-flesh strictly (Burema, 1953).

Most horse bones were found at the Castellum at Valkenburg. Of the three skulls one probably belonged to a 9–10 years old ♂, one to a foal (fig. 19, 20), the mandibulae belonged respectively to a horse approximately four years old, to two ♂ ♂ approximately 9–10 years old, and to two horses of unknown sex about 20 years old. Also long bones were found (Pl. IX*a*). With the help of the radius, metacarpus, tibia and metatarsus the height at the withers was calculated in accordance with the methods of Kiesewalter and Vitt as quoted by Müller (1955). Kiesewalter multiplies the lateral length of the long bones by a certain factor – only for the femur he used the maximum length – which gives the height at the withers in cm. Vitt divided the horses into nine classes according to their height at the withers, each with a variability of 8 cm. The maximum length of each bone in each class is between certain limits.

The heights at the withers for the material from Holland calculated by these two methods are given in Table 42. If we compare the heights thus obtained it appears that in some cases they differ considerably, but are more or less the same in most cases. The heights thus calculated are not exact, but they make it possible to compare the material found in Holland with horse finds elsewhere in Europe.

Studying the pre-Roman Oppidum of Manching in southern Germany Boessneck

(1958), Liepe (1958), Förster (1960) and Frank (1962) found that the height at the withers is between 110 and 137 with an average of 124 cm, while a few remains of larger horses were found. In Roman times the horses were larger, the remains of horses with a height at the withers of about 140 and of one large horse taller than 150 have been found. According to Boessneck the second group might be an improved form of the small pre-Roman breeds found at Manching, while the tall horse is Roman import. Nobis (1955) found this second group in North-western Germany and thinks that they were the improved forms of the Germanic native horse. Frank (1962), however, pointed out that the occurrence of geldings has to be taken into account too, so that there is a possibility that the remains of large horses belong to geldings. Bökönyi (1952, 1954, 1955) thinks that three of the 13 horses found at Vekerzúg (Hungary) were geldings.

Small horses like those from Manching have not been found at Valkenburg; perhaps the smallest could be compared with the larger Manching specimen of the group of small horses. In general the material from Valkenburg is too small to make a division into groups. Most remains could be compared with the middle (2nd) group of horses found at settlements from Roman times in Southern Germany. One metacarpus possibly belongs to a large horse.

The few horse remains from early Medieval Rijnsburg belonged to animals with the same stature as those from Roman times. The horse was never very important to meet the demand for food. The fact, that in Roman Valkenburg most horse bones were undamaged indicated that the Romans may have used them for military purposes, which is conceivable considering that Van Giffen (1949) writes that at least the earliest castellum housed one cohors miliaria equitata.

That in later Medieval times the horse became more important perhaps in agriculture for cultivating the soil is not reflected in the animal remains from those times, as horses were no longer eaten.

15, 16. Sus domesticus L. and Sus scrofa L. (*Table 62*)

Remains of the wild boar have been found at sites from all periods (Pl. X–XII, diagram LXI), but most frequently among the bones of the Eneolithic sites at Vlaardingen and at Hekelingen. In the following periods the wild boar was still hunted, but it was not important.

At Eneolithic Vlaardingen and Hekelingen it was often impossible to distinguish the bones of the wild boar from those of the domesticated pig, owing to the large number of bones belonging to young animals of which the epiphysises of the long bones had not yet grown to the shaft, to maxillae and mandibulae with an incomplete set of teeth and to damaged bones.

An attempt was made to distinguish which of the measurable mandibulae of young

individuals with $p_1p_2p_3$, $p_1p_2p_3M_1$, $p_1p_2p_3M_1M_2$ and $P_2P_3P_4M_1M_2$ belong to the wild boar and which to domestic pig. A clear difference between the lengths of the milk molar rows of animals from the Eneolithic and Roman period can be observed.

It can be assumed that all mandibulae dating from the Roman period belong to domesticated animals as only a few remains of adult wild boar have been found. The mandibulae from the Eneolithic period may belong to wild boar as well as to domesticated pig.

That a division by these measurements results in too large a number of wild boar mandibulae, is seen when the age at which the pigs from the Vlaardingen site were slaughtered and wild boar caught is considered. In diagram X it is clear that there are two peaks, one at level 4 and 5, animals about half a year old (Ellenberger & Baum, 1943), and one at level 8, 9 and 10, animals about 20 months to two years old (Table 43). If we assume that pigs are born in April or May this indicates that pigs were killed about November, in autumn, still the month for slaughtering at present. These two peaks for the age at which they were slaughtered are only slightly apparent for the domesticated pigs in Eneolithic Vlaardingen, but clearly so for the group of wild boar and for the group of either wild boar or domesticated pig. As it is highly improbable that in autumn Eneolithic man at Vlaardingen caught an extra supply of wild boars half a year and $1\frac{3}{4}$ year old it seems justified to assume that most of the mandibulae ascribed to wild boar and to the group of which the identification is uncertain in fact belong to domesticated pigs.

As the main purpose of pig keeping is obtaining meat, it is obvious that man slaughtered part of the young animals at a time when fodder became scarce and winter was drawing near. The two peaks in the age at which they were slaughtered also show very clearly for the domesticated pigs at Roman Valkenburg, in contrast to the Late Medieval Huis te Merwede and Amsterdam, where only the slaughtering of animals about 20 months to two years old shows a peak. For Valkenburg this may indicate that the Romans bred pigs at the Castellum, but one must also take into account that the Romans were fond of piglets (Zeuner, 1963). For Huis te Merwede and Amsterdam the age at which pigs were killed may indicate that they were not bred at those places generally but only kept and slaughtered yearly.

Not only for the bones of young animals is it difficult to distinguish between wild boar and domesticated pig, but also for the bones of adult animals if they are damaged. Usually domestic pig and wild boar are distinguished by measurements. The remains of wild boar are larger but the measurements of small wild females and large domesticated males may overlap. As diagram XIV and the irregularity of the other diagrams indicate, at least for the domesticated pig a slight sexual dimorphism existed. In the following scheme the dimensions are given which I used for positive attribution to either Sus domesticus or Sus scrofa.

	Sus domesticus	Sus scrofa
Maxilla		
length molar row	56–70	78–90
length M^3	23–40	41–50
Mandibula		
length of the symphysis	45–90	95–120
length of the molar row	20–36	36–45
length M_3	23–40	40–49
Scapula		
height of the neck	13–29	29–36
Humerus		
distal width	28–45	46–57
Radius		
proximal width	24–32	38–42
Ulna		
width of the articular surface	16–25	26–30
Pelvis		
length of the acetabulum	14–35	36–44
Femur		
proximal width	48–52	73–78
distal width	30–50	60–64
Tibia		
distal width	24–35	37–43

The wild boar may show a slight tendency to become smaller (diagram XIII, XIV, XVI) although in Roman times it still sometimes reached the Neolithic sizes (diagrams XVII, XX, XXIV).

The mandibulae of the ♂ ♂ wild boar at the Eneolithic settlement of Vlaardingen show a peculiarity. The root of the canine is too large for the mandibula and bends outwards at the end forming a protuberance in the labial side of the horizontal ramus (Pl. XII). Bökönyi (1961) found the same for Medieval domesticated pigs at Zalavár in Hungary and thought that the C root which is too long might be a domestication phenomenon, because the jaws might have shortened quicker than the canines Obviously this can not be the explanation for the Vlaardingen wild boars.

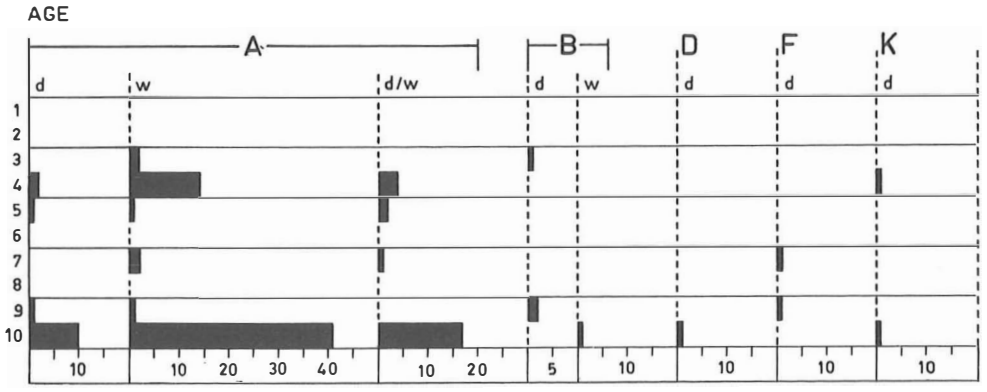


Diagram X. The age at which pigs were slaughtered and wild boars caught. (Table 43).

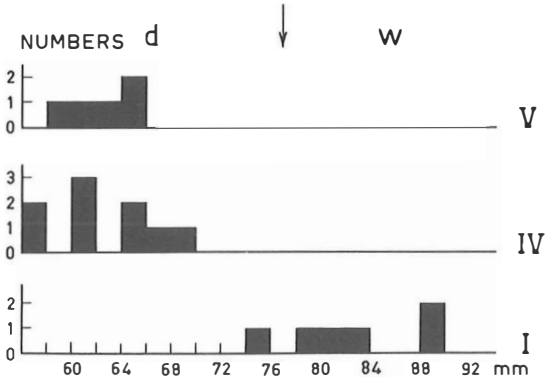
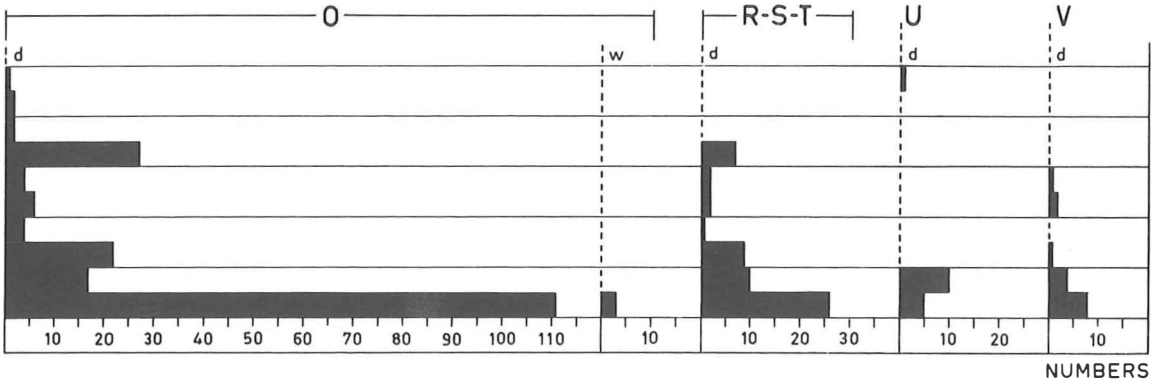


Diagram XI. Domestic pig and wild boar. Maxilla, length of the molar row.



Reitsma (1935) proved that the European domesticated pig, the remains of which have been found at many prehistoric sites, descended from Sus scrofa L., the wild boar that was found in Europe as well in the Near East.

The measurements demonstrate that the size of the domesticated pig diminished from Eneolithic till Roman times, to increase again in the early and late Middle Ages. The same phenomenon was noted by Boessneck (1958) for the pigs of Central Europe as opposed to what Nobis (1955) and Requate (1956) described for North-western Germany, where the smallest pigs dated from Medieval times[1]. The teeth of the pigs in Holland, however, show the tendency to have a delayed minimum in the Middle Ages, being even smaller at that time than during the Roman period. This is clearly demonstrated by diagrams XV, XVI, where it is shown that the size of the mandibula increases in the Middle Ages while at the same time the length of M_3 diminishes.

The domesticated pig occurred during all periods. At the Eneolithic sites of Vlaardingen and Hekelingen, the Bronze Age site of Vogelenzang, in the Roman Castellum Valkenburg and the Early and Late Medieval sites of Rijnsburg, Huis te Merwede and Amsterdam, the pig comes second after the domesticated cattle. In the Bronze Age, pre-Roman Iron Age and the Roman time the pig was outnumbered by the small ruminants (Tables 41, 42, diagram I).

The higher percentage of the pig at Eneolithic Vlaardingen and Hekelingen (see also sheep and goat) can be explained by the fact that the settlements were situated

1. See Opitz (1958) for an extensive list of measurements of pig for many European sites from the Neolithic onwards.

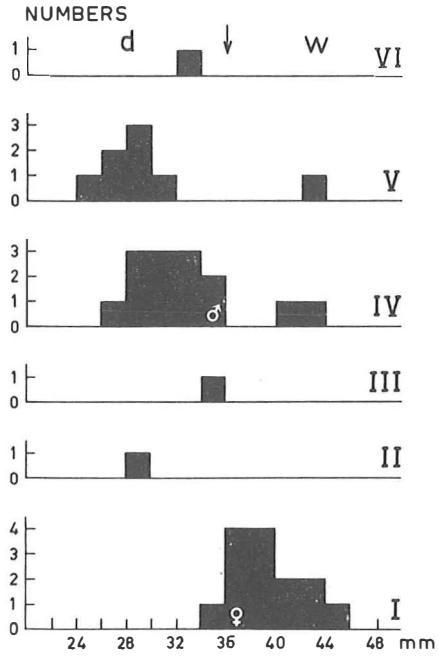


Diagram XII. Domestic pig and wild boar. M^3, length.

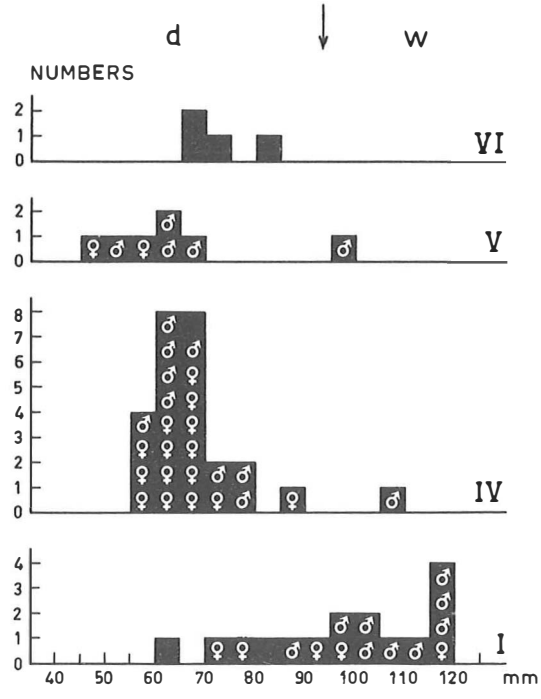


Diagram XIII. Domestic pig and wild boar. Mandibula, length of the symphysis.

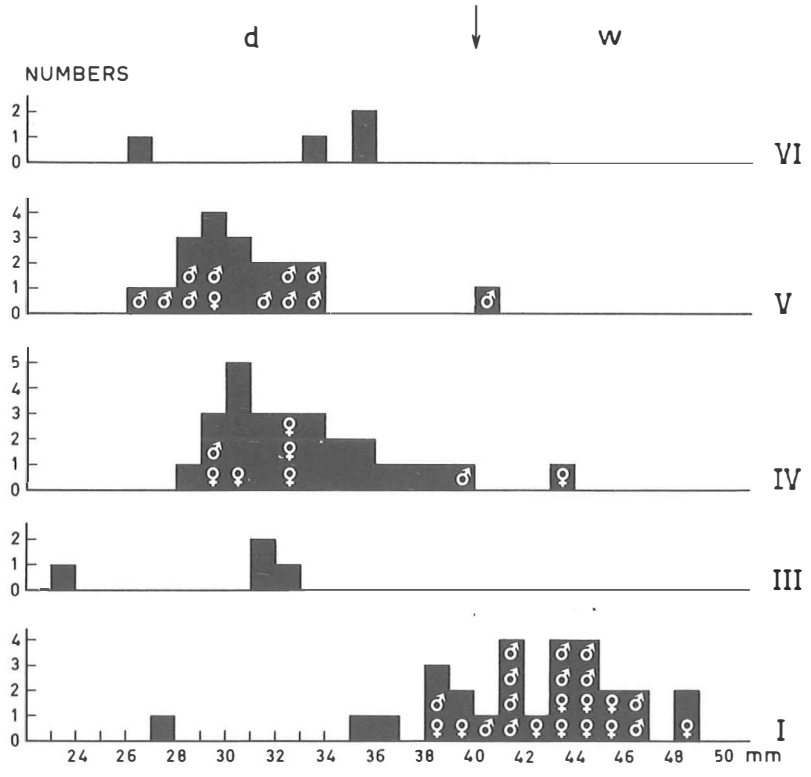


Diagram XIV. Domestic pig and wild boar. M_3, length.

in a biotope that was highly unsuitable to small ruminants and at the same time well suited to pigs.

The high percentage in the Castellum Valkenburg may be explained by the fact that the Romans preferred pork and probably consumed pigs which they themselves bred (see above) in addition to the animals they obtained from the local farmers. There may be several reasons why in the Late Middle Ages pig remains are more numerous than those of small ruminants. Primarily it is easier to keep pigs than small ruminants in a small space, since the former live on refuse. That pigs were kept generally in Medieval towns is demonstrated by the regulations against pigs roamin gin the streets (Baudet, 1904; Burema, 1953). Secondly, people living in the Middle Ages thought that pork was the best meat to eat as it was supposed to be highly digestable (Baudet, 1904). In the third place, in Medieval Amsterdam the slaughtering of sheep was as much as possible restricted for some unknown reason (Burema, 1953). Why pigs outnumber the small ruminants at Bronze Age Vogelenzang cannot be explained.

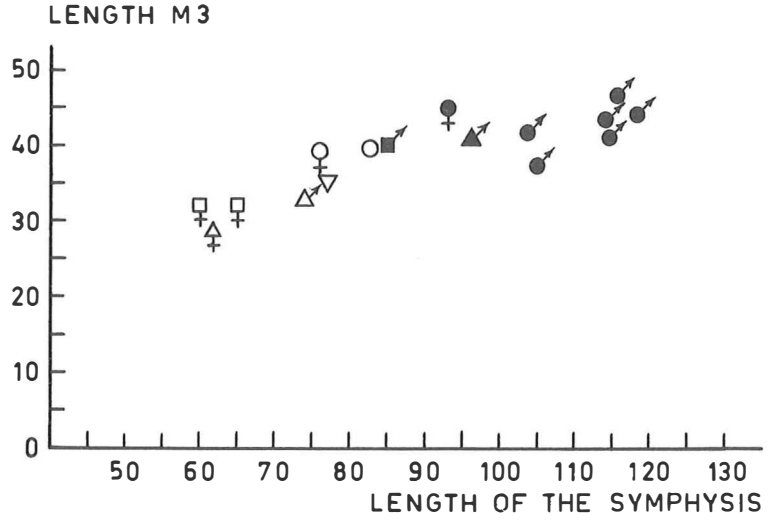


Diagram XV. Domestic pig and wild boar. Mandibula, depth of the horizontal ramus beneath M_3 plotted vs. the length of M_3.

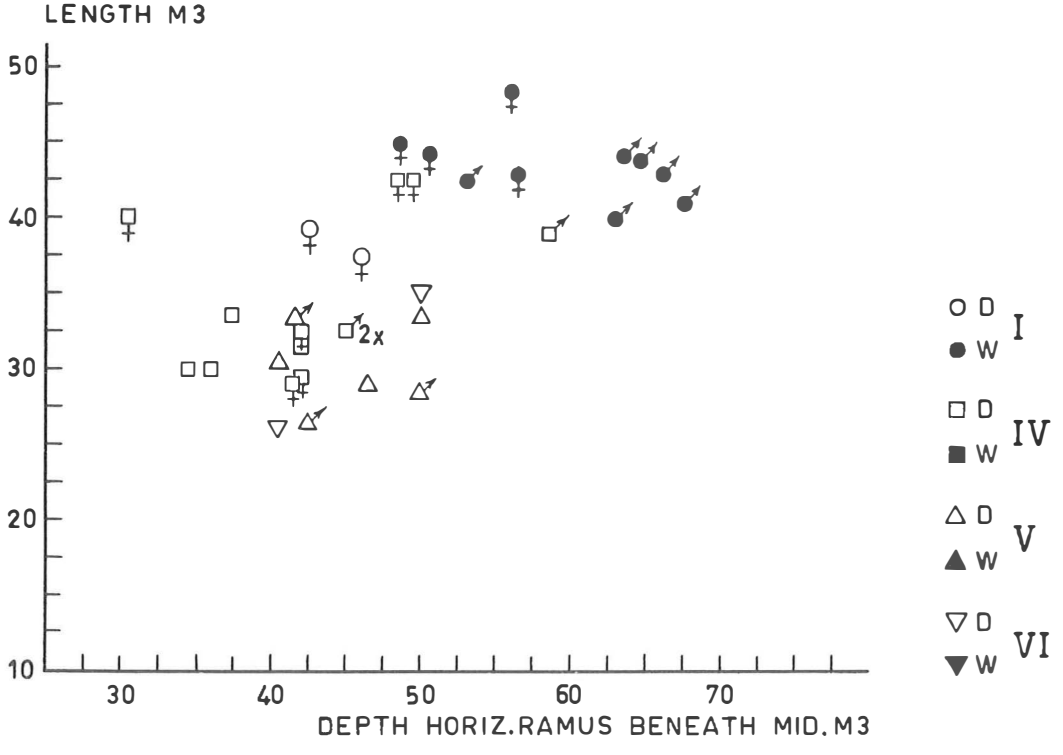


Diagram XVI. Domestic pig and wild boar. Mandibula, length of the symphysis plotted vs. the length of M_3.

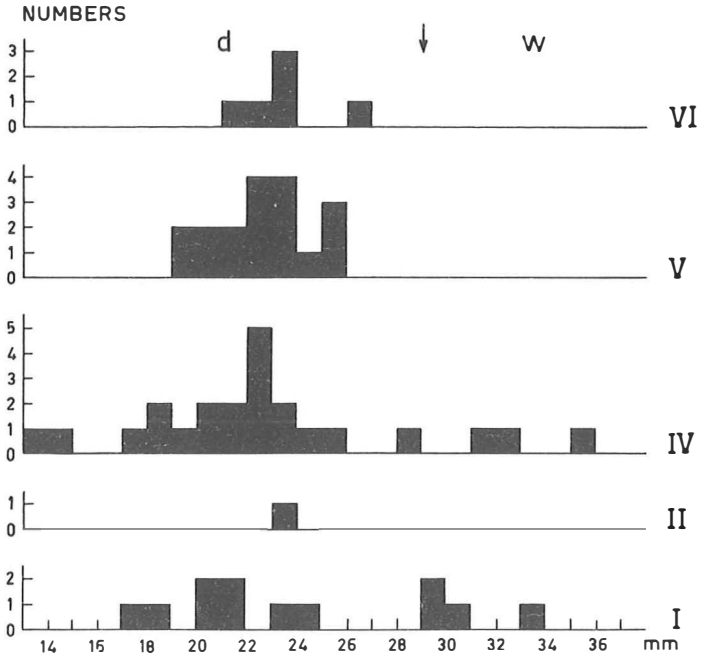


Diagram XVII. Domestic pig and wild boar. Scapula, minimum length of the neck.

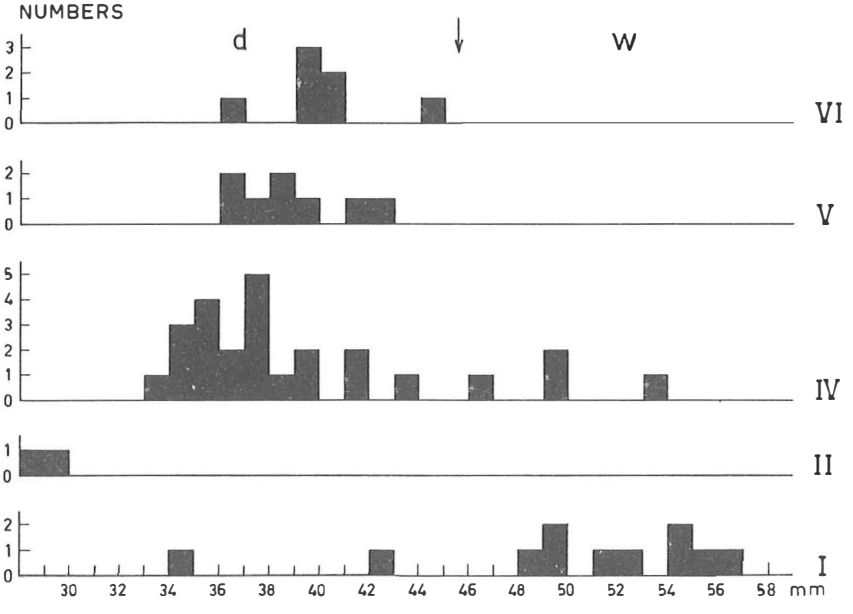


Diagram XVIII. Domestic pig and wild boar. Humerus, distal width.

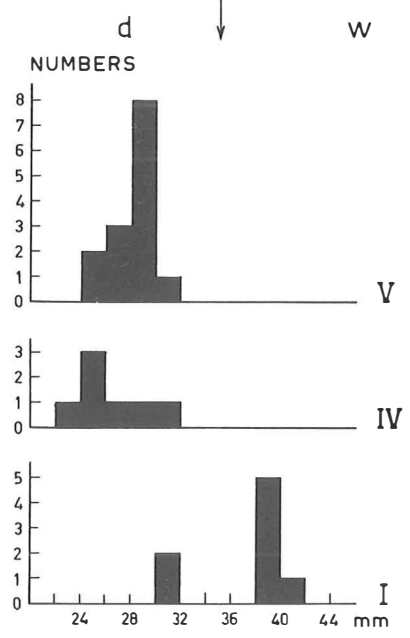


Diagram XIX. Domestic pig and wild boar. Radius, proximal width.

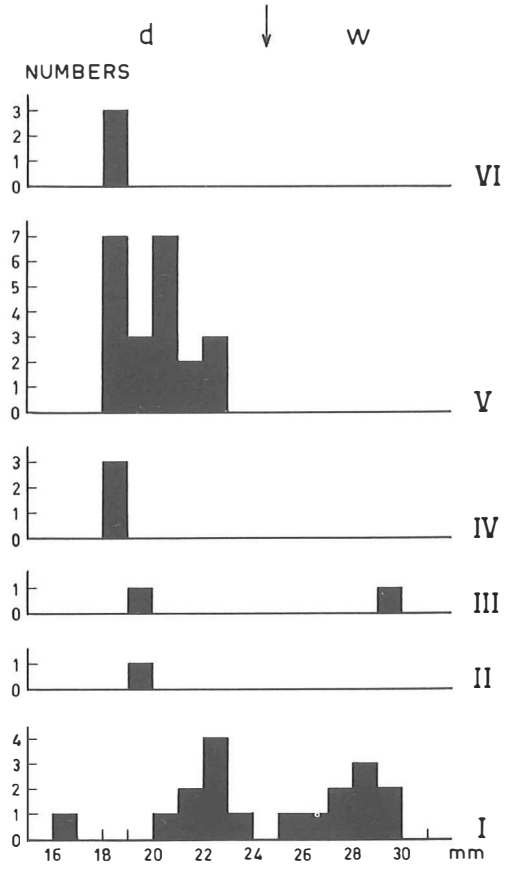


Diagram XX. Domestic pig and wild boar. Ulna, width of the articular surface.

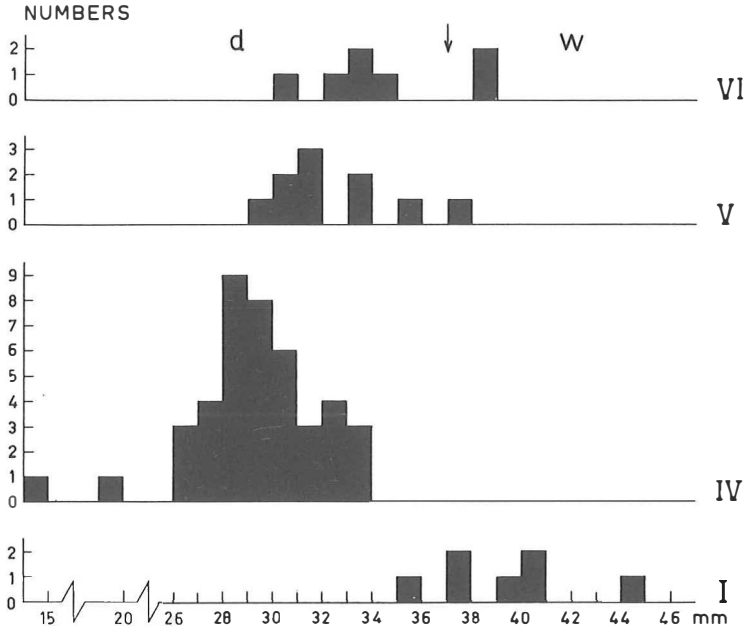


Diagram XXI. Domestic pig and wild boar. Pelvis, length of the acetabulum.

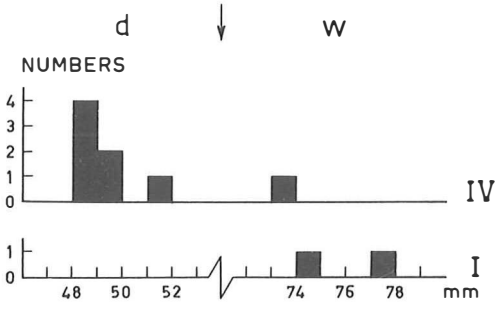


Diagram XXII. Domestic pig and wild boar. Femur, proximal width.

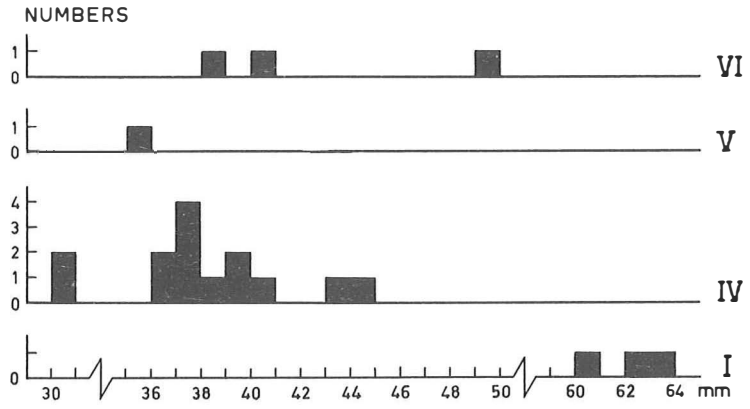


Diagram XXIII. Domestic pig and wild boar. Femur, distal width.

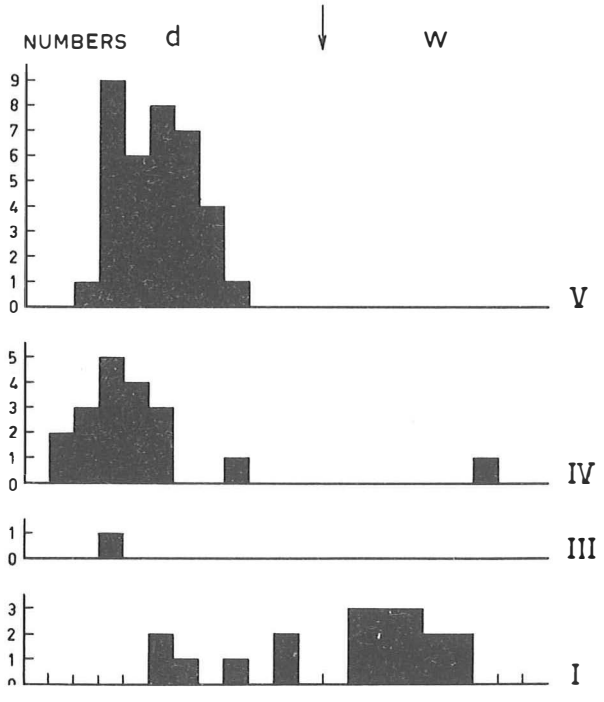


Diagram XXIV. Domestic pig and wild boar. Tibia, distal width.

17. Cervus elaphus L. (*Table 63*)

Remains of the red deer were found abundantly at the Eneolithic sites of Vlaardingen and Hekelingen, while at sites from the other periods only few bones were found, mostly antler fragments collected for the manufacture of implements. Only at the Roman Castellum at Valkenburg red deer bones were more numerous.

At Vlaardingen and Hekelingen the red deer must have provided the most important part of the meat. Apart from the meat, the antlers and long bones of the red deer were important as the raw material for many sorts of implements. A number of shed antlers were collected and then used for hammers, the manufacture of axes and axeholders, while the long bones were worked into large and small awls (Walvius, 1961[b]). Because of the extensive use that was made of the red deer bones most are damaged. There are no skull fragments that are large enough to identify the sex of the hunted animals at Hekelingen and Vlaardingen. At Roman Valkenburg three of the four skulls were ♂ ♂ and one ♀. Jéquier (1963) describing the red deer remains found at Seeberg Burgäschisee-Süd thought it difficult to establish a clear sexual dimorphism on the basis of the width measurements of the long bones. The same can be noticed when studying the Vlaardingen and Hekelingen material. Only in some cases there are indications in the diagrams (XXVII, XXVIII, XXIX) in the form of two tops. But in any case the diagrams are very irregular. Jéquier (1963) could establish a clear sexual dimorphism for the atlas and pelvis. At Vlaardingen and Hekelingen these bones were too much damaged to use them.

When comparing the bone measurements from Roman Valkenburg with those of Vlaardingen and Hekelingen, one finds that they are of the same order of magnitude. When comparing the measurements from the latter sites with those of Seeberg Burgäschisee-Süd one notices that they lie well within the limits found there, but always closer to the minimum than to the maximum. Only in one case does the length of a metacarpus from Valkenburg exceed the lengths of those found at Seeberg Bürgäschisee-Süd.

The general opinion is that Eneolithic red deer must have been much larger than present red deer. Boessneck (1958) first and later Jéquier (1963) (basing his conclusions on more extensive material than Boessneck did) proved that Eneolithic red deer from Central Europe were not larger than present red deer living in optimal circumstances. Walvius (1961[a]) compared the remains from Hekelingen and Vlaardingen with five recent Dutch red deer and found no evident difference in size between them. This is remarkable as it must be borne in mind that at present red deer only live on the poor sandy soils of the Veluwe. The Vlaardingen and Hekelingen red deer, however, lived on the creek banks covered with marshy woods and in the reedland, situated behind these banks. This environment is quite different from that of the Veluwe.

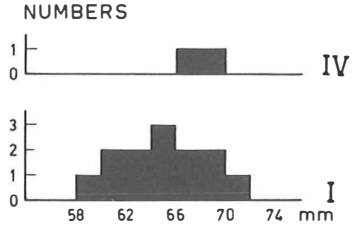


Diagram XXV. Red deer
Maxilla, length molar row.

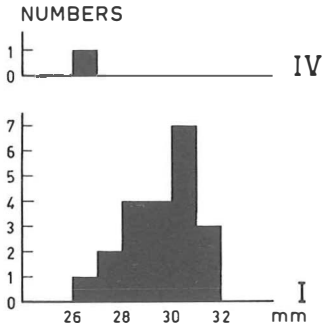


Diagram XXVI. Red deer
Mandibula, length M_3.

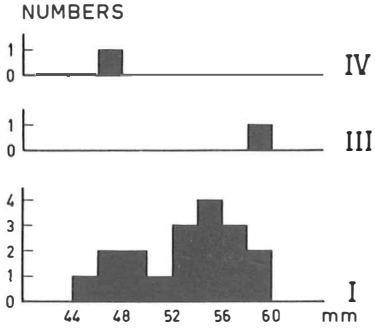


Diagram XXVII. Red deer Humerus,
width of the lower articular surface.

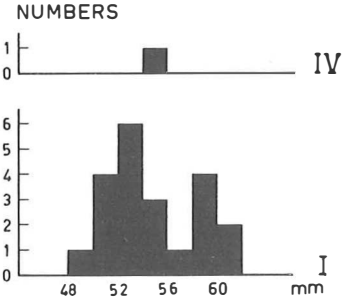


Diagram XXVIII. Red deer
Radius, proximal width.

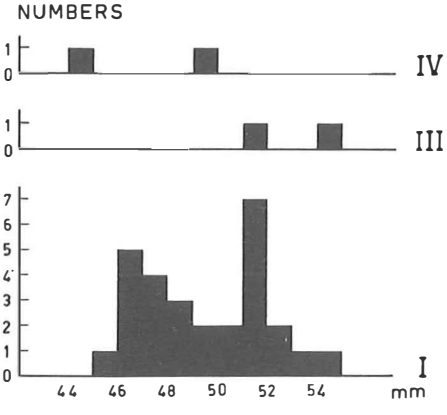


Diagram XXIX. Red deer Tibia, distal
width.

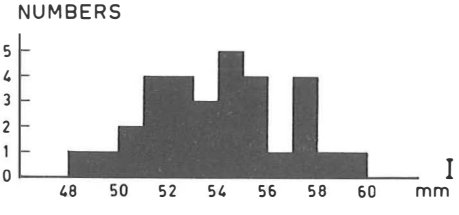


Diagram XXX. Red deer Astragalus, lateral
length.

The mandibulae and shed antlers show that red deer were caught throughout the year (Table 44). This is important as it proves that Eneolithic Vlaardingen was inhabited throughout the year. A number of mandibulae have deformations round the alveoli (Pl. XIV*b*).

The antler has always been an important raw material for the manufacture of many objects, in the Eneolithic period for axes and axeholders, later mostly for bits and combs. The only finished objects found at the sites discussed in this paper are from Vlaardingen, while at the other sites only a few pieces of waste antler show that it was worked. The largest number of waste antler pieces was found at Roman Valkenburg, where the worked sides clearly show marks caused by the use of metal saws. A curious antler was found in Huis te Merwede, with nail holes still visible showing that it has been used as a trophy formerly, perhaps the oldest known in the Netherlands (Plate XIII).

18. Capreolus capreolus (*L.*) (*Table 64*)

Remains of roe deer were found at sites from all periods, but they are most numerous at the Eneolithic sites of Vlaardingen and Hekelingen, and at Roman Valkenburg.

As far as can be gathered from the scarce material the roe deer in Roman Valkenburg was of the same size as those of Vlaardingen and Hekelingen.

Jéquier (1963) could establish a sexual dimorphism for the roe deer found in Eneolithic Seeberg Burgäschisee-Süd. He used the atlas, epistropheus and pelvis. Because of the small numbers it was impossible to see whether this was also true for the roe deer found in Holland.

It could be estimated from the mandibulae at what age the animals were caught. Seven mandibulae from Vlaardingen, one from Hekelingen and one from Valkenburg had a complete set of teeth that were just a little worn, thus indicating that the animals were about two to four years old. At Hekelingen a mandibula had shed p_3, while p_1 and p_2 were to be shed shortly after. According to Habermehl (1961) roe deer shed their milk molars between the 12th and 15th month approximately. At Valkenburg the distal epiphysis of a tibia and metatarsus had not grown to the diaphysis. Two skulls from Valkenburg belonged to young females.

In Eneolithic South Holland the roe deer lived in the marshy woods and reedland near Vlaardingen and Hekelingen, in the pre-Roman Iron Age it occurred in the dunes where the Amsterdam Waterworks are situated now.

In historical times the roe deer lived in the dunes along the coasts. In the Late Middle Ages roe deer were caught in the Haarlemmerhout (wood near Haarlem) on the third Monday in August by unarmed citizens of Haarlem (IJsseling & Scheygrond, 1950).

19. Alces alces L. (*Table 65*)

The third phalanx found at the pre-Roman Iron Age site of Alphen aan de Rijn, the mandibula found at the Roman Castellum at Valkenburg (Pl. XV) and the shaft of the metacarpus/tarsus used as a glider found at Early Medieval Rijnsburg are the only pieces of the elk known from sites discussed in this paper.

Whether these pieces belong to animals caught in the vicinity can not be said. They may have been imported.

Remarkable is the scarcity of elk remains as compared with the numerous remains of red deer in Eneolithic Vlaardingen and Hekelingen. Perhaps this is due to the marshy environment. The elk is supposed to prefer drier regions in winter.

20. Capra hircus L. and Ovis aries L. (*Table 66, 67, 68*)

At all sites bones belonging to the small ruminants, sheep and goat, have been found.

It has always proved difficult to distinguish the bones of the two species. It is easiest for the skulls and the horn-cores, although even the loose horn-cores are not always easily identified, if they belong to young animals or are damaged.

A number of investigators has tried to find significant differences for both species; the latest work in this field was published by Boessneck, Müller and Teichert (1964). These authors not only gave the results of their investigations but also reinvestigated earlier works and discussed their reliability. The criteria found by Boessneck, Müller and Teichert (1964) were used here in an attempt to decide in a number of cases whether the bone belonged to a sheep or to a goat. An attempt was made to identify loose horn-cores, skulls, scapula, humerus, radius, metacarpus and metatarsus. Horn-cores, skulls, radius and humerus were identified with the help of descriptions and drawings given by Boessneck, Müller and Teichert. For scapula, metacarpus and metatarsus a number of indices were calculated and plotted in a diagram.

The scapula of the goat is slenderer in general than that of the sheep. If the index "distance from the distal end of the spina scapulae to the fovea articularis: minimum height of the neck", is calculated, for the goat a variation is found from 1.04–1.72 and for the sheep from 0.78–1.19. By this index only one scapula belong to goat, the other ones to sheep and/or goats (diagram XXXIII).

In general the metapodia of sheep are longer and slenderer than those of goats. If the indices "proximal width: maximum length of the metapodium", "distal width: maximum length of the metapodium" and "minimum width of the diaphysis: maximum length of the metapodium" are calculated they would be smaller for sheep than for goats. In the diagrams XXXVI, XXXVII, XXXVIII these indices for the metacarpus have been plotted vs. the maximum length. In diagrams XL, XLI,

XLII the same has been done for the metatarsus. It appears that these diagrams compare very well with the diagrams of Boessneck, Müller and Teichert; the values found here fall within the range they give for sheep.

At the Eneolithic site of Vlaardingen a skull fragment with the base of the horn-cores, and a skull fragment with one horn-core base belonging to goats have been found, another fragment of a goat horn-core has been found at Hekelingen. Two heavy horn-cores of sheep dating from the Bronze Age have been found at Zwaagdijk, and a fragment of a slender goat horn-core at Vogelenzang. At the pre-Roman Iron Age site at Vlaardingen (Calvinistic Old People's Home) a fragment of a horn-core has been found belonging to either a sheep or a goat. At Santpoort two skull fragments of sheep have been found. In the Roman Castellum at Valkenburg four skulls (1 ♀, 1 ♂ and two?) belonging to goats have been found as well as seven loose horn-cores (3 ♀ ♀, 3 ♂ ♂, 1?). Seven skulls (4 ♀ ♀, 1 ♂, 2?) and nine loose horn-cores belonging to sheep have been found.

At Medieval Rijnsburg, one skull of a ♂ goat, two loose horn-cores and one skull fragment belonging to sheep have been found. At late Medieval Huis te Merwede two (♀ ♀) sheep skulls without horn-cores have been found. At the Medieval site in Amsterdam two skulls with horn-cores (1 ♀, 1 ♂) and one (♀) skull without horn-cores belonging to sheep have been found.

In general it can be said that both sheep and goat have been known since the Eneolithic period, but that after the Eneolithic sheep were more important than goats.

At present it is generally assumed that sheep were domesticated in the Near East (Reed, 1961) and brought to Southern Europe by Early Neolithic farmers (Chapter IV), from where they were spread over Europe. Some authors maintain, however, that there might have been an European wild sheep, which possibly influenced the stock imported from Asia (Herre & Kesper, 1953; Degerbøl, 1942; Zeuner, 1963; Radulesco & Samson, 1961).

Like the other domesticated animals sheep and goat were divided into a number of races by the earlier investigators, mostly on the evidence of the horn-cores. Reitsma (1932) proved that the Neolithic turbary sheep with small horn-cores, the Copper sheep without horn-cores and the heavy horned Bronze Age sheep belonged to the same breed (Ovis aries L.), the first two being the female, the third the male animals. Further Reitsma proved that the sheep found in the Dutch "terpen" (Early pre-Roman Iron Age till Early Middle Age) also belonged to the same breed, as is the case with the present "Drentse heideschaap" too. The two heavy male horn-cores (fig. 27*a*, *b*) found at the Bronze Age Zwaagdijk site excluded, most horn-cores are small, goat-like, or, as in Early Medieval Rijnsburg, small, round and slightly curved. In Roman Valkenburg and at the Medieval site female skulls without horn-cores have been found, showing dents at the places, where the horn-cores should be (fig. 27–35).

The goat is assumed to have descended from Capra aegagrus Erxleben (Boessneck, 1958) and to have been domesticated in the Near East like the sheep (Reed, 1961) and from there brought to Europe in Neolithic times.

Like the sheep remains, those of the goat were divided into a number of races. On the analogy of Reitsma's work (1932) on the sheep, Boessneck (1958) assumed that the heavy horned "copper" goat mentioned by Duerst is the male while the other mostly scimitar-horned goats may have been the females, although he could not prove it (fig. 21–26).

Taking the measurements of sheep and goat together and keeping in mind that most bones may belong to sheep, the diagrams XXXII, XXXIV, XXXV, XXXIX indicate a slight increase in size during the Roman time. Table 45 and diagram XXXI indicate that sheep and goats of all ages were slaughtered.

According to skulls and horn-cores the goat occurred in almost the same numbers as the sheep, while according to the long bones the number of goats was considerably smaller than that of sheep.

The same was found in the Celtic Oppidum of Manching in Germany. Pölloth (1959) explained this by observing that goat skulls without horn-cores do not exist or are at least very rare while sheep skulls without horn-cores are common. The sheep skulls without horn-cores, however, are much more easily damaged and so found in smaller numbers.

The percentage of the small ruminants is very low in the Eneolithic, but increases in the Bronze Age. Till the Early Middle Ages the small ruminants take the second place among the domesticated animals if one excludes the bones found in the castellum at Valkenburg which was occupied by the Romans. In other cultures found in North-western Europe the number of sheep and goat is always small during the Nedithic and Eneolithic. In the following Bronze Age an increase of the small ruminants can be observed, as in our area. This increase may be due to clearing woods, giving especially the sheep more grazing land, but there may also be a correlation between increase of sheep and woollen garments becoming the fashion in North-western Europe in the Bronze Age.

The cause of the decrease of sheep bones in the Early and Late Middle age sites in Holland is probably not to be sought in a decrease of the sheep population. Already in the Early Middle Ages woollen goods were an important merchandise in these regions and at the Late Medieval site in Amsterdam the implements of a sheep-shearer were among the refuse. In Medieval Amsterdam a regulation existed that the slaughter of sheep was to be restricted as much as possible (Burema, 1953).

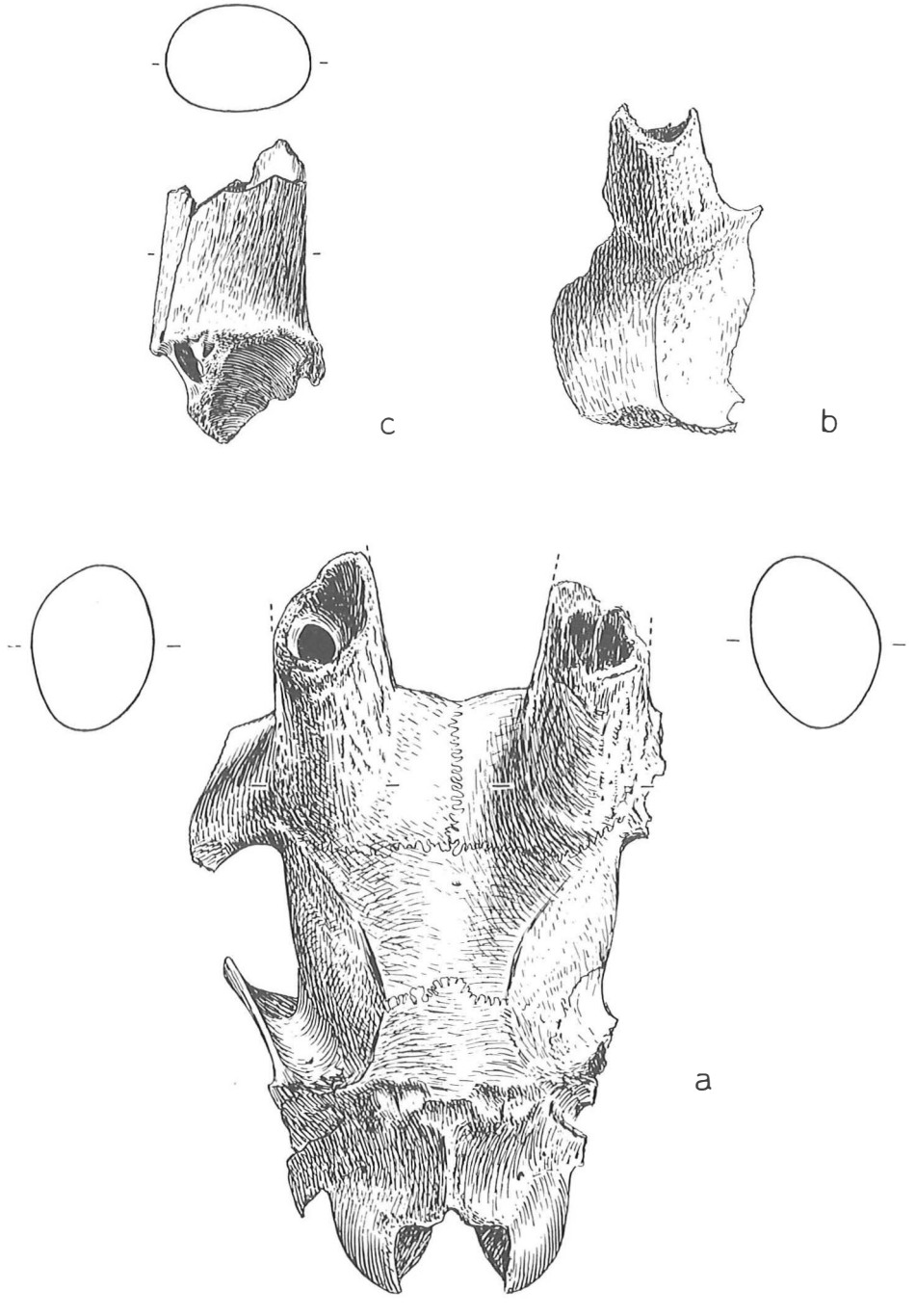


Fig. 21. Capra hircus – skull: *a*, A/?; horn-cores: *b*, A/?; *c*, B/15. 2 : 3

Fig. 22. Capra hircus – skull, maxilla and mandibula of the same individual: O/?. 2 : 3

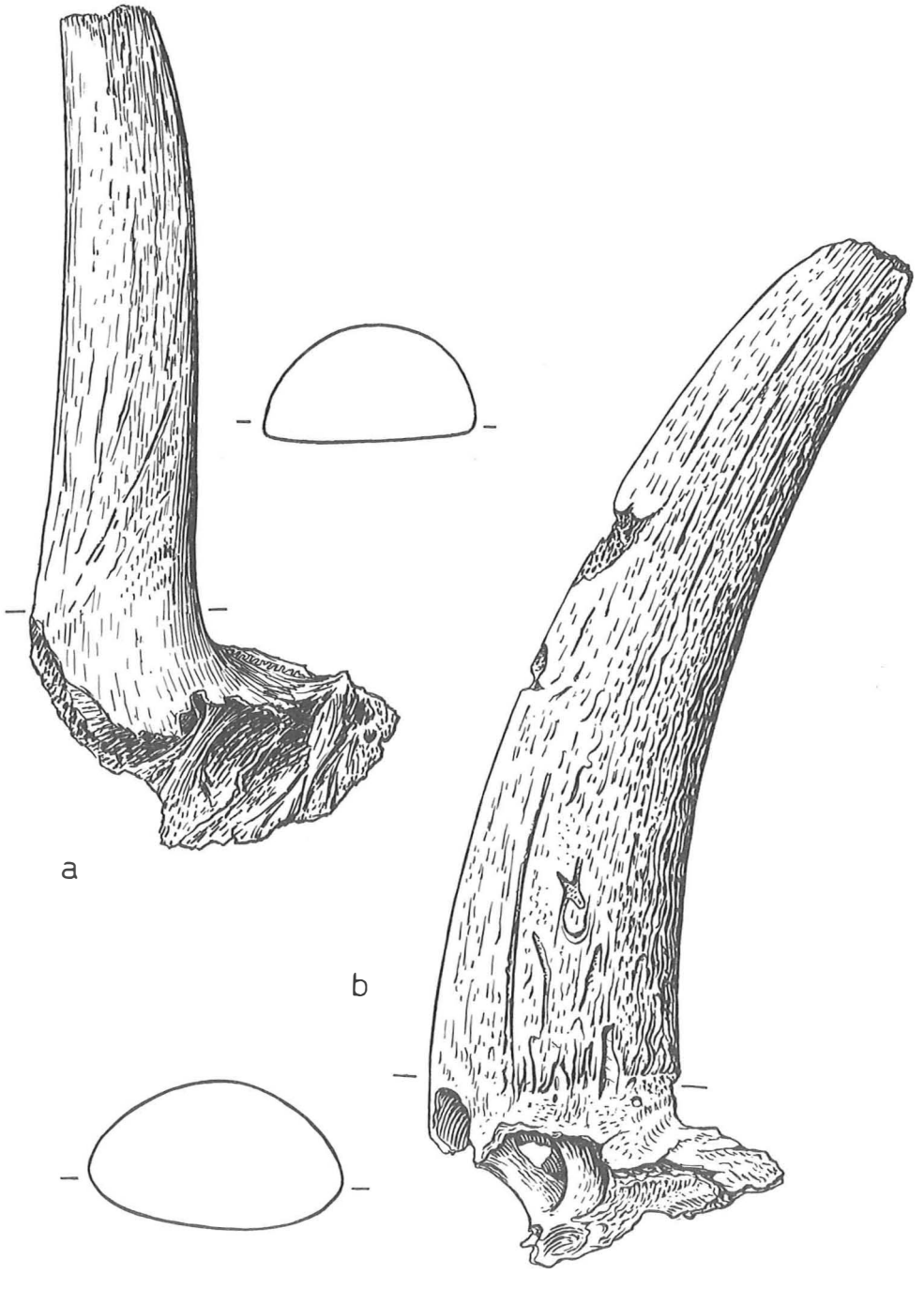


Fig. 23. Capra hircus – horn-cores: *a*, O/1468; *b*, O/1628. 2 : 3

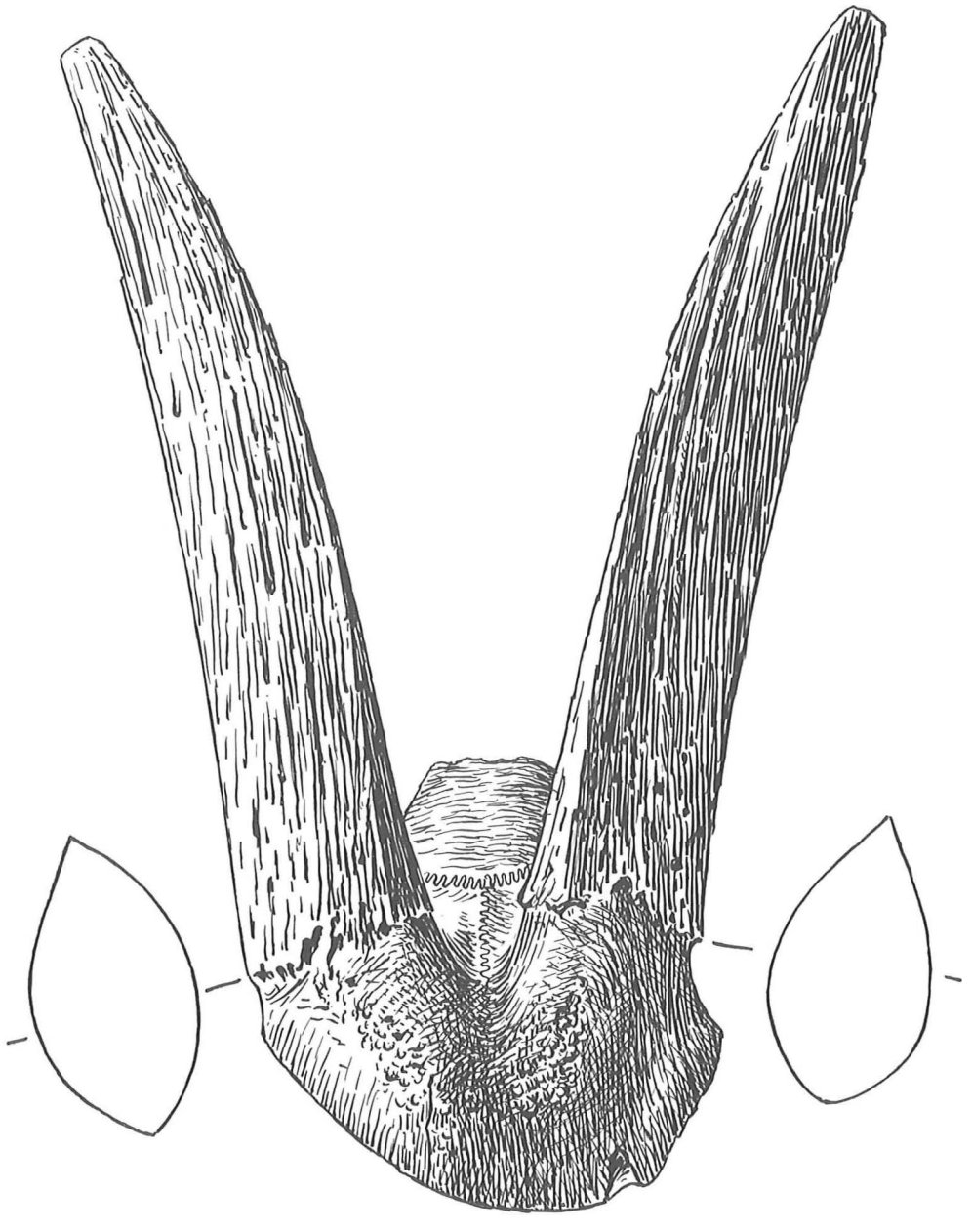


Fig. 24. Capra hircus – skull fragment with horn-cores: R/292. 2 : 3

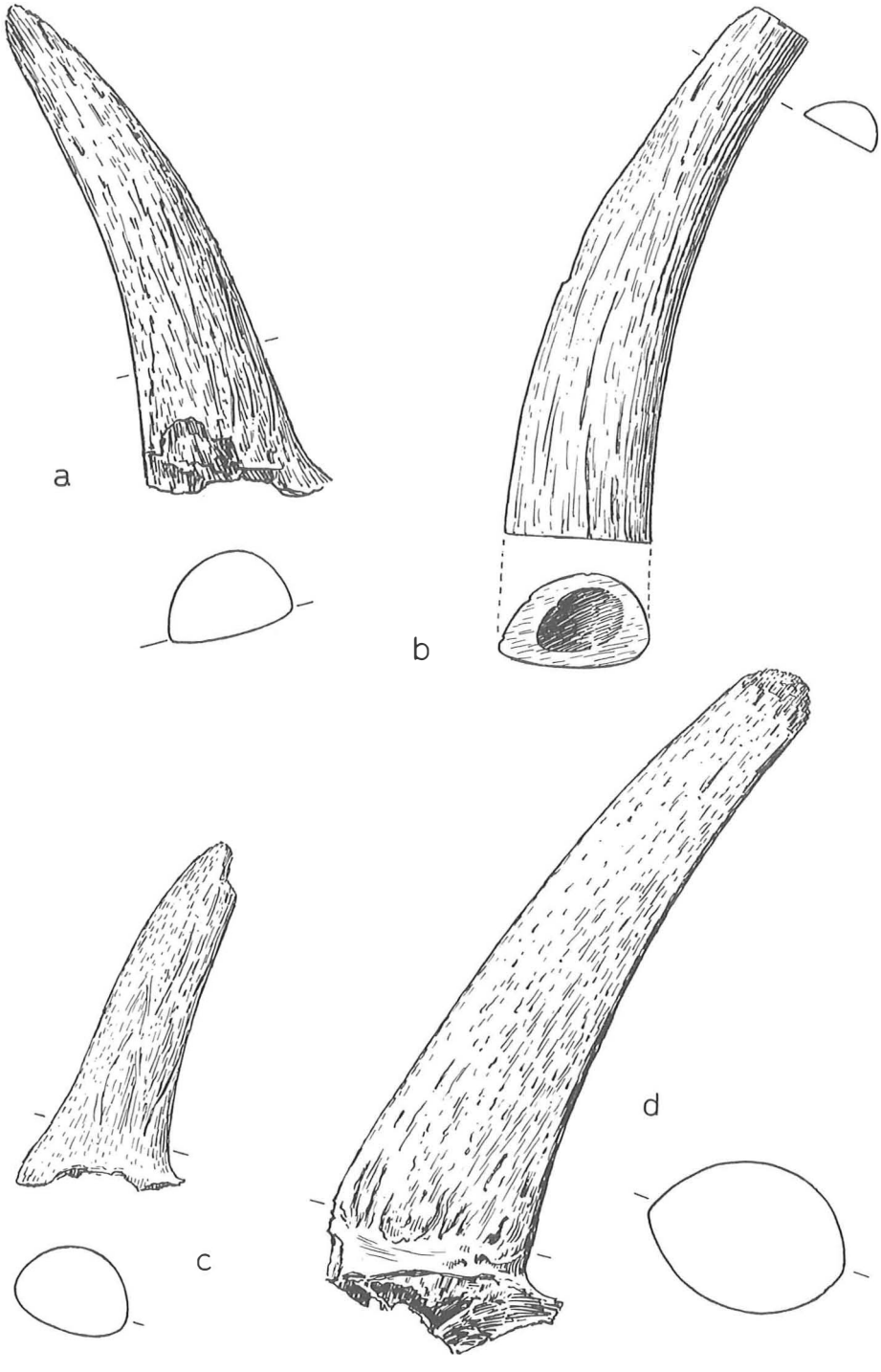


Fig. 25. Capra hircus – horn-cores: *a*, O/384; *b*, O/3708; *c*, O/2968; *d*, O/2101. 2 : 3

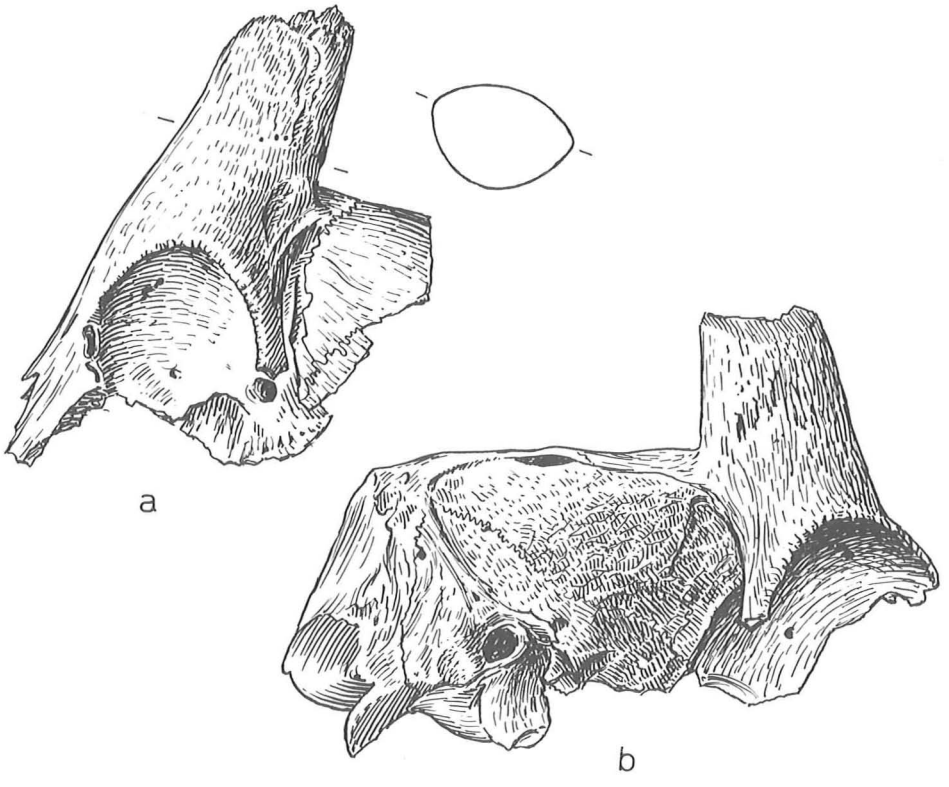


Fig. 26. Capra hircus – skull fragments: *a*, O/1347; *b*, O/1594. 2 : 3

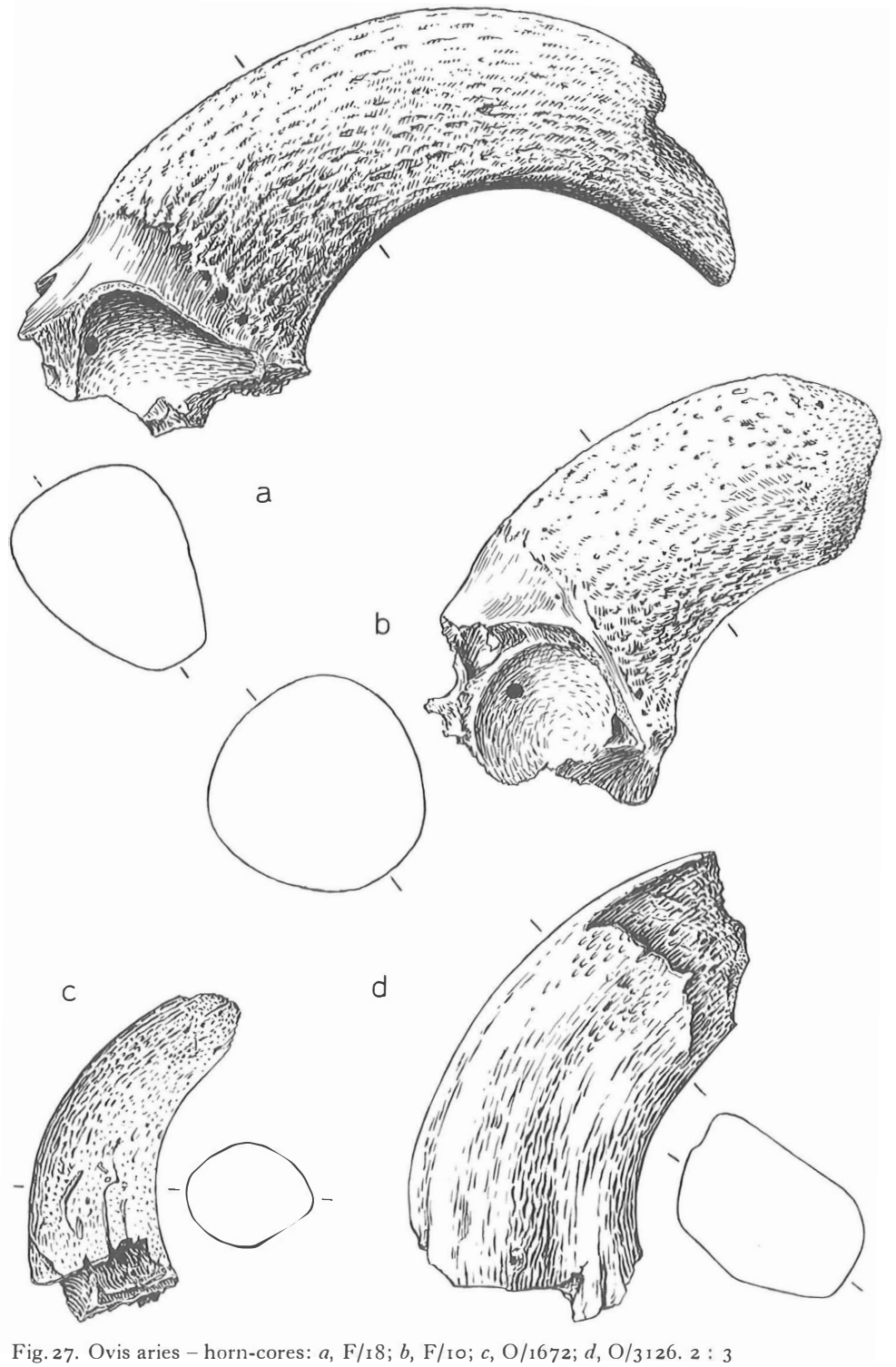


Fig. 27. Ovis aries – horn-cores: *a*, F/18; *b*, F/10; *c*, O/1672; *d*, O/3126. 2 : 3

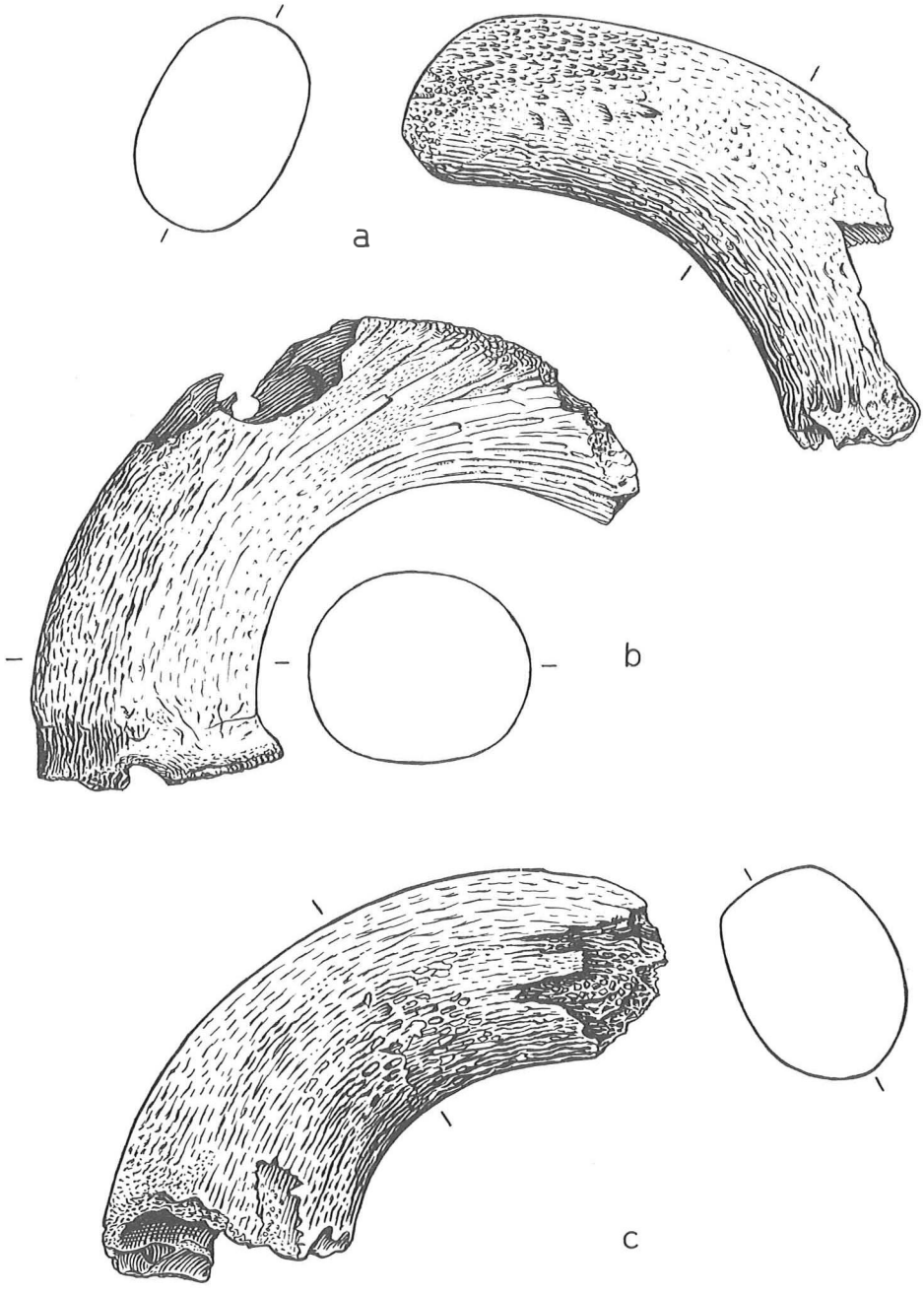


Fig. 28. Ovis aries – horn-cores: *a*, O/1469; *b*, O/1469; *c*, O/1146. 2 : 3

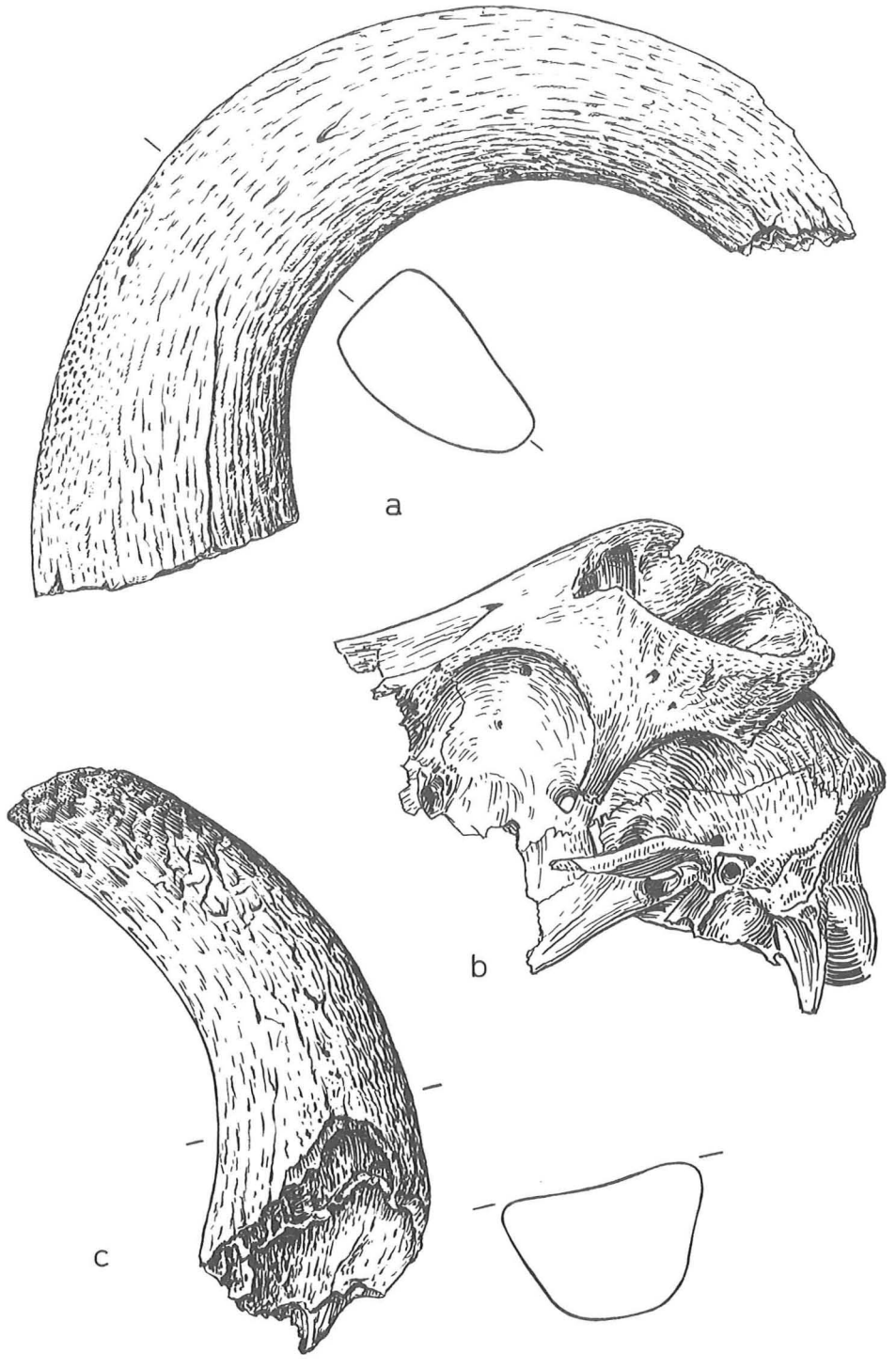


Fig. 29. Ovis aries – horn-cores: *a*, O/1088; *c*, O/586; skull fragment : *b*, O/1469. 2 : 3

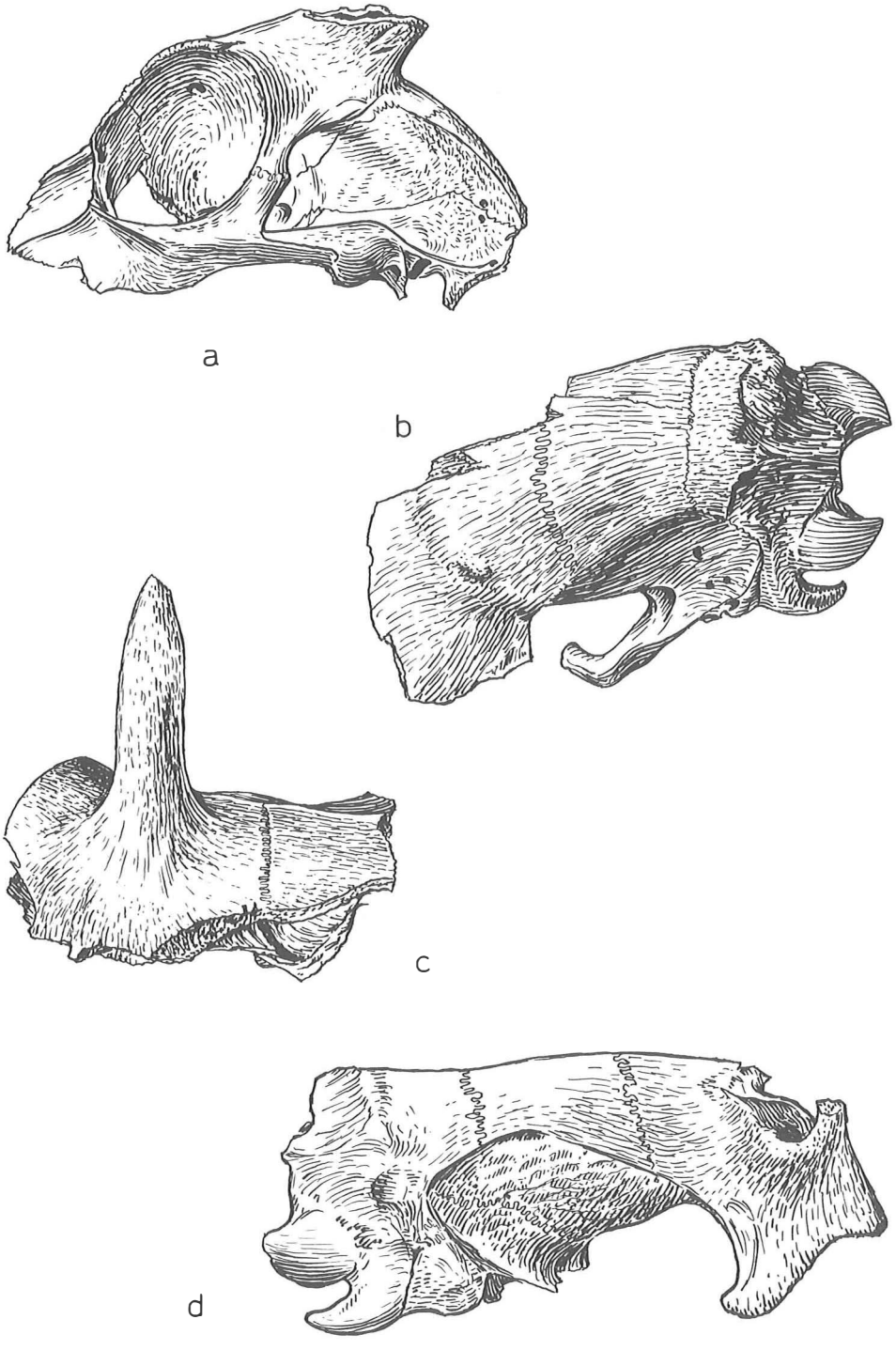


Fig. 30. Ovis aries – skull fragments: *a*, O/3293; *b*, O/1160; *c*, O/2161; *d*, O/?. 2 : 3

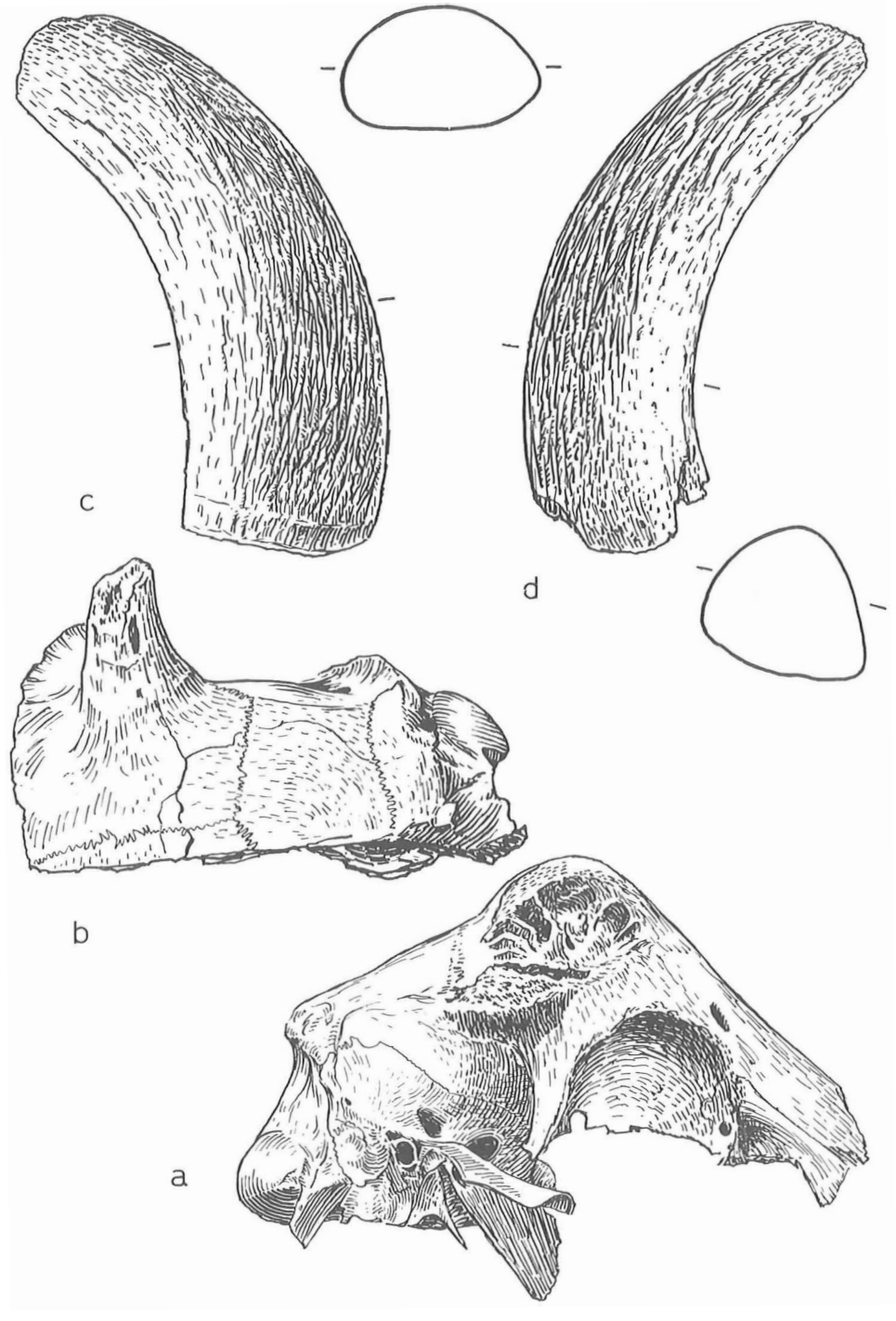


Fig. 31. Ovis aries – skull fragments: *a*, O/1469; *b*, O/2412; horn-cores: *c*, R/239; *d*, R/344. 2 : 3

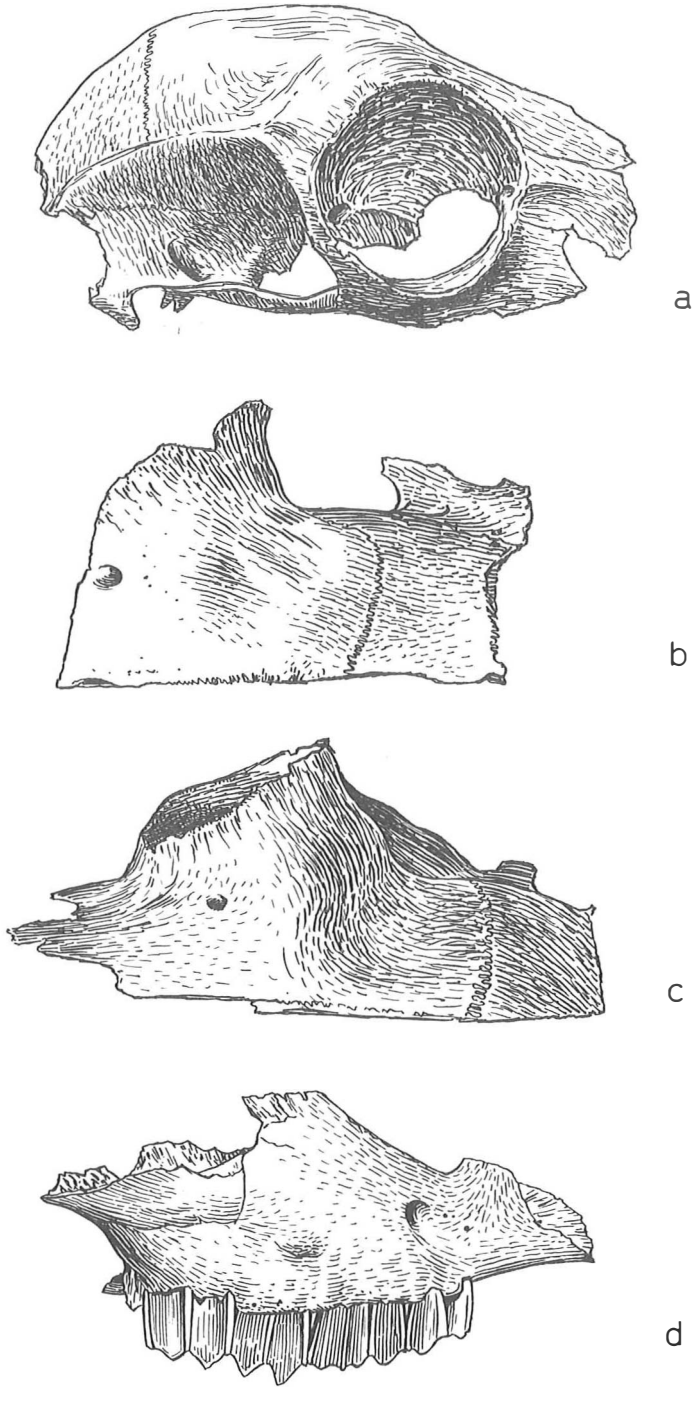


Fig. 32. Ovis aries – skull fragments: *a*, U/211; *b*, U/217; *c*, U/112; *d*, U/216. 2 : 3

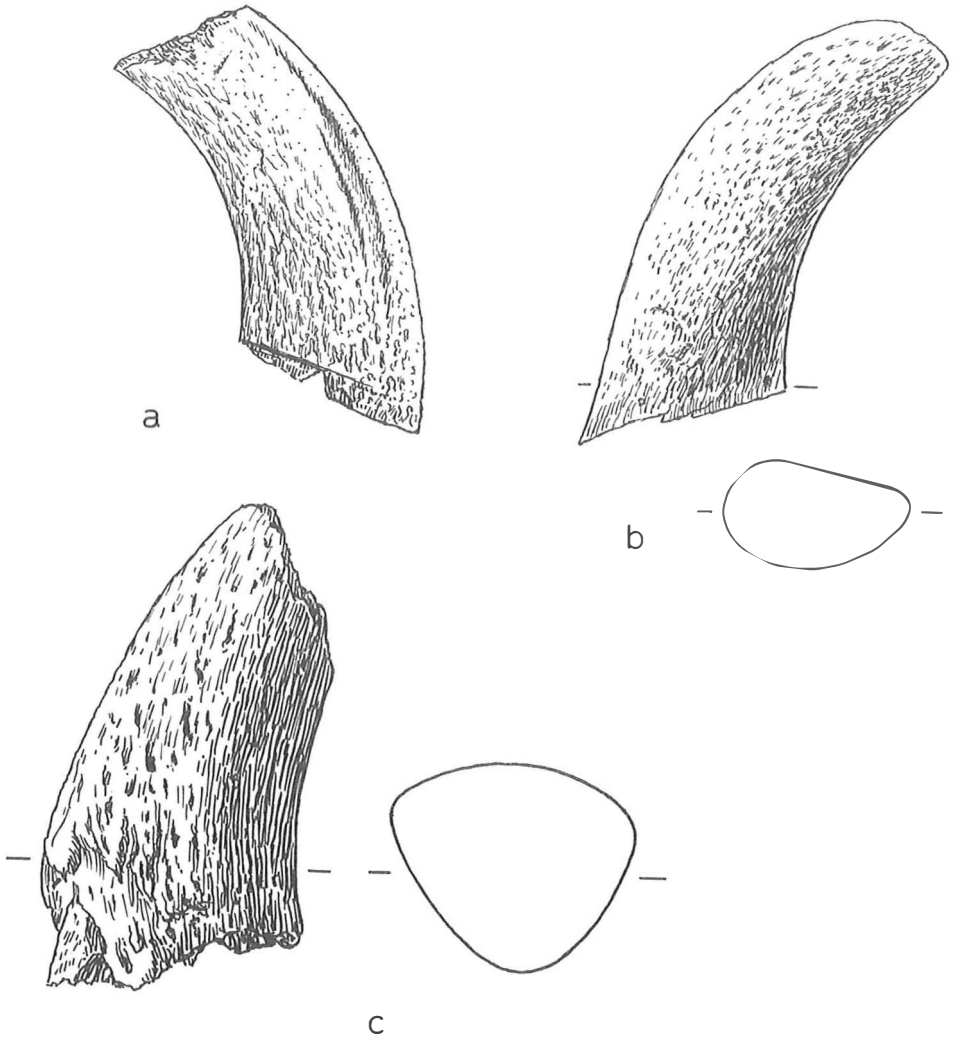


Fig. 33. Ovis aries – horn-cores: *a*, O/335; *b*, O/1417. 2 : 3

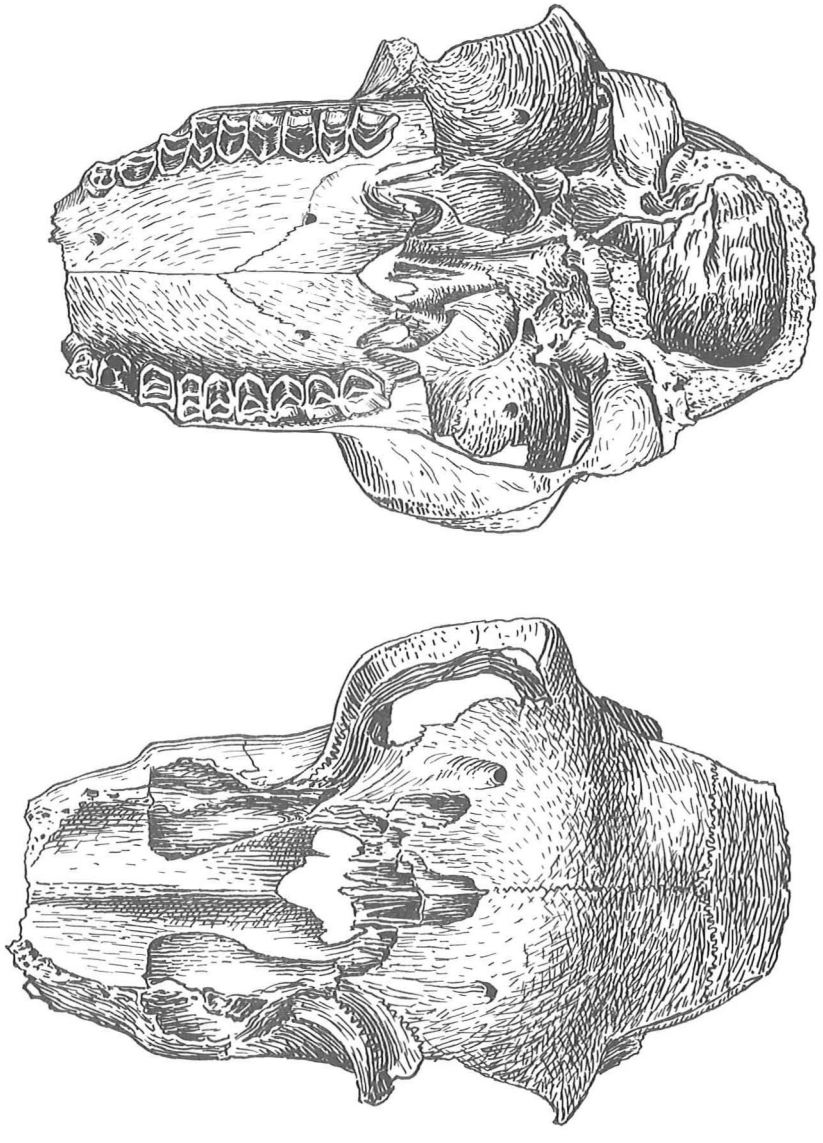


Fig. 34. Ovis aries – skull: O/1704. 2 : 3

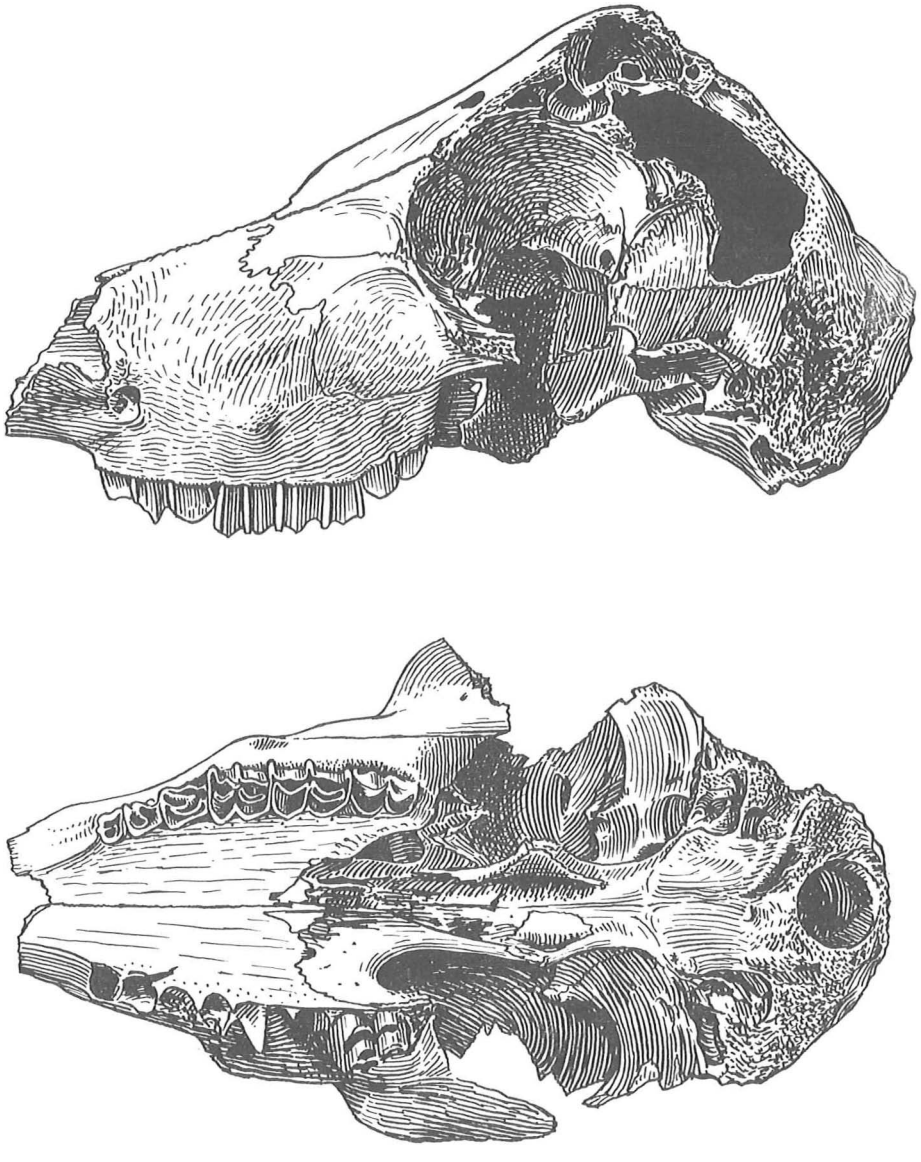


Fig. 35. Ovis aries – skull: R/343. 2 : 3

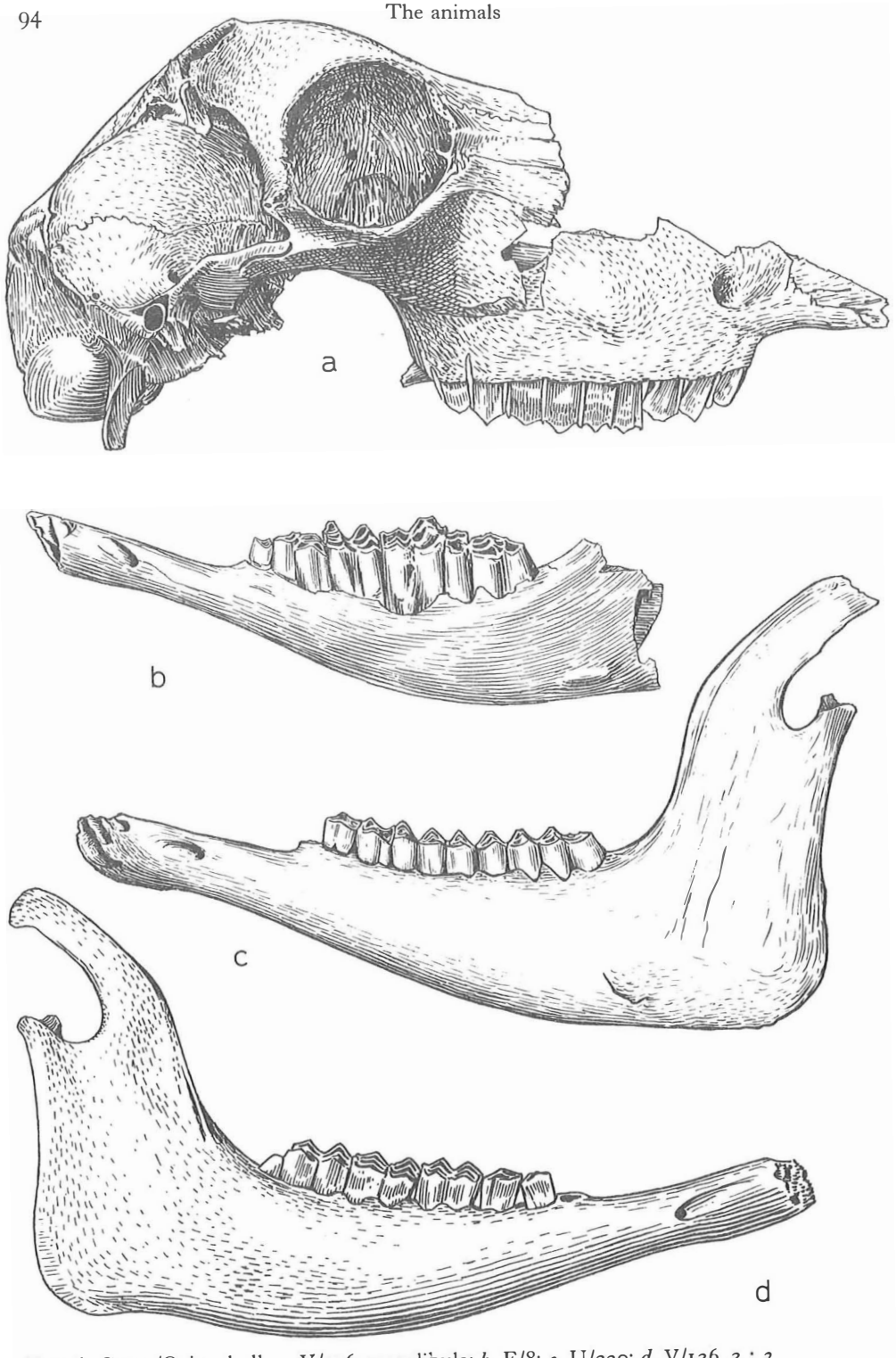


Fig. 36. Capra/Ovis–skull: *a*, V/126; mandibula: *b*, F/8; *c*, U/220; *d*, V/126. 2 : 3

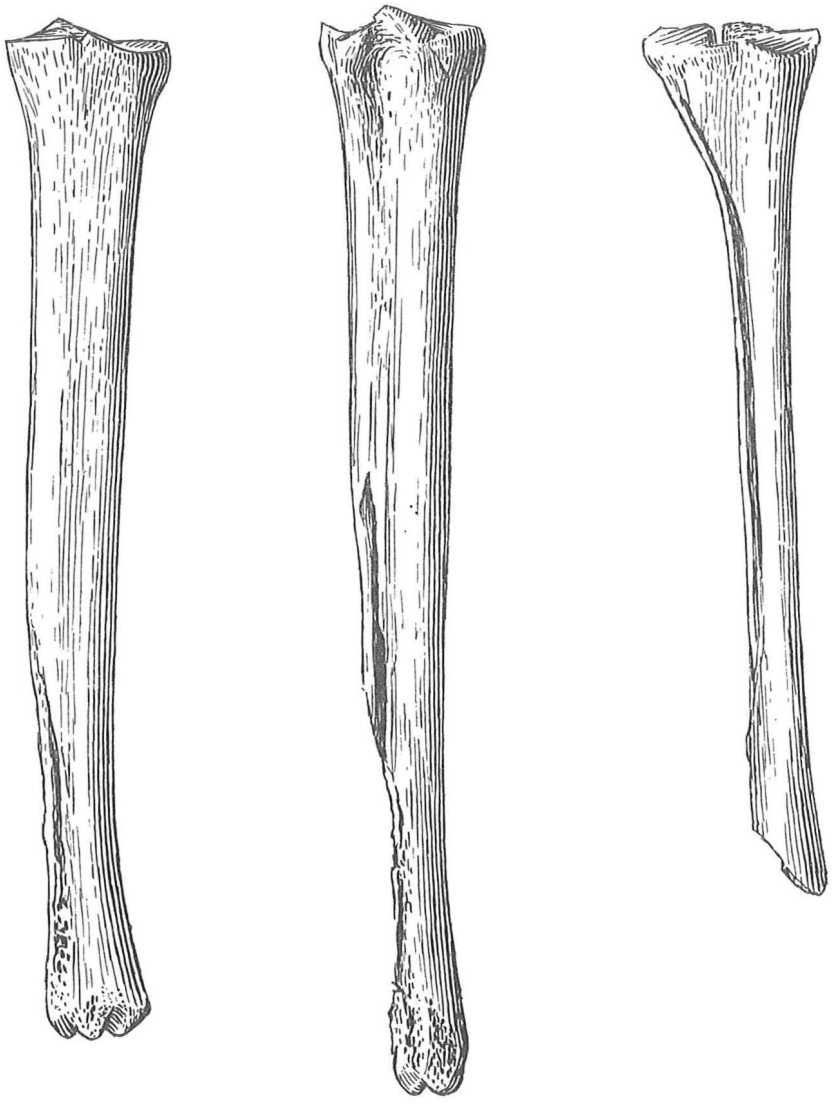


Fig. 37. Capra/Ovis – metapodia, cleft in the medieval way: V/123 (3 ×). 1 : 1

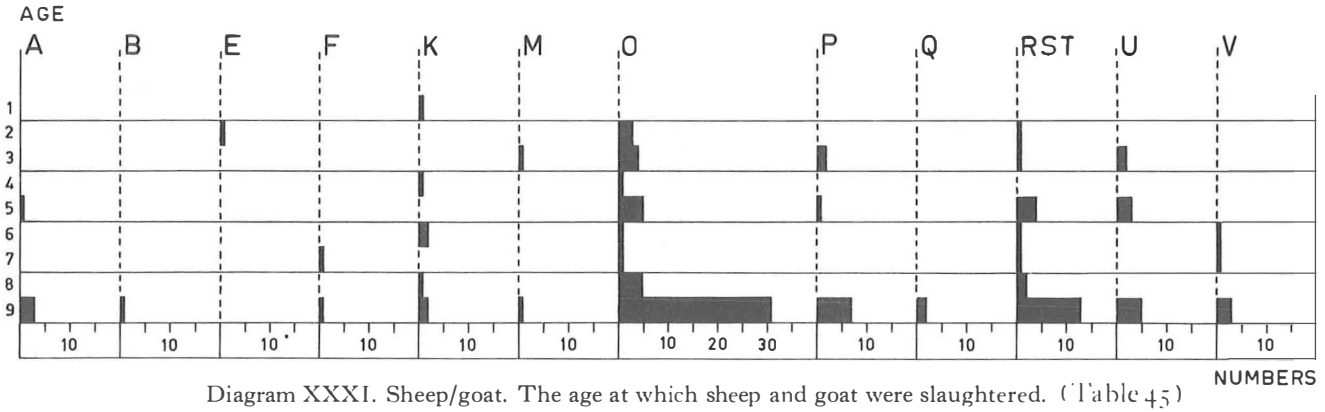


Diagram XXXI. Sheep/goat. The age at which sheep and goat were slaughtered. (Table 45)

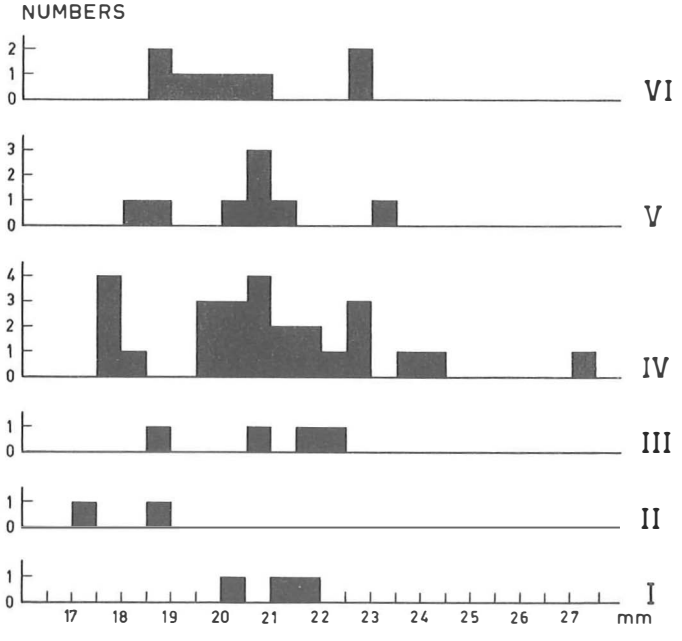


Diagram XXXII. Sheep/goat. M_3, length.

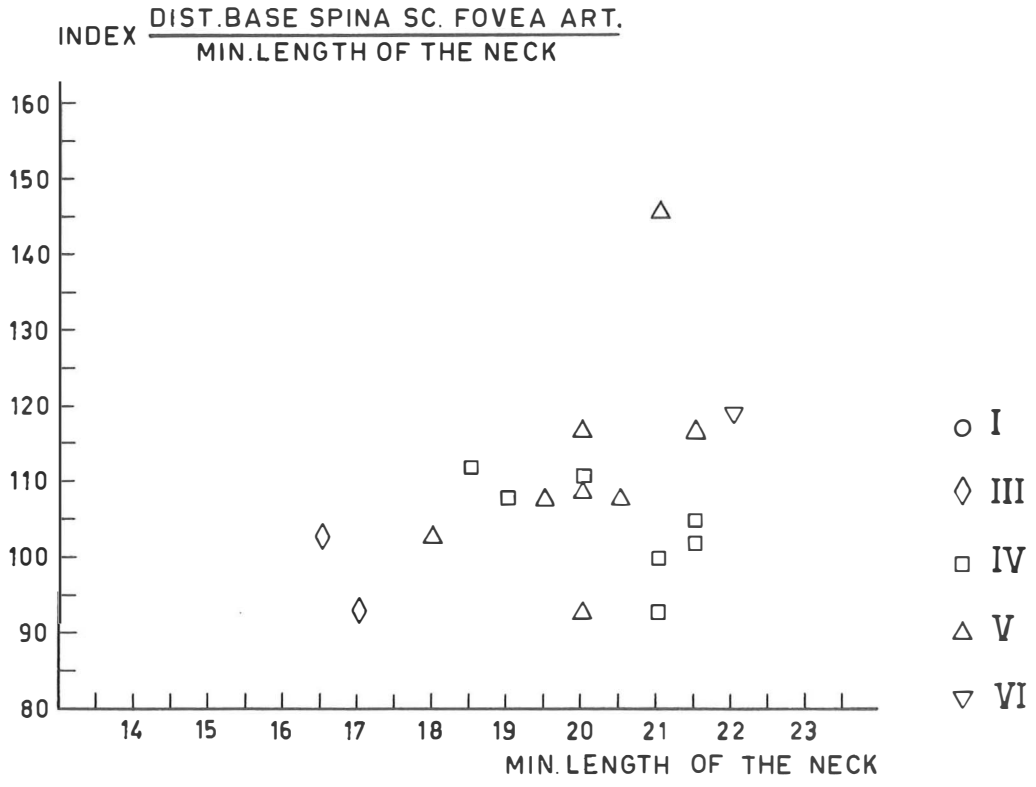


Diagram XXXIII. Sheep/goat. Scapula, length of the neck plotted vs. index: $\frac{\text{distance of the base of the spina scapulae to the fovea articularis}}{\text{minimum length of the neck}}$

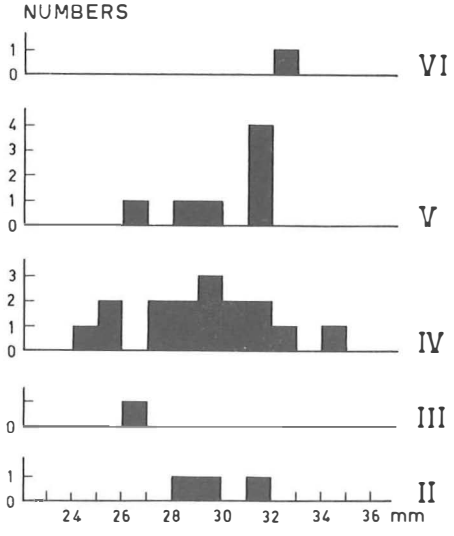


Diagram XXXIV. Sheep/goat. Humerus, distal width.

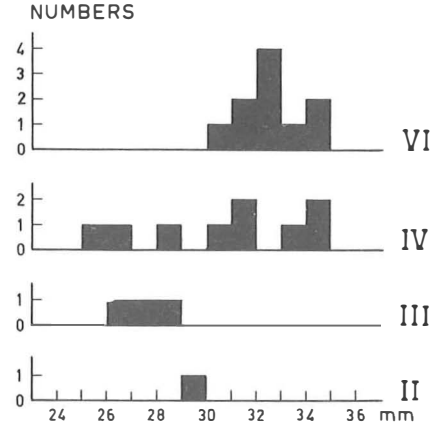


Diagram XXXV. Sheep/goat. Radius, proximal width.

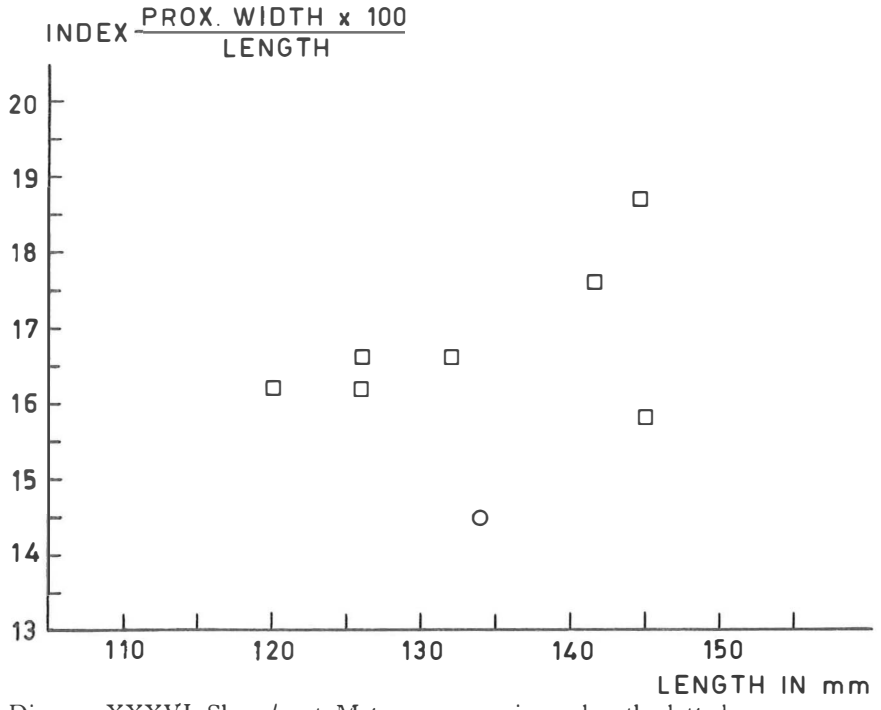


Diagram XXXVI. Sheep/goat. Metacarpus, maximum length plotted vs. the index: $\frac{\text{proximal width} \times 100}{\text{maximum length}}$

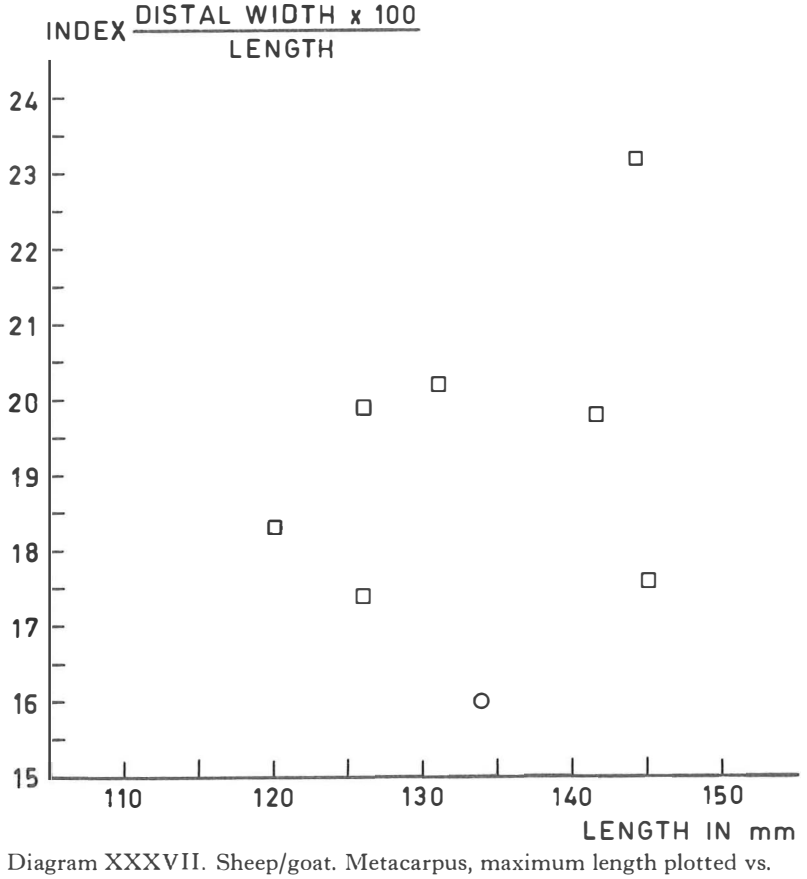


Diagram XXXVII. Sheep/goat. Metacarpus, maximum length plotted vs. the index: $\frac{\text{distal width} \times 100}{\text{maximum length}}$

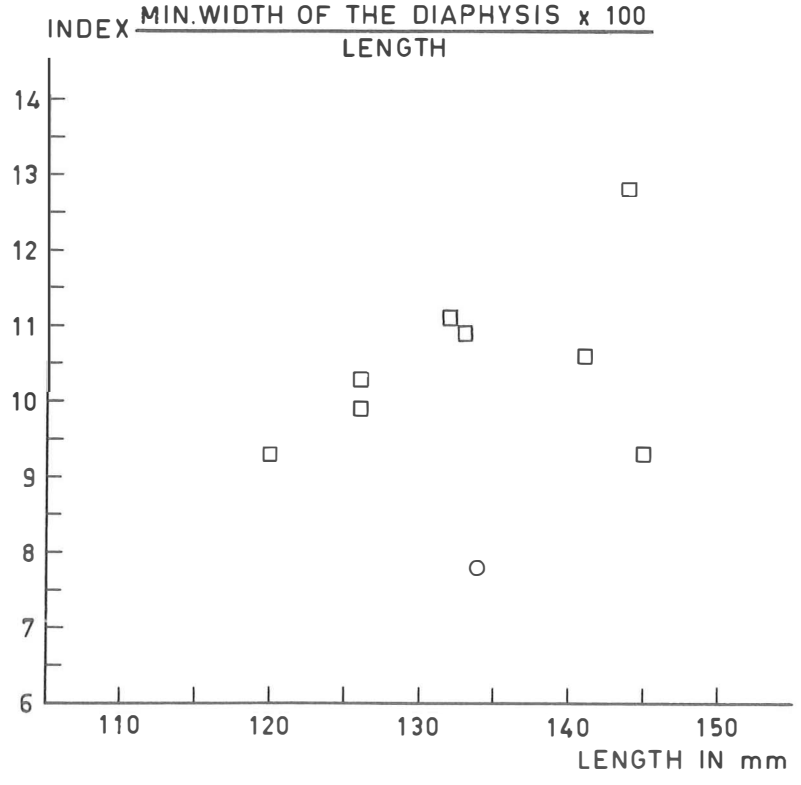


Diagram XXXVIII. Sheep/goat. Metacarpus, maximum length plotted vs. the index: $\frac{\text{minimum width of the diaphysis} \times 100}{\text{maximum length}}$

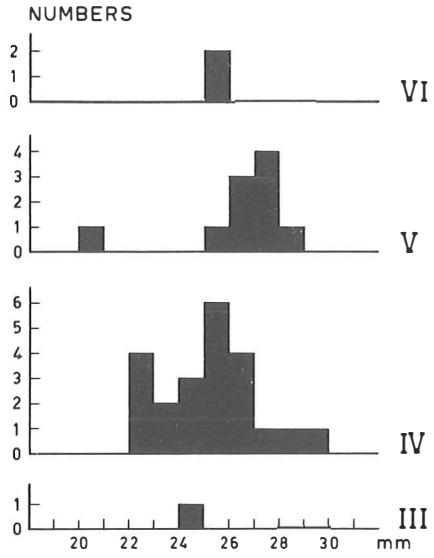


Diagram XXXIX. Sheep/goat. Tibia, distal width.

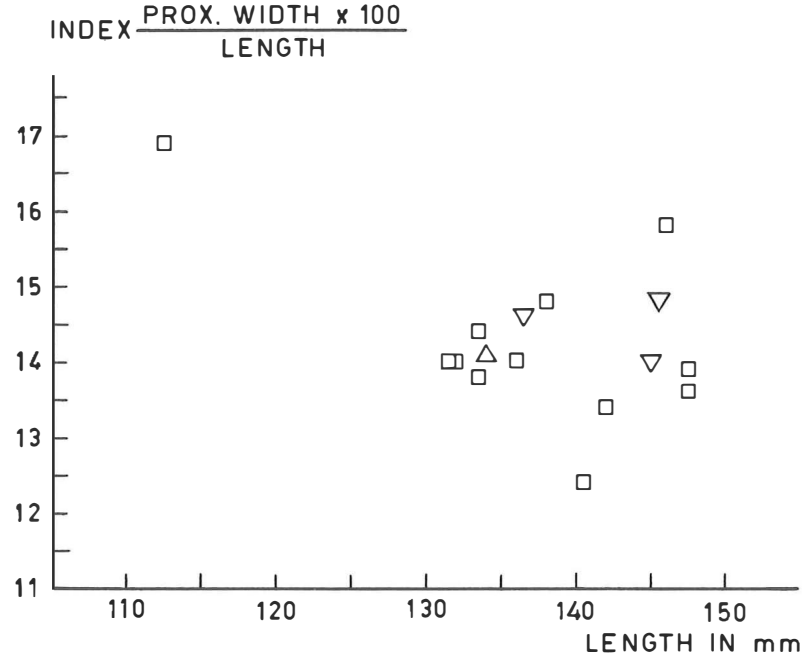


Diagram XL. Sheep/goat. Metatarsus, maximum length plotted vs. the index: $\frac{\text{proximal width} \times 100}{\text{maximum length}}$

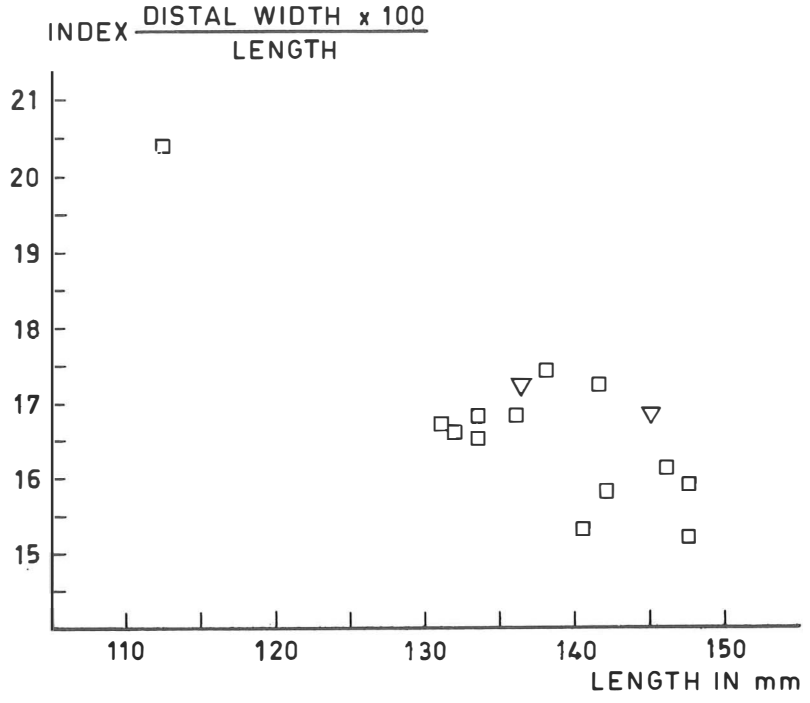


Diagram XLI. Sheep/goat. Metatarsus, maximum length plotted vs. the index: $\frac{\text{distal width} \times 100}{\text{maximum length}}$

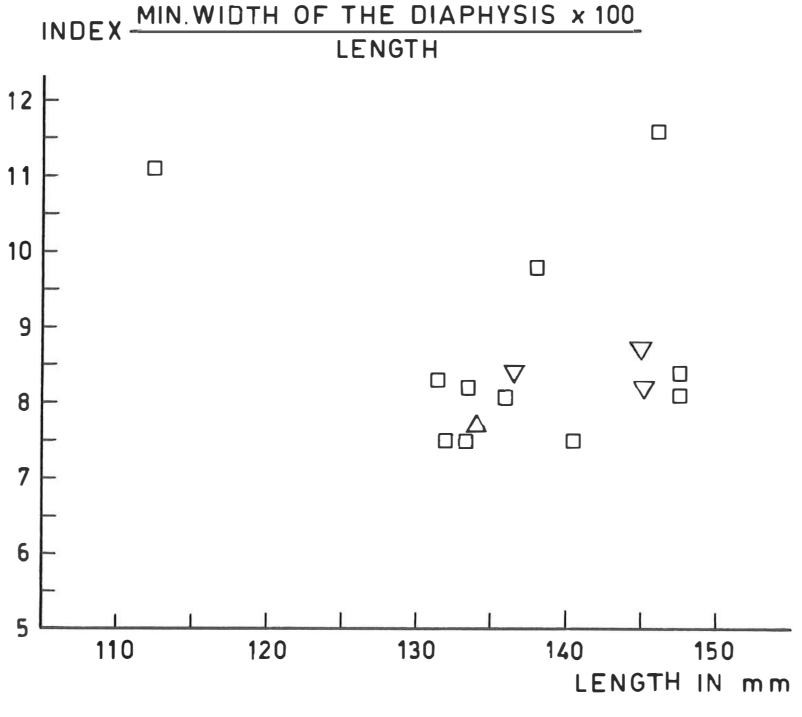


Diagram XLII. Sheep/goat. Metatarsus, maximum length plotted vs. the index: $\frac{\text{minimum width of the diaphysis} \times 100}{\text{maximum length}}$

21. Bos taurus L. (*Table 69*)

Domestic cattle have always been the most important domesticated animals; remains have been found at all sites. It was only at the Eneolithic sites of Vlaardingen and Hekelingen that the red deer remains outnumbered those of cattle (Table 47, diagram XLVIII).

Most bones had been broken once or more often. Of the skull the horn-cores and maxillae have been found most frequently. The mandibulae had mostly been broken into four parts, the pars incisiva and the ramus mandibularis had been cut off from the pars molaris, while in many cases the lower edge of the latter had been cut off. Of the scapula only the lower articular parts were found usually. The long bones had often been broken into two or three pieces. In the Early and Late Middle Ages only a long splinter was cut off the metacarpal and metatarsal bones, either from the lateral or medial side or from the proximal or distal end (fig. 57). The same was noted concerning the metapodia of the small ruminants. Generally undamaged are the os carpi, os tarsi and the phalanges.

Although the remains of domesticated cattle are not numerous – those from the Roman Castellum at Valkenburg excepted – it is still possible to draw conclusions about the development of domesticated cattle in Holland and make comparisons with the development in other European areas.

As most long bones were damaged, only width measurements could be taken in general. When studying the diagrams drawn for the different width measurements of the long bones one notices at once that the measurements of the cattle from the Roman period show the largest variation, at the one end reaching the smallest found for the Holland material, at the other end only in three cases the maxima of the Neolithic measurements were slightly higher than the maxima of the Roman measurements (diagrams XLIX, LI, LVII).

A second feature is that the Eneolithic measurements lie on the right hand side, so in the range of the maximum Roman measurements, the Bronze Age measurements lie slightly more to the centre, and the pre-Roman Iron Age measurements always correspond with the most frequent Roman measurements. The measurements from the Early Middle Ages also correspond with the most frequent Roman measurements, or lie a little more to the right; this phenomenon is still more apparent where remains from the Late Middle Ages are concerned.

When the horn-cores are studied (diagram XLIV, fig. 38–56, Pl. XIX*a*) another picture is obtained. The Eneolithic horn-cores are partly larger than the Roman horn-cores. The measurements of Bronze Age and pre-Roman Iron Age horn-cores can be compared with those of the most frequent measurements of the Roman horn-cores. The measurements of those belonging to Early Medieval cattle correspond with the most frequent Roman measurements, while those belonging to Late Medie-

val cattle are smaller than the most frequent Roman and the most frequent Early Middle Age measurements.

The conclusion that can be drawn from these observations is that the size of the domesticated cattle diminished from Eneolithic till Roman times, to increase again in the Early and Late Middle Ages. It is shown that although the size diminished, the variation increased during the Roman time, reaching the minimum size on the one side but still reaching the size of Eneolithic cattle on the other side. Boessneck (1958) also found larger-sized cattle at the Roman sites in Bavaria. He is of the opinion that they are the result of the improved breeding methods of the Romans rather then of the import from Roman cattle, although the latter could not be excluded.

At the same time the horn-cores and so the horn grew smaller from Eneolithic till Late Medieval times.

This progress must be considered as a direct result of the interference of man, who could obviously handle cattle with small horns better than those with large horns. The final stage of this development is to be seen in North and South America where hornless cattle are bred (Hammond, 1950). The present Dutch cattle still have small horns.

The gradual decrease in size of domesticated cattle is also observed in other European regions. Boessneck (1958) recorded it for Bavaria, Nobis (1954) and Requate (1956) for North-western Germany. Hartman-Frick (1960) observed a decrease in size of the cattle from the Eneolithic till the Bronze Age for the principality of Liechtenstein, while Jewell (1962, 1963) found the same decrease in size for the prehistoric cattle of the British Isles. Nobis (1954) also observed for the Medieval cattle from the "Wurt" of Hessens an increase in size together with a decrease in size of horn-cores.

To get an insight into the size of the domesticated cattle the height at the withers was calculated in accordance with the method of Boessneck (1956), who multiplies the maximum length of the metapodia by a given factor. If the sex has not been established with certainty the factor is 6.40 for the metacarpus and 5.71 for the metatarsus. Most bones must have been from cows, but it is difficult to distinguish the few bones of bulls and bullocks with certainty, therefore the factors Boessneck gives for ♂ ♂ and ♀ ♀ respectively were not used. Complete metacarpal bones were only found at the Roman (Pl. XX*a*) and Medieval sites, giving for the Roman cattle a height at the withers of 105–138 cm, for the Early Medieval cattle 108–133 and the Late Medieval cattle 125–135. One metatarsal bone is known from the Eneolithic site at Vlaardingen and one from the somewhat later site of Langeveld. The height at the withers that could be calculated for cattle from Eneolithic Vlaardingen was 136, from Langeveld near Lisse 113. At Roman Valkenburg the height at the withers calculated from the metatarsal bones (Pl. XX*b*) ranges from 105–142, in the Early Middle Ages from 117–126 and in the Late Middle Ages it was 133.

For the Roman period and also in some cases for the Middle Ages the diagrams show

two peaks indicating that the material is not homogeneous. The same can be observed elsewhere in Europe and this is generally considered to be the consequence of the fact that the cattle populations consisted of cows, bulls, and bullocks, rather than that it is assumed that different species occurred (Boessneck, 1958; Nobis, 1954). Since Von Leithner (1927) could establish a considerable sexual dimorphism for the aurochs, Nobis (1954) showed this for domesticated cattle too. However, the picture here is obscured by the fact that man at an early date practised castration and consequently the existence of bullocks has to be taken into account.

Horn-cores, metacarpus and metatarsus – the bones generally best preserved – were used to get an insight into the distribution of the sexes (following Nobis (1954) and Boessneck (1958)). If for the Eneolithic, the Bronze Age and Pre-Roman Iron Age, the Roman and Medieval horn-cores the relation between the circumference at the base and the index $\frac{\text{minimum diameter} \times 100}{\text{maximum diameter}}$ is studied (diagram XLV) a decrease in the circumference at the base can be noticed and at the same time the variation is greater with the material from the Roman period than with that from the preceding periods; two groups can be distinguished, the larger consisting of cows, the smaller of bulls and bullocks.

The metacarpal bones show the difference between the sexes the most clearly. The metacarpi of cows and bulls have about the same length, while the metacarpus of the bull is broader and sturdier than that of the cow. The metacarpus of the bullock is longer than that of the cow and bull, and slender like that of a cow. According to Figdor (quoted by Dürer, 1961) the growing period of bullocks is longer than that of cows and bulls. According to Zalkin (1960) bullock metapodia are approximately 7% longer than those of cows and bulls. When the length-width indices (diagrams LII, LIII) are studied, it appears that most metacarpal bones belong to cows, and only a few to bulls and bullocks. Three metacarpal bones from the Roman Castellum at Valkenburg belong to bulls and one to a bullock probably. Among the remains from Medieval Rijnsburg there may be one metacarpus belonging to a bull and three belonging to bullocks (at both Huis te Merwede and Amsterdam there may have been one metacarpus of a bullock). For the metatarsal bones the picture is less clear, but the three large metatarsi from Valkenburg, which are even larger than the metatarsus from Eneolithic Vlaardingen, could be from bullocks. It can be concluded that in all periods the adult animals which were slaughtered were usually cows.

Table 46 and diagram XLIII indicate that animals of all ages were slaughtered (Pl. XVIII*a*, *b*). According to Ellenberger and Baum (1943) animals of primitive late-ripe breeds acquire their full set of teeth after about three years.

In some cases a reduction of the teeth of the mandibula could be observed. P_2 did not erupt (diagram XLIII) in one case at Eneolithic Vlaardingen, in 26 cases at Roman Valkenburg and in one case at Medieval Rijnsburg. M_3 had only two talons in

twelve cases at Roman Valkenburg, in two cases at Roman Velsen and in one case at Early Medieval Rijnsburg.

A number of bones showed pathological deformations. A deformation of the mandibula round one or more alveoli occurred most. The humerus found in the ring-ditch of the Bronze Age barrow of Wervershoof had an abnormally thickened shaft, probably the result of a fracture which had healed (Pl. XIX*b*).

At none of the sites remains of the aurochs have been found. Van der Feen and Kortenbout van der Sluys (1958) thought that some of the cattle remains found at Eneolithic Hekelingen belong to wild cattle, which is not true, however. The measurements of the mandibula they attributed to an aurochs, are exceeded in the Roman period and this bone does certainly not belong to an aurochs. The large horn-core from Eneolithic Zandwerven corresponds with the largest which Nobis (1954) describes for domesticated cattle in Weisenfels.

The absence of the aurochs in the provinces of North and South Holland must be explained by the geographical nature of these provinces in ancient times. The narrow coastal area which was habitable for man was separated from the higher sandy soils in the east by extensive bogs that were unfit for habitation (Pons, Jelgersma, Wiggers & De Jong, 1963).

The coastal area could be reached via some narrow causeways formed by the somewhat higher situated banks along the large rivers. Unlike man the aurochs did not use these causeways apparently. In the Late Middle Ages when the bogs were reclaimed, the aurochs must have been exterminated already in the Netherlands.

In prehistoric times meat and hides must have been the most important products obtained from the domesticated cattle, while in Eneolithic Vlaardingen, Hekelingen and Zandwerven cattle bones were used for the manufacture of implements. Whether in those early times milk was used cannot be said. In the Roman period the Frisians living in the provinces of Frisia and Groningen had to pay tribute to the Romans in the form of ox-hides (Boeles, 1951). The Romans are known to have fed pigs with milk and to have made a variety of cheeses. In the Middle Ages cheese and butter were exported from Holland (Unger, 1916). At that time cheese was a popular food, but butter was only for the rich. Very little milk was drunk, but milk-dishes were known. Generally, however, cattle were kept for graziery mainly.

In the Late Middle Ages large numbers of cattle came from Denmark and North-western Germany to graze in the pastures of Holland (Unger, 1916; Bakker, 1909), and at an early date there was an important cattle market at Amsterdam (Unger, 1916; Burema, 1953).

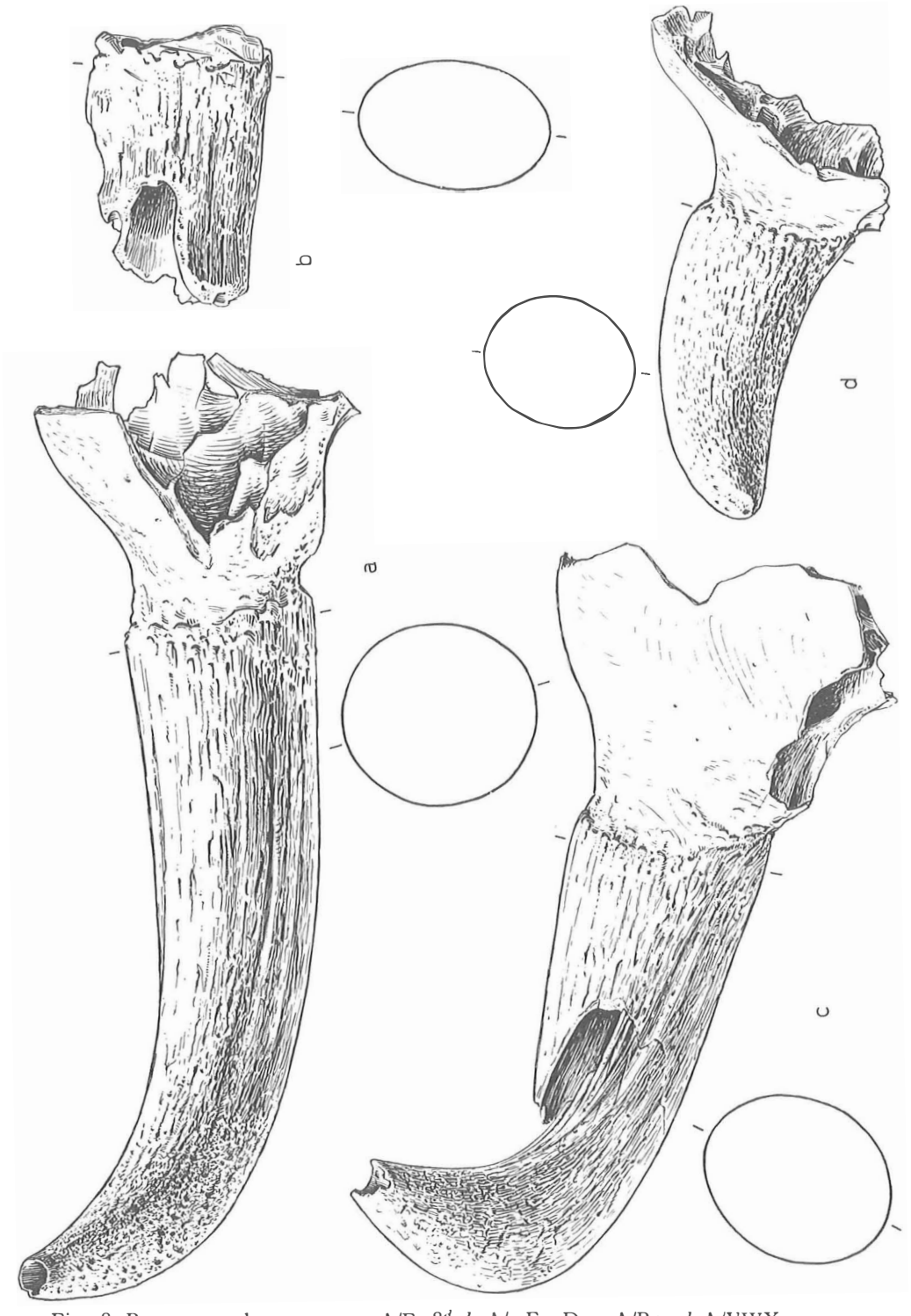


Fig. 38. Bos taurus – horn-cores: *a*, A/F 18[d]; *b*, A/2 E 2 D; *c*, A/P 7; *d*, A/VWX. 1 : 2

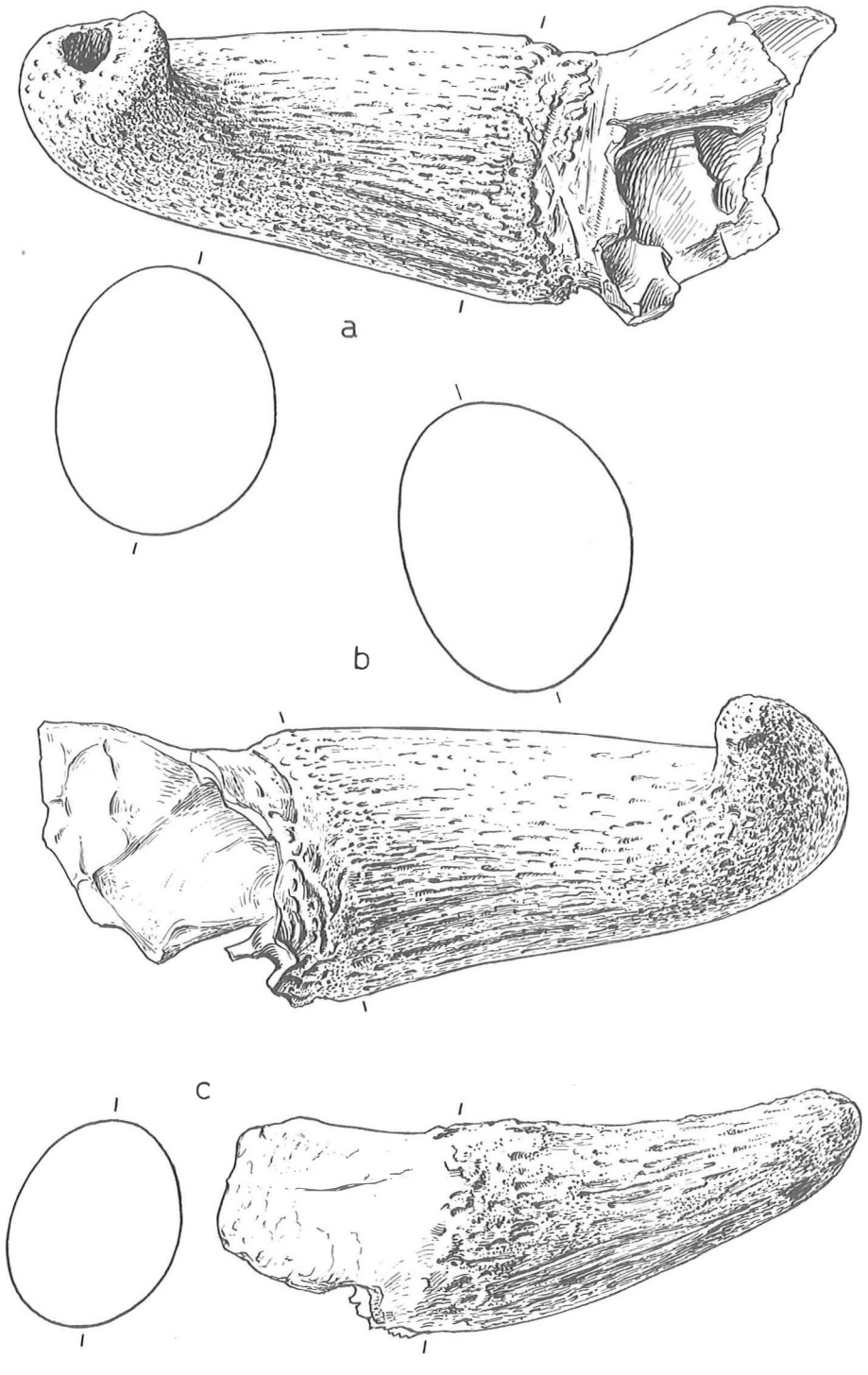


Fig. 39. Bos taurus – horn-cores: *a*, A/H 19^{d}; *b*, A/H 19^{d}; *c*, A/G 21^{d}. 1 : 2

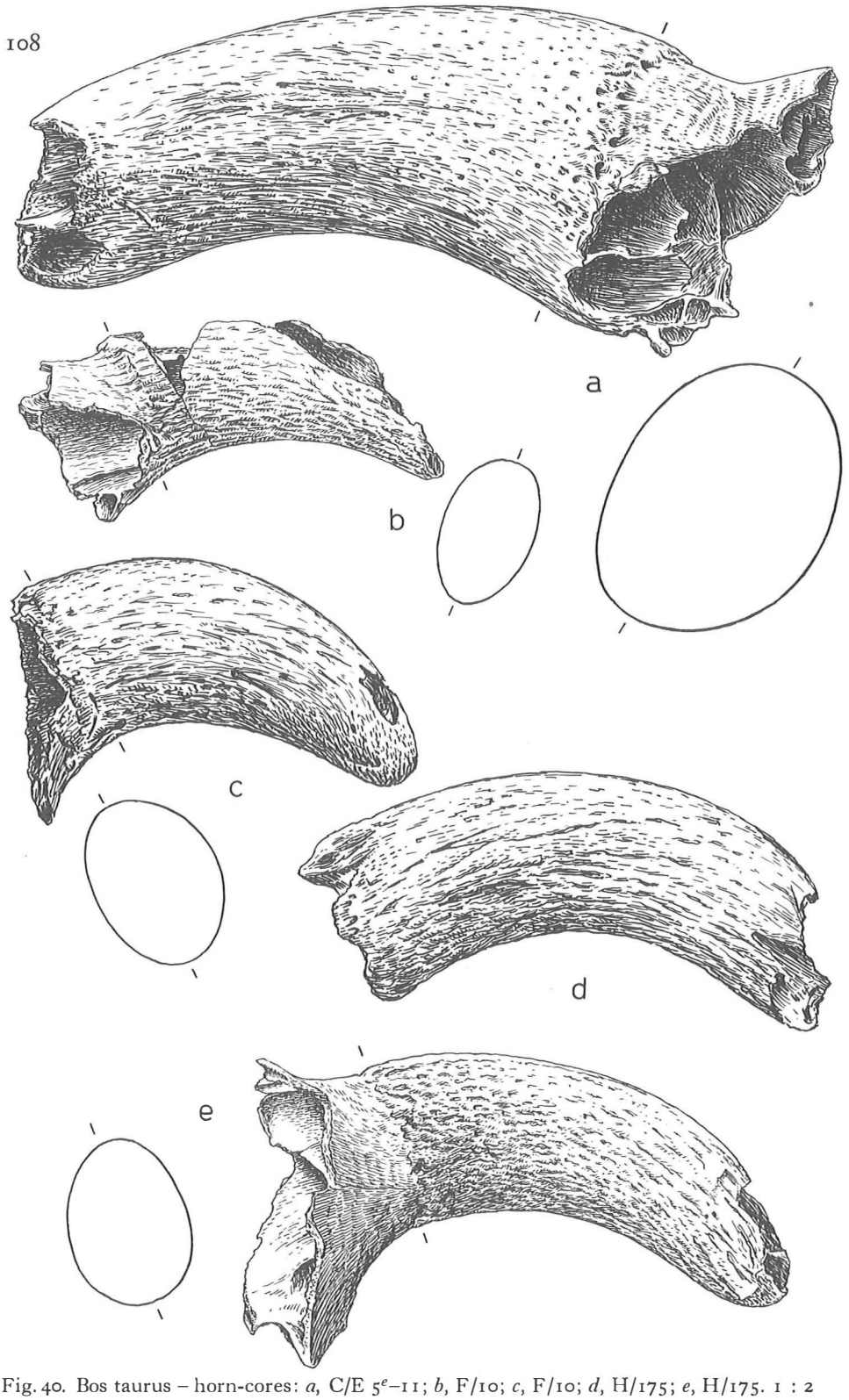


Fig. 40. Bos taurus – horn-cores: *a*, C/E 5^{e}–11; *b*, F/10; *c*, F/10; *d*, H/175; *e*, H/175. 1 : 2

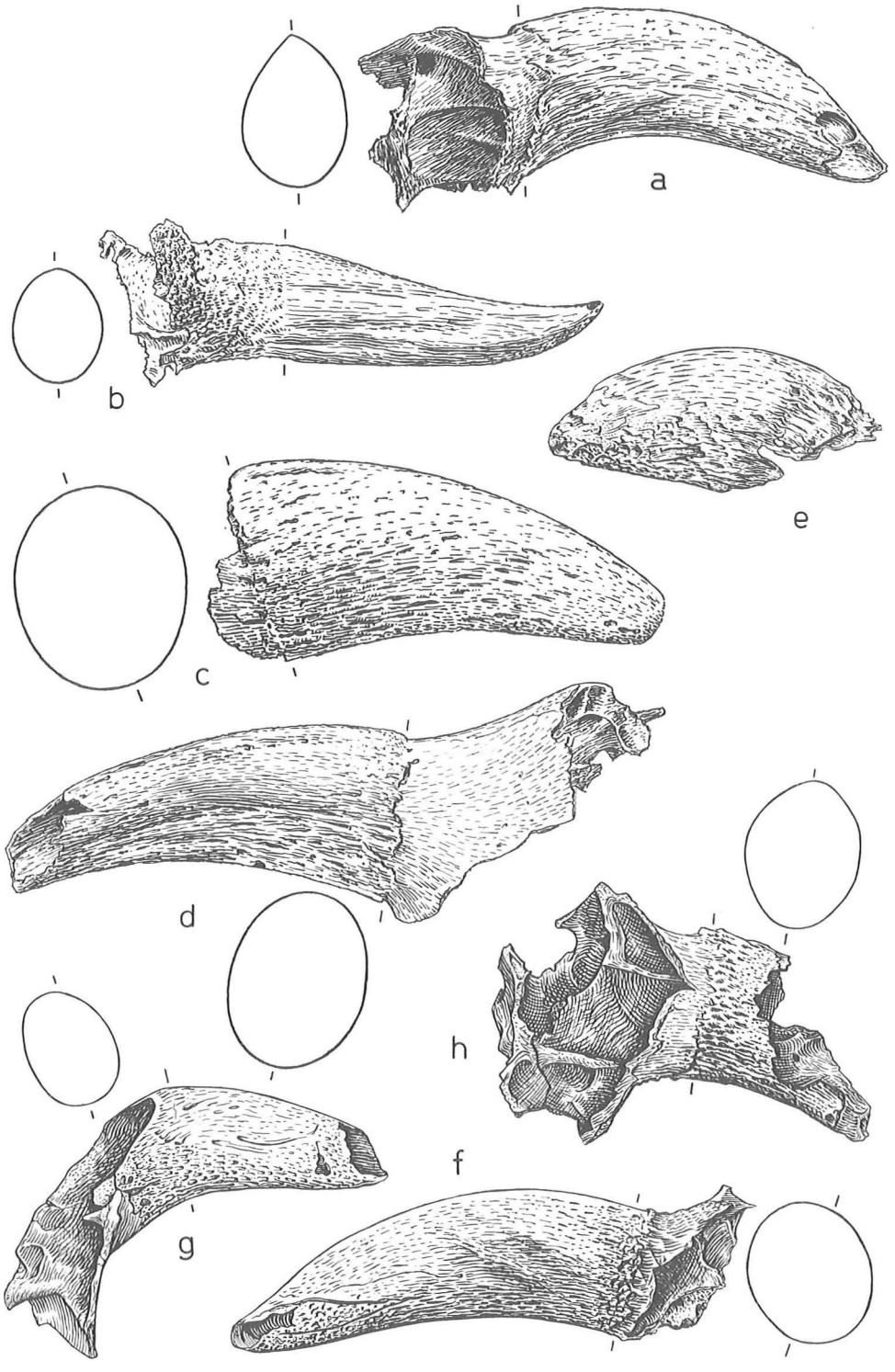


Fig. 41. Bos taurus – horn-cores: *a*, K/1; *b*, K/17; *c*, K/15; *d*, K/12; *e*, M/?; *f*, M/219; *g*, N/29; *h*, N/108. 1 : 2

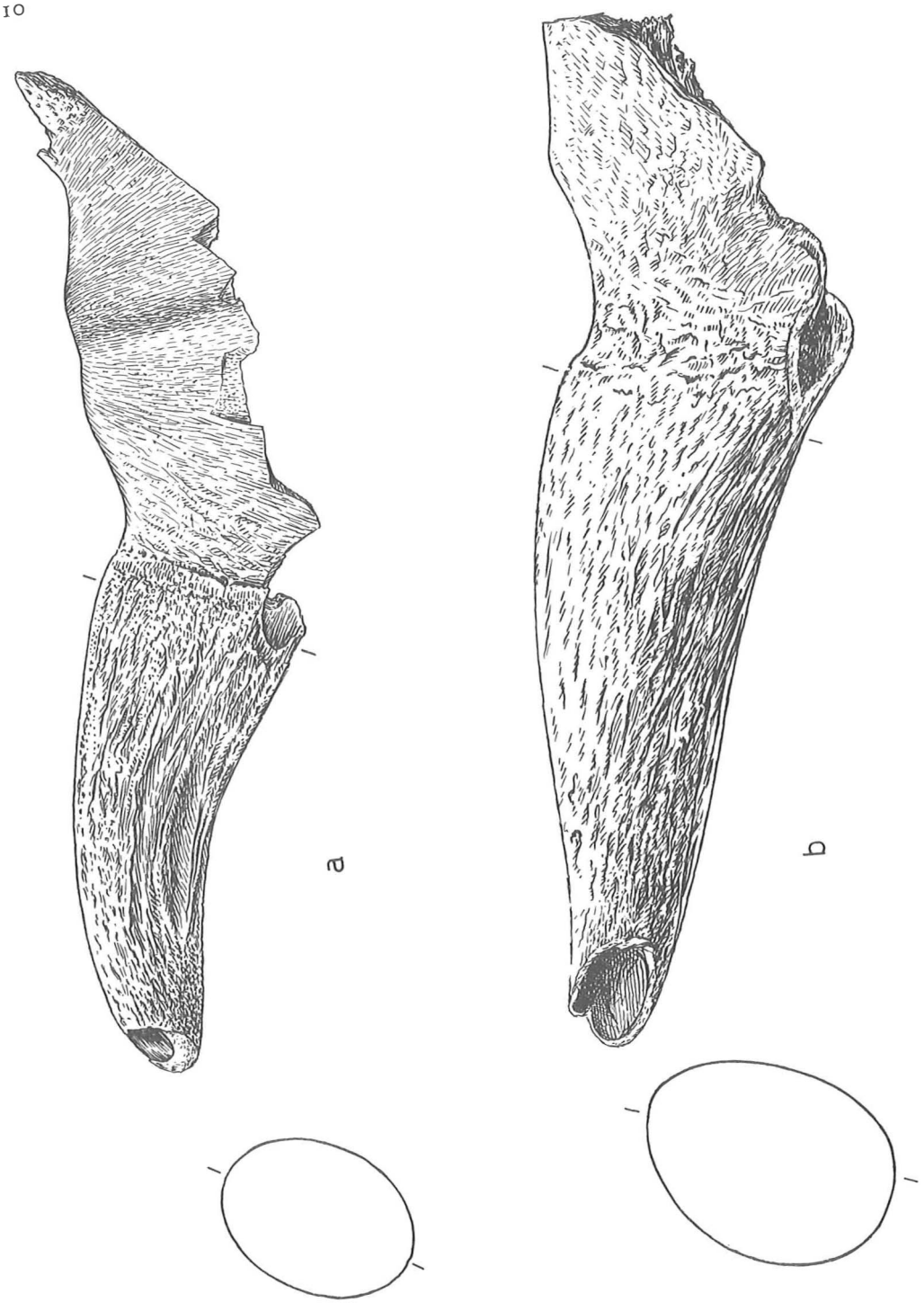


Fig. 42. Bos taurus – horn-cores: *a*, O/1006; *b*, O/?. 1 : 2

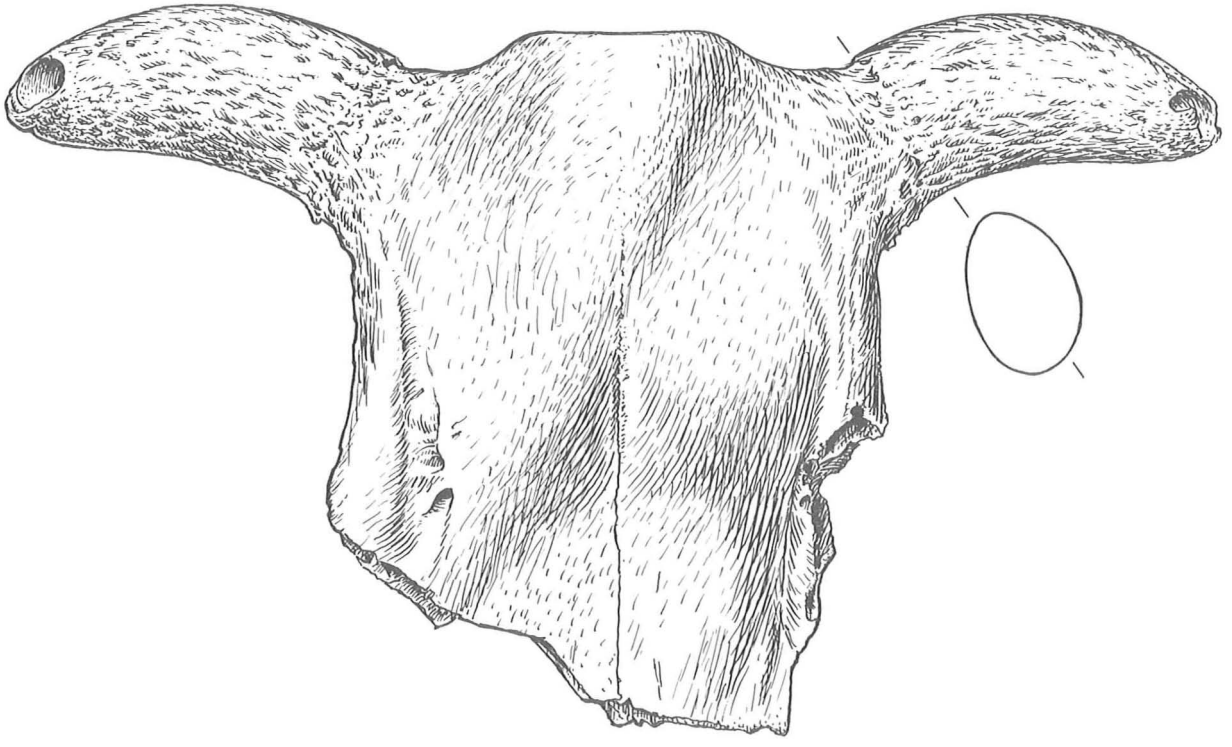


Fig.43. Bos taurus – skull fragment with horn-cores: O/4891. 1 : 2

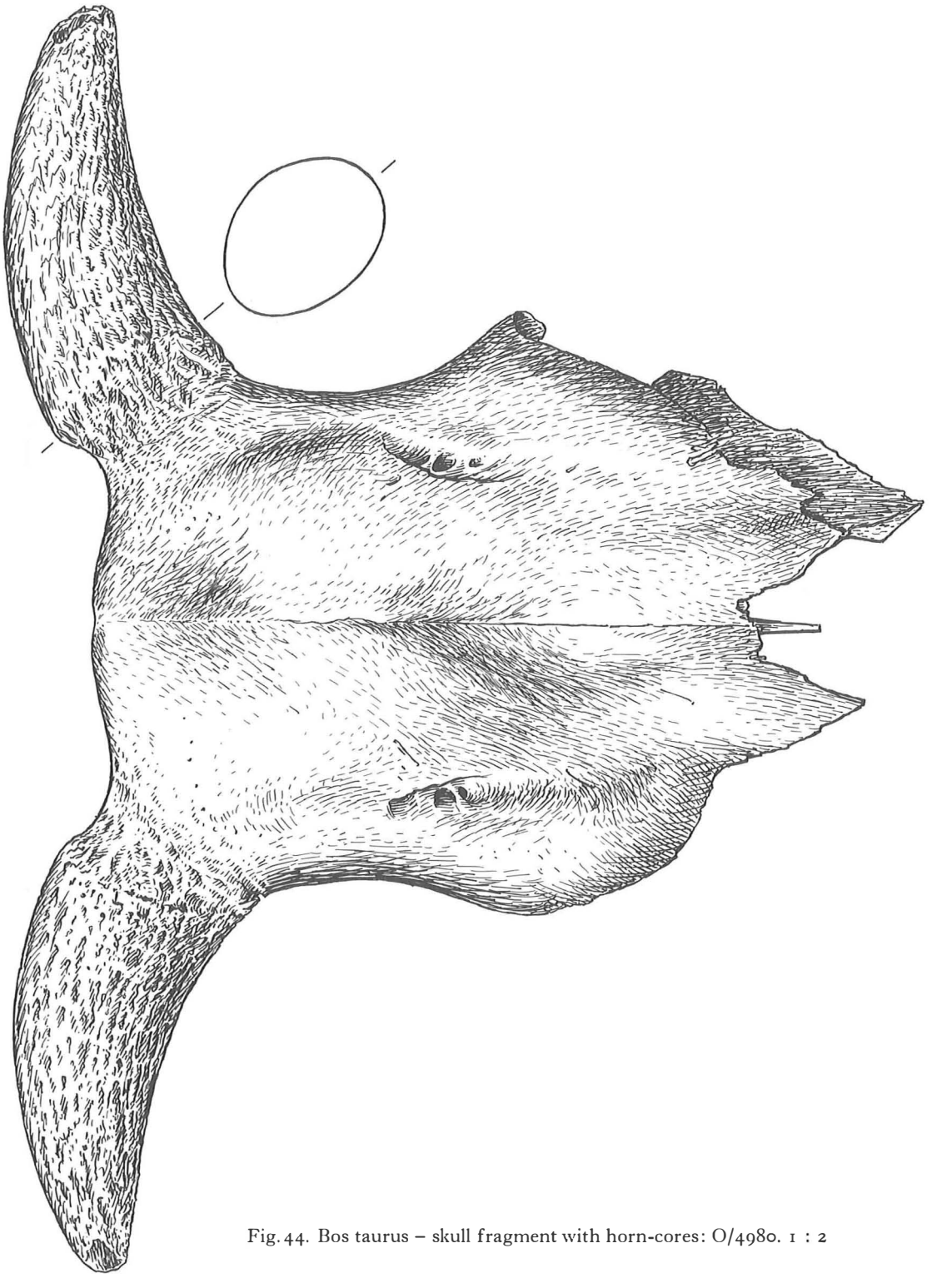


Fig. 44. Bos taurus – skull fragment with horn-cores: O/4980. 1 : 2

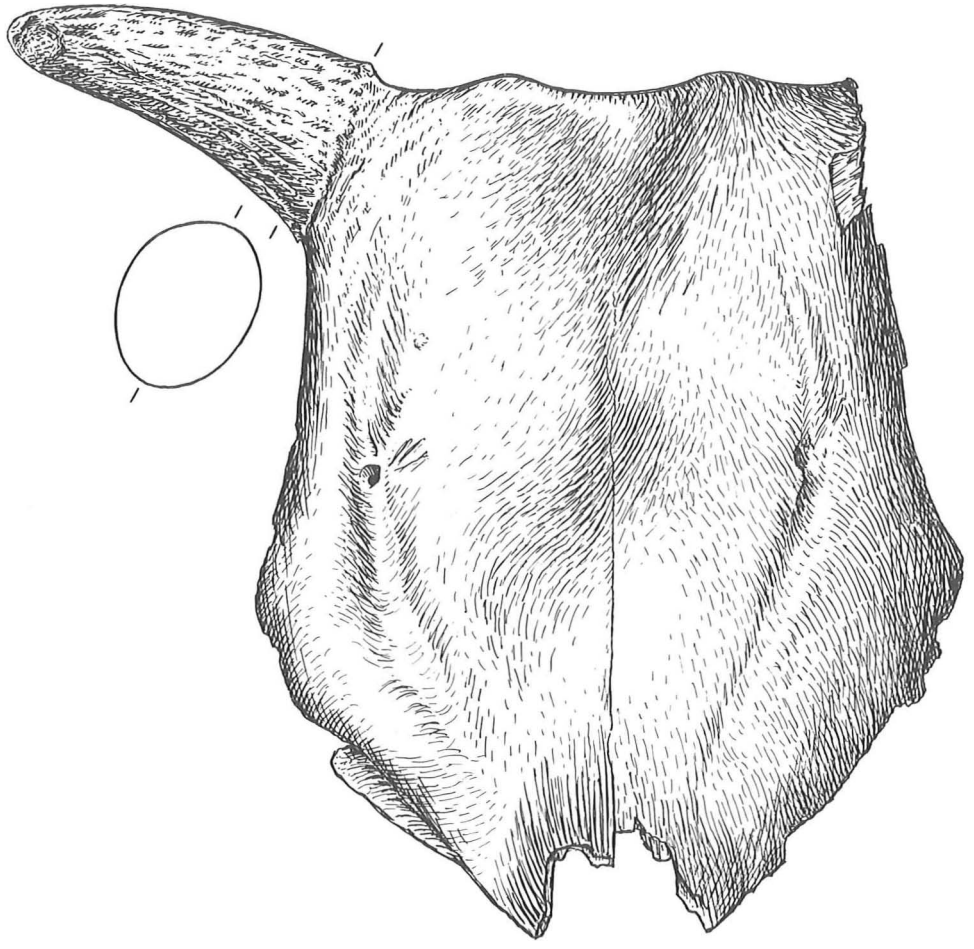


Fig. 45. Bos taurus – skull fragment with horn-cores: O/4791. 1 : 2

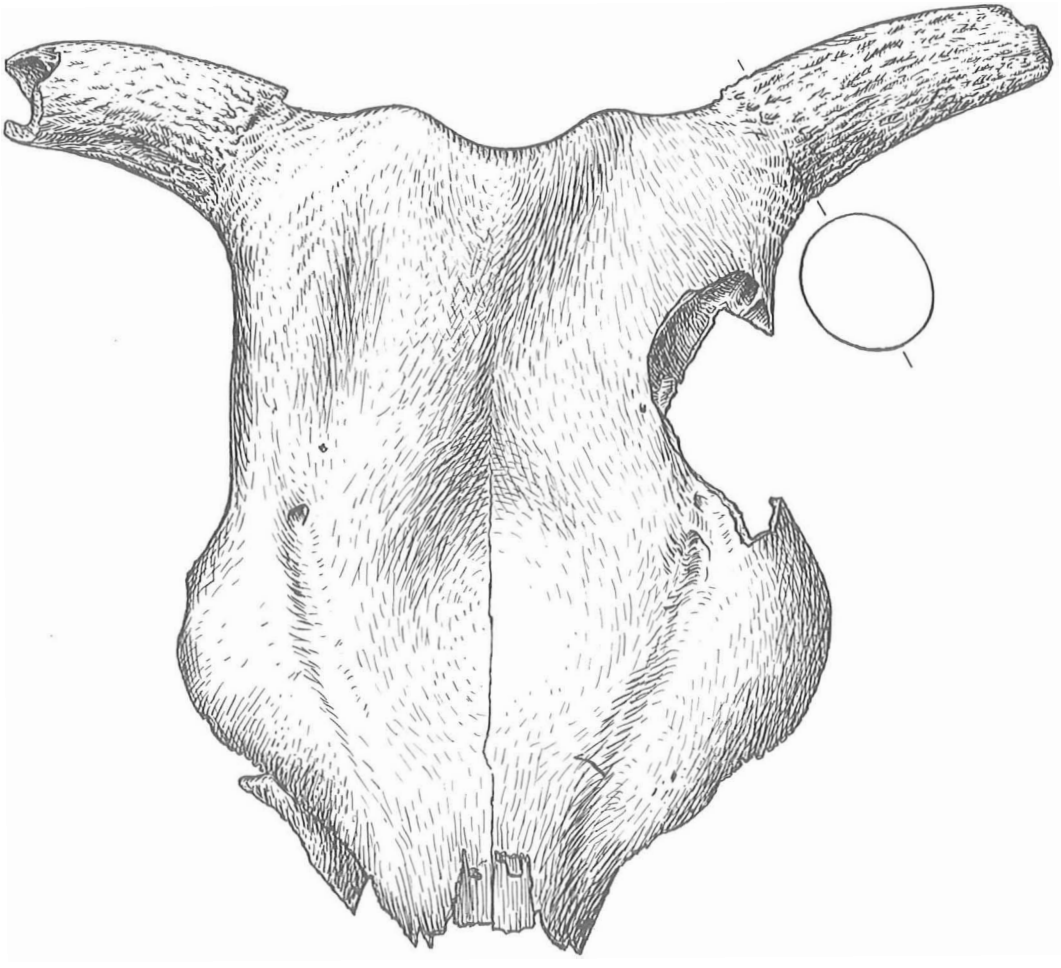


Fig. 46. Bos taurus – skull fragment with horn-cores: O/4891. 1 : 2

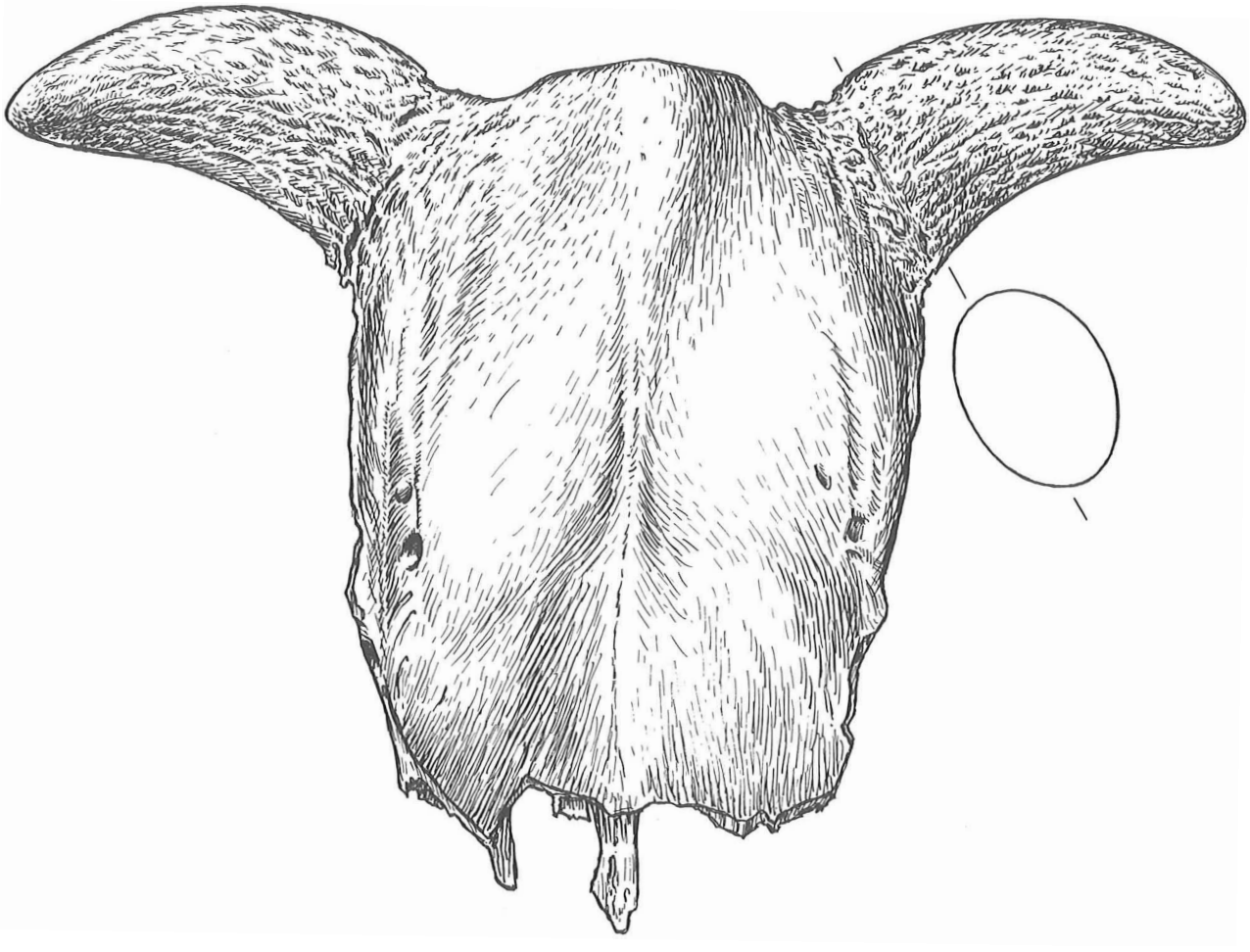


Fig. 47. Bos taurus – skull fragment with horn-cores: O/1669. 1 : 2

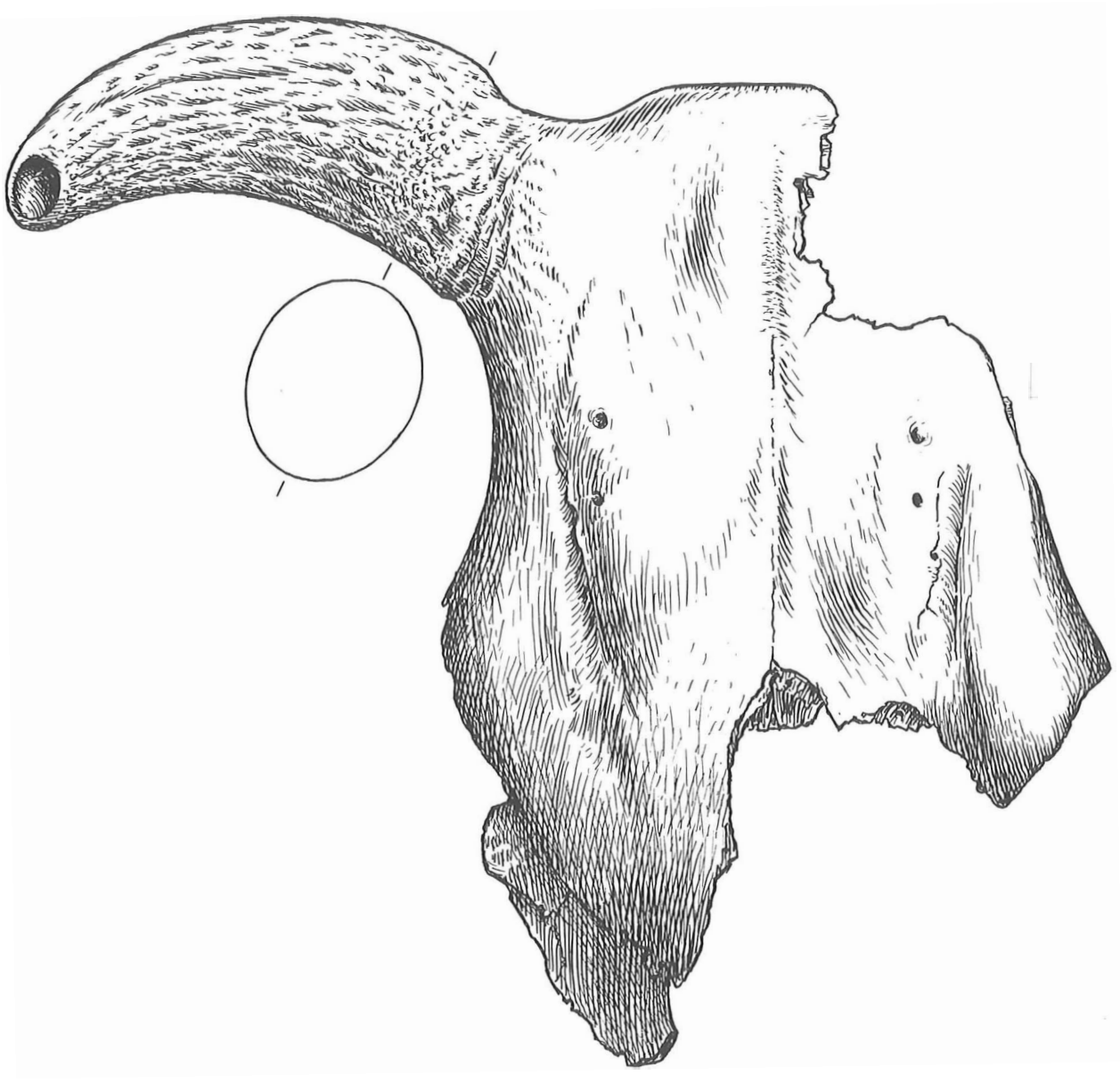


Fig. 48. Bos taurus – skull fragment with horn-cores: O/4085. 1 : 2

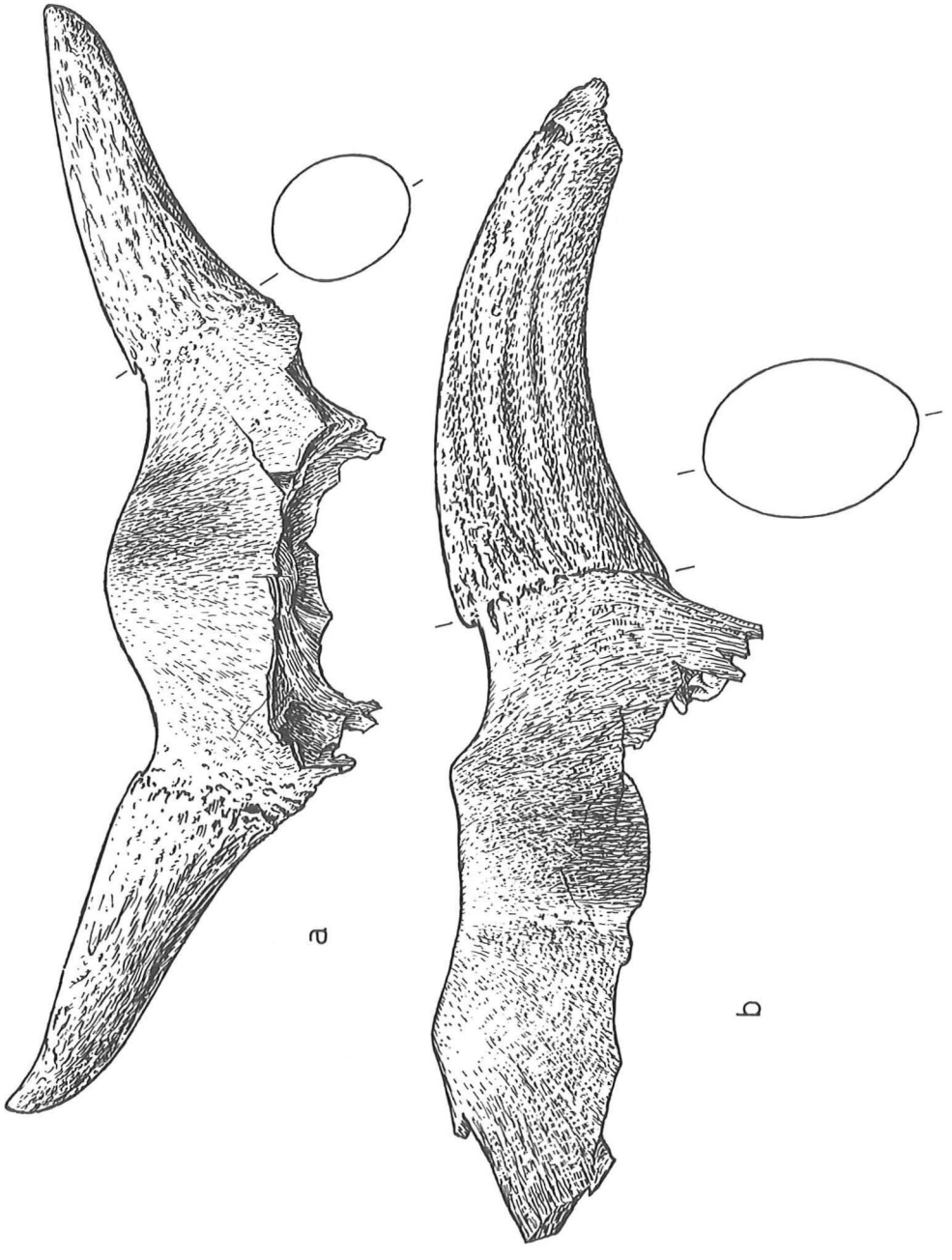


Fig. 49. Bos taurus – skull fragment with horn-cores: *a*, O/3911; *b*, R/293. 1 : 2

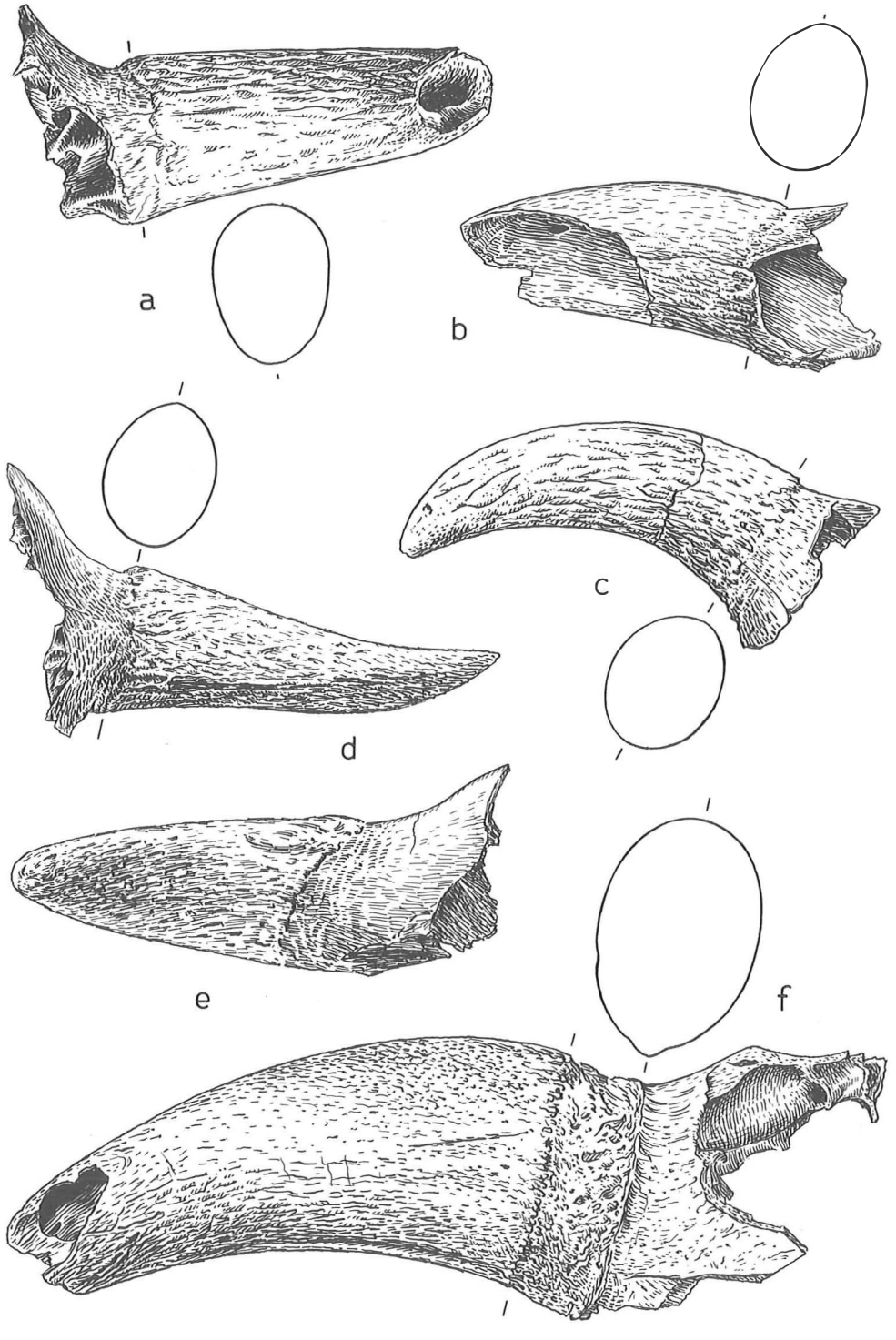


Fig. 50. Bos taurus – horn-cores: *a*, R/251; *b*, R/251; *c*, S/352; *d*, S/378; *e*, S/367; *f*, R/297. 1 : 2

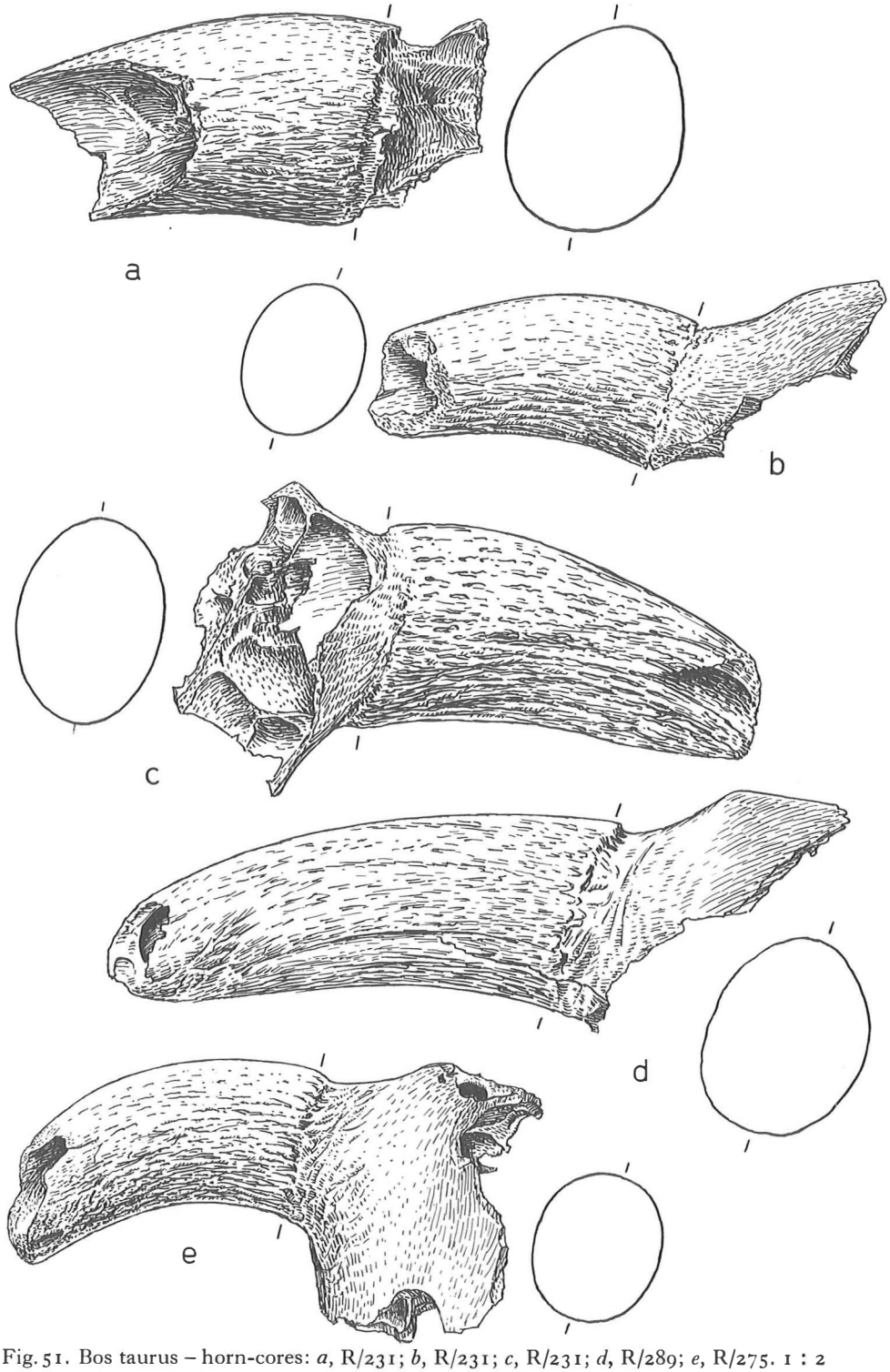


Fig. 51. Bos taurus – horn-cores: *a*, R/231; *b*, R/231; *c*, R/231; *d*, R/289; *e*, R/275. 1 : 2

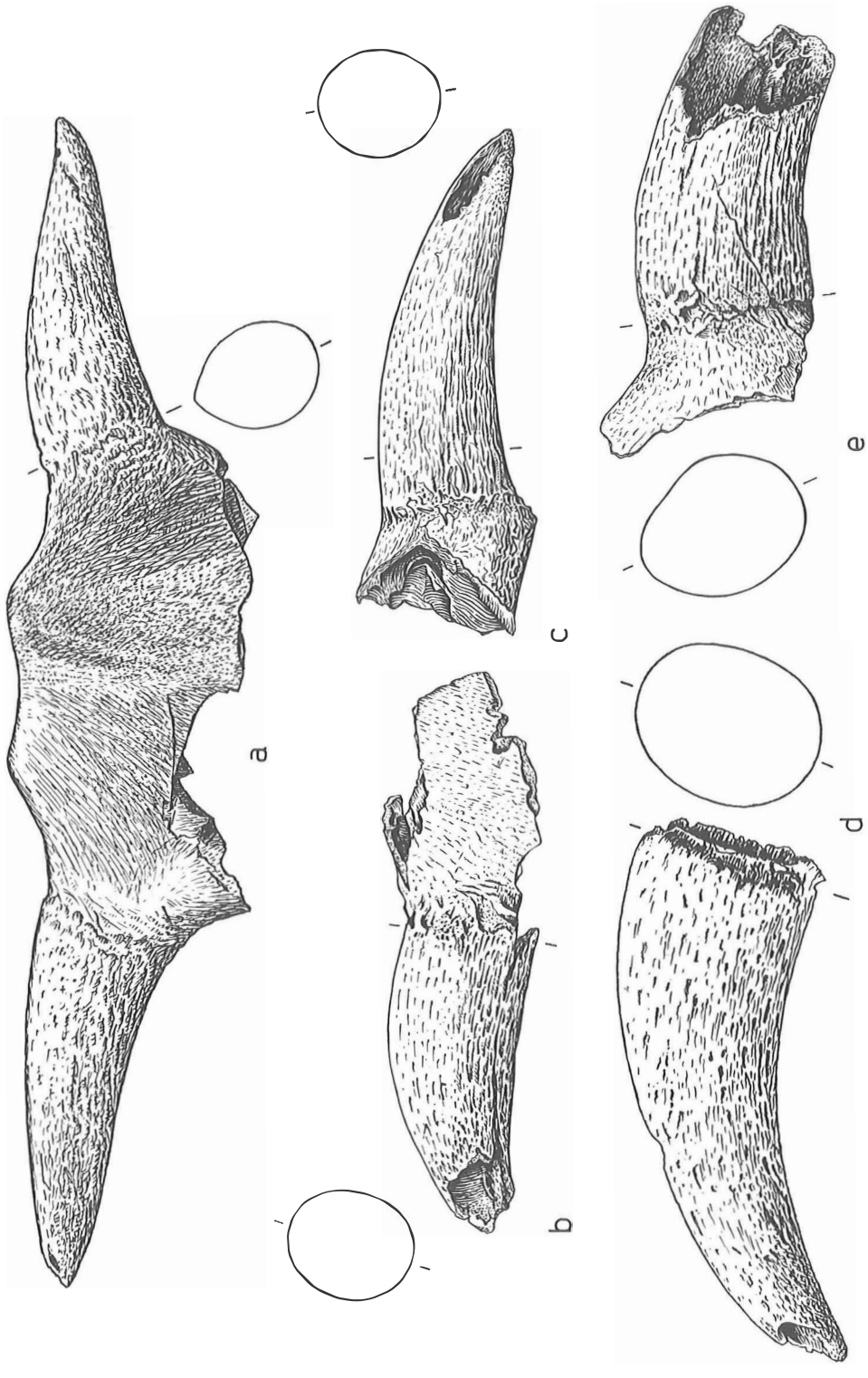


Fig. 52. Bos taurus – skull fragment with horn-cores: *a*, S/378; horn-cores: *b*, T/226; *c*, T/226; *d*, S/380; *e*, T/257. 1 : 2

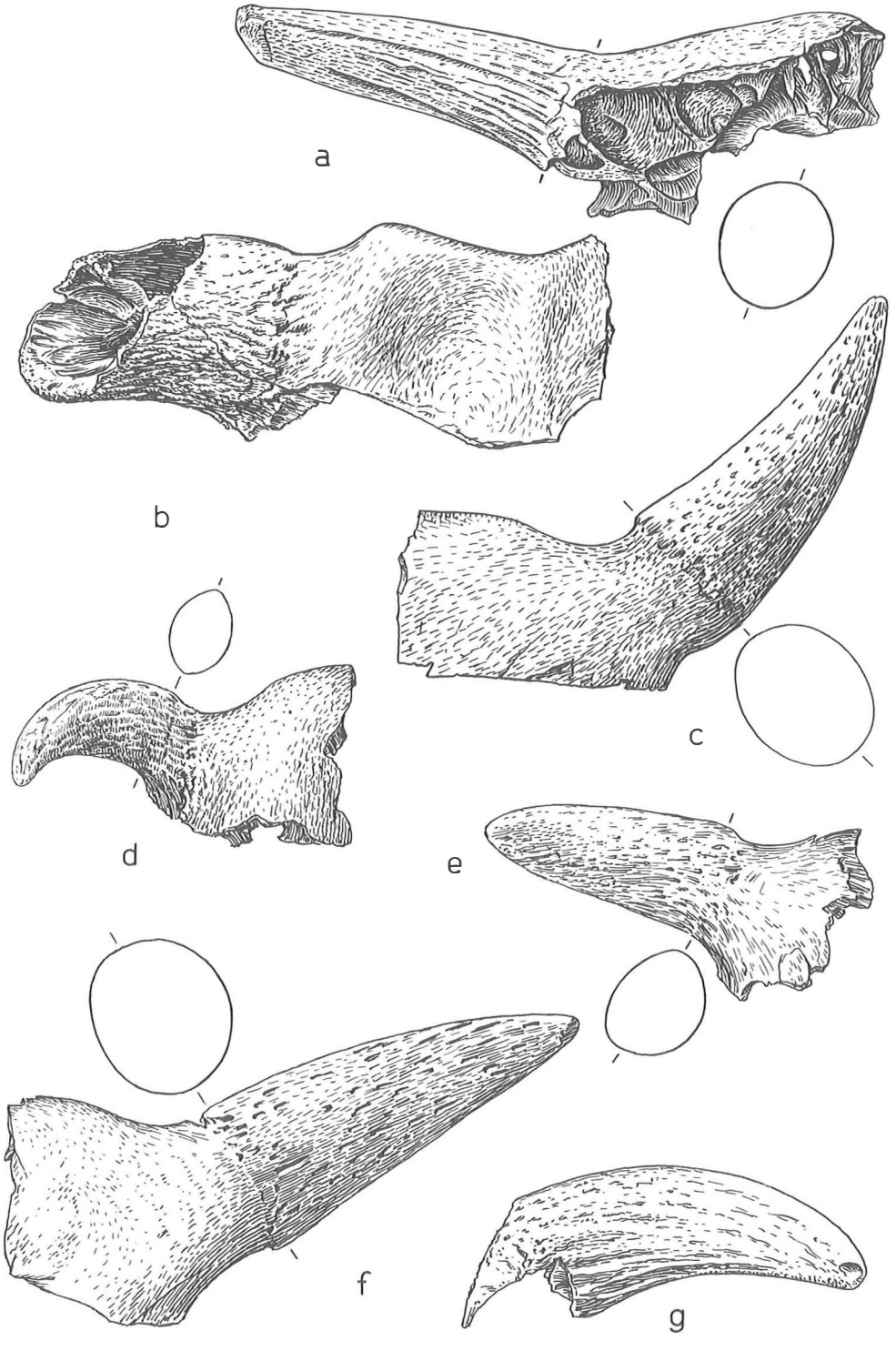


Fig. 53. Bos taurus – horn-cores: *a*, T/343; *b*, T/257; *c*, V/54; *d*, V/54; *e*, V/54; *f*, V/118; *g*, V/54. 1 : 2

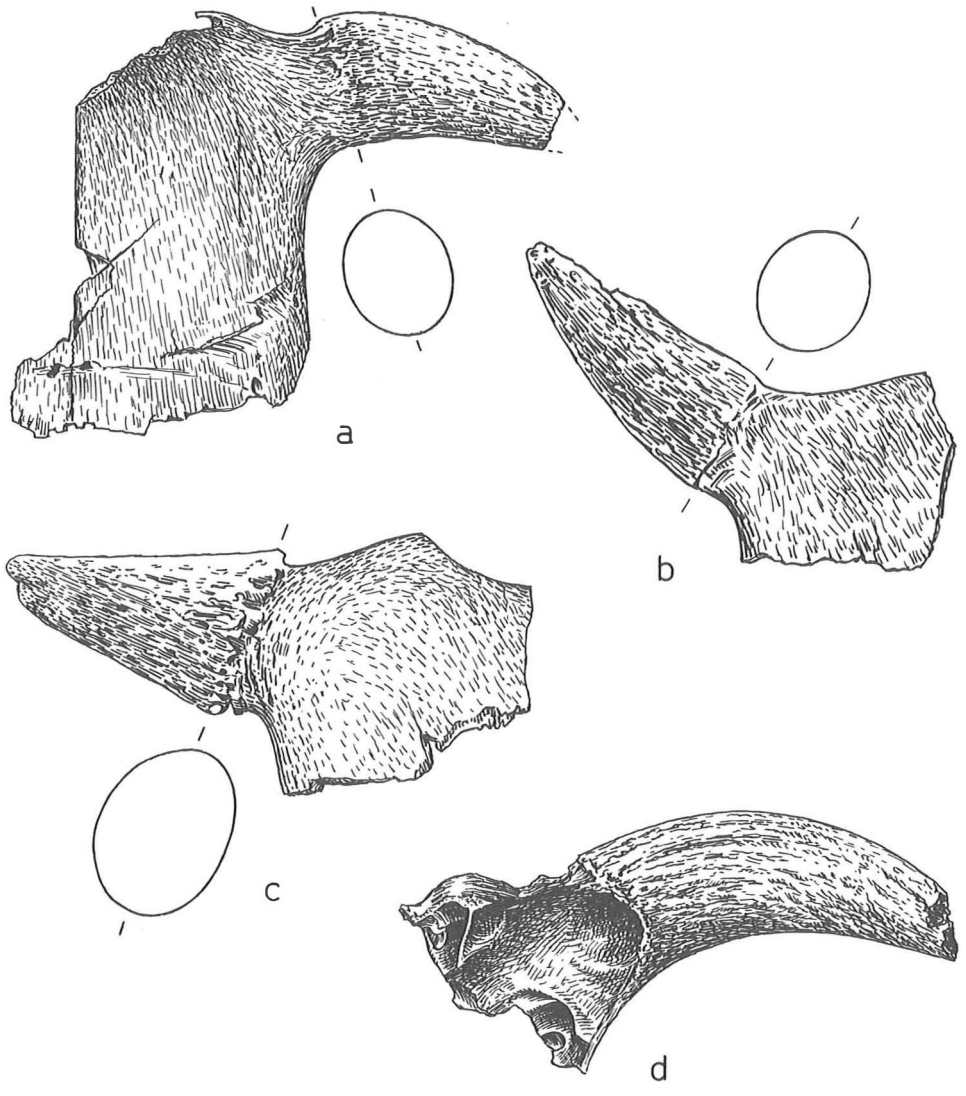


Fig. 54. Bos taurus – horn-cores: *a*, V/?; *b*, V/82; *c*, V/67; *d*, V/83. 1:2.

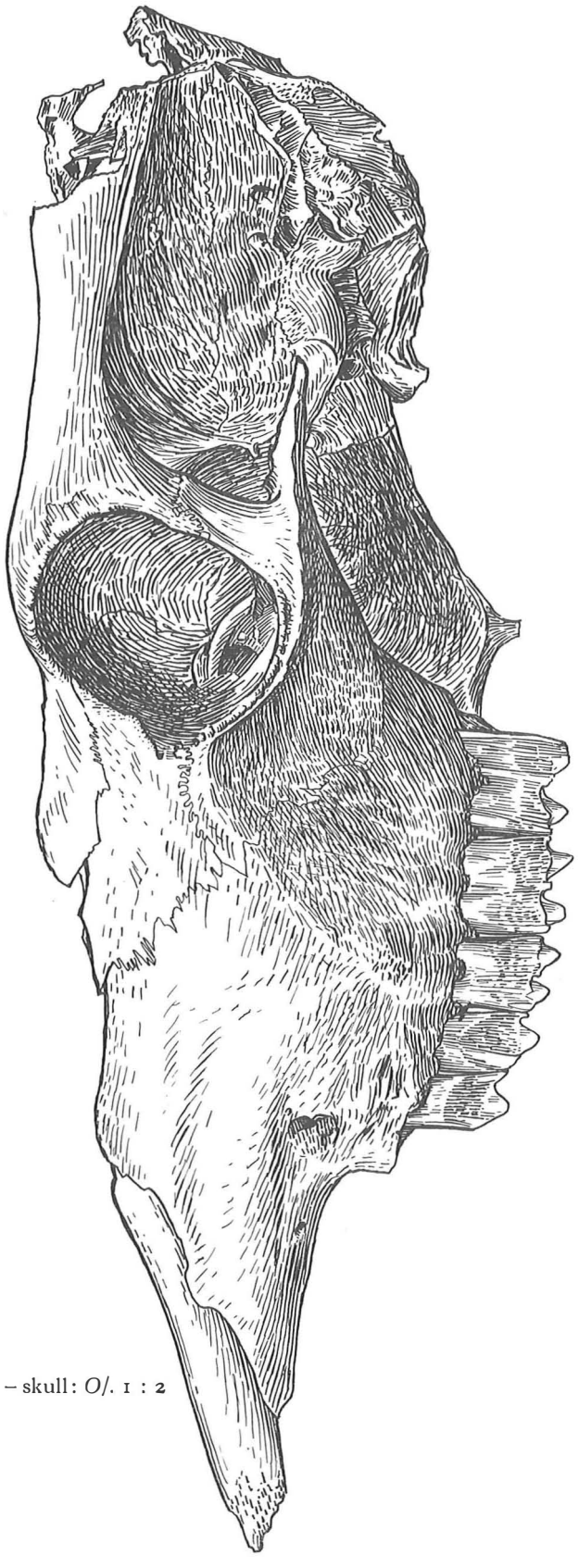


Fig. 55. Bos taurus – skull: *O/*. 1 : 2

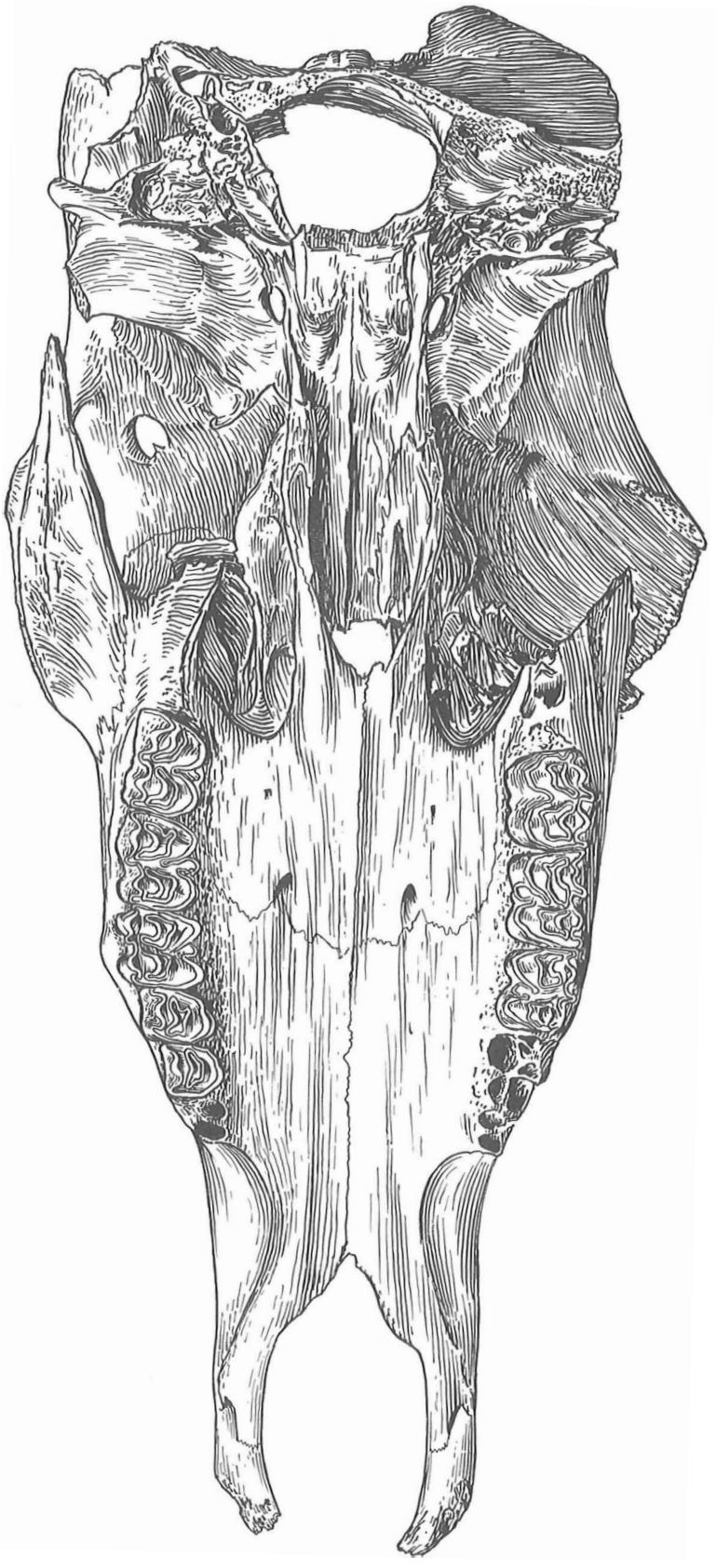


Fig. 56 Bos taurus – skull: *O/*. 1 : 2

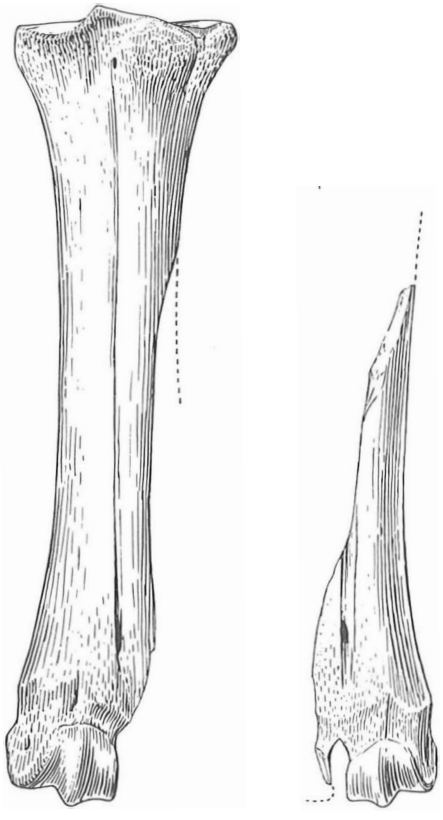


Fig. 57. Bos taurus – metacarpal and -tarsal bones, cleft in the medieval way: *a*, V/93; *b*, V/120. 1 : 2

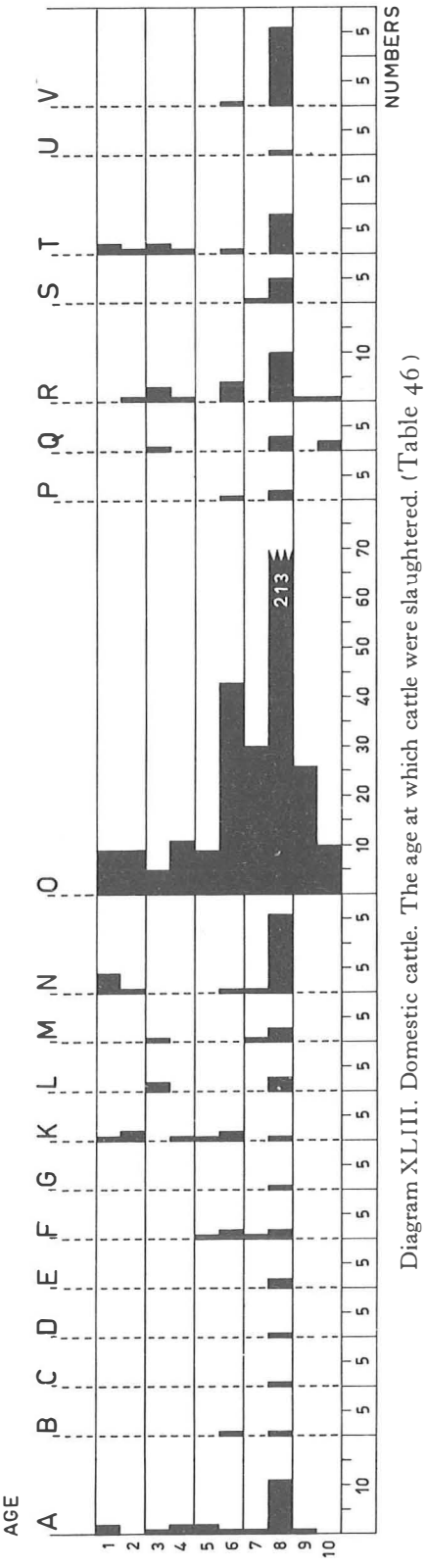


Diagram XLIII. Domestic cattle. The age at which cattle were slaughtered. (Table 46)

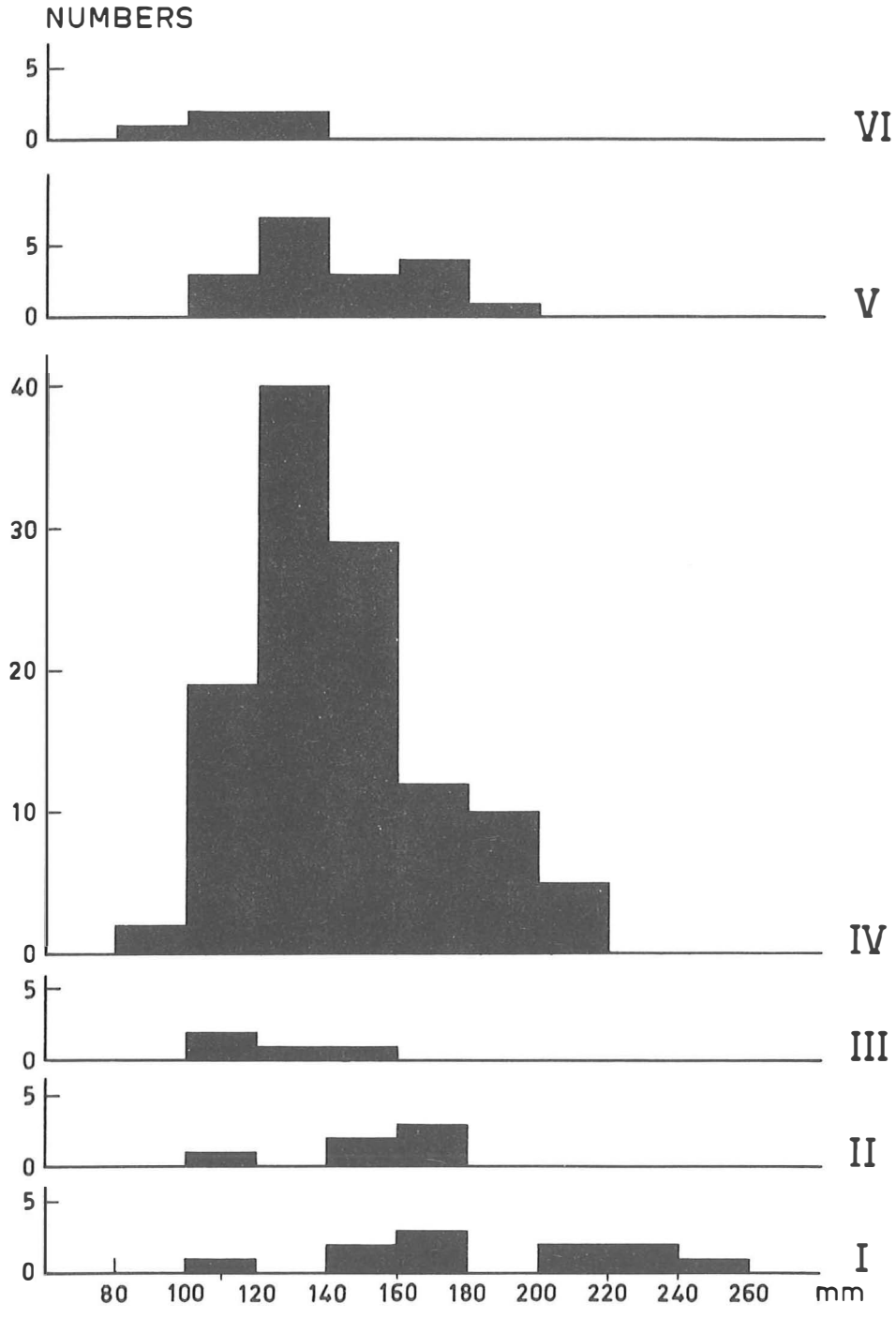


Diagram XLIV. Domestic cattle. Horn-cores, circumference at the base.

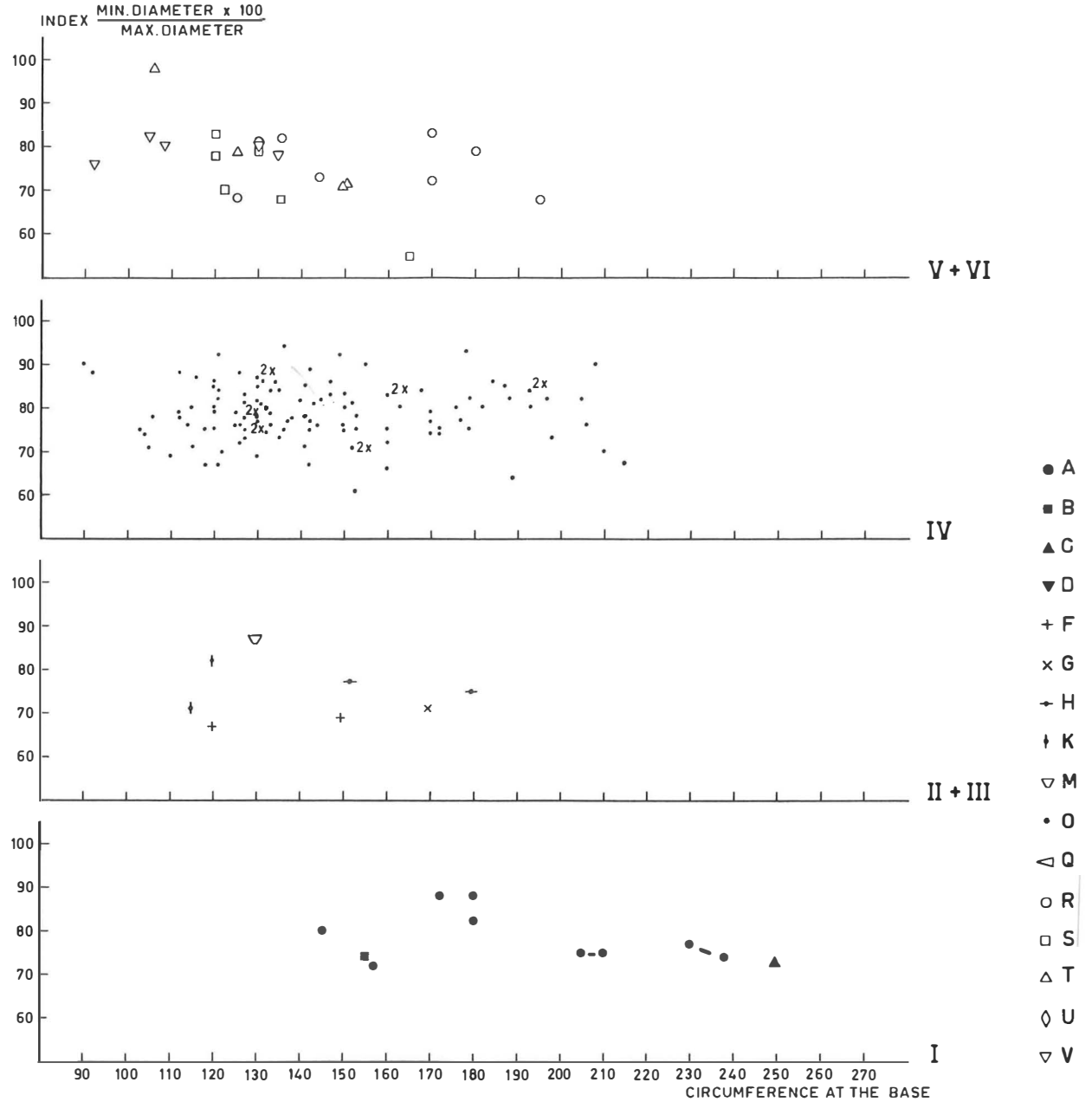


Diagram XLV. Domestic cattle. Horn-cores, circumference at the base plotted vs. the index: $\frac{\text{minimum diameter} \times 100}{\text{maximum diameter}}$

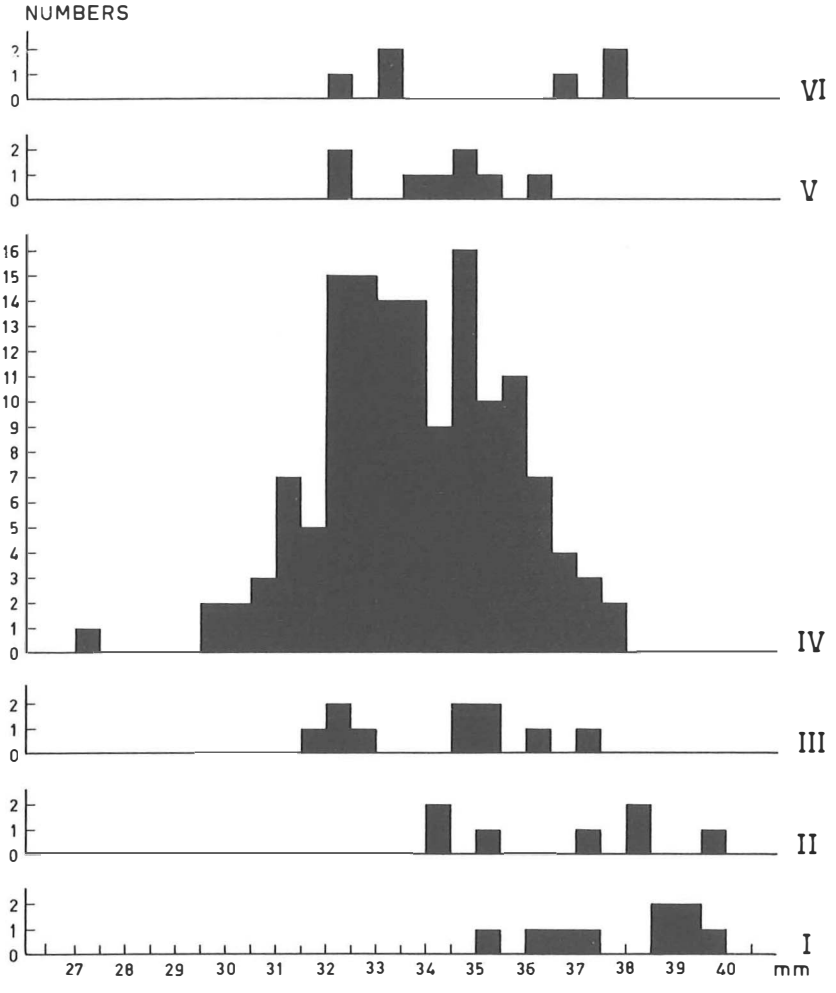


Diagram XLVI. Domestic cattle. M_3, length.

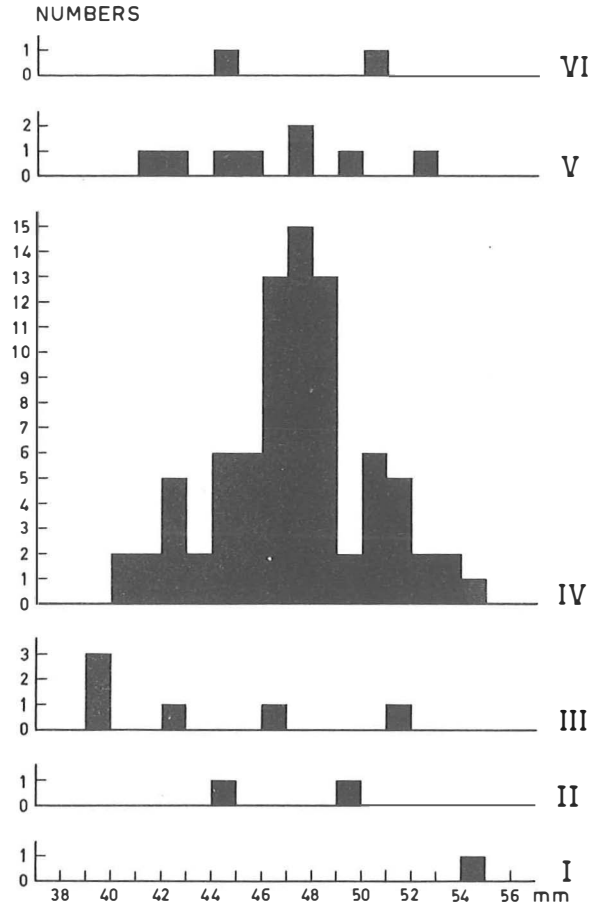


Diagram XLVII. Domestic cattle.
Scapula, minimum length of the neck.

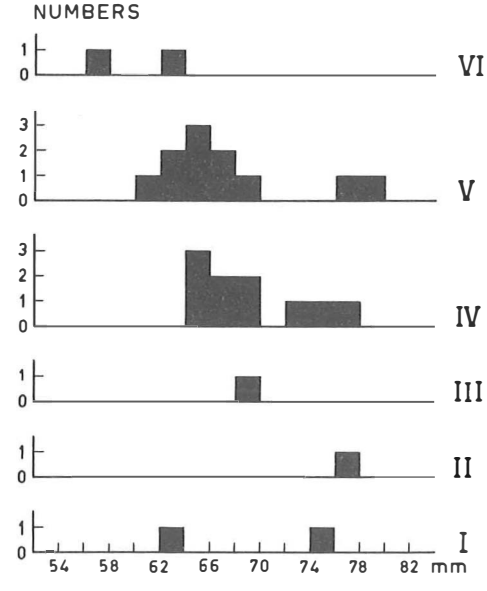


Diagram XLVIII. Domestic cattle.
Humerus, width of the trochlea. (Lower articular surfase).

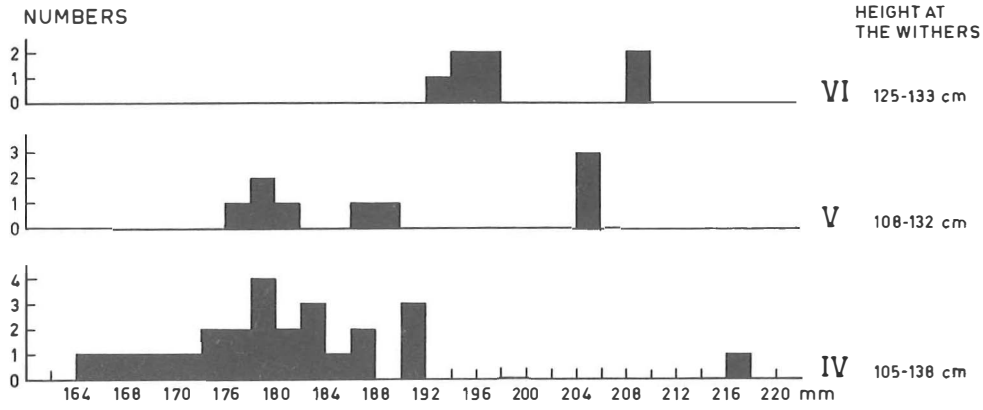


Diagram XLIX. Domestic cattle. Metacarpus, maximum length and calculated height at the withers.

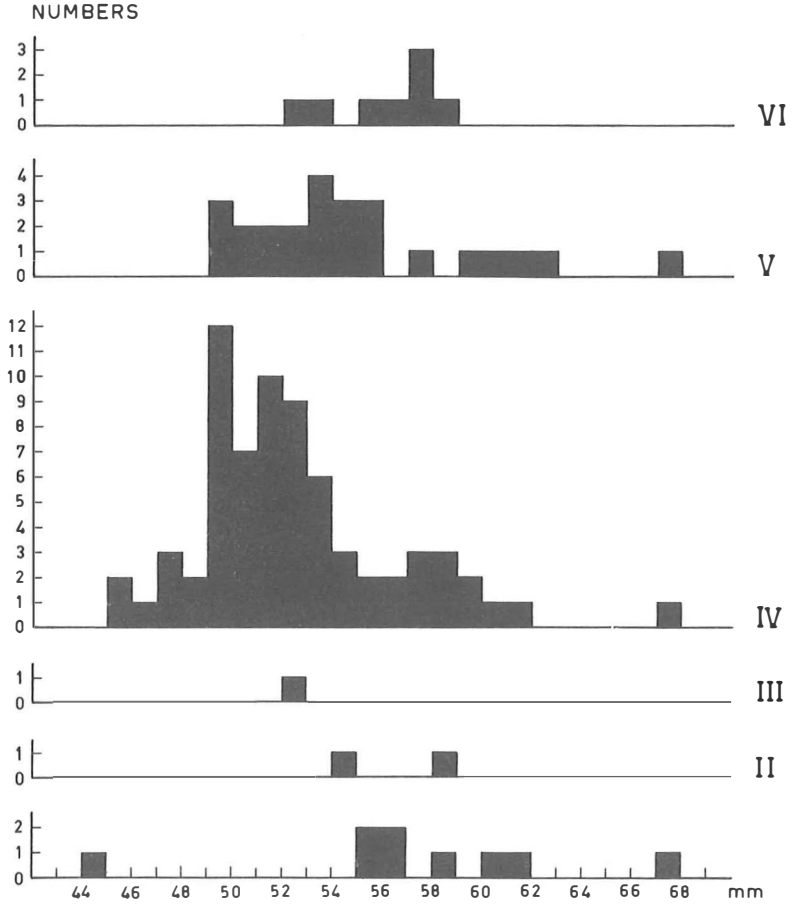


Diagram L. Domestic cattle. Metacarpus, proximal width.

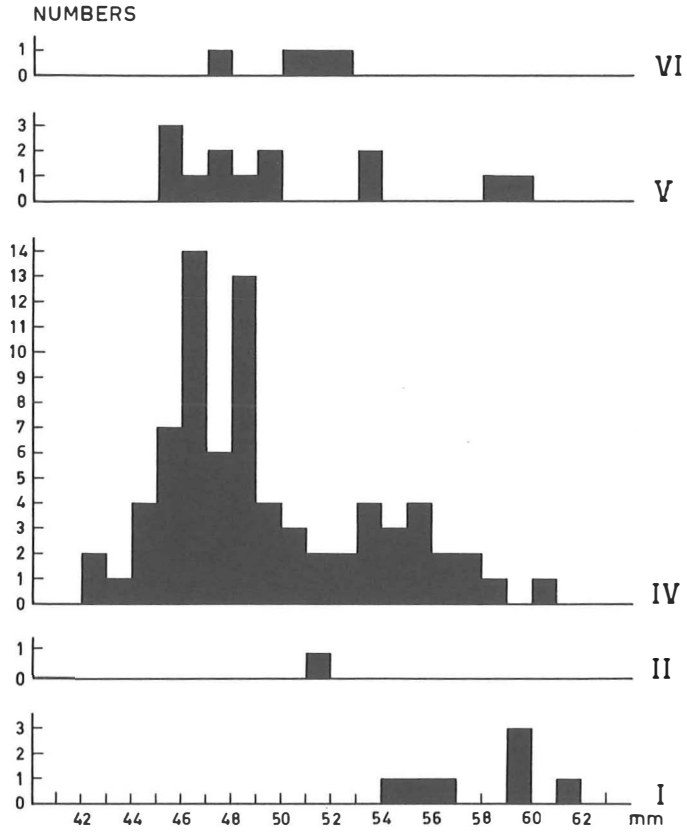


Diagram LI. Domestic cattle. Metacarpus, distal width.

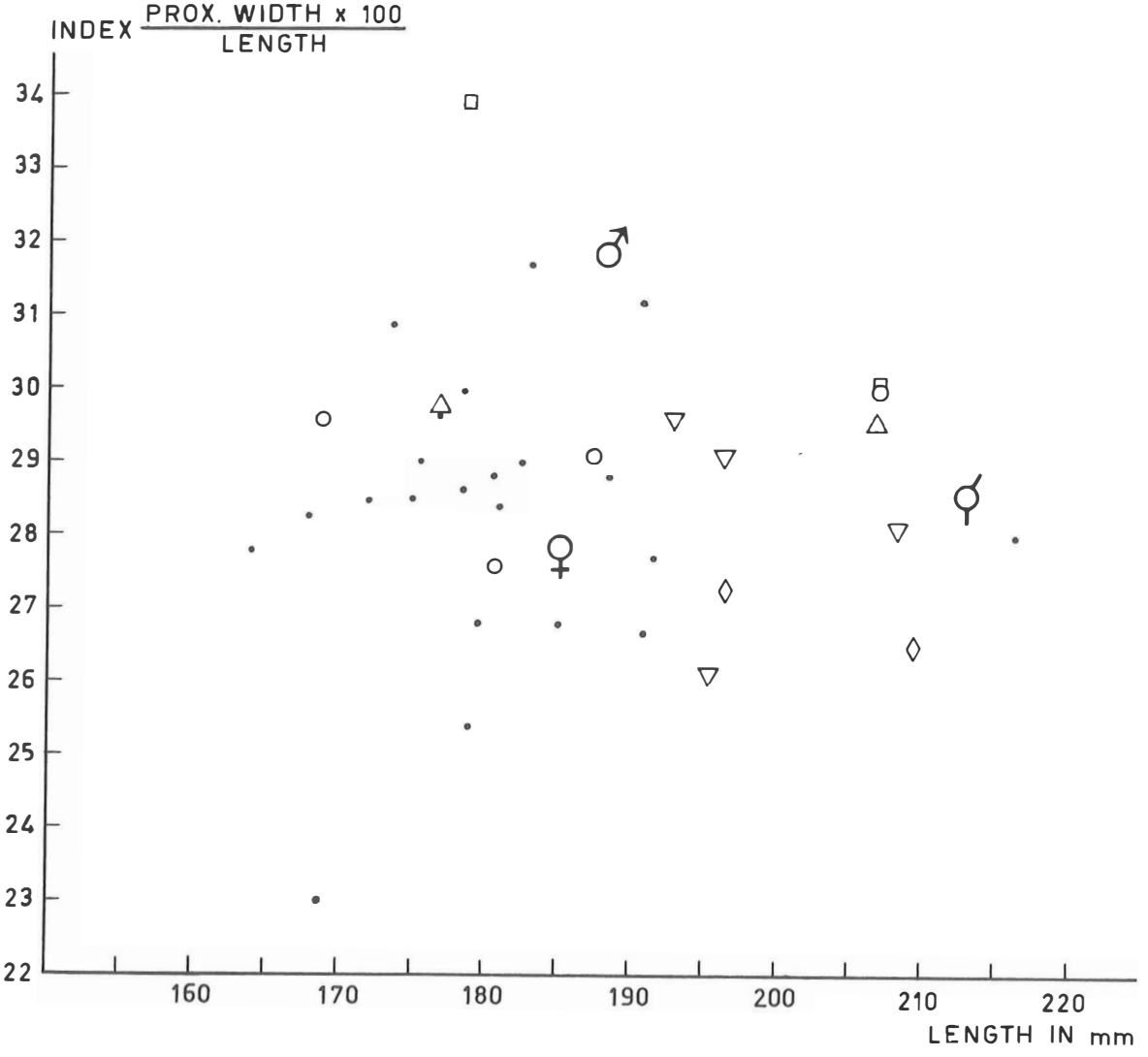


Diagram LII. Domestic cattle. Metacarpus, maximum length plotted vs. the index: $\frac{\text{proximal width} \times 100}{\text{maximum length}}$

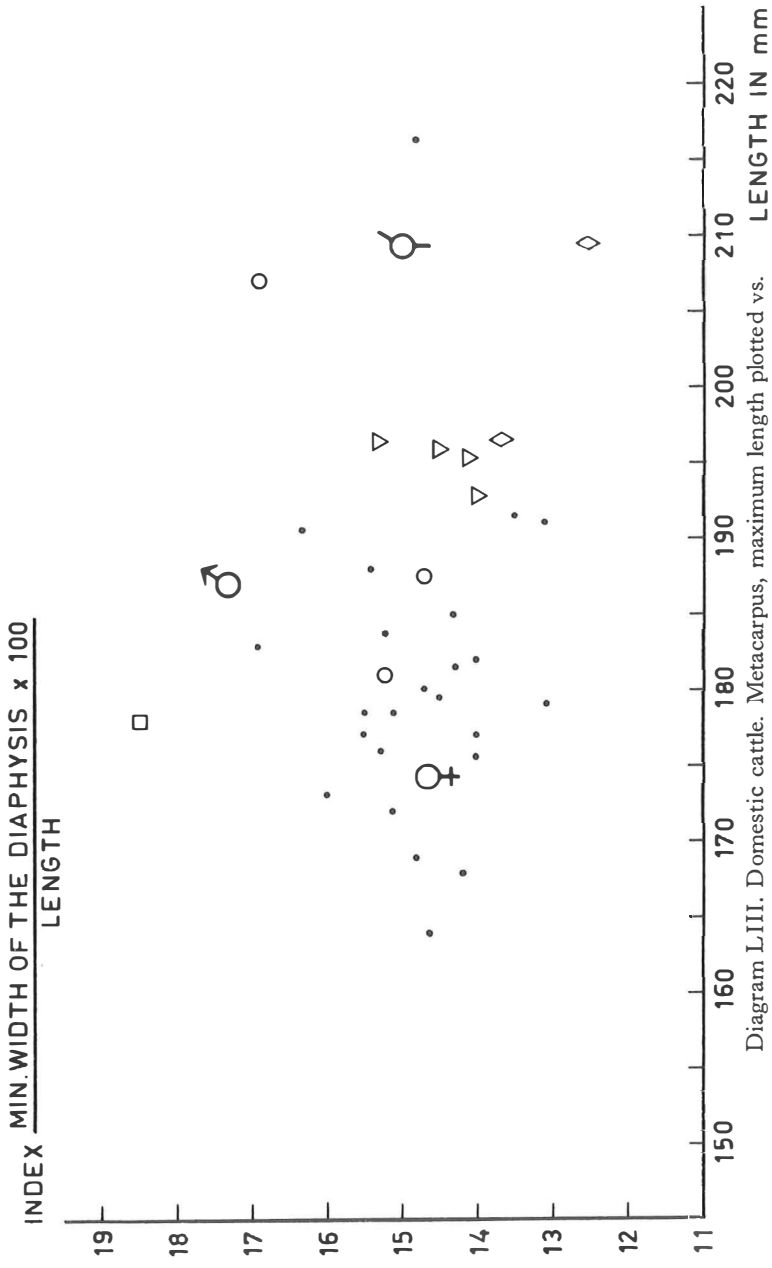


Diagram LIII. Domestic cattle. Metacarpus, maximum length plotted vs. the index: $\frac{\text{minimum width of the diaphysis} \times 100}{\text{length}}$

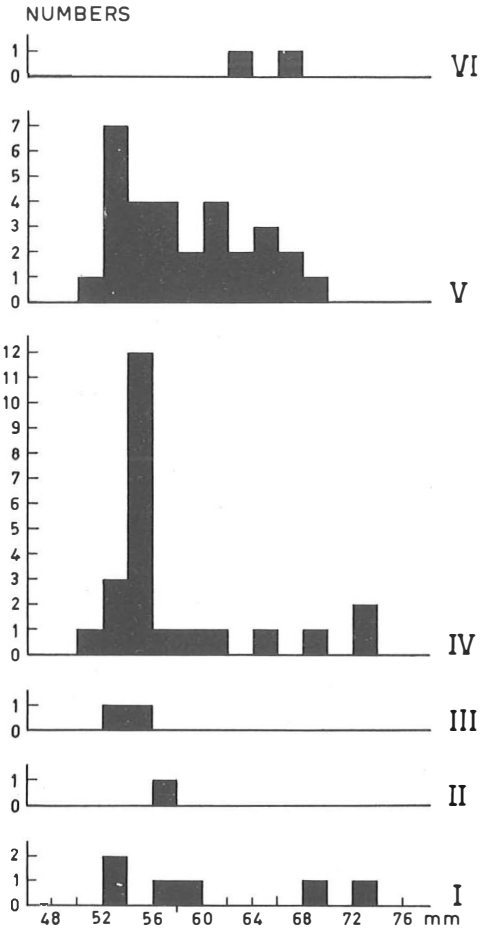


Diagram LIV. Domestic cattle. Tibia, distal width.

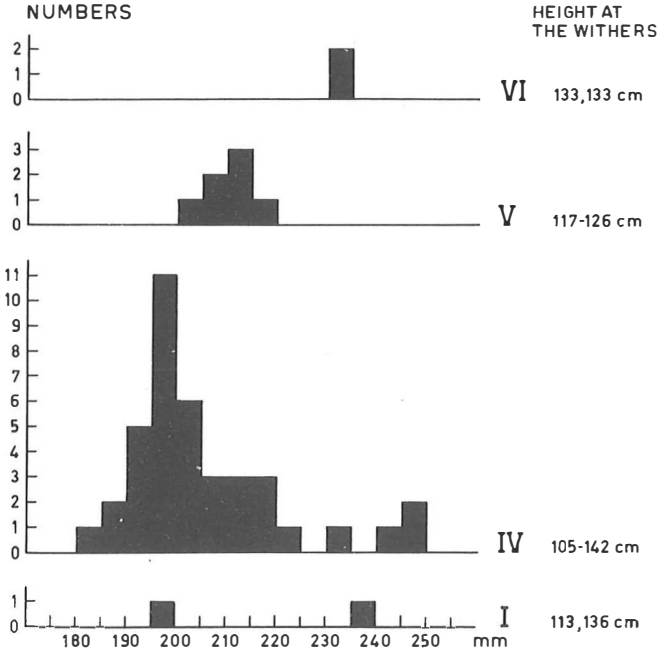


Diagram LV. Domestic cattle. Metatarsus, maximum length and the calculated height at the withers.

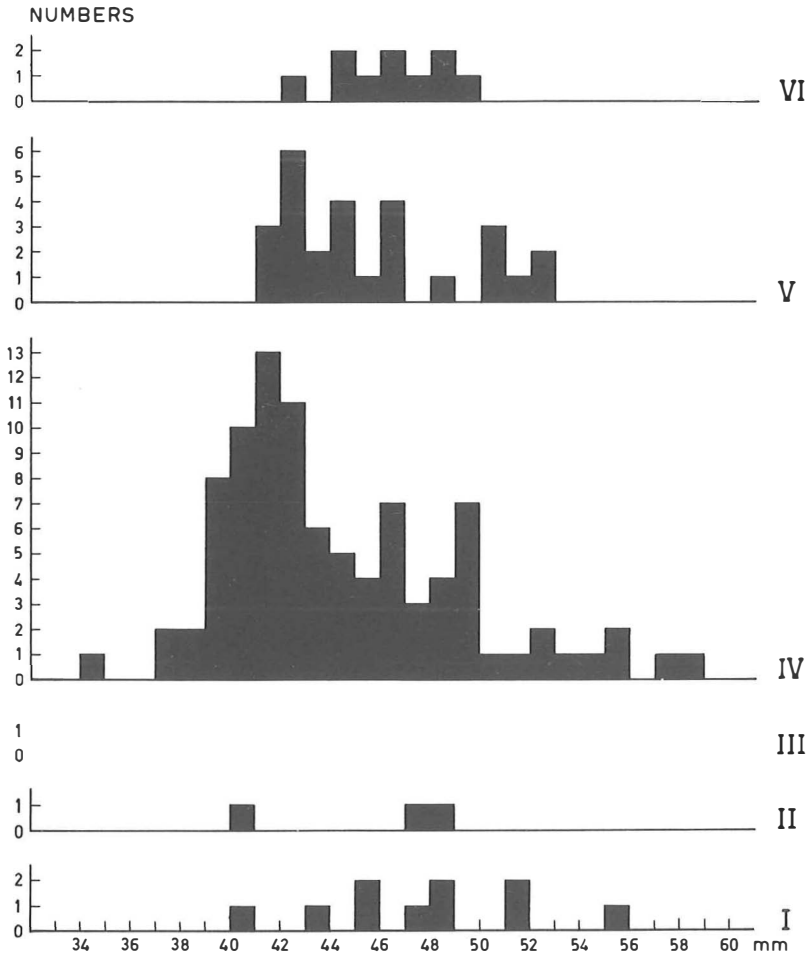


Diagram LVI. Domestic cattle. Metatarsus, proximal width.

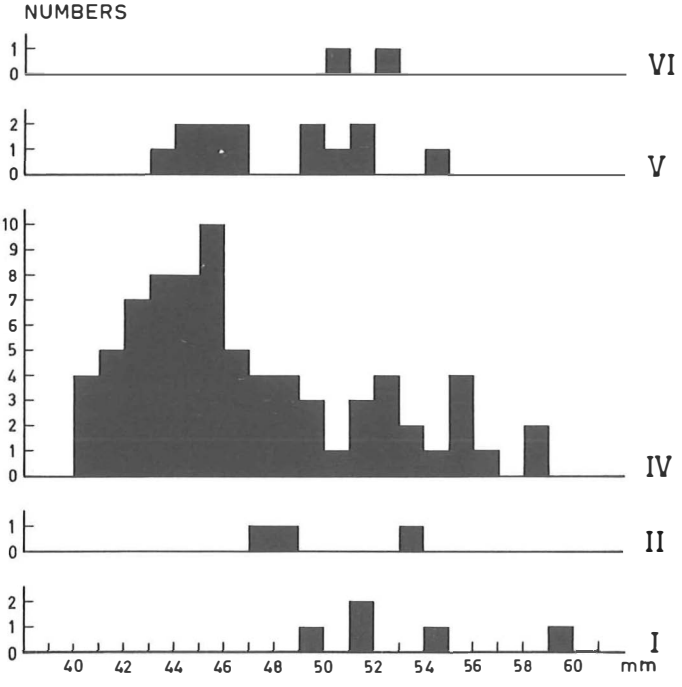


Diagram LVII. Domestic cattle. Metatarsus, distal width.

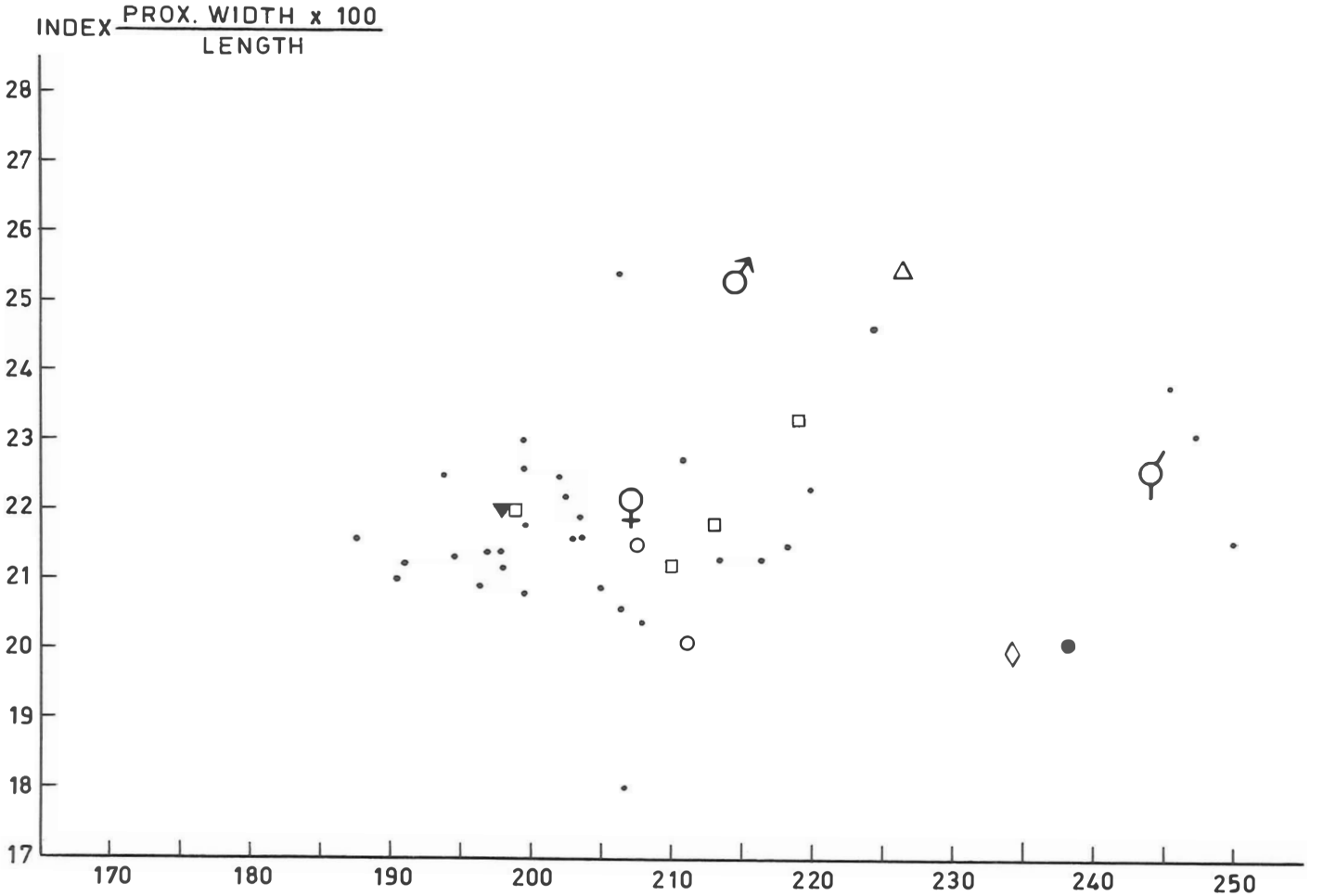


Diagram LVIII. Domestic cattle. Metatarsus, maximum length plotted vs. the index: $\frac{\text{proximal width} \times 100}{\text{length}}$

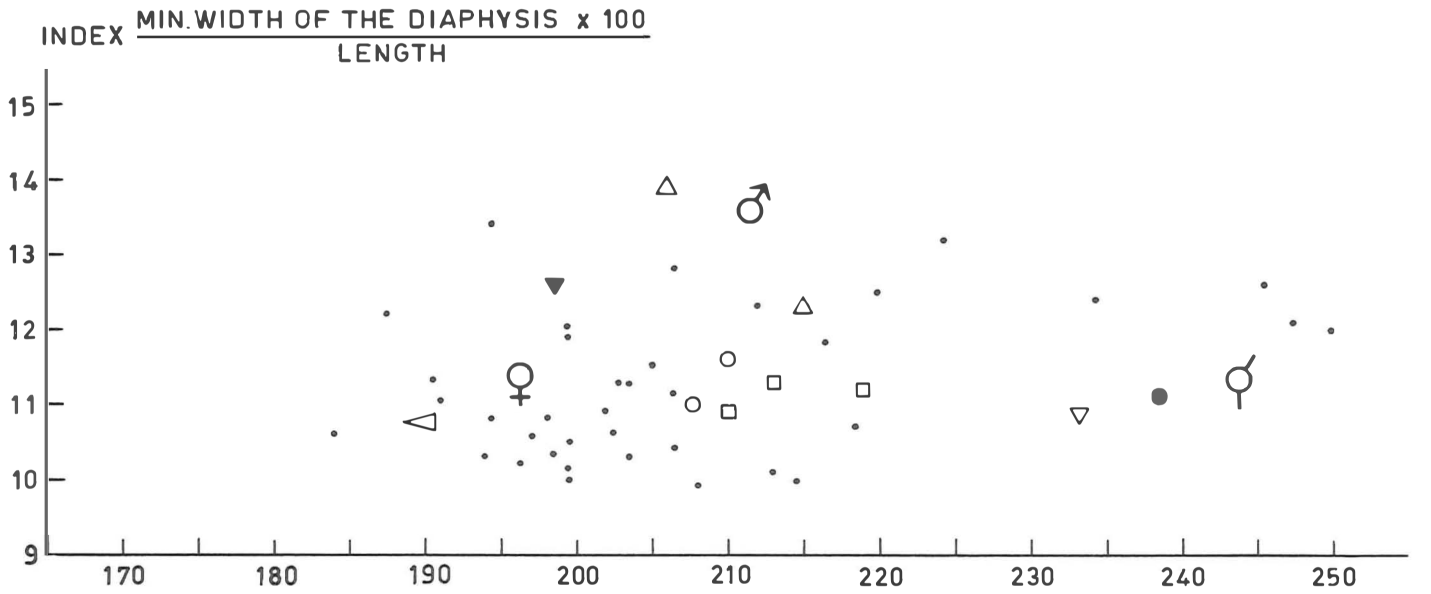


Diagram LIX. Domestic cattle. Metatarsus, maximum length plotted vs. the index: $\frac{\text{minimum width of the diaphysis} \times 100}{\text{length}}$

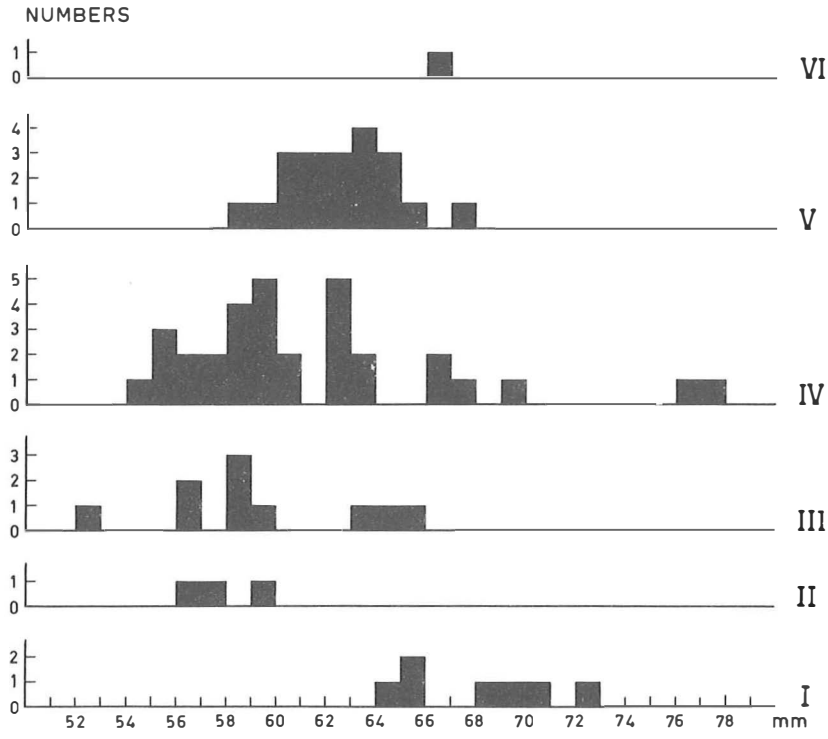


Diagram LX. Domestic cattle. Astragalus, lateral length.

22. Tursiops truncatus (*Montague*)

Two bones, part of a scapula and a skull fragment, found at the Eneolithic site of Vlaardingen, may have belonged to the bottle-nosed dolphin[1]. From the pre-Roman Iron Age site in the area of the Amsterdam Waterworks a vertebra is known.

According to IJsseling and Scheygrond (1950) the bottle-nosed dolphin is the second of the Cetacea in order of occurrence on the coast of Holland at present. The animal occasionally ascends rivers.

23. Phocoena phocoena (*L.*)

Remains of the common porpoise were found at the Eneolithic site of Hekelingen, the pre-Roman Iron Age site in the area of the Amsterdam Waterworks and at the Roman Castellum at Valkenburg (Pl. XXI*a*).

1. Among the bones found at Vlaardingen during the excavation of 1960 a mandibula was found which could be identified with certainty.

IJsseling and Scheygrond (1950) mention that at present the common porpoise strands on the coast of Holland throughout the year, but most frequently in summer. The females come to the coast to catch salmon most probably and they even ascend the great rivers. They have been observed upstream as far as Venlo and Emmerik.

The remains found at the prehistoric sites could be of stranded animals or from animals which were caught closer to the settlements in one of the creeks.

24. Cetacea

A number of whale bones that could not be identified with certainty were found at the Eneolithic sites of Vlaardingen and Hekelingen, the pre-Roman Iron Age site of Santpoort, the Roman Castellum at Valkenburg, and the Early Medieval site of Rijnsburg.

Of toothed whales (Odontoceti) three neck vertebrae grown together were found at the Eneolithic site of Vlaardingen, and a vertebra fragment was found at the pre-Roman Iron Age site at Santpoort.

Eight bone fragments belonging to right whale or rorqual (Mystacoceti) were found at the Eneolithic site of Vlaardingen (Pl. XXI*b*). One of a skull, two of a mandibula and one of a rib. The other pieces were too small to distinguish what part of the skeleton they belonged to.

At Roman Valkenburg five pieces of right whale or rorqual were found. Two fragments of a mandibula and one of a rib could not be identified, two fragments of a humerus – the caput and the distal end of the shaft – probably belonged to the blue whale (Sibbaldus musculus (L.)) or the common rorqual (Balaenoptera physalus (L.)). At Early Medieval Rijnsburg two unidentified pieces were found.

Van Deinse (1931) reported 45 cases of stranded common rorquals on the coast of Holland in historical times. The blue whale stranded a few times on the Belgian coast but such cases have not been reported from the Dutch coast. So in all probability the humerus from Valkenburg belonged to the common rorqual.

Clark (1952) states that in prehistoric and in early historical times only the (Eubalaena glacialis (Borovski)) Biscay right whale was actually hunted. The hunting of other whales started much later. The Dutch whale hunting started in the 17th century (IJsseling & Scheygrond, 1950). So in Eneolithic times as well as later the whales were not hunted most probably, but stranded animals were used.

The economic importance of a single stranded large whale is described by Olaus Magnus in 1555 (quoted by Clark, 1952) "This animal might fill between 250 and 300 wagons and yield meat for salting, blubber for lighting and heating, small bones for fuel, large ones for building and hide sufficient to clothe forty men". In France the tongue of a stranded whale was thought a delicacy (Baudet, 1904).

At Eneolithic Vlaardingen there must have been enough wood for building houses and for fuel. So the small pieces of bone were probably taken home to obtain the train-oil. Two pieces were later used as a kind of "polissoirs" as their polished surfaces and carefully rounded edges show.

Van Giffen (1913) described two teeth belonging to the sperm whale found in the "terp" of Eenum in the province of Groningen, and the humerus, radius and ulna of a Killer whale found in the lower layers of the "terp" Schettens in the province of Frisia.

B. AVES

The bird bones, except most of the domesticated fowl, were identified with the kind help of Dr. J. Lepiksaar at the "Naturhistoriska Museet" in Gothenburg.

The sternum, furcula, coracoid, scapula, humerus, metacarpus and tibio-tarsus differ so much in form from the corresponding mammalian bones that some measurements had to be taken differently. The numbers of those measurements refer to fig. 58.

At Table 48 and Diagram LXII the number of bones of each identified species at each site is given.

1. Gavia stellata (*Pontoppidan*) (*Table 70*)

A tibio-tarsus of the red-throated diver was found at the Eneolithic site of Vlaardingen (fig. 59).

Van der Feen and Kortenbout van der Sluys (1953[b]) reported a tibio-tarsus of the red-throated diver at the Eneolithic site of Hekelingen, but depicted a metacarpus (Plate XXII*a*). At present the red-throated diver is common in winter, when it is sometimes observed in groups along the coast from early October till early May.

2. Pterodroma sp. (*Table 71*)

Among the bird bones found at the Roman Castellum at Valkenburg an ulna belonged to a petrel (fig. 60*a*).

In general aspects it resembles the ulna of the fulmar (Fulmaris glacialis(L.)), but it is much shorter.

The petrels are ocean birds which are found along our coasts.

3. Phalacroxorax carbo (*L.*) (*Table 72*)

The coracoid of the cormorant was found in the Roman Castellum at Valkenburg.

At present the cormorant is a resident bird in the Netherlands. Earlier it was much hunted and reckoned to the "edele vogels" (noble birds) (fig. 60*b*).

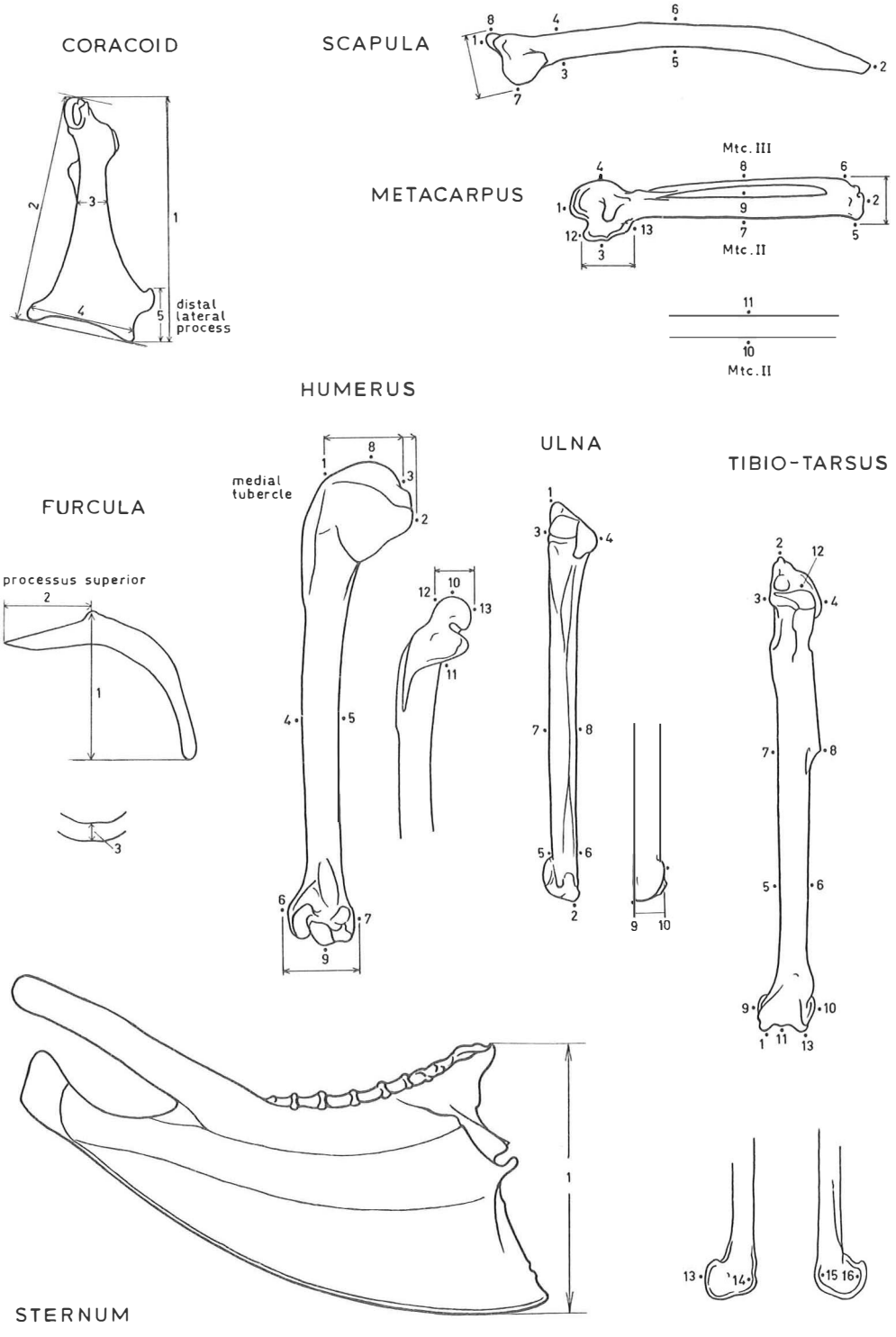


Fig. 58. Aves: *a*, sternum; *b*, furcula; *c*, coracoid; *d*, scapula; *e*, humerus; *f*, metacarpus; *g*, tibio-tarsus.

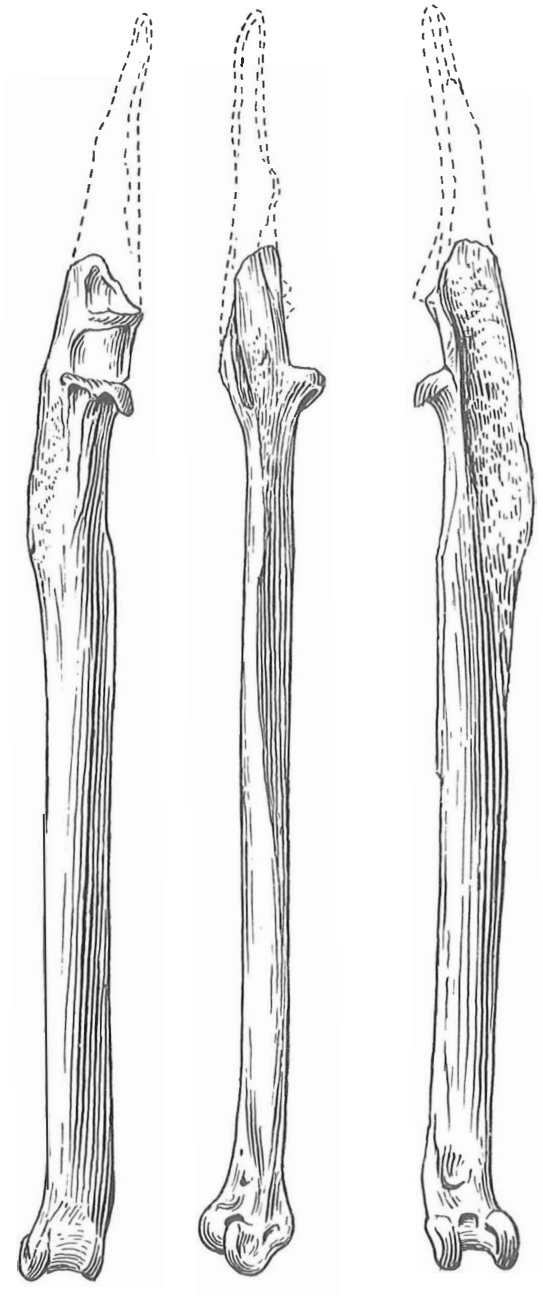


Fig. 59. Gavia stellata – tibio-tarsus: A/H 21[a]. 1 : 1

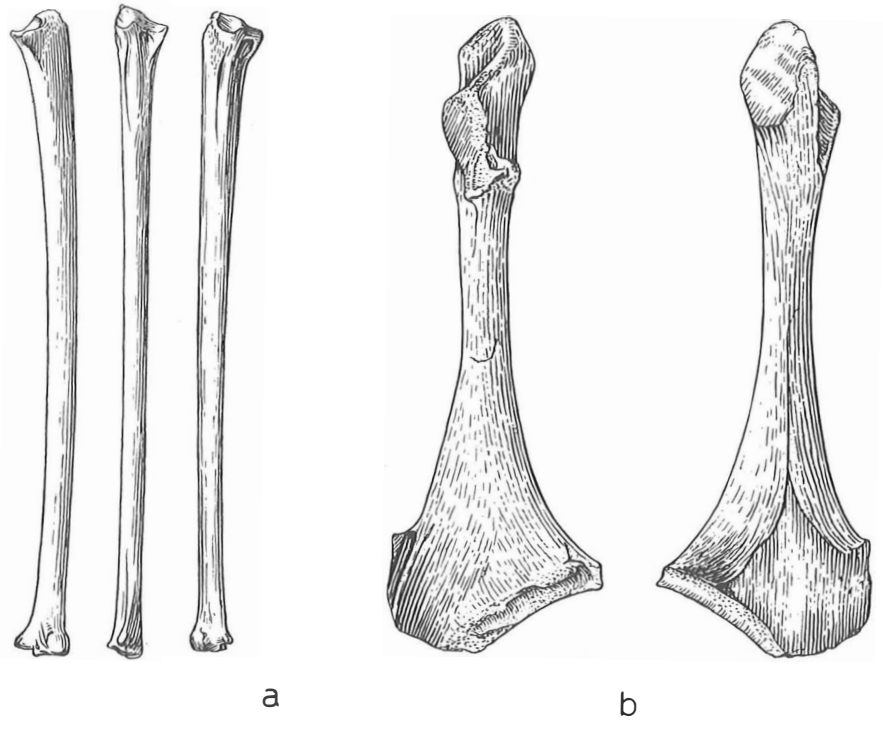


Fig. 60. Pterodroma sp. – ulna: *a*, O/3596; Phalacrocorax carbo–coracoid: *b*, A/2284. 1 : 1

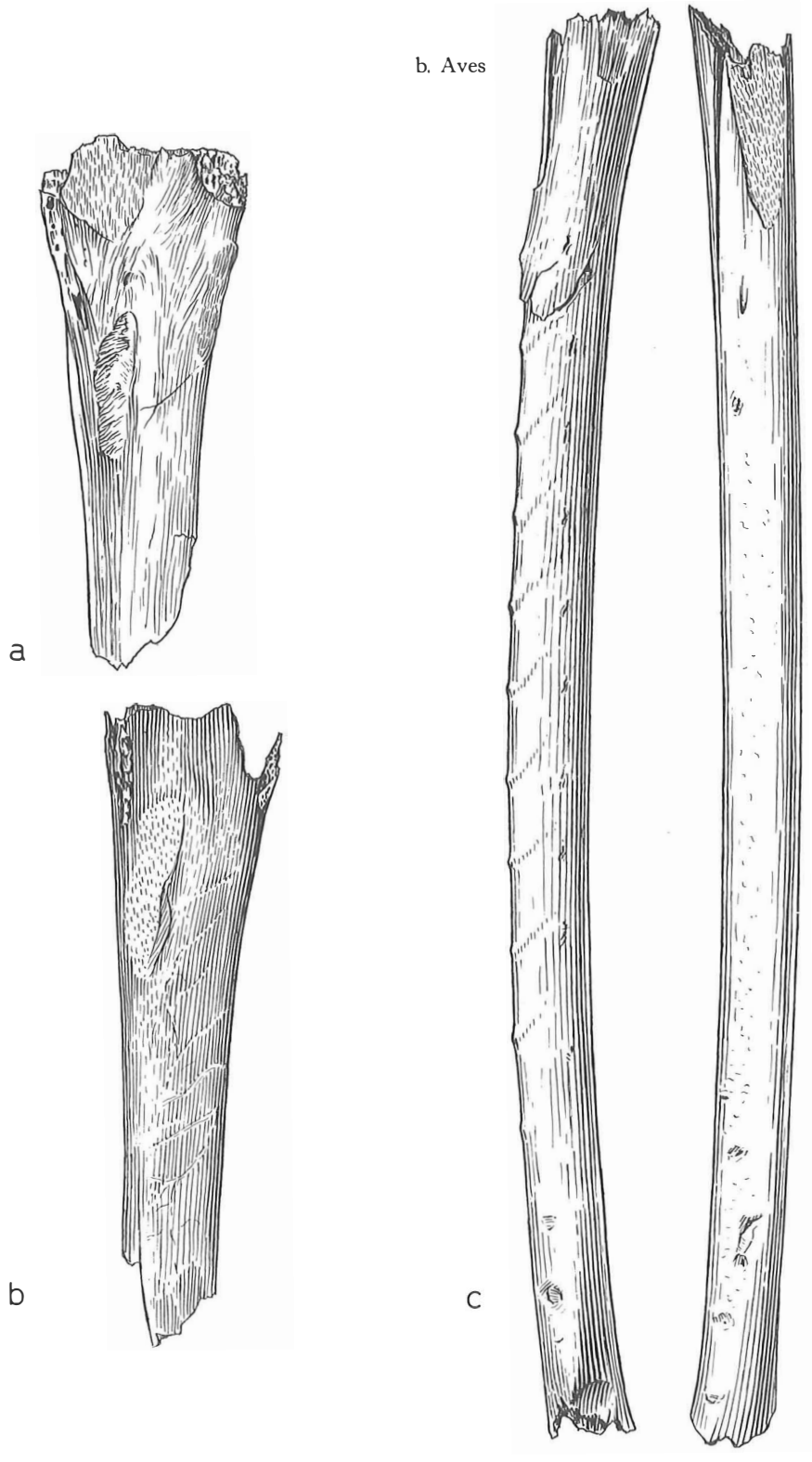


Fig. 61. Pelecanus crispus – humerus: *a*, A/G 23^{b}; *b*, A/G 19^{b}; ulna: *c*, A/G 18^{b}. 2 : 3

4. Pelecanus crispus Bruch

Of the pelican seven bones have been found at the Eneolithic site of Vlaardingen: two fragments of a humerus (fig. 61*a*, *b*) and two fragments of an ulna (fig. 61*c*). A fifth, sixth and seventh fragment were too small to distinguish which bones they belonged to.

Because the bones were ill preserved it was only possible to ascertain that the two humerus fragments and one ulna fragment[1] belonged to the Dalmatian pelican[2]. As, however, the bones were found close together it is reasonable to assume that the other fragments belong to the same species.

Recently Hatting (1963) investigated anew the pelican remains found in Denmark dating from Boreal and Subatlantic times. She found that all the bones belonged to the Dalmatian pelican.

Joysey (1964) did the same for the pelican remains found in England. He too found that these bones belonged to the Dalmatian pelican. Partly they could be dated to the Bronze Age and pre-Roman Iron Age. The bones from the pre-Roman Iron Age were collected at the Glastonbury lake village and among them were several bones of young birds, thus indicating that at that time the bird was at least a summer resident in England.

According to Voous (1960) Pliny stated that at Roman times the Dalmatian pelican bred in the estuary of Scheldt, Rhine and Elbe. Bernström (1951) reported that on his "Carta Marine" dated 1539 Olaus Magnus depicted a pelican on a Finnish lake, and also mentioned a pelican which was shot in the moat of the castle of Åbo in Sweden in 1605.

From these facts it can be concluded that in prehistoric times the pelican was probably more common in West and North-west Europe than at present. Nowadays they breed only in Southern Europe, in Greece. These facts confirm the statement of Voous (1960) that the present day distribution of the pelican is a relic. The extermination in Europe is due to man, who disturbed the natural habitat and breeding ground and hunted the animal excessively.

The pelicans are birds of inlands lakes, swamps and shallow lagoons, where they catch fish.

Noteworthy is the fact that the prehistoric remains of the pelican found in Denmark, Holland and England are all of the Dalmatian pelican while at present it is usually the white pelican which strays to Western and North-western Europe.

Both species are much alike. They live in the same biotope and have more or less the same distribution at present.

1. The shaft of the ulna shows a clear row of teeth marks at both sides, thus indicating that the bird was hunted with the help of a dog.

2. The author is indebted to Miss T. Hatting and Dr. U. Møhl of the Quartair-Zoologiske Laboratorium in Copenhagen for their assistance in identifying the pelican bones.

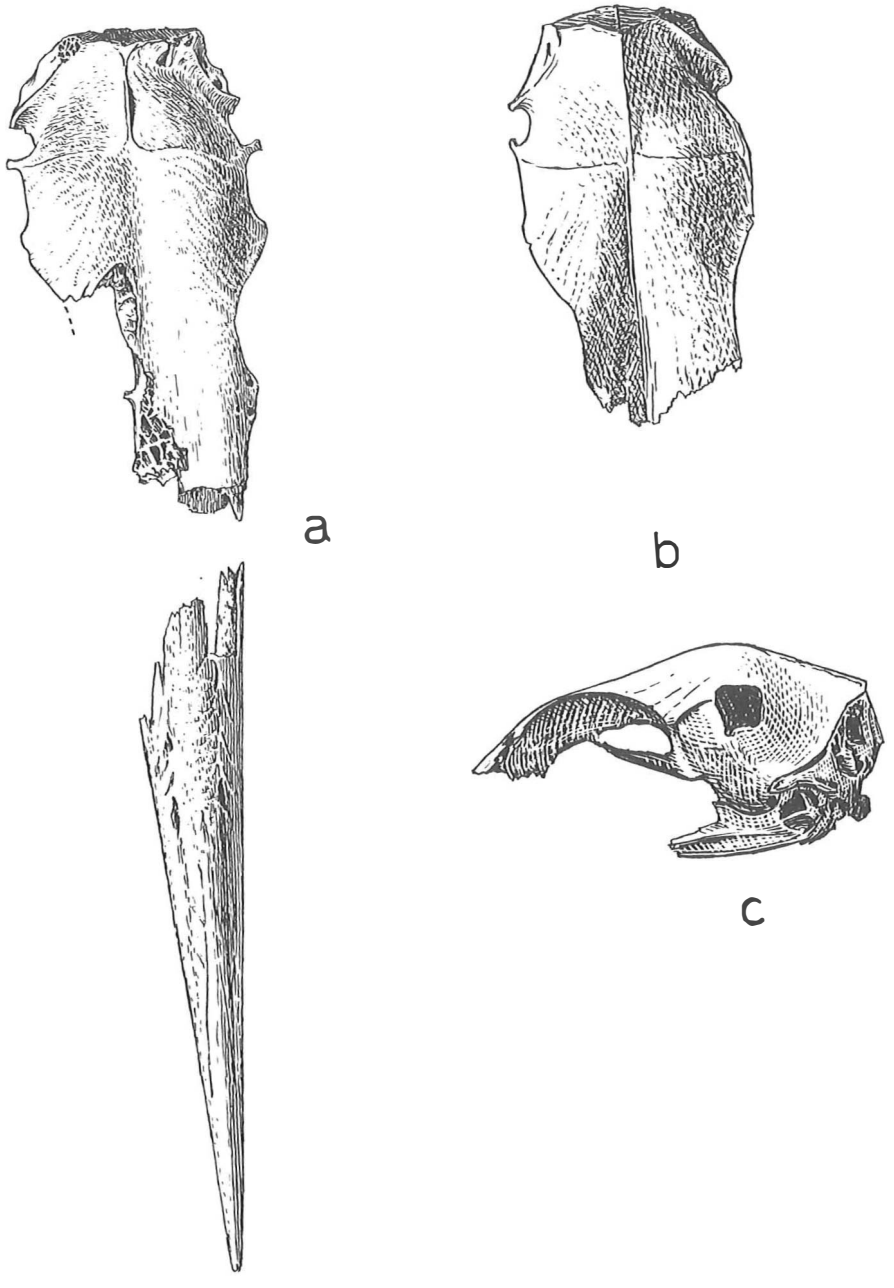


Fig. 62. Ardea cinerea – skull fragment: *a*, O/1297; *b*, *c*, U/2, 3. 1 : 1

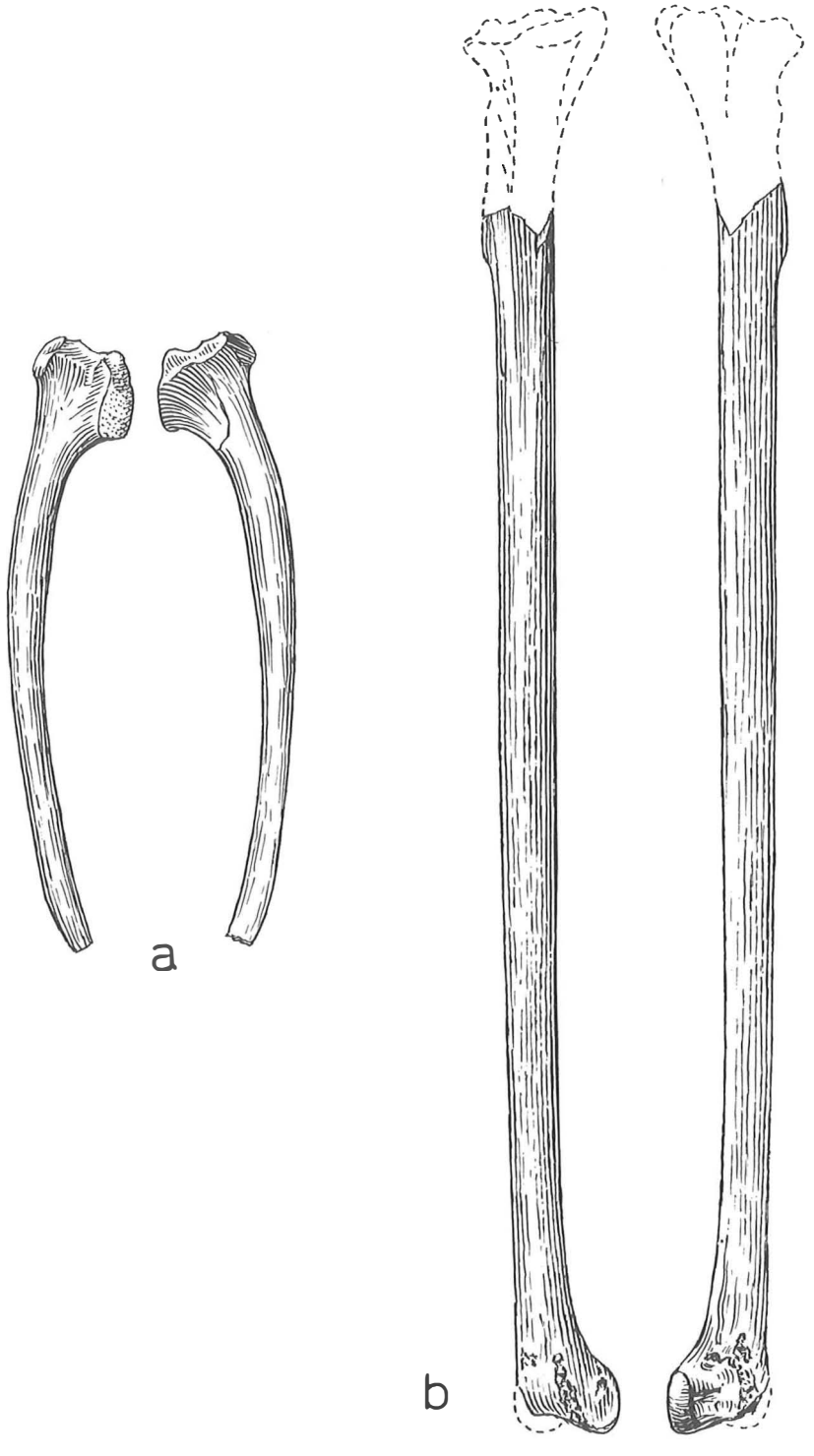


Fig. 63. Ardea cinerea – scapula: *a*, A/F 18^{e}; tibio-tarsus: *b*, O/1493. 1 : 1

5. Ardea cinerea L. (*Table 73*)

Remains of the heron have been found at the Eneolithic site of Vlaardingen, the pre-Roman Age site of Vlaardingen, the Roman Castellum at Valkenburg and the Late Medieval site in Amsterdam (fig. 62, 63).

In the Middle Ages the heron was important game for falconry (Dam, 1953). Burema (1953) states that the heron was much hunted and commonly eaten in the Middle Ages. To ascertain a regular supply of heron, heron woods (where the birds could nest) were laid out. When Duke Albert's wife visited the town, the city of Amsterdam presented her with nineteen herons and fifteen pikes, which shows how important this bird was at that time (Burema, 1953).

At present the heron is a fairly common resident bird and a passage migrant from the middle of July till the winter and from early March till May.

6. Egretta alba (*L.*) (*Table 74*)

A tarso-metatarsus found at Roman Valkenburg may be that of a great white heron. As the bone belongs to a young animal not fully grown it could not be identified with certainty. Its length, however, compared with the lengths of the tarso-metatarsi of herons and other great white herons as cited in literature make it almost certain that the bone belongs to a great white heron (fig. 64*a*).

Its maximum length is 166.5 mm, to which could be added at least 10 mm for the missing tarsal part, and this would result in an adult length of 176.5 mm.

The tarso-metatarsus of a recent specimen at the Naturhistoriska Museum at Gothenburg had a maximum length of 168 mm. Witherby (1947) gives in the "Handbook of the British birds" the somatic length of 170–215 mm.

C. Eykman (1941) gives in "De Nederlandse vogels" a length of 170–215 mm for ♀ great white heron, for the ♀ heron 135–165 mm and the ♂ 131–156 mm.

The bird breeds in colonies in dense reed-land. In recent times it was observed in the Netherlands at least ten times.

7. Botaurus stellarus (*L.*) (*Table 75*)

Of the bittern a coracoid and a humerus have been found at the Eneolithic site of Vlaardingen, and a vertebra at the Medieval site in Amsterdam (fig. 64*b*).

The bittern is a resident bird, which needs extensive reed-land and swamps with shallow water. The bird was commonly eaten in ancient times (Dam, 1953).

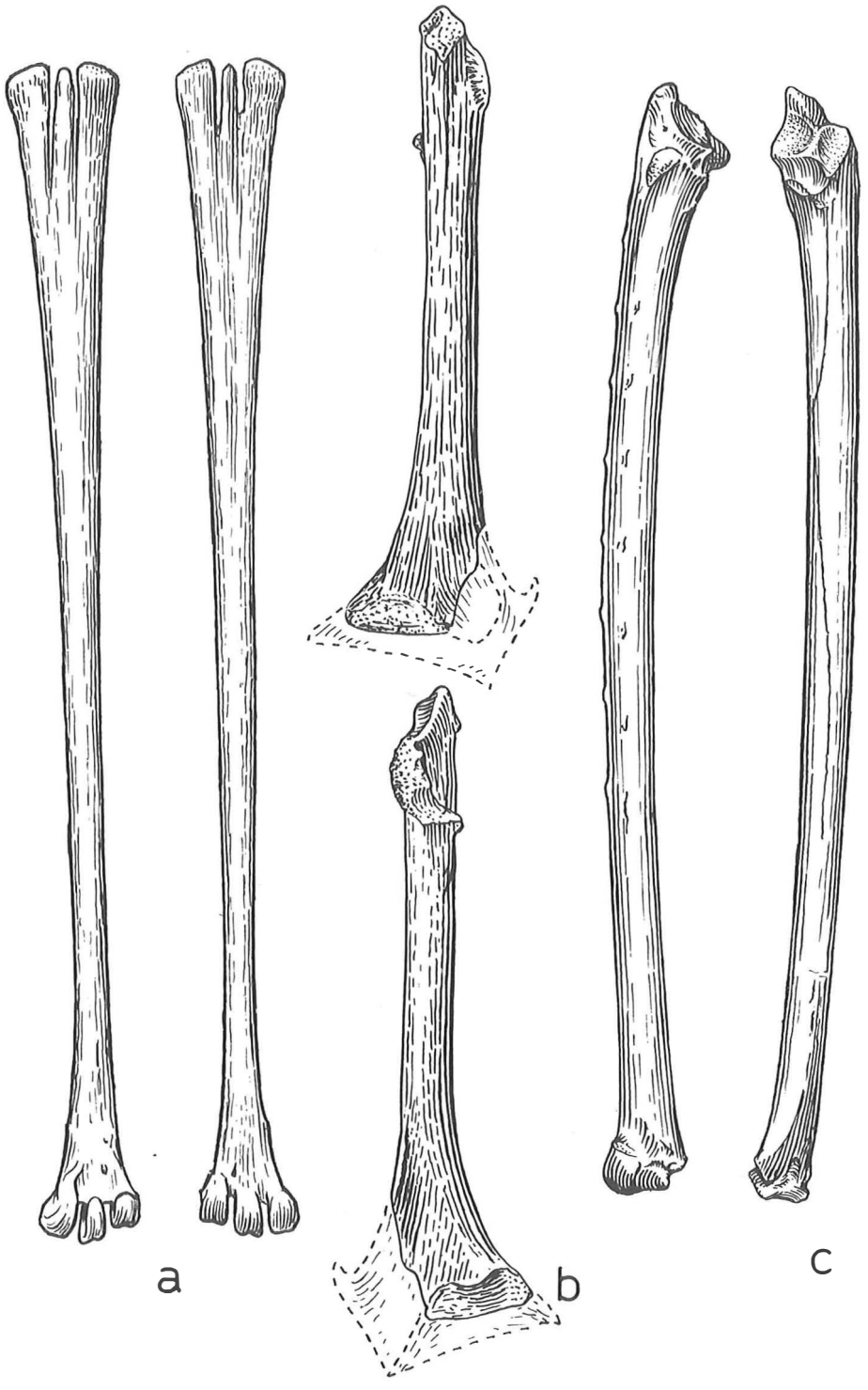


Fig. 64. Egretta alba – tarso-metatarsus: *a*, U/118; Botaurus stellaris – coracoid: *b*, A/O 8; Platalea leucorodia – ulna: *c*, U/126. 1 : 1

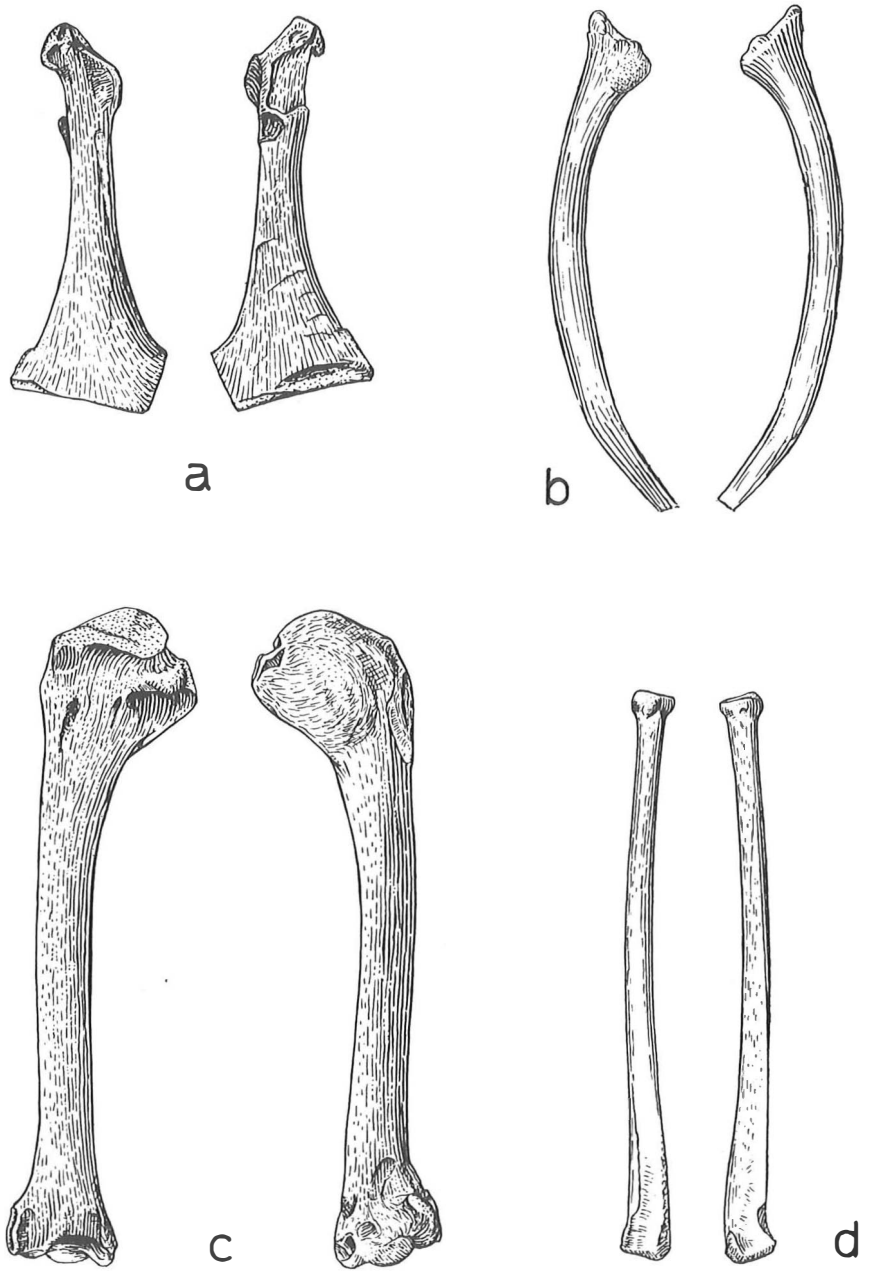


Fig. 65. Anas platyrhynchos and/or Anas platyrhynchos domesticus – coracoid: *a*, A/P 8; scapula: *b*, V/32; humerus: *c*, O/6185; radius: *d*, V/118. 1 : 1

8. Platalea leucorodia L. (*Table 76*)

Two ulnae of the spoonbill have been found, one at Roman Valkenburg and the other at the Medieval site in Amsterdam (fig. 64*c*).

Atpresent this species breeds in three colonies in the Netherlands, viz. the Naardermeer, the Zwanewater near Callantsoog and in the Muy on Texel. It migrates in southern direction in August and September to return in March.

In the Middle Ages spoonbills were game for falconry (Burema, 1953) and thought edible (Baudet, 1904). Thysse (1965) mentions that in the Middle Ages young spoonbills were caught alive in the nest, to be sent to England, where they were reared to be used as game birds when fully grown.

It is only due to human conduct that the spoonbill has become rare at present; its only breeding-grounds in Europe are in the Netherlands and in Spain (Voous, 1960).

9, 10. Anas platyrhynchos L. and Anas platyrhynchos domesticus L. (*Table 77*)

Remains of the mallard have been found at the Eneolithic sites of Vlaardingen, Hekelingen and Zandwerven. Remains of the mallard and of the domestic duck have been found in the Roman Castellum at Valkenburg, the Late Medieval castle Huis te Merwede and the Late Medieval site in Amsterdam (fig. 65, 66).

The mallard is the wild ancestor of the duck. When and where domestication took place, however, is uncertain. Zeuner (1963) thinks that ancient Mesopotamia and China were domestication centres. Boessneck (1953) and Zeuner (1953) mention that the Egyptians kept several wild species in enclosures. The Greeks and Romans are reported to have rarely kept domestic ducks, although at Rhodes and Cyprus ducks were kept (Zeuner, 1963).

It is difficult to distinguish bones of the mallard from those of the duck. It is generally thought that bones of the duck should be slightly larger than those of the mallard.

At Eneolithic Vlaardingen 48% of the bird bones belonged to the mallard, in Roman Valkenburg 4.1% to the mallard or domesticated duck and in Medieval Amsterdam 31.0%.

Most of the bones were damaged and only a small number could be measured; it was therefore impossible to get a clear insight in possible differences in size of the ducks from the different periods. In general the measurements are more or less alike and correspond to those found by Dräger (1964) at Roman Klagenfurt (Austria).

Although it is not possible to prove it one may assume that the remains found at the Eneolithic sites of Vlaardingen, Hekelingen and Zandwerven, are from the mallard. Likewise it is assumed that the remains found in the Castellum at Valkenburg are either from the mallard or from the domesticated duck and that the remains found at the Medieval sites are for the greater part from the domesticated duck, although

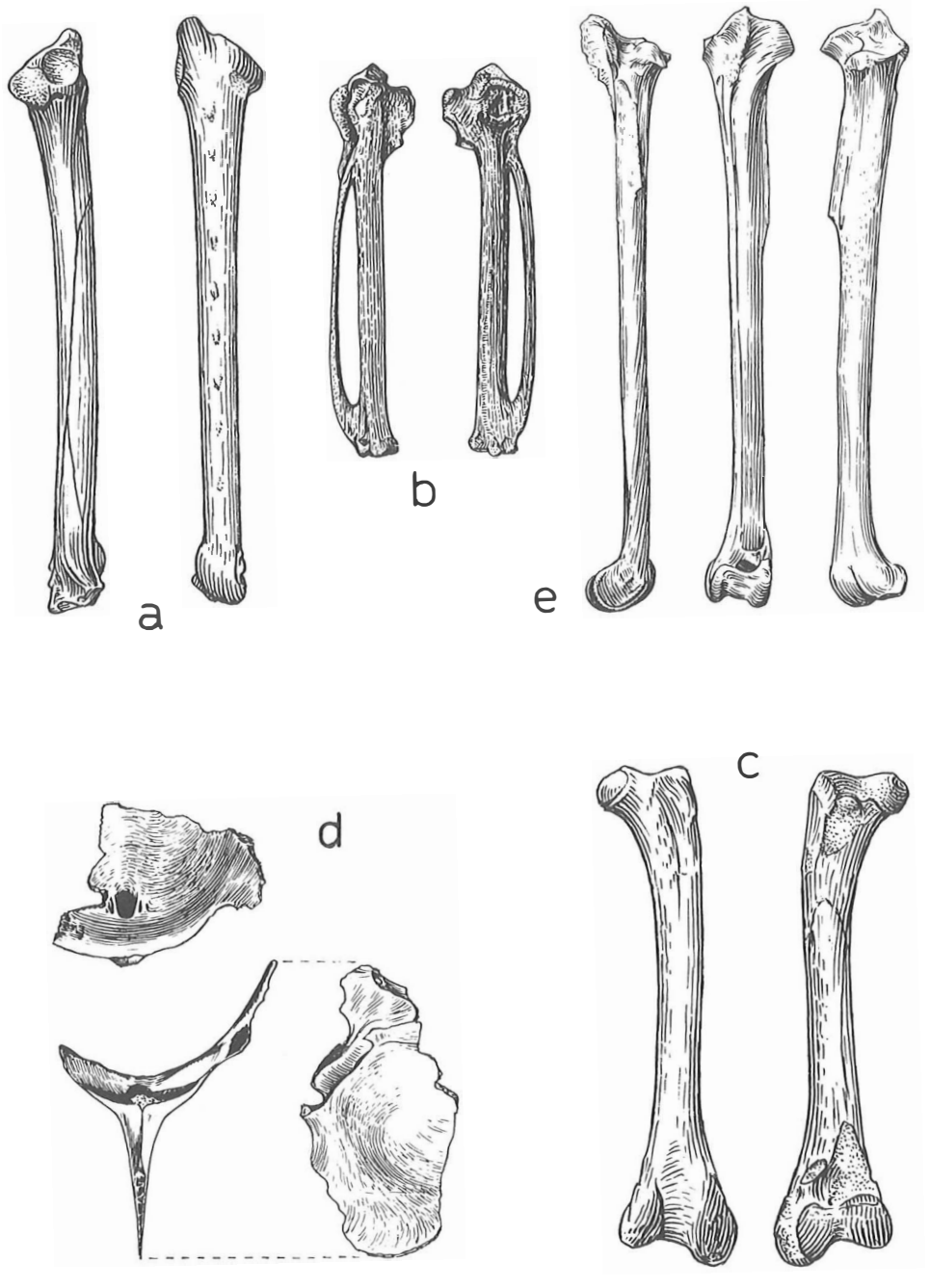


Fig. 66. Anas platyrhynchos and/or Anas platyrhynchos domesticus – ulna: *a*, V/126; metacarpus: *b*, U/201; femur: *c*, O/4237; sternum : *d*, A/E 17; tibiotarsus: *e*, V/121. 1 : 1

some bones may belong to the mallard. That the Romans rarely kept domesticated ducks (Zeuner, 1963) seems to be confirmed by the few duck remains from Roman Valkenburg and the absence of duck bones in the native settlements of those days. This is in contradiction to the large number of duck bones which Dräger (1964) found at Roman Klagenfurt. In general it is assumed that in Eneolithic times the duck had not yet been domesticated in Europe, but it may be possible that in Eneolithic Holland man provided the mallard with shelter for breeding as is done nowadays, and so could easily take the eggs.

In Medieval Amsterdam ducks were kept as is known from documents, but beside the duck the mallard may have been consumed. That mallard and duck were much alike is indicated by the regulation that one or both feet of the mallard had to be cut off before it could be offered for sale on the market in Amsterdam (Unger, 1916).

Many of the long bones show carving traces on the proximal and distal ends. The caputs of most humeri found at Vlaardingen are slightly damaged by fire, one humerus found in Amsterdam was damaged in the same way, and this suggests that duck wings were roasted at Eneolithic Vlaardingen as well as in Medieval Amsterdam.

At present the mallard is a common resident in lakes and canals in the Netherlands.

11. Anas crecca L. (*Table 78*)

Remains of the teal have been found at the Eneolithic site of Vlaardingen as well as in Medieval Amsterdam (fig. 67*a*, *b*, *c*, *d*, *e*).

At present the teal is a passage migrant from August till April; it rarely occurs as a resident.

12. Anas querquedula L. (*Table 79*)

A humerus of the garganey has been found in Medieval Amsterdam (fig. 67*g*). The garganey is at present a summer resident living near water, leaving from August to September and returning from early March till May. The garganey is a passage migrant as well as a resident.

13. Anas strepera L. or Anas clypeata L. (*Table 80*)

A left scapula found at Amsterdam resembles that of a gadwall, but it is just possible that it belongs to a shoveller.

At present the gadwall is rare as a resident; as a passage migrant it is found from the end of July till December, and from February till April. For consumption the gadwall is appreciated more than the shoveller.

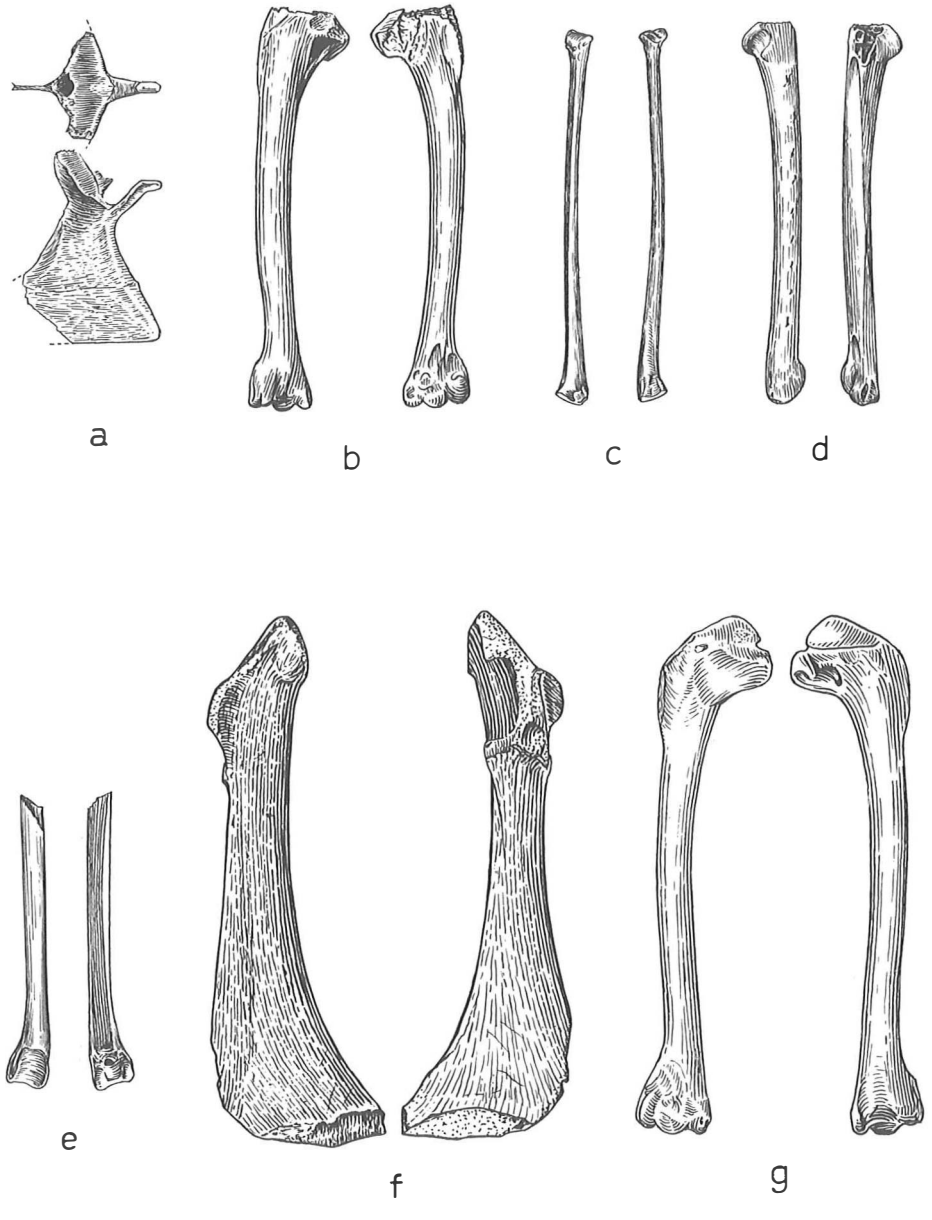


Fig. 67. Anas crecca – sternum: *a*, V/76; humerus: *b*, A/H 18; radius: *c*, V/86; ulna: *d*, V/30; tibio-tarsus: *e*, V/82; Mergus merganser – coracoid: *f*, A/P 7; Anas querquedula – humerus: *g*, V/126. 1 : 1

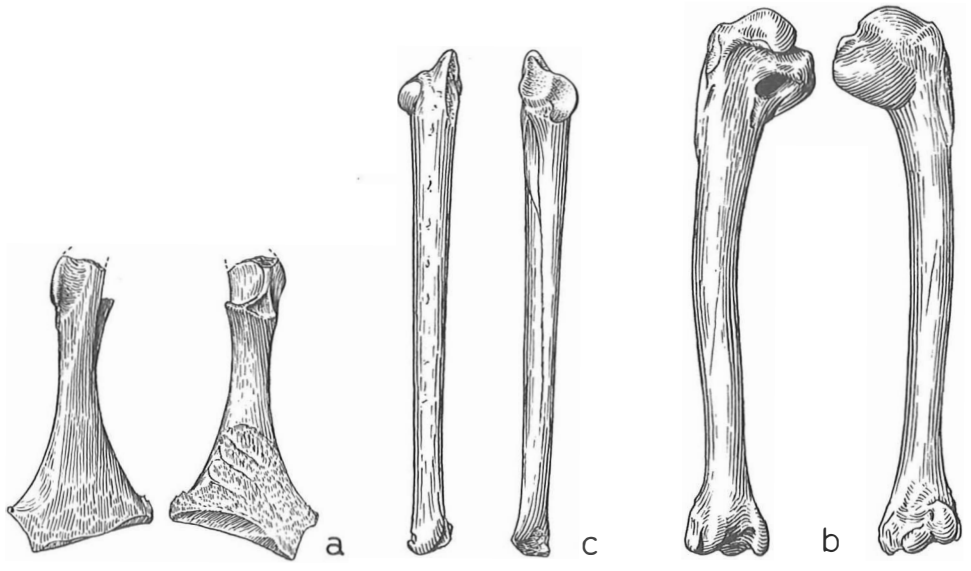


Fig. 68. Tadorna tadorna – coracoid: *a*, A/H 19^{b}; Anas cf. clypeata – humerus: *b*, V/74; ulna: *c*, V/118. 1 : 1

14. Anas cf. clypeata L. (*Table 81*)

An ulna and humerus found in Medieval Amsterdam may belong to a shoveller. At present the shoveller is a resident, as well as a passage migrant from August till October and from March till May (fig. 68*b*).

15. Mergus merganser L. (*Table 82*)

The damaged coracoid of a goosander was found at the Eneolithic site of Vlaardingen (fig. 67*f*).

The goosander is a passage migrant from October till May, and a winter visitor. Some goosanders stay in summer.

16. Tadorna tadorna (*L.*) (*Table 83*)

A slightly damaged coracoid (fig. 68*a*) of a shelduck has been found at the Eneolithic site of Vlaardingen.

At present the shelduck is a resident of the Frisian Islands and a passage migrant along the coast of Holland.

17, 18. Anser anser (*L.*), *Anser anser domesticus* (*L.*) *and Anser fabalis* (*Latham*)

Remains of the goose have been found at the Eneolithic site of Vlaardingen, in the Roman Castellum at Valkenburg, at the native settlement of the Roman period at Vlaardingen, at Early Medieval Rijnsburg, in the Late Medieval castle Huis te Merwede and in the Late Medieval site in Amsterdam (fig. 69–74).

At Vlaardingen only a few bones have been found. In the Roman Castellum at Valkenburg and at the Early and Late Medieval sites the goose remains are quite numerous, 24,5 % of all bird bones from Valkenburg and 37,1 % of those from Amsterdam belong to geese.

The measurements that could be taken of the Eneolithic bones do not suggest that the Eneolithic geese were smaller than the later ones. If the measurements of the bones are compared with those found by Dräger (1964) for the bones of Roman and Medieval geese and the bones of recent wild and domesticated geese, it appears that most bones are relatively large. Dräger (1964) states that the present domesticated goose is larger than the grey lag-goose. The sizes of the domesticated goose and grey lag-goose are not very different, however. So it is hardly possible to tell, whether a bone belongs to a domesticated bird or to a wild one.

On account of the small number of bones found at Eneolithic Vlaardingen and the increase of the number of bones found at sites dating to Roman and later times,

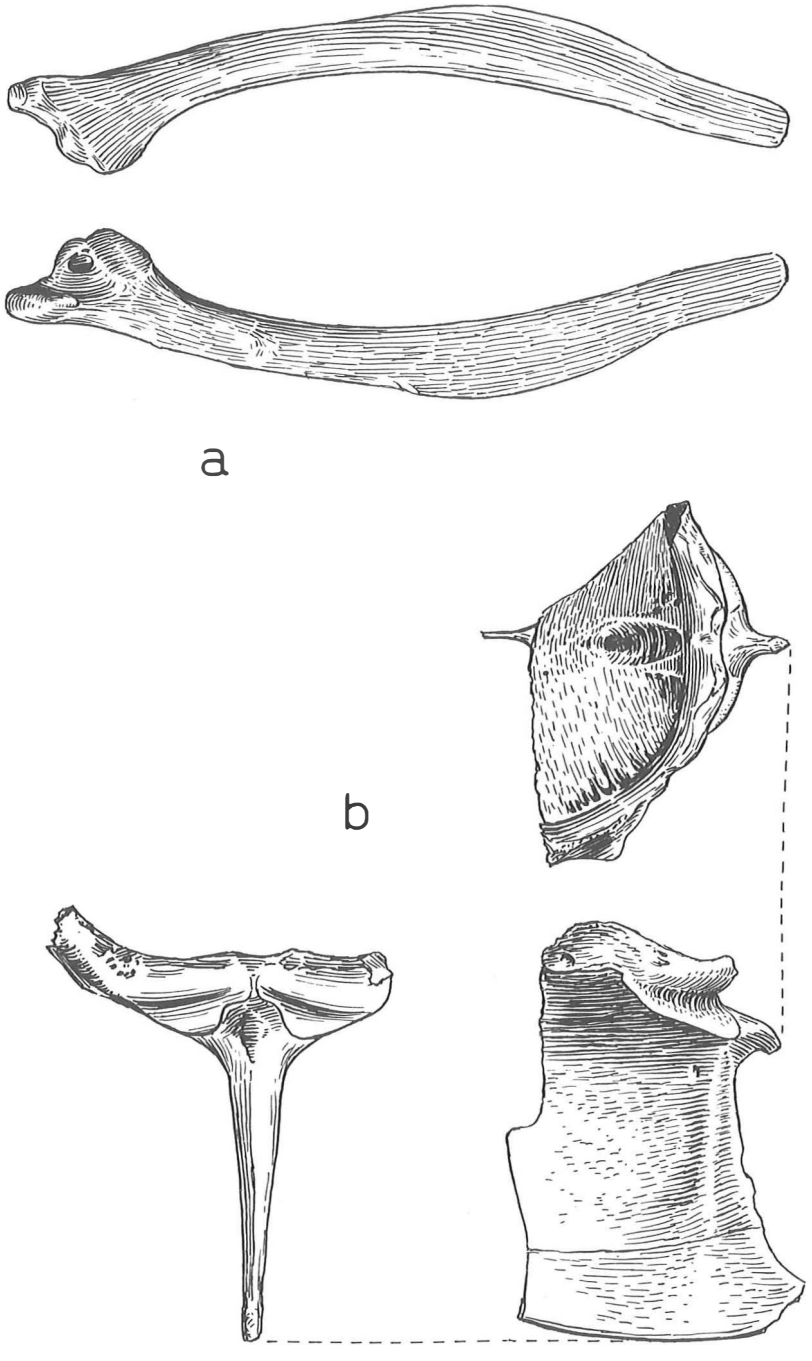


Fig. 69. Anser anser and/or anser anser domesticus – scapula: *a*, O/409; sternum: *b*, O/1470. 1 : 1

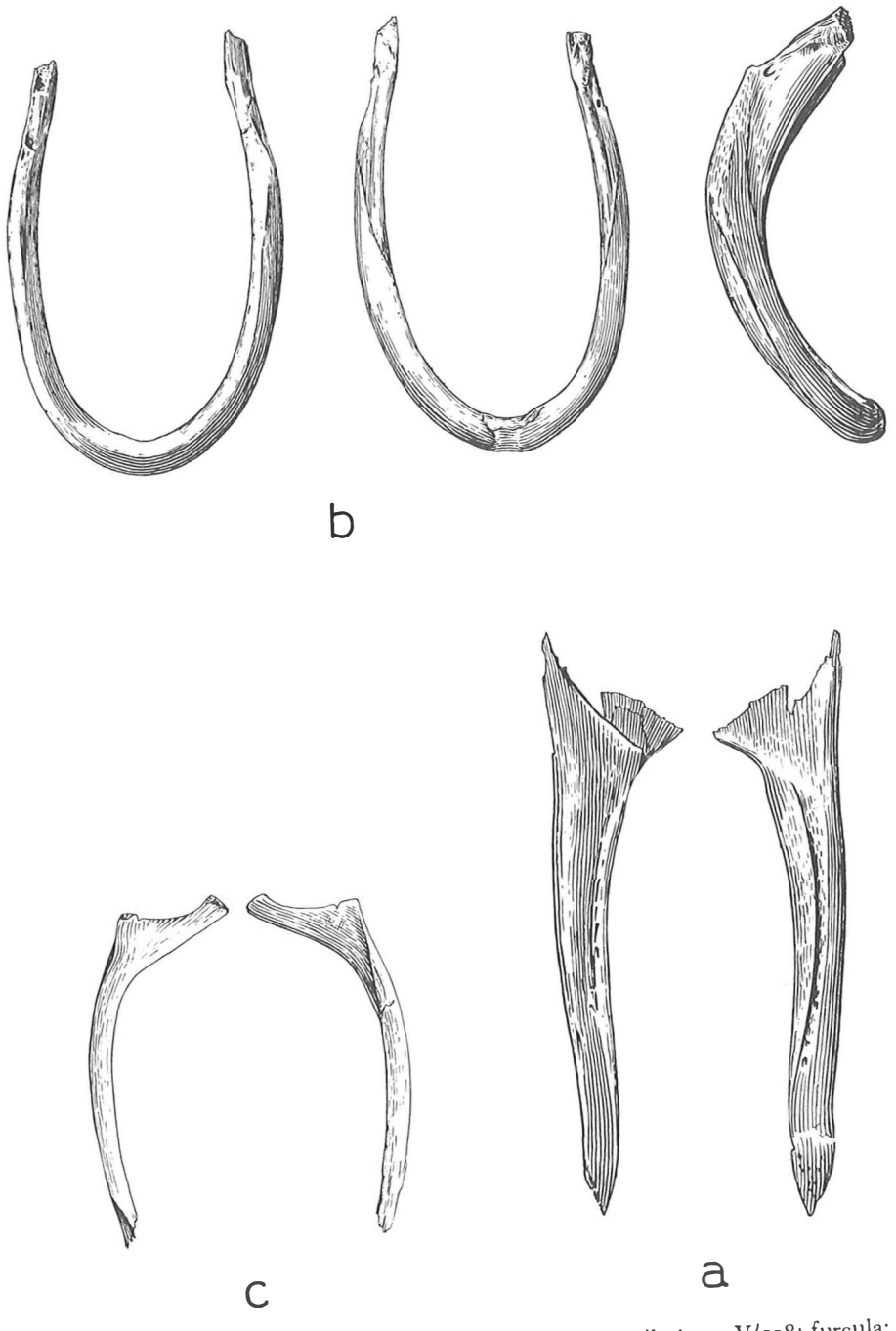


Fig. 70. Anser anser and/or anser anser domesticus – mandibula: *a*, V/118; furcula: *b*, O/377; rib: *c*, V/68. 1 : 1

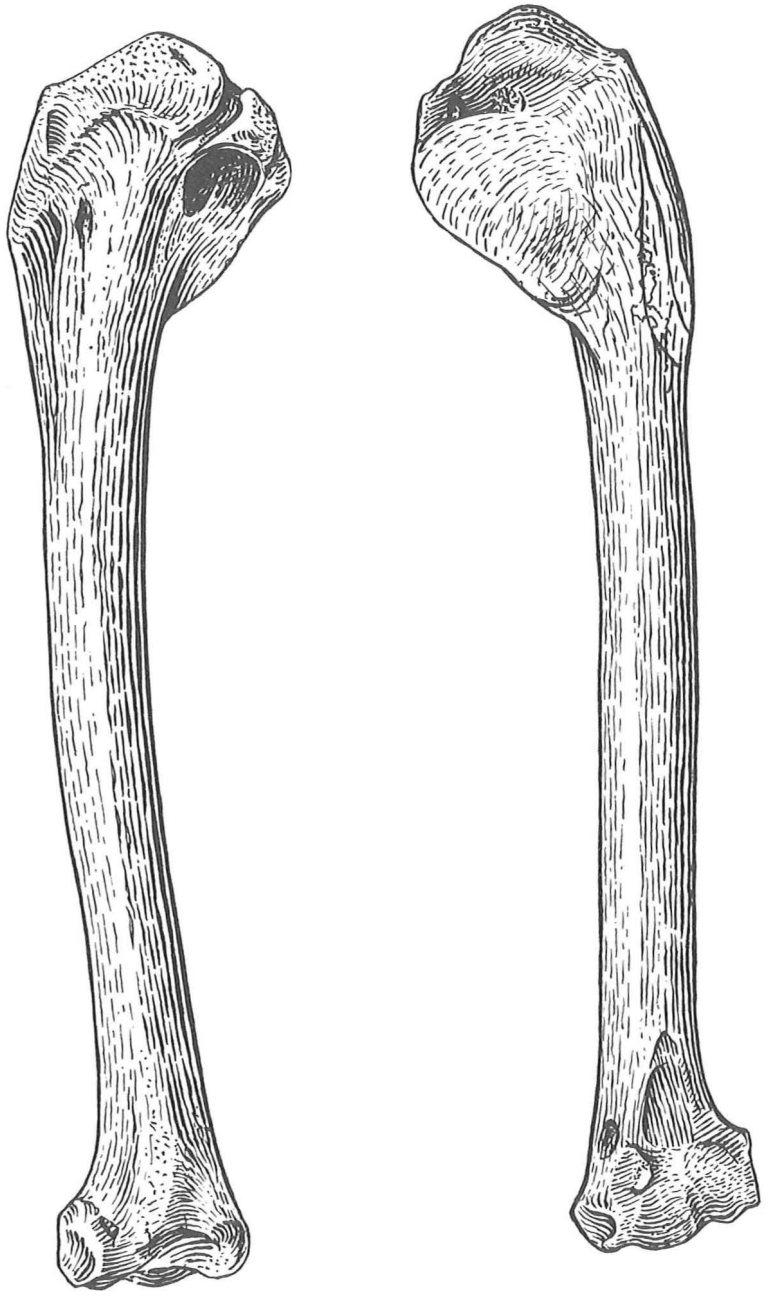


Fig. 71. Anser anser and/or anser anser domesticus – humerus: O/248. 1 : 1

however, it seems likely that the former may belong to the grey lag-goose while most of the other belong to the domesticated goose. When and where in Europe the goose was first domesticated is not certain. Zeuner (1963) suggested a centre in South-western Europe. Boessneck (1960) states that the ancient Egyptians domesticated the grey lag-goose. The Greeks as well as the Romans knew the domesticated goose. Well known is the story of the geese saving Rome with their warning cackle. On the strength of small goose-like figurines found in Biegen, in Eastern Germany, Gandert (1953) thought that already in the Bronze Age the domesticated goose was known in Central Europe.

As according to Lepiksaar (private communication) bones of the grey lag-goose and the bean goose are also difficult to distinguish in some cases, the possibility that some of the bones belong to the bean goose has to be considered.

At present the grey lag-goose is a winter visitor and a passage migrant from September till November and from early March till the middle of May. The bean goose is a winter visitor at present from the end of September till March.

19. Anser albifrons (Scopoli) and Anser cf. fabalis brachyrhynchus Baillin (Table 85, 86)

Four coracoids found in the Roman Castellum at Valkenburg belong to the white-fronted goose in all probability (fig. 75*d*).

Three metacarpal bones found in Medieval Amsterdam may belong to the white-fronted goose or to the pink-footed goose. The pink-footed goose is sometimes considered a small form of the bean goose (fig. 75*e*).

At present both are passage migrants from September/October till March.

20. Anser sp. or Branta sp.

Two humerus fragments found at the Eneolithic site of Zandwerven and in Medieval Amsterdam belong to a goose, but it is impossible to say whether this was Anser sp. or Branta sp.

21. Branta sp.

Two radius fragments from the Roman Castellum at Valkenburg are too much damaged to tell whether they belong to the brent-goose or the barnacle goose.

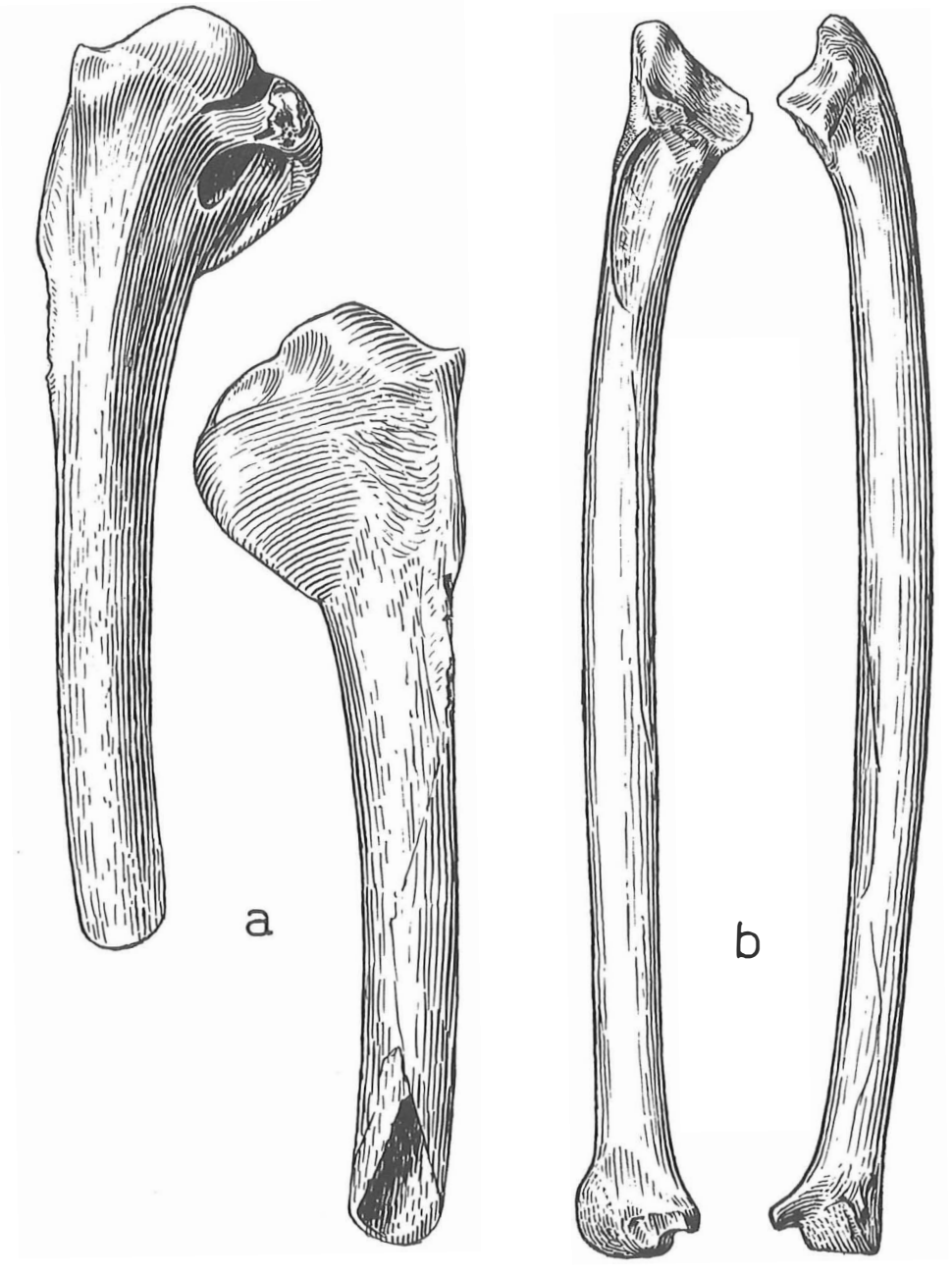


Fig. 72. Anser anser and/or anser anser domesticus – humerus: *a*, O/2663; ulna: *b*, O/1012. 1 : 1

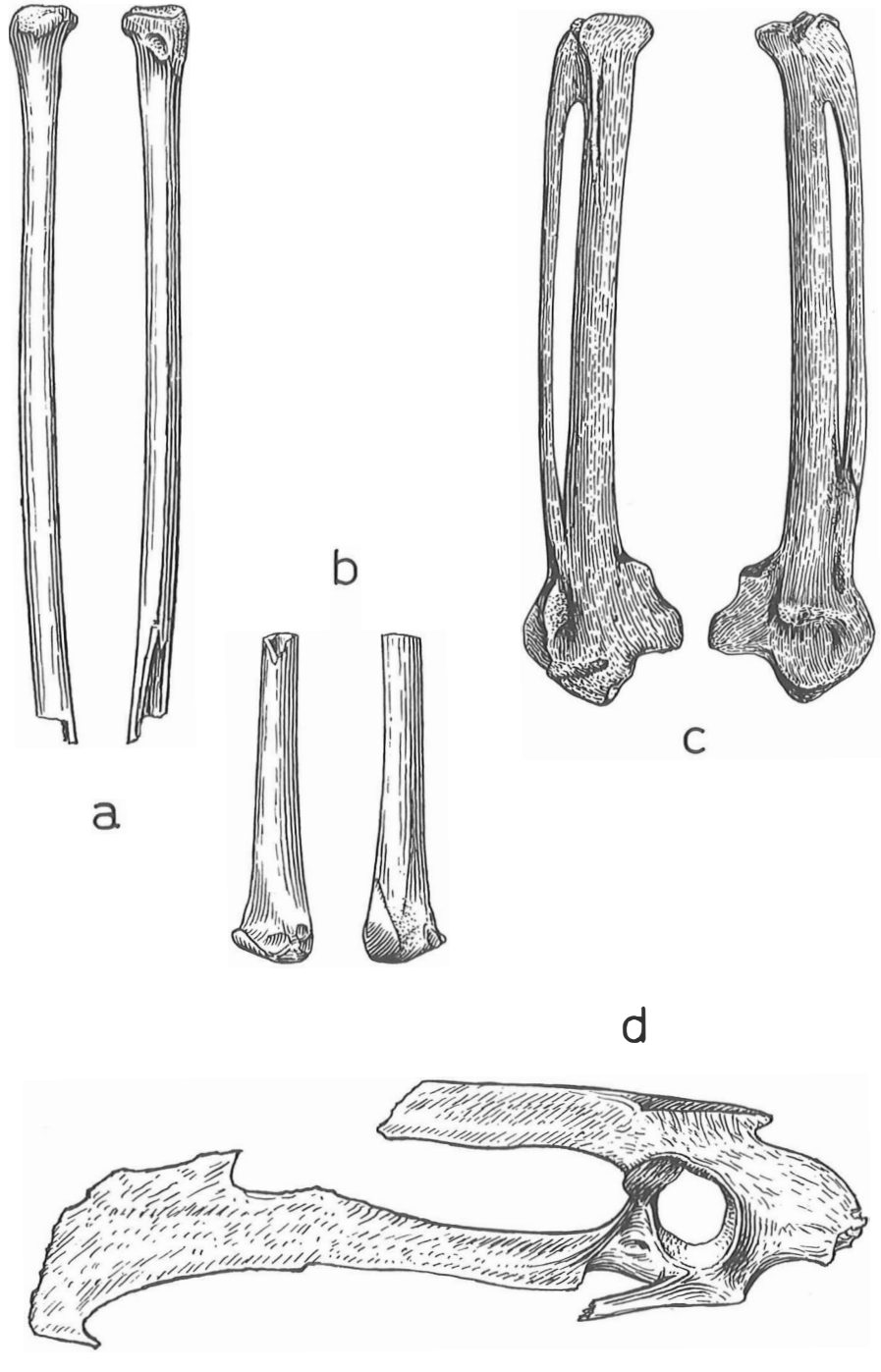


Fig. 73. Anser anser and/or anser anser domesticus – radius: *a*, V/113; *b*, V/92; metacarpus: *c*, R/281; pelvis: *d*, O/?. 1 : 1

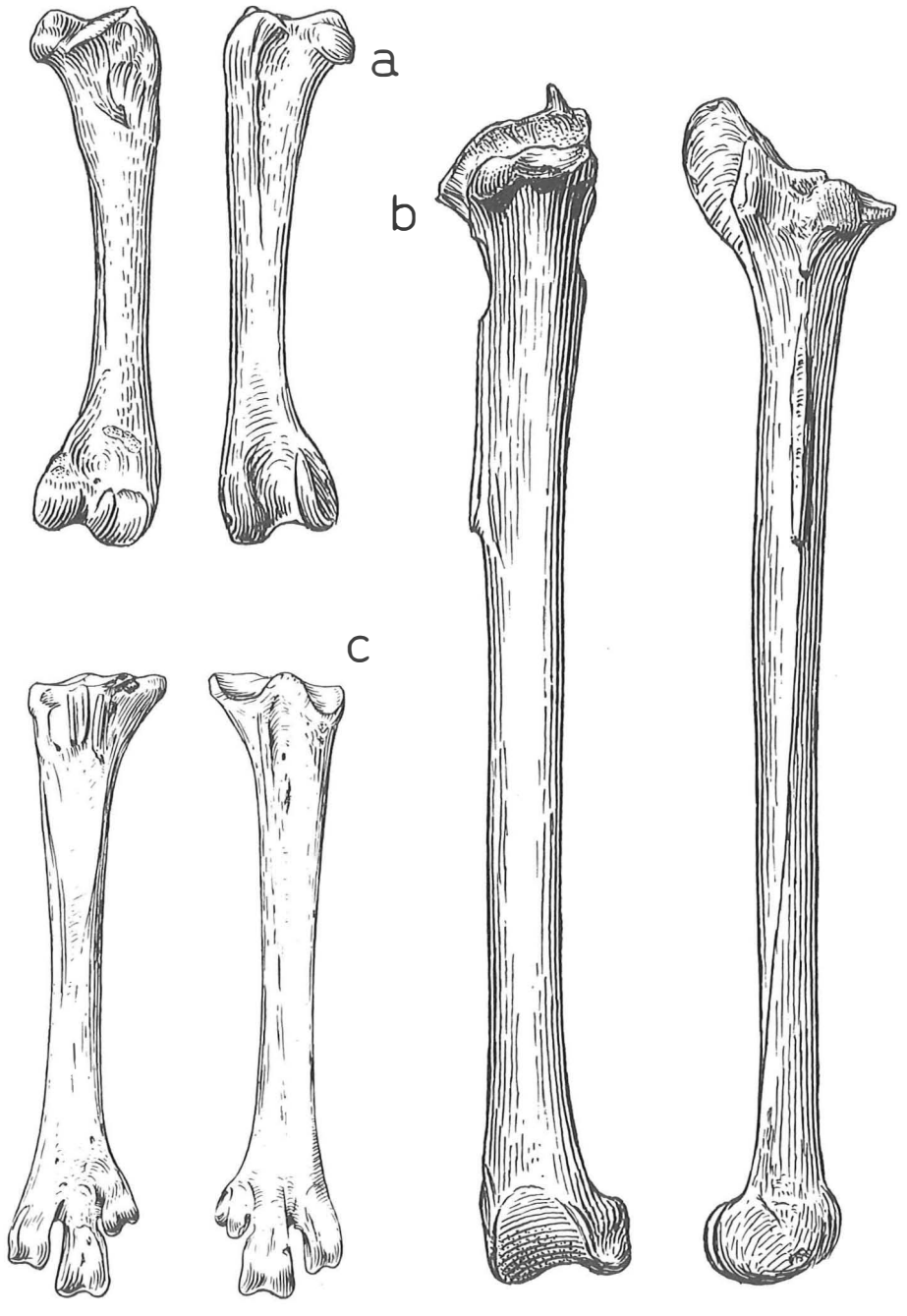


Fig. 74. Anser anser and/or anser anser domesticus – femur: *a*, O/870; tibio-tarsus: *b*, O/586; tarso-metatarsus: *c*, V/85. 1 : 1

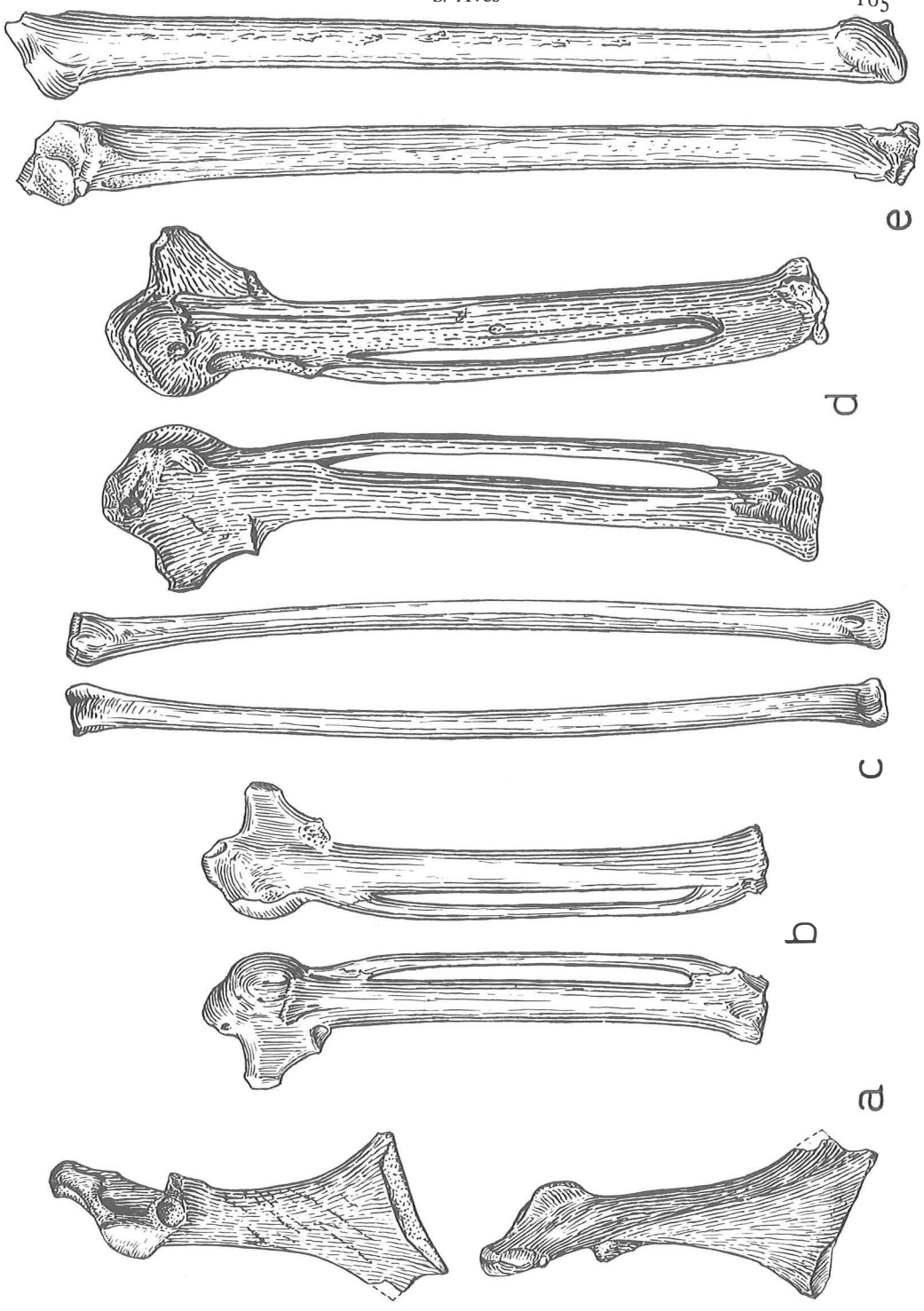


Fig. 75. Anser albifrons – coracoid: *a*, O/4237; cf. Anser fabalis brachyrhynchos – metacarpus: *b*, V/93; Branta bernicla – radius: *c*, O/?; metacarpus: *d*, O/4237; Branta leucopsis – ulna, O/4237. 1 : 1

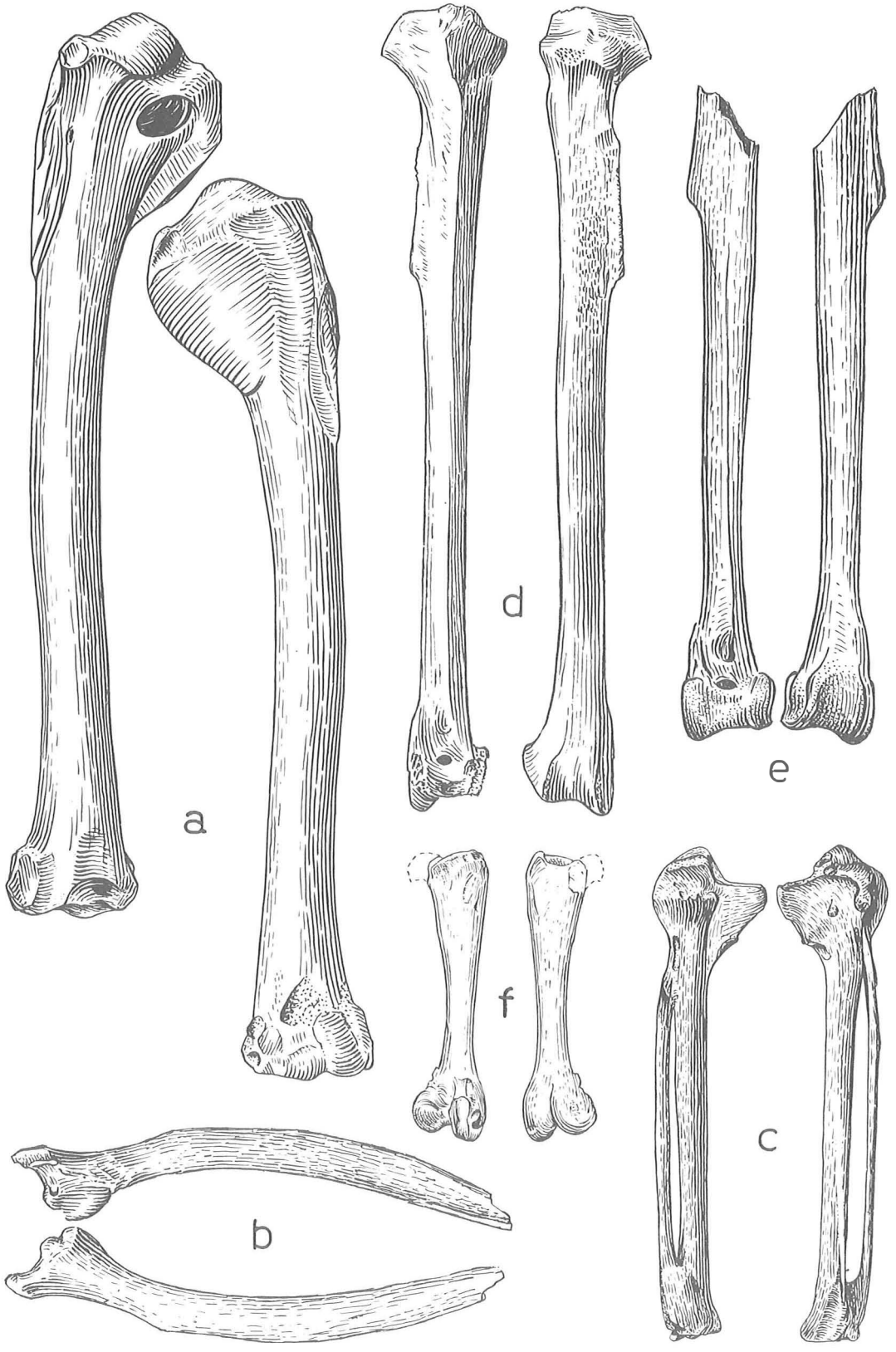


Fig. 76. Branta leucopsis – humerus: *a*, O/1187; scapula: *b*, O/4237; metacarpus: *c*, O/2989; tibio-tarsus: *d*, O/4520, *e*, O/1161; femur: f. 1 : 1

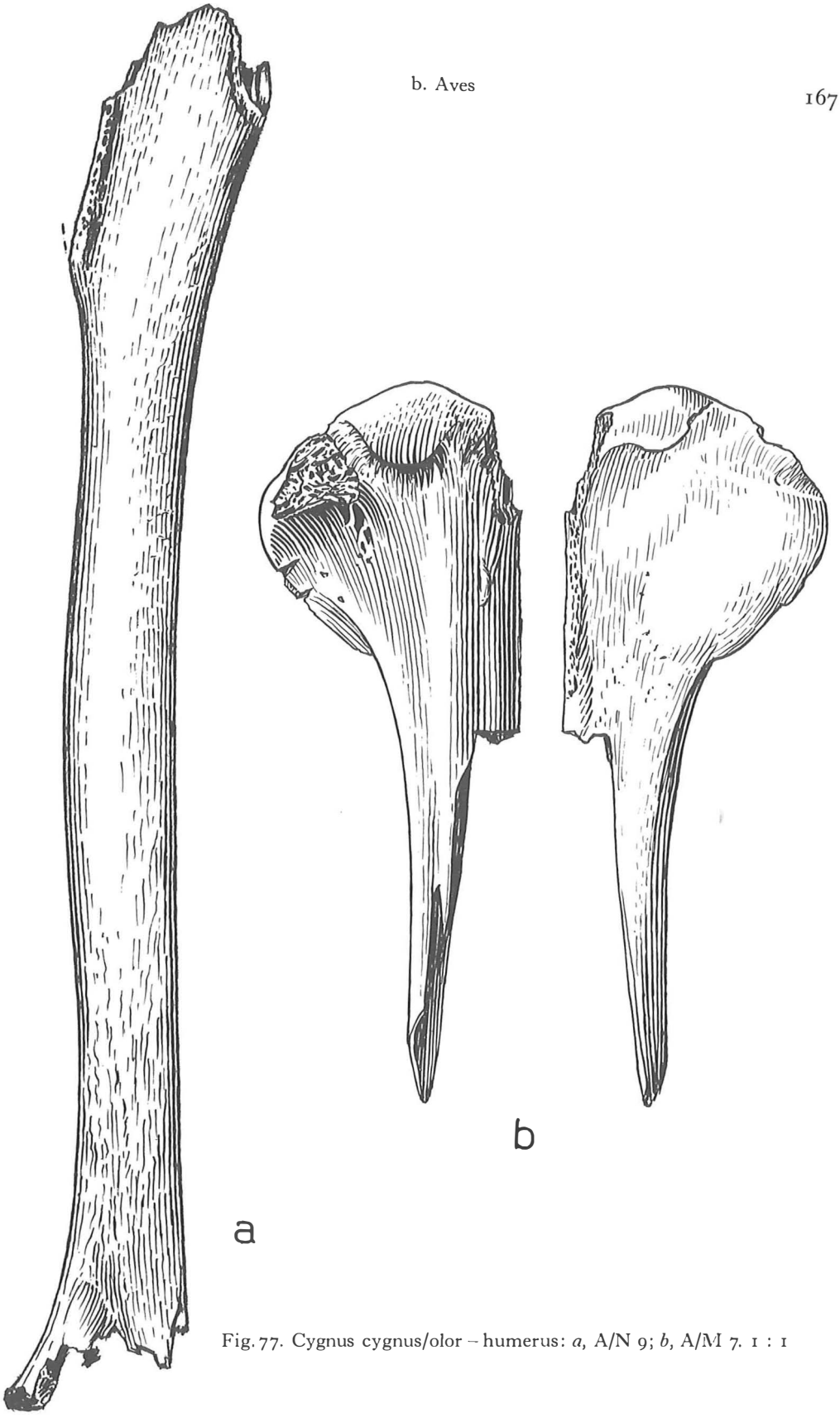


Fig. 77. Cygnus cygnus/olor – humerus: *a*, A/N 9; *b*, A/M 7. 1 : 1

22. Branta bernicla (L.) (Table 87)

Remains of the brent-goose have been found at the Eneolithic site of Vlaardingen and in the Roman Castellum at Valkenburg (fig. 75*a*, *b*, *c*).

The brent-goose is smaller than the barnaclegoose. At present the brent-goose is a fairly common winter visitor from the middle of September till May. Usually it is found on mud-flats along the coast.

23. Branta leucopsis (Bechstein) (Table 88)

Remains of the barnacle goose have been found at the Eneolithic site of Vlaardingen and in the Roman Castellum at Valkenburg (fig. 76*a*, *b*, *c*, *d*). At the latter site 37 bones were found, together about 21.6% of all bird bones.

A humerus found at Vlaardingen had a slightly burnt caput.

At present barnacle geese are winter visitors from early December till March, usually turning up locally in large numbers.

24. Cygnus olor (Gmelin) (Table 89)

Bones of the mute swan have been found at the Eneolithic site of Hekelingen, in the Medieval castle Huis te Merwede and in the Medieval city of Amsterdam (fig. 78*a*, *b*, *c*).

Although it cannot be proved it is assumed that the ulna found at Hekelingen belongs to a wild mute swan, while those from the Late Medieval castle Huis te Merwede and Amsterdam may belong to domesticated birds.

In the Middle Ages the swan was commonly eaten (Baudet, 1904), but it was also kept in the moats of castles and in the canals of the cities. It is known that in 1672 the swans in Amsterdam had to be disposed of ('t Hooft, 1933), because of bad times.

At present the wild mute swan only breeds in the "Zwarte Meer", (Zwolle).

25. Cygnus olor (Gmelin) or Cygnus cygnus (L.) (Table 89)

At the Eneolithic site of Vlaardingen a number of bones has been found of which it is difficult to tell whether they belong to the mute swan or to the whooper swan (fig. 77*a*, *b*).

At present both are scarce as winter visitors, becoming more numerous during a period of hard frost.

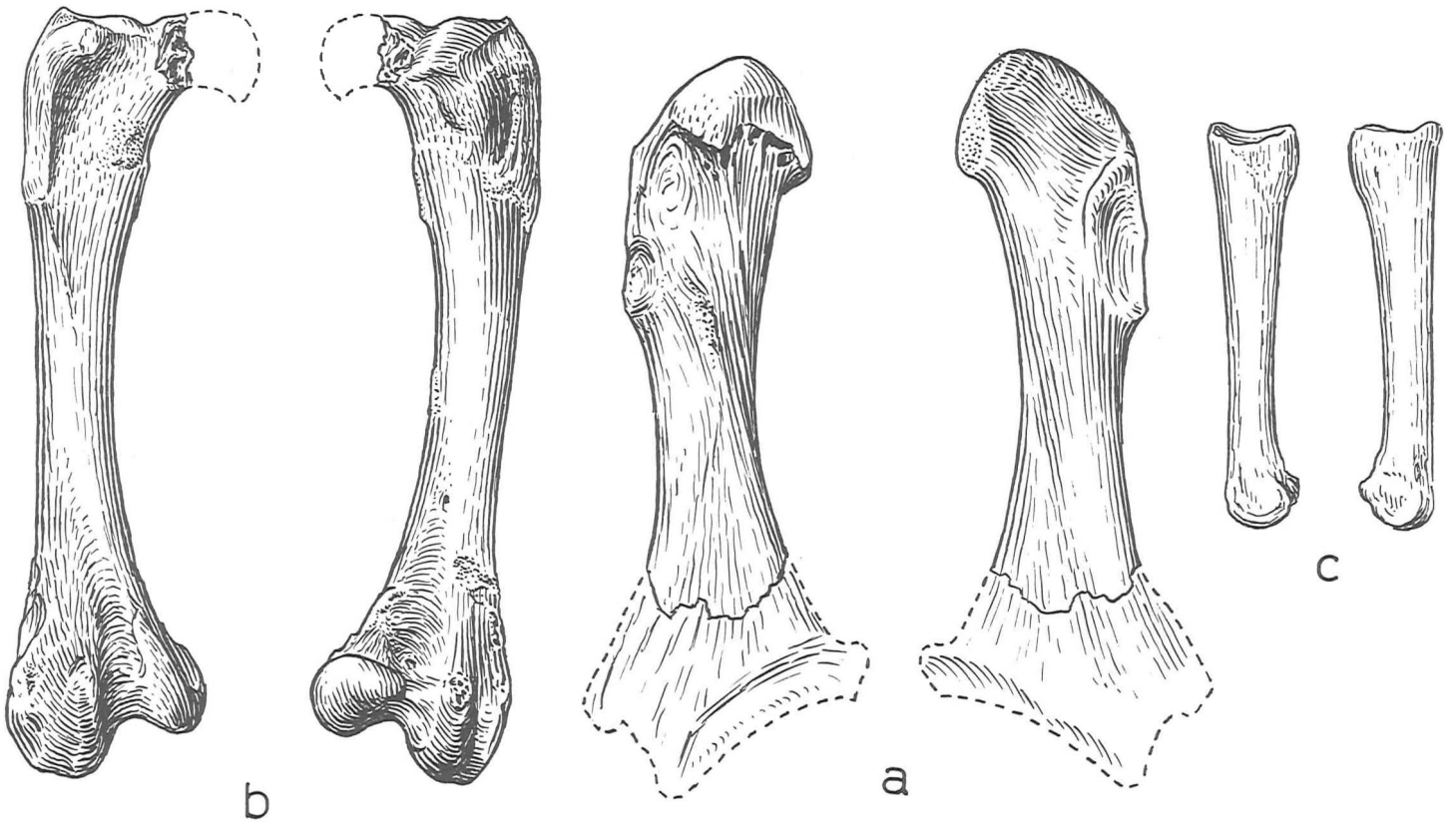


Fig. 78. Cygnus olor – coracoid: *a*, V/133; femur: *b*, V/126; phalanx II: *c*, V/133. 1 : 1

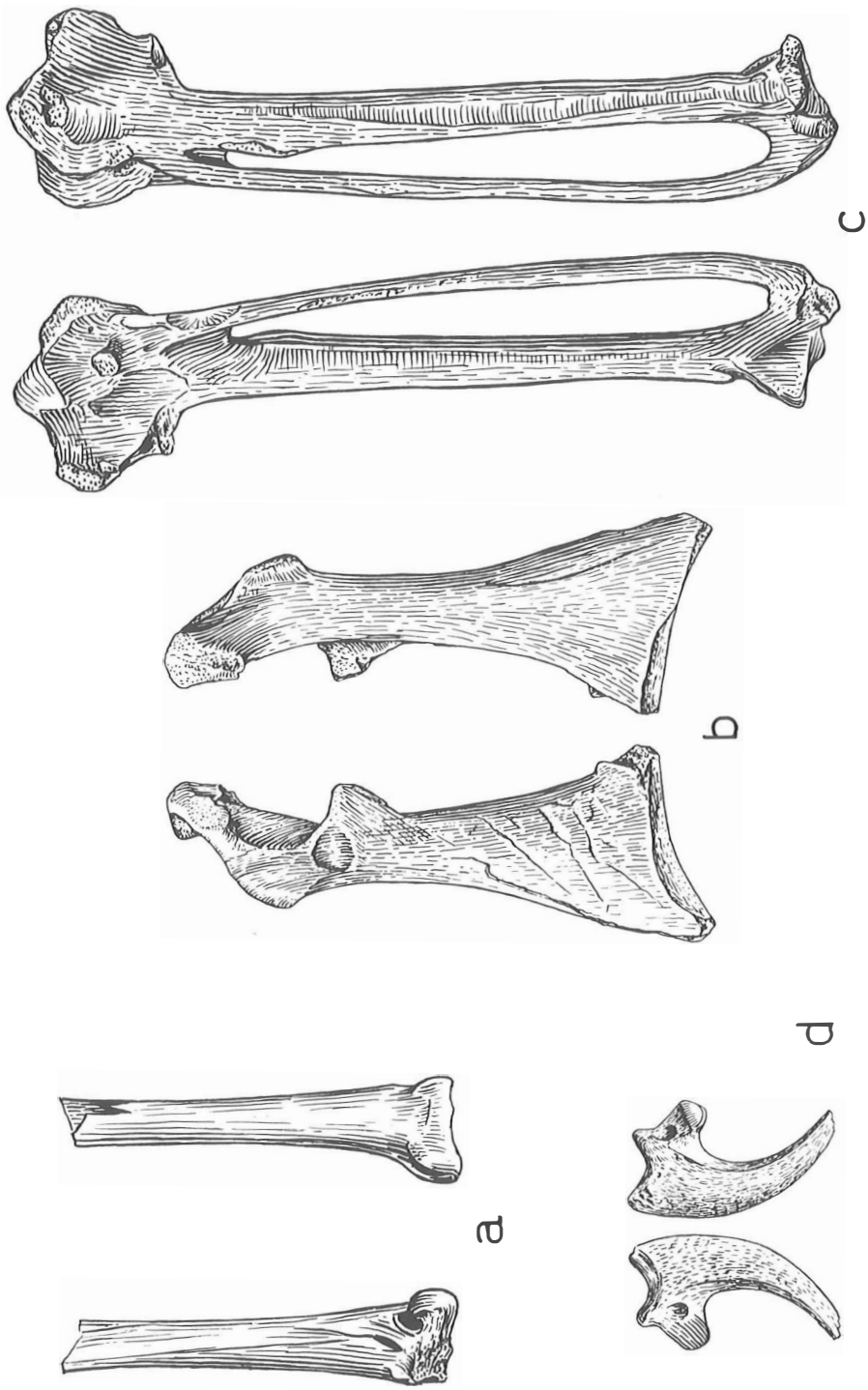


Fig. 79. Buteo buteo – tibio-tarsus: *a*, V/152; Haliaëtus albicilla – coracoid: *b*, O/326; metacarpus: *c*, O/4507; phalanx III: *d*, O/?

26. Buteo buteo (*L.*) (*Table 91*)

In Medieval Amsterdam a pelvis and a tibio-tarsus of a buzzard have been found (fig. 79*a*).

At present the buzzard occurs as a summer resident in the eastern part of the Netherlands occasionally, and as a common passage migrant and winter visitor from August till May.

The buzzard dislikes dense woods and is found in the woods along the edges of meadows.

27. Haliaeëtus albicilla (*L.*) (*Table 92*)

Twenty-three bones of the white-tailed eagle have been found at the Eneolithic site of Vlaardingen, i.e. 17.8 %, one at the Eneolithic site of Zandwerven and seven in the Roman Castellum at Valkenburg (fig. 79*b*, *c*; 80 ,81).

The presence of a large number of white-tailed eagle bones at Vlaardingen indicates that the bird was not rare in those days. Although the meat was eaten probably, according to Clark (1948) the main value of eagles may have been their feathers. Clark (1948) supplied many instances of the use of eagle feathers for arrows in various parts of the world in classic and historical times.

At present the white-tailed eagle is rare as a winter visitor from the end of August till March.

Voous (1960) states that the present irregular boundaries of the breeding grounds of the white-tailed eagles indicate that formerly the bird was distributed all over Europe.

28. Gallus gallus domesticus L. (*Table 93*)

Remains of domestic fowl were found at the Eneolithic site of Vlaardingen, the pre-Roman Iron Age sites at the Amsterdam Waterworks, in the Roman Castellum at Valkenburg, at the native settlement from the Roman period at Vlaardingen, at Early Medieval Rijnsburg, at the Late Medieval castle Huis te Merwede and in the city of Amsterdam (fig. 82–85).

The number of measurable bones is not large. The bones dating from the Roman period can be divided into three groups. The first group comprises the smallest bones, which may have belonged to hens (O/409 femur, tibio-tarsus O/812 and O/4074). The second group – larger bones – consists of those belonging to cocks as the spurred tarso-metatarsi show. The large femur O/17? and tarso-metatarsus O/? may belong to a capon.

In general the measurements never reach the maxima put on record by Dräger (1964) for the fowl bones found at the Roman site of Magdalensberg near Klagenfurt.

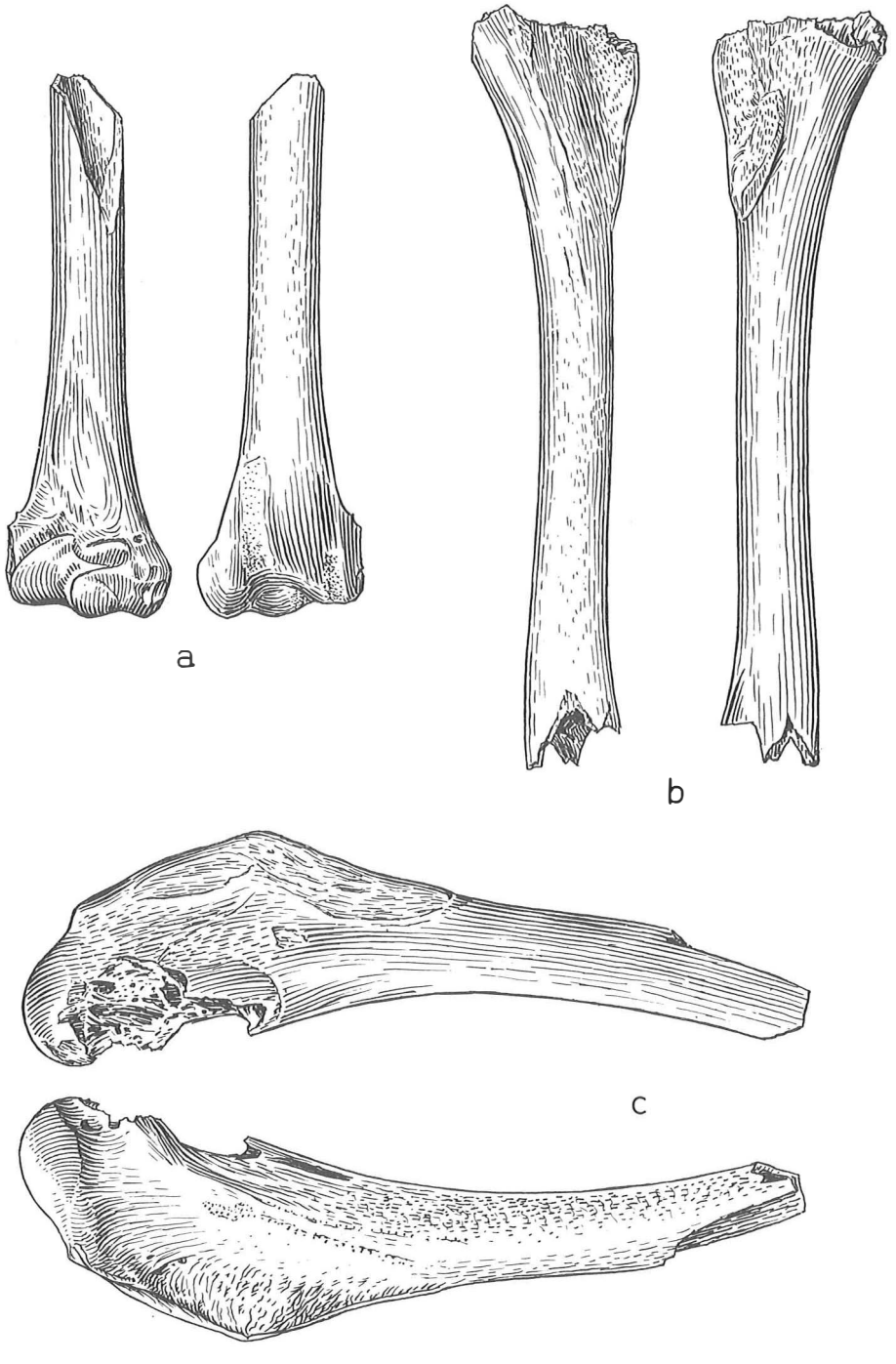


Fig. 80. Haliaeëtus albicilla – humerus: *a*, A/G 18[d]; *b*, O/4507; *c*, O/4891. 2 : 3

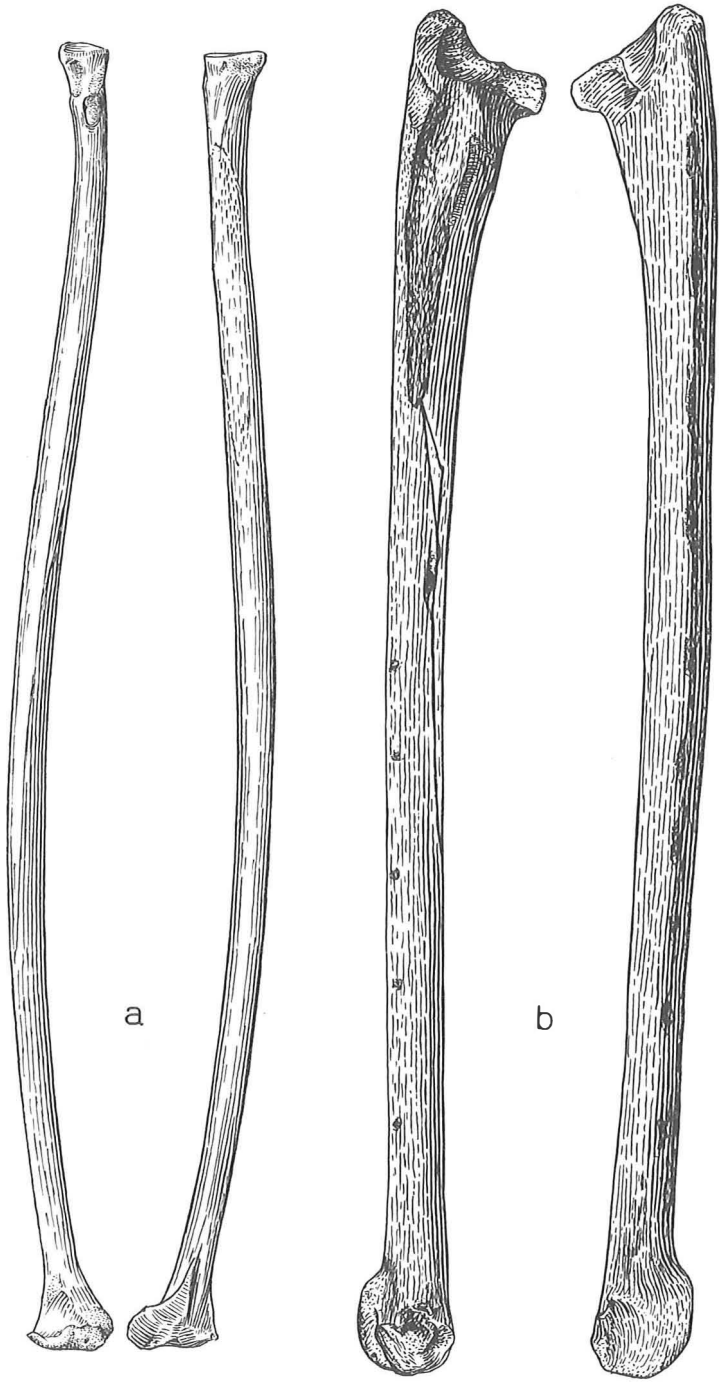


Fig. 81. Haliaeëtus albicilla – radius: *a*, O/4891; ulna: *b*, O/1891. 2 : 3

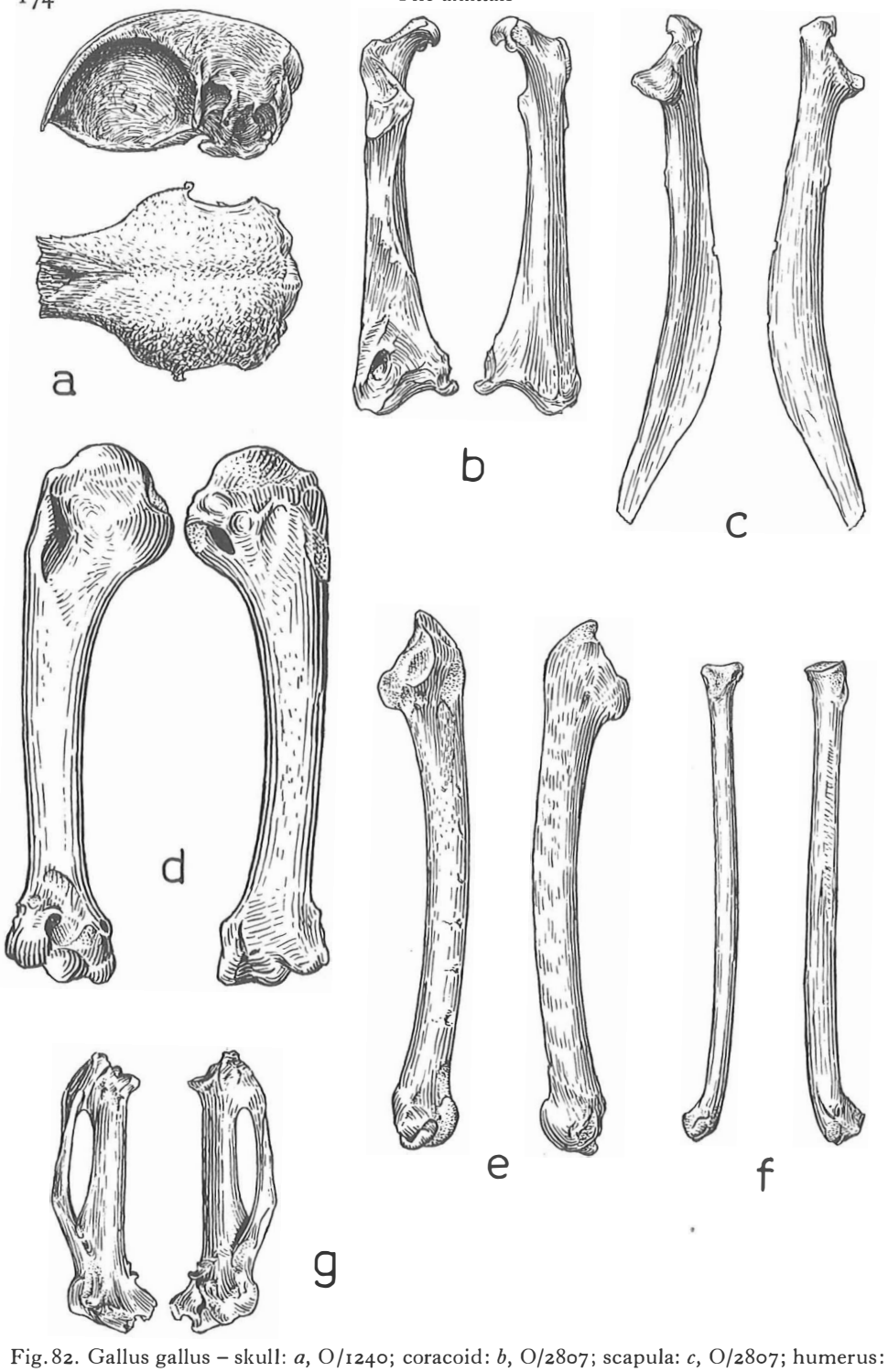


Fig. 82. Gallus gallus – skull: *a*, O/1240; coracoid: *b*, O/2807; scapula: *c*, O/2807; humerus: *d*, O/2807; ulna: *e*, O/2807; radius: *f*, O/2807; metacarpus: *g*, O/2807. 1 : 1

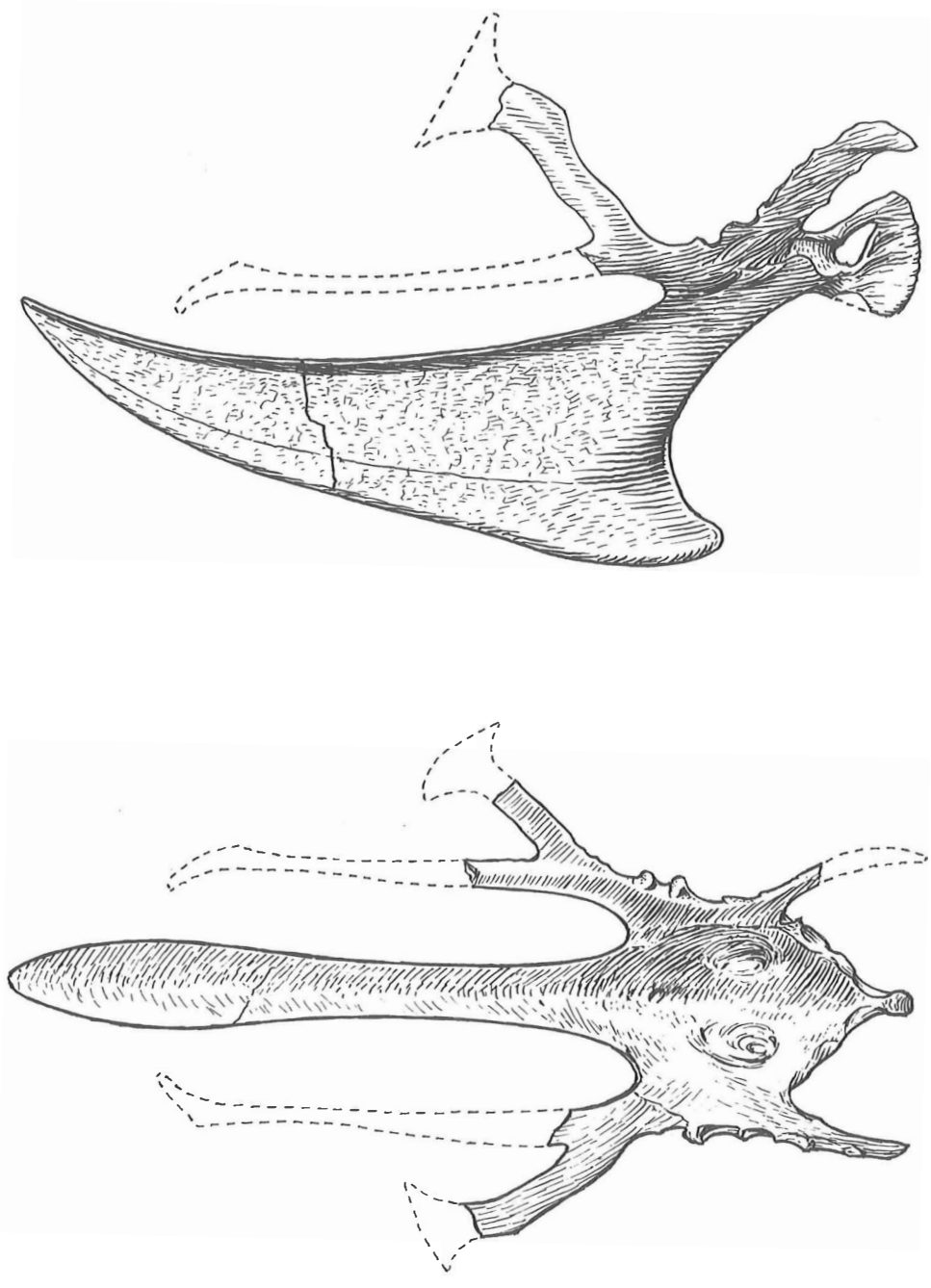


Fig. 83. Gallus gallus – sternum: O/2807. 1 : 1

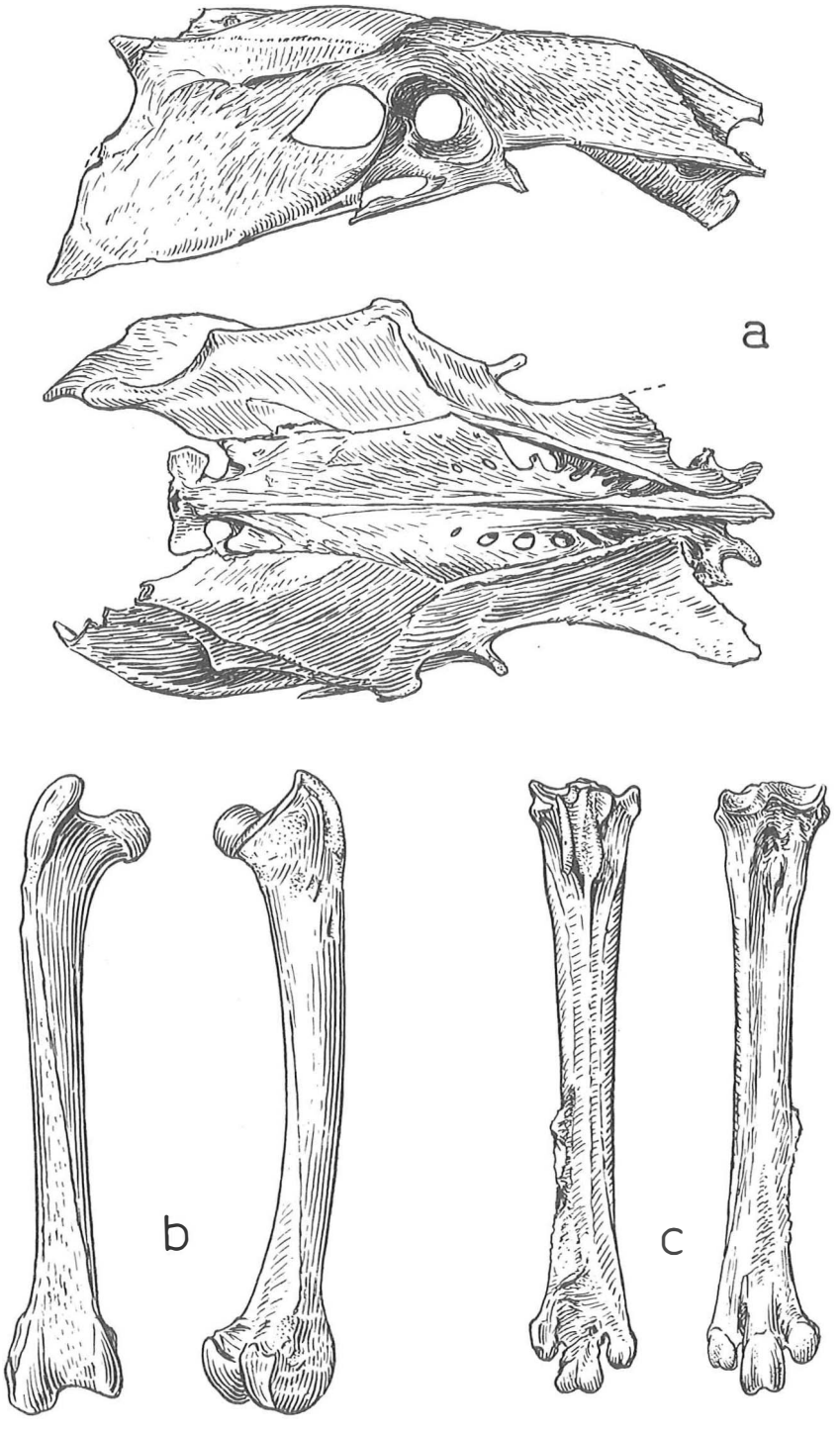


Fig. 84. Gallus gallus – pelvis: *a*, O/2807; femur: *b*, O/2807; tarso-metatarsus: *c*, O/2807. 1 : 1

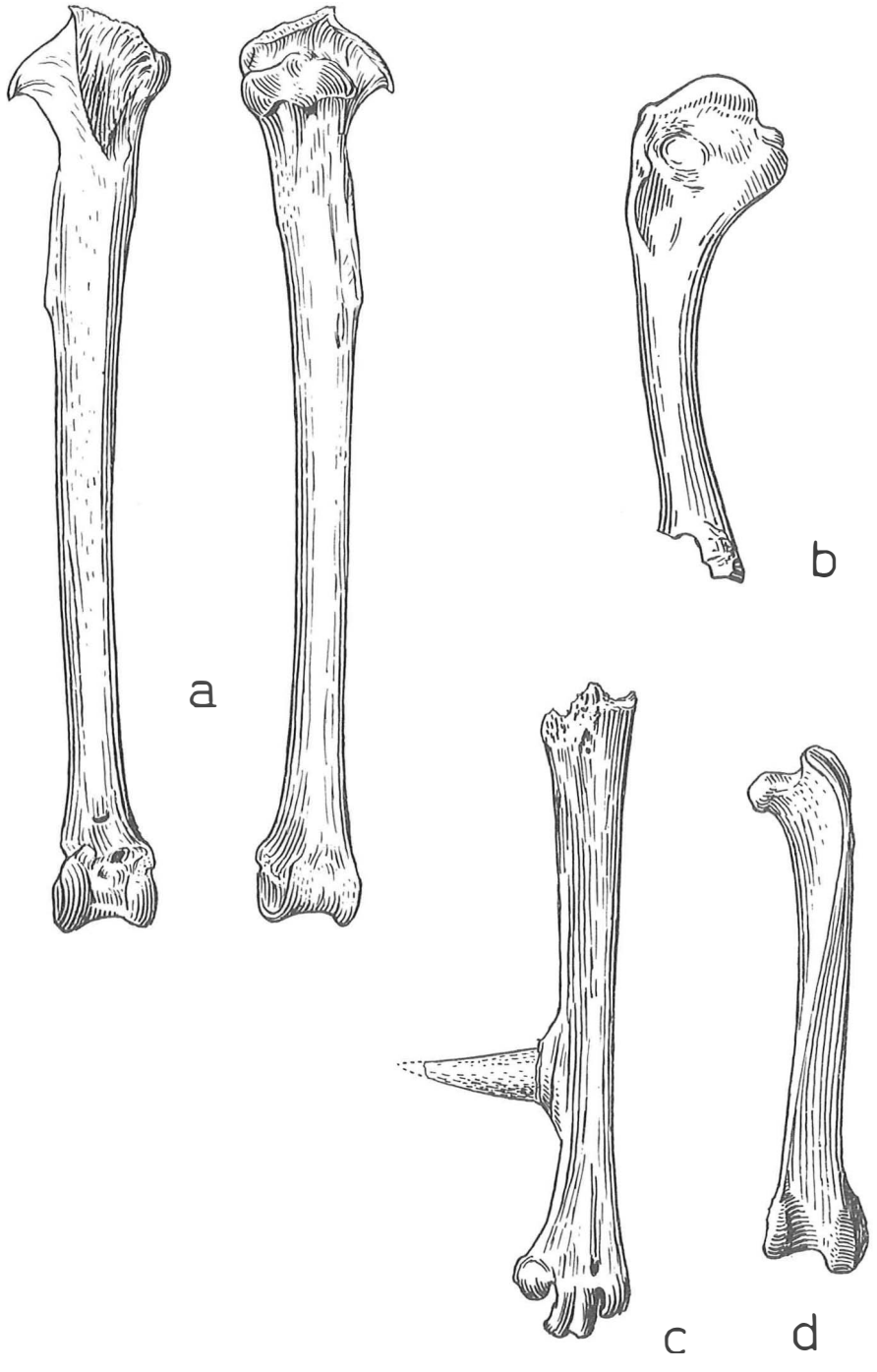


Fig. 85. Gallus gallus – tibio-tarsus: *a*, O/2807; humerus: *b*, V/92; tarso-metatarsus: *c*, V/82; femur: *d*, V/85. 1 : 1

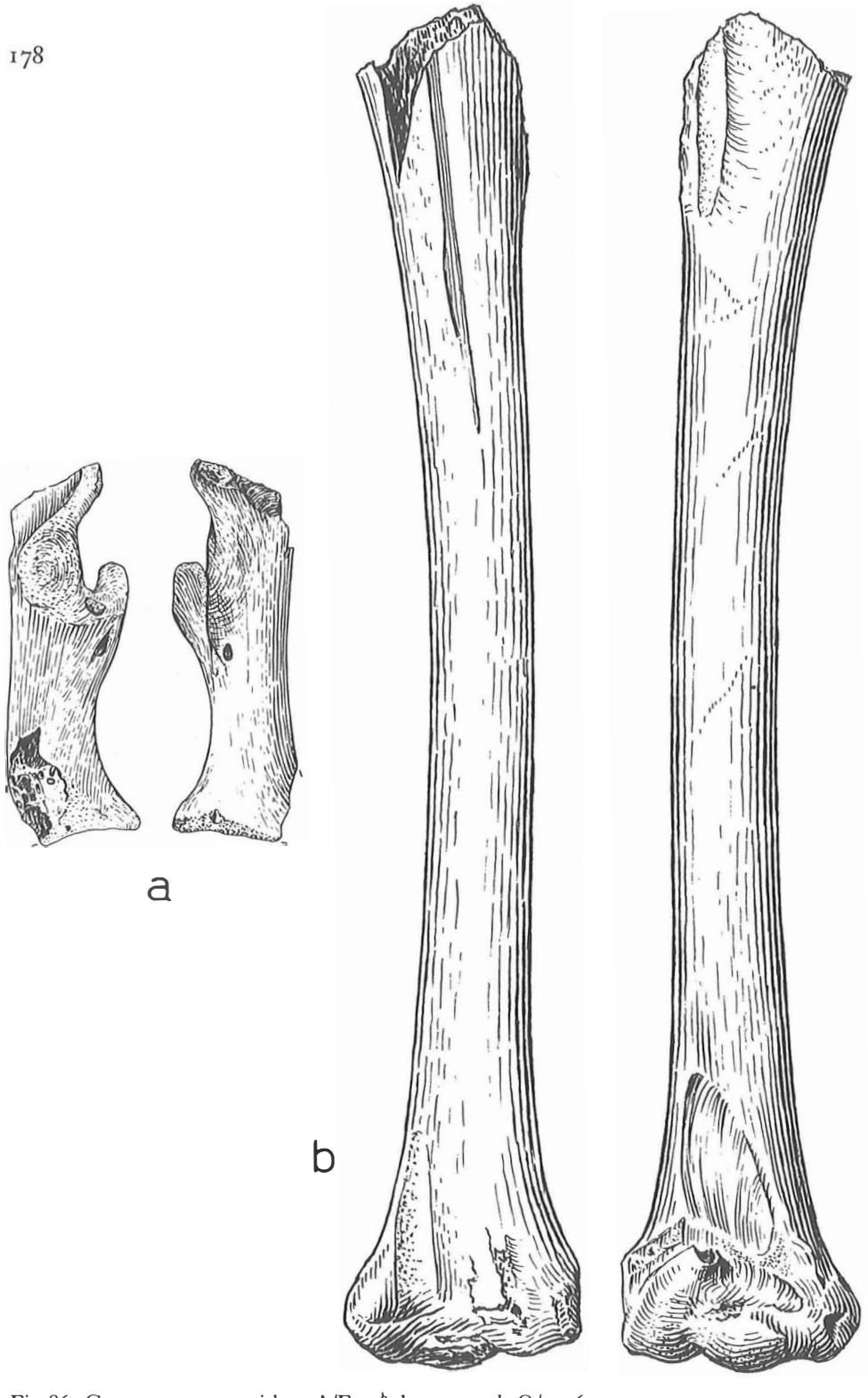


Fig. 86. Grus grus – coracoid: *a*, A/F 19^{b}; humerus: *b*, O/1226. 1 : 1

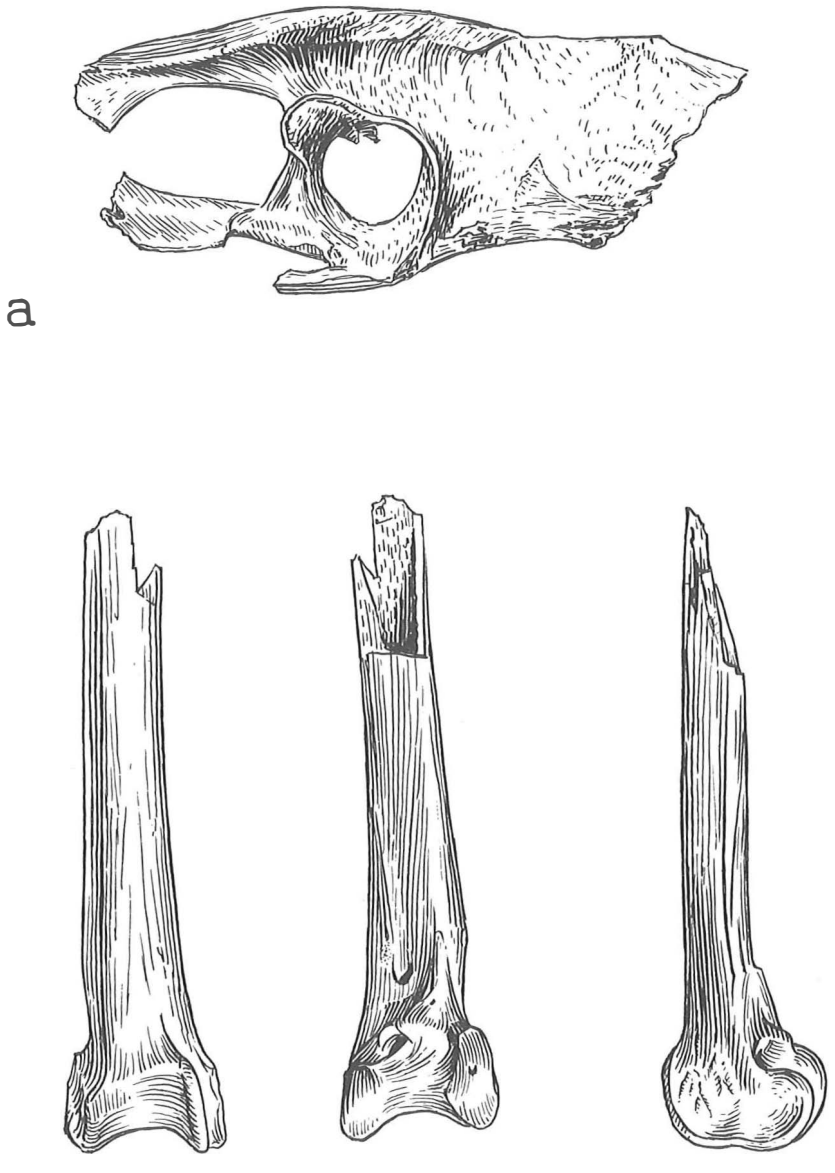


Fig. 87. Grus grus – pelvis: *a*, A/N 8; tibio-tarsus: *b*, O/3999. 1 : 1

Most bones from the Medieval sites are smaller than those from the Roman settlements. Perhaps all belong to hens. This supposition is supported by the fact that the one tarso-metatarsus, which is almost as long as the largest Valkenburg tarso-metatarsus, belongs to a cock.

That the cock was larger than the hen was also found by Schweizer (1961). At Valkenburg three, at Amsterdam eight bones belonged to very young animals.

The ancestry of the domestic fowl must be sought in the Burman wild fowl (Gallus gallus L.) of Further India. About 3000 B.C. the inhabitants of the Indus valley probably knew the domestic fowl already (Zeuner, 1963). From there it spread to Persia, Mesopotamia and Egypt, reaching Greece in 800 B.C. and Italy at a later date.

The oldest remains of domestic fowl from the early La Tène period have been found in the Heuneburg (Schüle, 1960) and Ladenburg (Gandert, 1953) in Southern Germany.

The oldest domestic fowl known in Holland has been found in the area of the Amsterdam Waterworks. The femur found at Eneolithic Vlaardingen is in all probability a later intrusion. Degerbøl (1942) found a bone of a domestic fowl at the Eneolithic site of Kolind, (Denmark), in layer IV, which probably was an intrusion too.

29. Grus grus (L.) (Table 94)

Five bones of the crane were found at the Eneolithic site of Vlaardingen and two in the Roman Castellum at Valkenburg (fig. 86, 87). Zeuner (1963) mentions that the Romans kept tame cranes for their wives' and children's pleasure.

The authors of the Dutch seventeenth century hunting book "Jacht-bedrijf" (quoted by Van Dam, 1953) state "that in the past the crane used to breed in boggy swamps but that at that time they only came from the east during cold weather. The crane was considered excellent food". This may explain why at the Medieval sites no crane bones were found.

Voous (1960) states that in Post-glacial Europe the crane bred in wooded and swampy areas. The bird is being exterminated rapidly, however, as its breeding grounds are disturbed. The crane takes refuge from man.

30. Fulica atra L. (Table 95)

Coot remains have been found at Eneolithic Vlaardingen only (fig. 88*a*). The way the bones are damaged indicates that the birds were eaten.

The hunting book "Jacht-bedrijf" states that coots were not appreciated highly as food (Dam, 1953). This may account for the lack of coot remains at the Medieval sites.

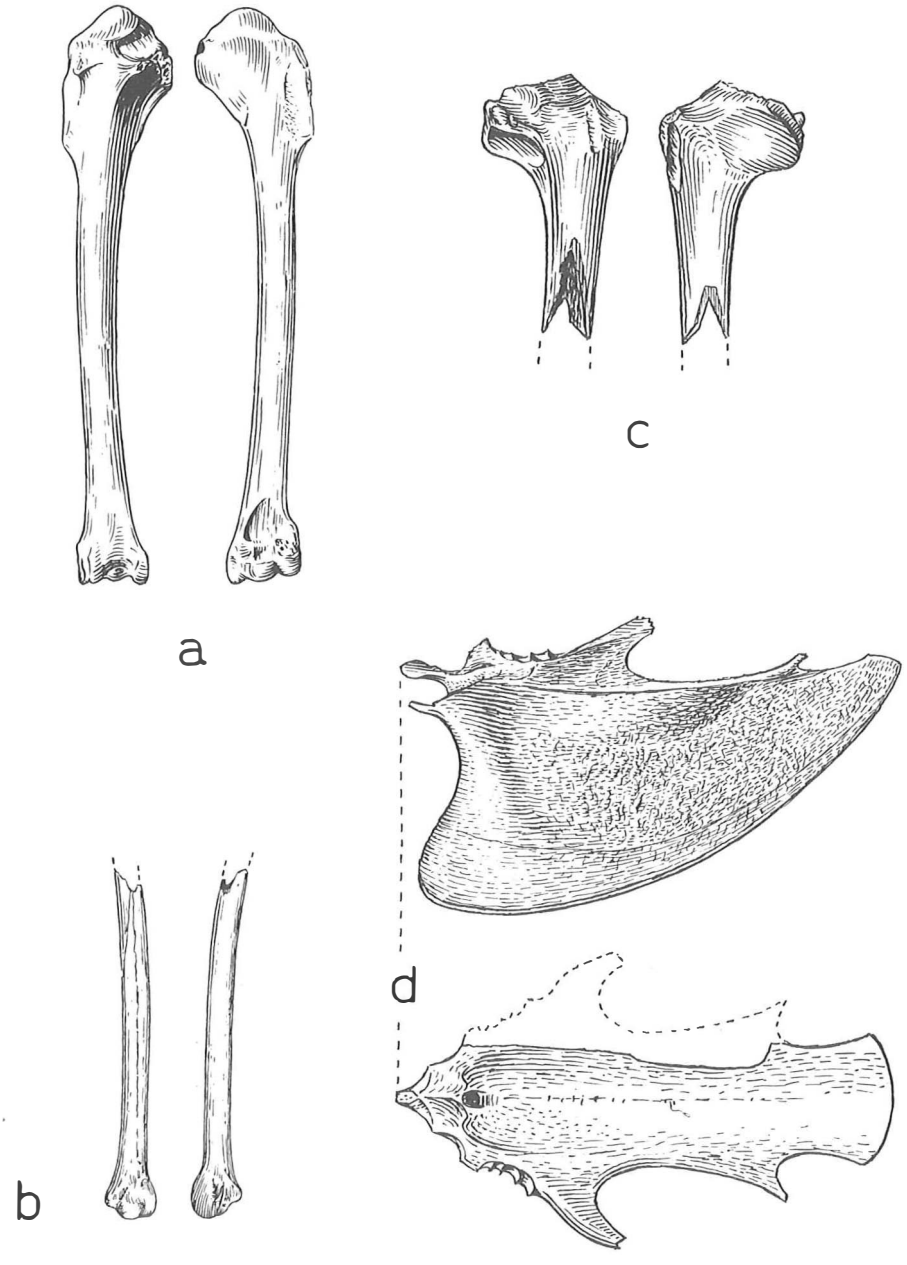


Fig. 88. Fulica atra – humerus: *a*, A/09; ulna: *b*, A/F 15; Columba livia dom. – humerus: *c*, V/434; Columba palumbus – sternum: *d*, V/118. 1 : 1

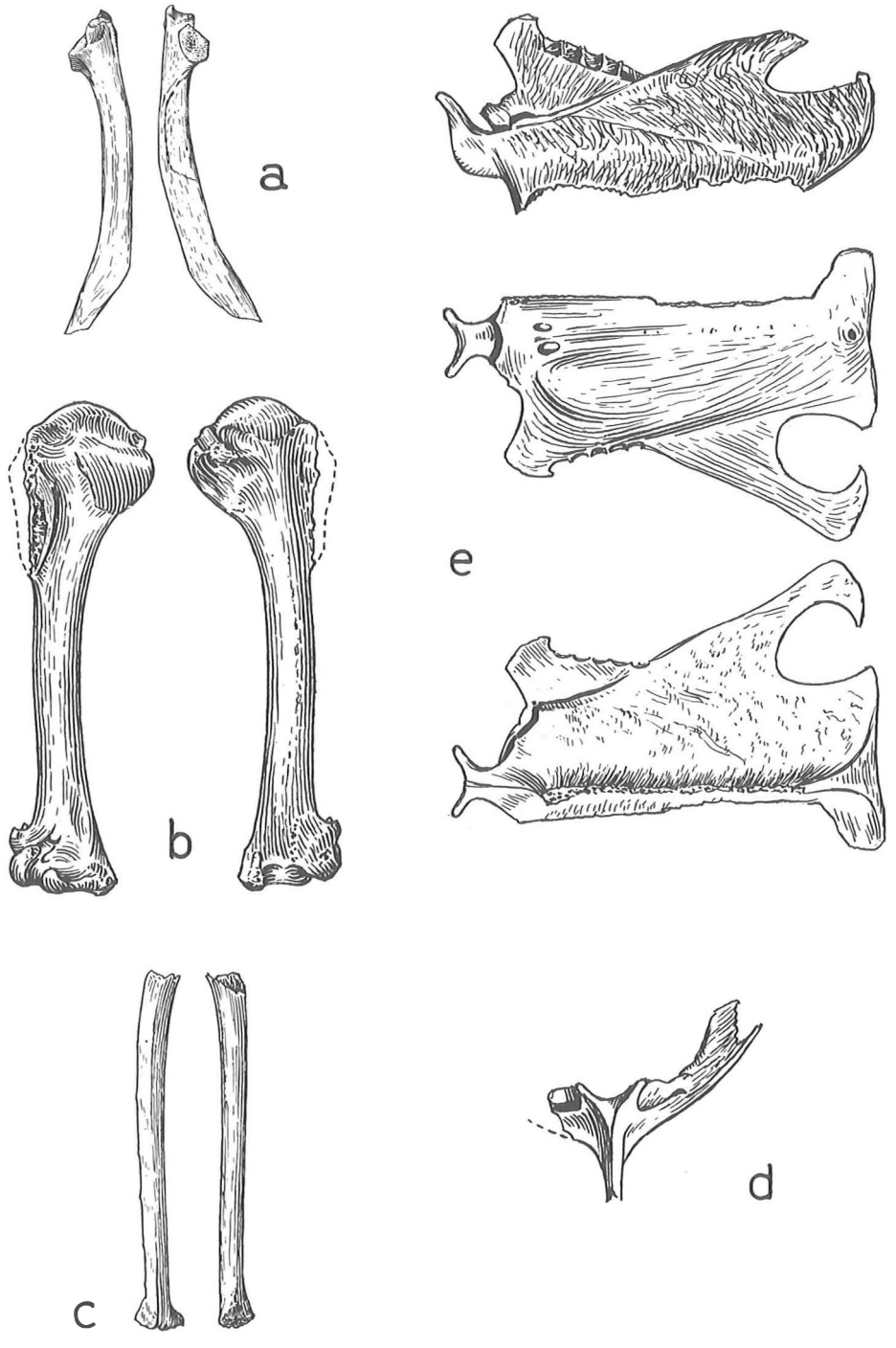


Fig. 89. Corvus cf. corone – scapula: *a*, A/F 18[c]; humerus: *b*, A/G 21[c]; ulna: *c*, A/O 7; sternum: *d*, O/260; *e*, O/2603. 1 : 1

At present the coot is still occasionally eaten in the Netherlands.

The coot is a resident, a winter visitor, and a passage migrant from early August till the middle of April.

31. Columba livia domesticus Gmelin (*Table 96*)

Of the domestic pigeon three bones have been found: two sterna in the Late Medieval castle Huis te Merwede and a humerus in the city of Amsterdam (fig. 88*c*).

The two sterna do not differ from recent sterna. The humerus fragment is larger than those of recent domestic pigeons but smaller than those of wood pigeons. As it has been proved that the domestic pigeon occurred at Huis te Merwede, this humerus possibly belonged to a domestic pigeon too.

32. Columba palumbus (*L.*) (*Table 97*)

Three sternum fragments of the wood pigeon were found in Amsterdam at a site dated to the Late Middle Ages (fig. 88*d*).

At present the wood pigeon is a passage migrant from October till November and from the end of January till May, and a resident that adapted itself to urban life. So the presence of the wood pigeon in Medieval Amsterdam is not surprising.

33. Corvus cf. corone L. (*Table 98*)

Three bones belonging to the carrion crow have been found at the Eneolithic site of Vlaardingen (fig. 89) and one at the Roman Castellum of Valkenburg (fig. 88*d*).

There is a close resemblance between bones of the carrion crow, the hooded crow and the rook. The carrion crow lives in Western Europe, the hooded crow in Eastern Europe and their areas hardly overlap. The rook is a culture follower depending on open fields. If one considers these facts the most likely conclusion is that the bones found at Vlaardingen belong to the carrion crow.

34. Corvus monedula L. (*Table 99*)

A cranium and a pelvis fragment of the jackdaw were found at the Medieval castle Huis te Merwede.

Favourite breeding-places of the jackdaw are chimneys and large buildings.

At present the jackdaw is a resident and a passage migrant from October till November and from the middle of February till May.

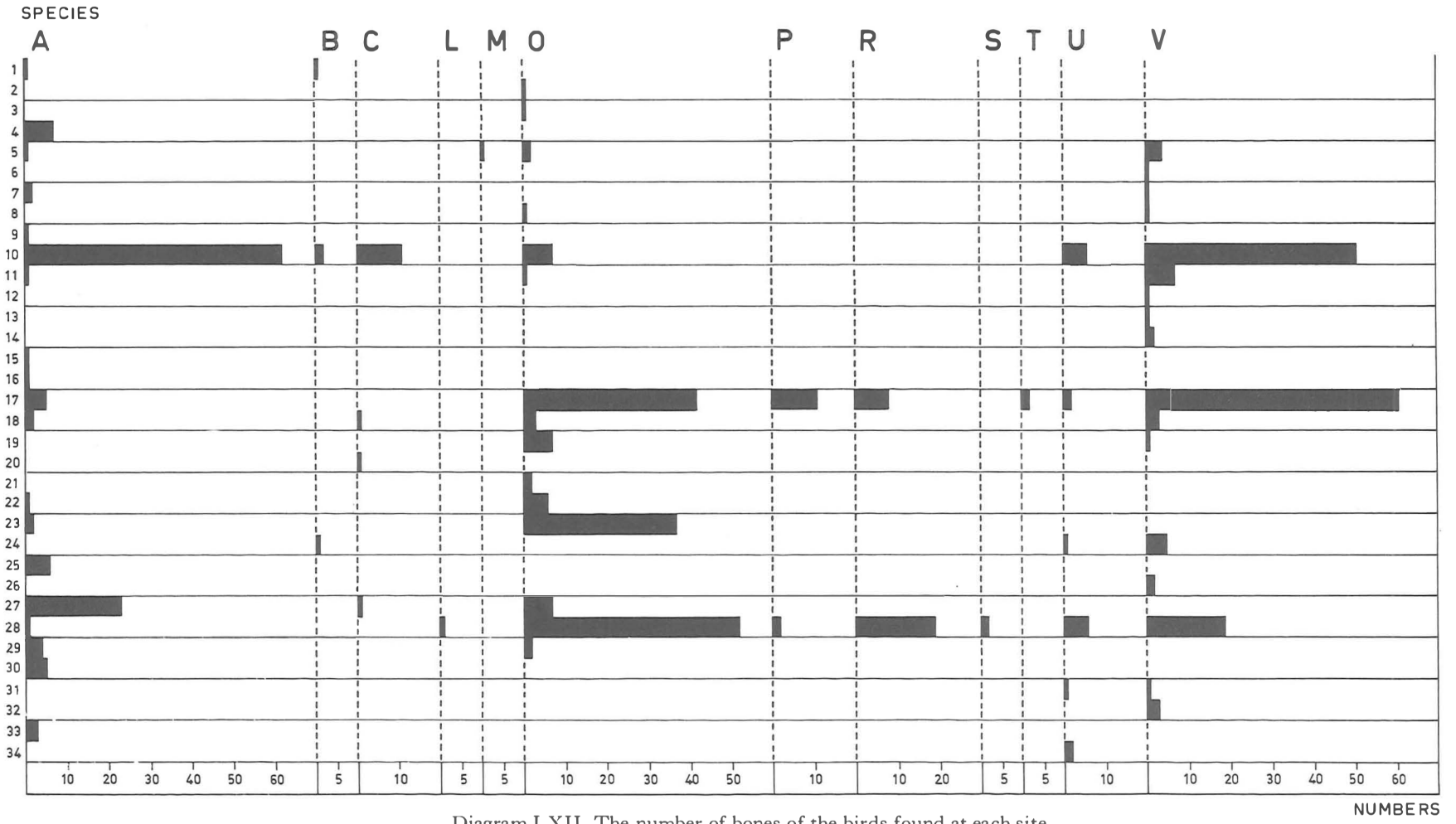


Diagram LXII. The number of bones of the birds found at each site.

C. PISCES

At the sites of Eneolithic Vlaardingen and Zandwerven, of Roman Valkenburg and of Late Medieval Amsterdam numerous fish bones were found. Owing to the lack of a comprehensive collection of skeletons of recent fish it was impossible to identify most of the fish bones. Only the remains of sturgeon and pike could be identified with certainty.

1. Acipenser sturio L.

At the Eneolithic site of Vlaardingen numerous remains of the sturgeon were found. At the sites of Eneolithic Hekelingen and Zandwerven, of Bronze Age Vogelenzang, of pre-Roman Iron Age Vlaardingen, in the Roman Castellum at Valkenburg, at the native settlement of the Roman period at Vlaardingen, and at Early Medieval Rijnsburg a few sturgeon remains were found (Pl. XXII*b*).

The sturgeon is an anadromous fish, ascending the great rivers to spawn.

It is interesting to observe that while at the Eneolithic site of Vlaardingen sturgeon remains were very numerous, at the Vlaardingen sites from the pre-Roman Iron Age and from the Roman period only a few fragments were found. The more so as the sturgeon is known to have been a common fish in the delta of the Maas in historical times still. At the beginning of this century it was still numerous in the Biesbos south of Rotterdam. Owing to the gradual pollution of the rivers and the dredging of the shallow places at the mouth of the great rivers – which are the possible spawning ground of the sturgeon – the sturgeon has become very rare recently (Verhey, 1961).

2. Esox lucius L.

Remains of the pike have been found in small numbers at some sites of all periods.

D. MOLLUSCA

At several sites shells and snail-shells have been found, indicating that molluscs were collected and eaten (Pl. XXII*c*).

1. Mytilus edulis L.

The shells of mussels have been found at the Eneolithic site of Vlaardingen (Bakker, private communication), and at the Eneolithic site of Zandwerven (Van Regteren Altena, private communication). In Amsterdam twelve shells dating from the Middle

Ages were found [1]. These shells were the size of recent mussels for consumption. The mussel is a common mollusc along the coast of the Netherlands.

2. Cardium edule L.

Three shells of the edible cockle have been found at the Late Medieval site in Amsterdam. The cockle is excellent eating and common along the coast.

3. Ostrea edulis L.

At the Roman Castellum at Valkenburg 202 shells of the oyster have been found. The Romans were very fond of oysters. At an early date they made oysterbanks. They succeeded in keeping oysters fresh, probably in sea water containers, and transported them all over their Empire (Hintze, 1934).

4. Spisula subtruncata (Da Costa)

Of the cut through-shell two shells have been found at the Late Medieval site in Amsterdam. The cut through shell is edible and at present common along the coast.

5. Buccinum undatum L.

Of the whelk 42 snail-shells have been found at the Roman Castellum at Valkenburg. The whelk is edible and at present common along the coast.

6. Littorina littorea (L.)

Of the common periwinkle one snail-shell has been found at the Late Medieval site in Amsterdam. The animal is an excellent food and at present common along the coast.

7. Unio pictorum (L.)

Two shells of the painters' unio dating from the Middle Ages have been found in Amsterdam.

1. The author is indepted to Mr. S. van der Spoel of the "Zoologisch Museum" at Amsterdam, who kindly identified the molluscs found at Amsterdam.

8. Unio sp.

Five shells of the unio have been found at the Roman Castellum at Valkenburg.

9. Succinea cf. elegans Risso

One shell of the amber snail has been found at the Late Medieval site in Amsterdam. The amber snail is to be found in brackish as well as in fresh water.

E. CEPHALOPODA

Sepia officinalis L.

At the Roman Castellum at Valkenburg the internal skeleton of the cuttle-fish was found (Pl. XXII*e*).

That the Romans liked ink-fish as they do nowadays is known (Hintze, 1934). At the "terp" Wieremerschouw in the province of Groningen Van Giffen (1913) found another fragment of this animal.

CHAPTER IV

THE SPREAD AND CONSOLIDATION OF STOCK-BREEDING IN NEOLITHIC AND ENEOLITHIC EUROPE

When the coastal area of the Netherlands was inhabited for the first time in the late Eneolithic stock-breeding was nothing new in Europe. Next to agriculture it had been known for at least 3000 years in Southern and Central Europe, and there are indications that in the Near East stock-breeding reaches back another 3000 years. Reed (1961) discussed the real and fictitious evidence about domestication and keeping domesticated animals in the Near East. He came to the conclusion that the oldest known domestic cattle have been found at the Halafian site of Banahill and the Diyana plain in Northern Iraq, dating from some 7000 years ago. For sheep the bones found at the cave of Shanidar and at the village of Zawi Chemi were of importance. It was demonstrated by Perkins that about 11 000 years ago the people of Zawi Chemi had domestic sheep or that they domesticated sheep. Domestic goats were found in Jericho and Jarmo, at the latter site from the oldest stratum (6500 B.C.) upward. The oldest pigs are known from the upper, or ceramic-bearing, levels of the village-farming community of Jarmo. Indications for the occurrence of the domestic dog are altogether doubtful and Reed comes to the conclusion that no real evidence for the existence of the domesticated dog is known at present, the very dog-like figures with curled tail found at Jarmo excluded.

Together it is a meagre picture thus obtained about the real knowledge of early domestication of domestic animals in the Near East. Much work still has to be done by systematical collecting of bones at excavations, studying them as a whole and publishing all the facts so that it is possible for others to get a clear picture of the material and the results.

If one considers the situation in Europe it is surprising to see that from the earliest Neolithic[1] settlements on record going back to the pre-ceramic phase not only the

1. The nomenclature for the successive periods as used by Neustupný (E. & J., 1961) for Czechoslovakia has been followed mainly. As, however, the oldest Neolithic cultures (Proto-Sesklo, Starčevo, Körös, etc.) found in the Balkans have not been discovered in Czechoslovakia until now, these authors divided the Neolithic in Early Neolithic (Bandkeramik) and Late Neolithic (Stichbandkeramik, Lužianky, Lengyel). These phases will be called Middle and Late Neolithic, while Early Neolithic I shall call the oldest Neolithic cultures found South of Czechoslovakia in the Balkans. In this way it is possible to use one nomenclature for the whole of Europe.

five most important domesticated animals (cattle, sheep/goat, pig and dog) were known but that the wild animals were of minor importance (Table 49, diagram LXXIII).

The succession of the different cultures the stock-breeding of which will be discussed in the following pages is well known. At present C 14 measurements enable us to know the exact dates of their appearance. For a better understanding they will be surveyed briefly on hand of some C 14 measurements of sites of the different periods. The Early Neolithic period ranges from the end of the seventh millenium till 4400 B.C.

Argissa, Early Ceramic[5]	GrN–4145	7500±90	5550 B.C.
Nea Nikomedeia, Proto Sesklo[1]	Q 655	8180±150,	6230 B.C.
Gualarit, Körös culture[2]	Bln–75	7090±100,	5140 B.C.
Hódmezövásárhely-Kotacpart, Körös culture[2]	Bln–115	6450±100,	4500 B.C.
Katalzeg, Körös culture[2]	Bln–86	6370±100,	4420 B.C.

The Middle Neolithic ranges from ± 4400 B.C.– ± 4000 B.C.

Zalavár, Bandkeramik culture[2]	Bln–86	6180±100,	4230 B.C.
Mohelnice, Bandkeramik culture[2]	Bln–102	6285±100,	4335 B.C.
	Bln–102[a]	6405±100,	4455 B.C.
Elsloo, Bandkeramik culture[4]	GrN–2164	6270±85,	4320 B.C.
Korlát, Bükk culture[2]	Bln–119	6440±100,	4490 B.C.

The Late Neolithic ranges from ± 4000 B.C.– ± 3500 B.C.

Tiszapolgar-Czöshalom, Herpály culture[4]	GrN–1993	5854±60,	3895 B.C.
Hienheim, Stichbandkeramik[5]	GrN–4832	5780±85,	3830 B.C.
Hamangia, Hamangia culture[4]	GrN–1986	5880±70,	3930 B.C.

The Eneolithic starts ± 3500 B.C.

Gumelnita, Gumelnita A2 culture[4]	GrN–3028	5400±90,	3450 B.C.
	GrN–3025	5715±70,	3765 B.C.
Vărăsti, Boian B[4]	GrN–1987	5360±70,	3410 B.C.
Hăbăsesti, Cucuteni A[4]	GrN–1985	5330±80,	3380 B.C.
Valea Lupului, Cucuteni B[4]	GrN–1982	4950±60,	3000 B.C.
Seeberg Burgaschisee-Süd, Cortaillod[3]	B–119*a*	4750±100,	2800 B.C.

The Eneolithic ends with the onset of the Bronze Age around 2500–1500 B.C.

1. (Godwin & Willis, 1962).
2. (Kohl & Quitta, 1964).
3. (Oeschger, Schwarz & Gfeller, 1959).
4. (Vogel & Waterbolk, 1963).
5. (Vogel & Waterbolk, 1967).

The first farmers in Europe who settled on the plains of Thessaly and Macedonia came from the Near East as is shown by the close affinity of their culture with slightly older cultures found in Turkey (Rodden, 1961) and the fact that they were familiar with stock-breeding.

Boessneck (1960/1961) studied the bones collected by Milojčić during his excavations in Thessaly (Argissa- and Otzaki-Magula near Larissa). He found that already in the lowest layers of the Otzaki-Magula site, belonging to the Proto-Sesklo culture, domesticated specimen of cattle, sheep, goat and pig occurred while at the same time only a few remains of wild animals were found. Also in the following periods the domesticated animals remained the most important at Otzaki-Magula. At the nearby site of Argissa-Magula pre-pottery Neolithic layers yielded bones of domesticated animals mainly (Boessneck, 1960, 1961). The same situation was found by Higgs (1962) in Macedonia (Nea Nikomedeia).

In Roumania a number of publications on Early Neolithic bone finds has been issued during the last few years. The oldest known animal bones were found in the neighbourhood of Cluj (Gara Baciului) at a settlement of the Starčevo-Cris culture (Necrasov, 1961) and at the settlements of the Starčevo-Criș culture at Lețul Vechi, Valea Lupului, Glăvănești Vechi and Pogorești (Necrasov, 1964). At these sites (with the exception of-Valea Lupului) the remains of domestic animals outnumber those of wild animals by far and hunting could have been only of minor importance for the meat supply. The bones from a Bandkeramik settlement present a slightly different picture as wild animals reach a percentage of 34% (Necrasov and Haimovici, 1962[b]). This high percentage may be due to the fact that a layer of the much later Cucuteni AB culture with a high percentage of wild animals covered the Bandkeramik layer and the possibility of mixing of the bone material from those two layers cannot altogether be excluded.

The Eneolithic sites of the Boian, Gumelnița, and Hamangia cultures (Necrasov & Haimovici, 1959, 1962[b], 1966) show a low percentage of wild animals; while at the same period the sites of the Pre-Cucuteni and Cucutini cultures show a higher percentage of wild animals; at Trușești the remains of wild animals even outnumbered those of the domesticated animals (44.7%) (Haimovici, 1960, Necrasov & Haimovici, 1962).

Data about the animal remains from Neolithic and Eneolithic settlements in Hungary were published by Bökönyi (1958, 1959, 1961[b], 1962, 1964). A few bones found at a Körös settlement belonged to domestic cattle, dog and some wild animals. At a second site of the Körös culture however the remains were more numerous and the domesticated animals outnumbered the wild ones by far. More material is available from three settlements which yielded remains from the Bükk and Bandkeramik culture and of two sites where material from the earlier Körös, Bükk and Bandkeramik culture is found together with material of the later Theiss culture. The relatively high percentages of wild animals found at the sites of Lebö and Szegvá'r

may have been effected by Theiss culture elements. The Theiss culture is related to the Herpály culture, which shows a very high percentage of wild animals. The three sites of Folias Szilmeg, Gjör-Pápai Vám and Pomáz-zdzavlyál where only the Bükk and the Bandkeramik culture were found show the low percentages of wild animals, which have been found in Bandkeramik settlements of Roumania, Bohemia and Central Germany.

In the Late Neolithic period the settlements of the Herpály culture show very high percentages of wild animals; of the three sites of the Lengyel culture, Zengörvárkonyi had a percentage of 34% of wild animals while at Pécsvárad-Aranyhegy and Villanykövesd 26.9% and 11% was found. The Eneolithic site of Tarnabod showed 18.7% wild animals, but Derecske showed a percentage of 10%.

In Bohemia the animal remains found at the settlement of the Bandkeramik culture near Bylany (Clason i.m.) and those found in Slovakia at two sites of the Lužianky culture (related to the Stichbandkeramik culture) (Ambros, 1961) show that domesticated animals predominate, as is also the case in the settlement of Makotřašy (Clason i.m.) belonging to the TRB culture. In the Bandkeramik settlements[1] of Central and West Germany (Müller, 1964; Stampfli, 1965) and the Eneolithic settlements of Weissenfels in Central Germany and Fuchsberg-Südensee in Schleswig-Holstein (Nobis, 1955[a], 1962), belonging to the TRB culture, wild animals are of little or no importance. On the Russian plains, in Switzerland, in Northern Europe and in England, regions the Bandkermik farmers did not reach, farming begins at a later date than in Southern Europe but still considerably earlier than in the provinces of North and South Holland.

From Russia animal remains are known from the successive Eneolithic settlements of the Tripolje culture (Hančar, 1956) of which the data available suggest that the earlier settlements have a high percentage of wild animals while the later show a decreasing number of wild animal bones.

In Denmark at sites of the Ertebølle culture (Degerbøl, 1942) only domestic cattle and dog were found, at the settlements of the TRB culture, Bundsø and Kolind (Degerbøl, 1939, 1942), also pigs and sheep/goat were found. According to Nobis (1955[a]) at Bundsø wild animals formed only 2% of all bones.

1. The relatively high percentage (28.8) of wild animals Stampfli found for the Bandkeramik settlement of Müddersheim in West Germany is explained by the fact that this author uses lower limit values for attributing bones to the aurochs then other authors. If compared, however, with the measurements Müller found for the aurochs in Central Germany most of the bones attributed to the aurochs are from domesticated cattle. The percentage of the wild animals could have been then 11.4, a value which falls in the limits found by Müller.

Data about the animal remains found at Late Neolithic and Eneolithic settlements in Switzerland and the adjoining Liechtenstein were published by Hartmann-Frick (1960, 1965); Josien (1956); Boessneck, Jéquier and Stampfli (1963). At the settlements of the Rössen and Michelsberg cultures in Liechtenstein, and at the settlements of the Pfyn culture in Switzerland (Clason i.p.) wild animals are of small importance, while at the Eneolithic settlements of the Pfyn culture at Pfyn and the Cortaillod culture at Seeberg Burgäschisee-Süd and Süd-West in Switzerland, the remains of hunted animals outnumber those of domesticated animals.

In England animal remains from two Eneolithic sites are known. At Windmill Hill (Joppe & Grigson, 1965) bones of domesticated animals outnumber those of wild animals; the same is found at the settlement of Durrington Walls (Stone, Piggott & Booth, 1954) of the Rinyo-Clacton culture.

Although from France little or no data about animal remains from Neolithic and Eneolithic sites are known, Bailloud (1964) gives some information about stock-breeding and hunting in the Basin of Paris. He states that from the late Bandkeramik sites, cattle, sheep, goat and pig are known while remains of wild animals were unimportant; remains of the dog were not found. In the sites of the Eneolithic Chasséen culture domesticated animals were much more important than wild animals. The domesticated animals were mostly cattle, but goat, sheep, pig and dog were also found. The wild animals were red deer, roe deer, aurochs, wild boar and beaver; there were also some indications for fishing. In the Late Eneolithic sites of the Seine-Oise-Marne culture, however, remains of wild animals outnumber those of domesticated animals. At the only site where the animal remains were more thoroughly investigated (Poulain-Josien, 1958) 70% of the bones belonged to wild animals. Of the domesticated animals, remains of cattle, sheep, pig and dog were found; of the wild animals, red deer, roe deer, aurochs wild boar, wild horse and brown bear. The actual numbers of bones were not mentioned.

The foregoing survey shows that in the Late Neolithic and Eneolithic period for the first time a differentiation can be observed in the part hunting plays in the economy of the different settlements. Whereas in the Early and Middle Neolithic period hunting is not very important, in the Late Neolithic and Eneolithic period groups of farmers turn to hunting for their meat supply, while at the same time other groups in the same region, even belonging to the same culture, go on being traditional stock-breeders. This for instance can be seen in Hungary for the Lengyel settlements and in Switzerland by the two settlements of the Pfyn culture (Pfyn and Niederwil) and those of the Cortaillod culture (Seeberg Burgäschisee-Süd and Süd-West).

After the discussion of the role hunting played in the economy of Neolithic and Eneolithic people the composition of domesticated animals will be surveyed briefly (diagram LXIV–LXXI). I have calculated the percentages of the domesticated species separately, omitting the wild species; in this way the composition of the domes-

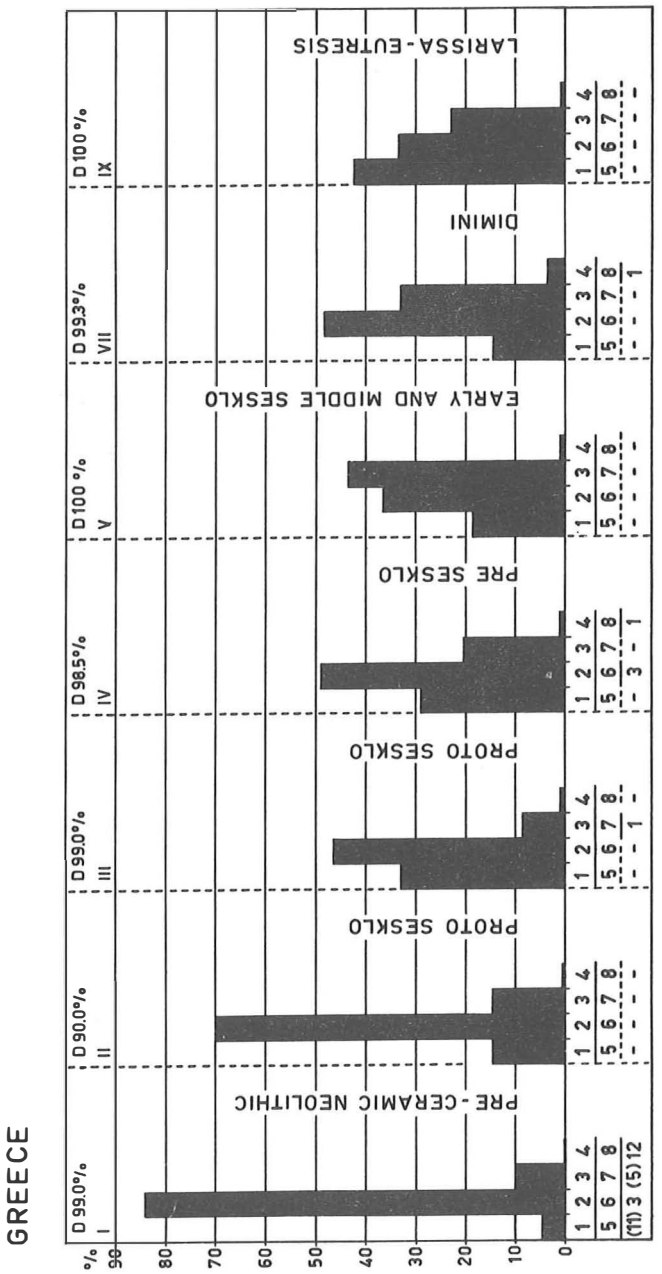


Diagram LXIV. The percentages of the five most important domesticated animals (cattle, sheep, goat, pig and dog) when the sum of the bones has been put at 100, and the percentages of aurochs, red deer, wild boar and other species when their sum has been put at 100, in Greece.

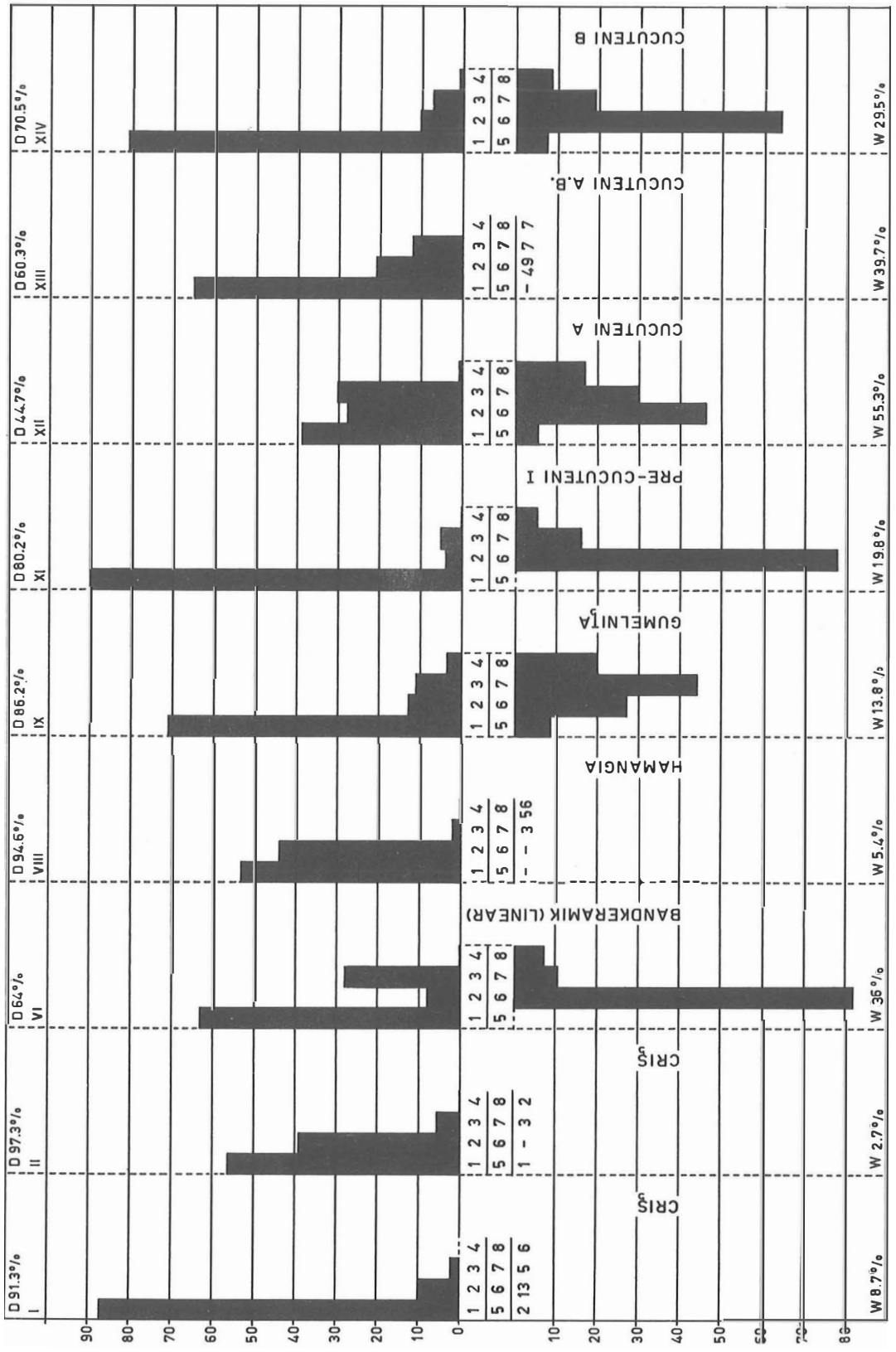


Diagram LXV. The percentages of the five most important domesticated animals (cattle, sheep, goat, pig and dog) when the sum of the bones has been put at 100, and the percentages of aurochs, red deer, wild boar and other species when their sum has been put at 100, in Roumania.

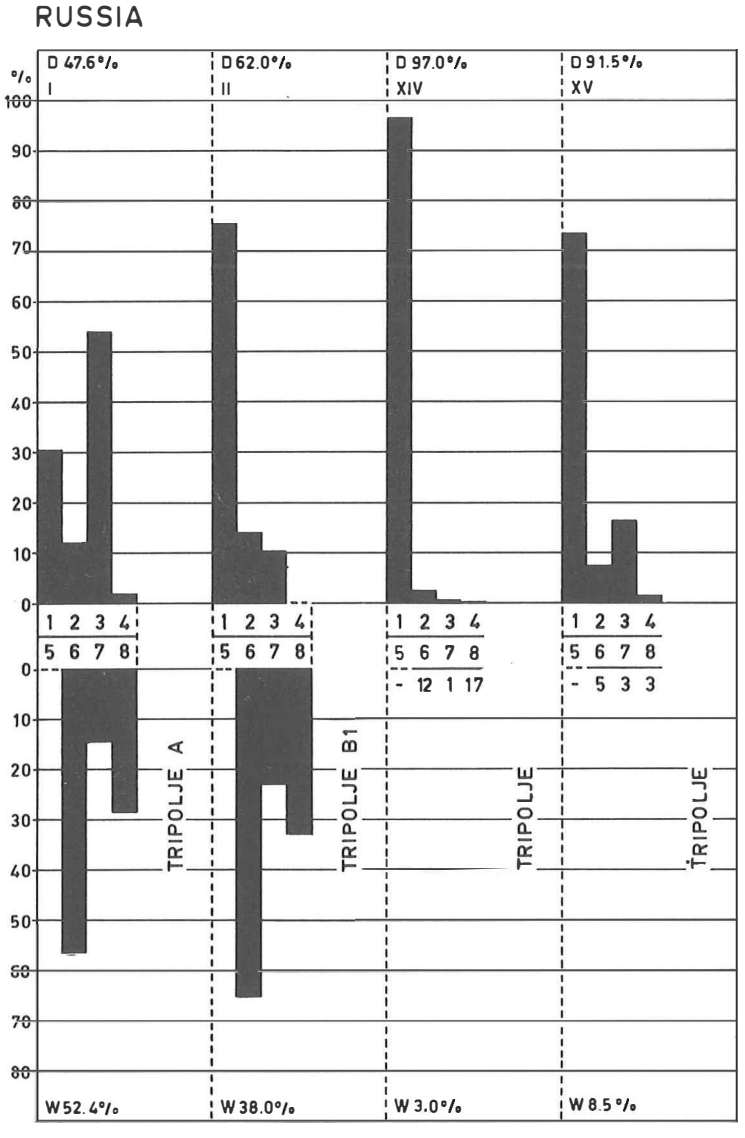


Diagram LXVI. The percentages of the five most important domesticated animals (cattle, sheep, goat, pig and dog) when the sum of the bones has been put at 100, and the percentages of aurochs, red deer, wild boar and other species when their sum has been put at 100, in Russia.

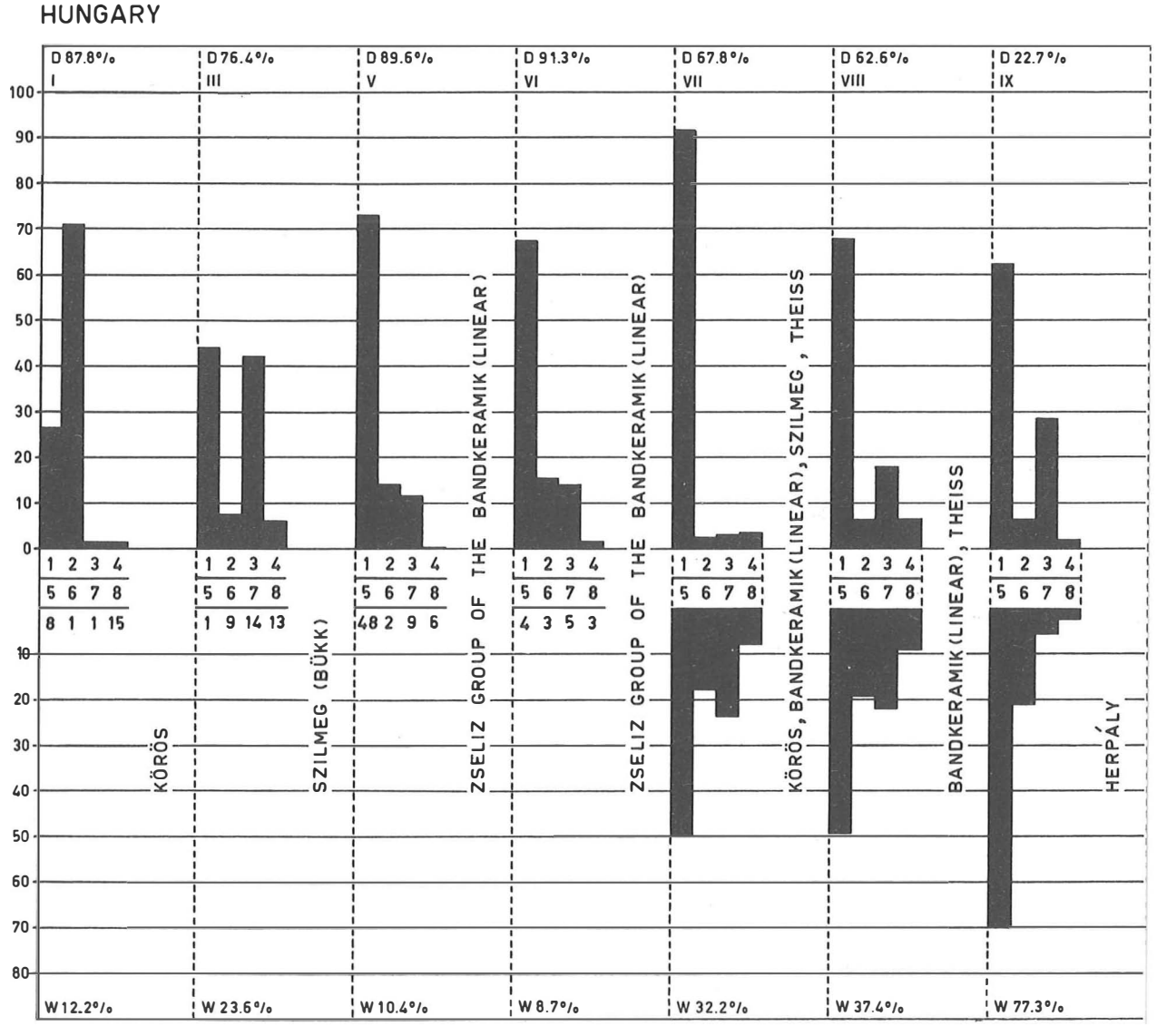
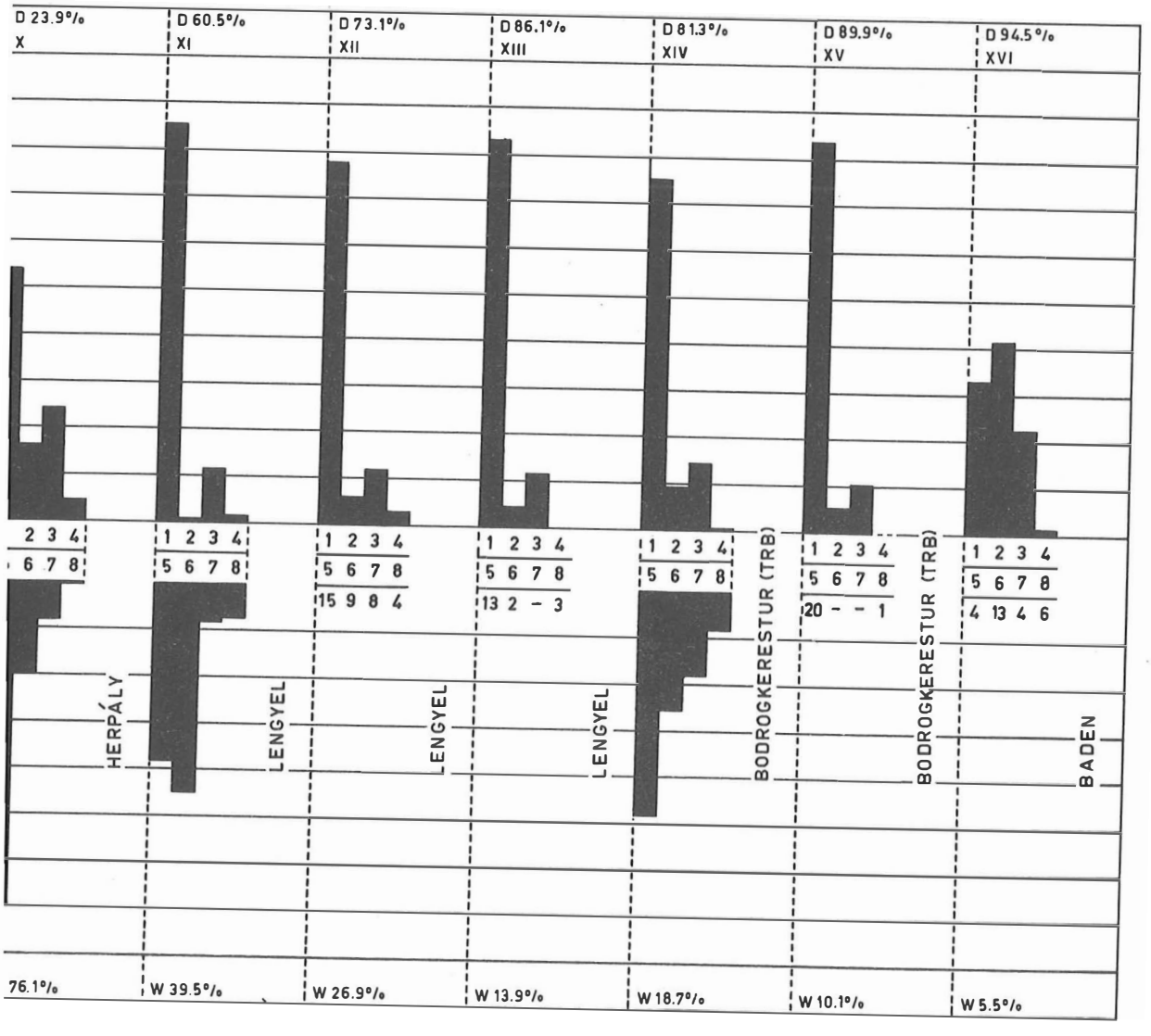
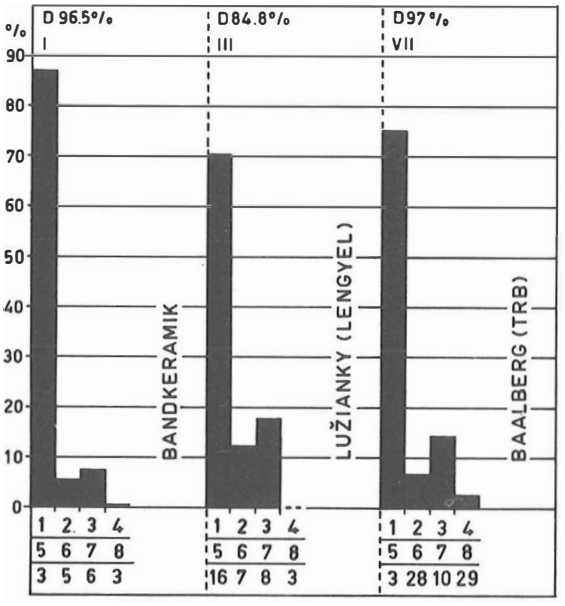


Diagram LXVII. The percentages of the five most important domesticated animals (cattle, sheep, goat, pig and dog) when the sum of the bones has been put at 100, and the percentages of aurochs, red deer, wild boar and other species when their sum has been put at 100, in Hungary.


D 23.9%
X
D 60.5%
XI
D 73.1%
XII
D 86.1%
XIII
D 81.3%
XIV
D 89.9%
XV
D 94.5%
XVI
2 3 4
6 7 8
1 2 3 4
5 6 7 8
1 2 3 4
5 6 7 8
15 9 8 4
1 2 3 4
5 6 7 8
13 2 - 3
1 2 3 4
5 6 7 8
1 2 3 4
5 6 7 8
20 - - 1
1 2 3 4
5 6 7 8
4 13 4 6
HERPÁLY
LENGYEL
LENGYEL
LENGYEL
BODROGKERESTUR (TRB)
BODROGKERESTUR (TRB)
BADEN
76.1%
W 39.5%
W 26.9%
W 13.9%
W 18.7%
W 10.1%
W 5.5%

LXVII

BOHEMIA & SLOVAKIA



LIECHTENSTEIN

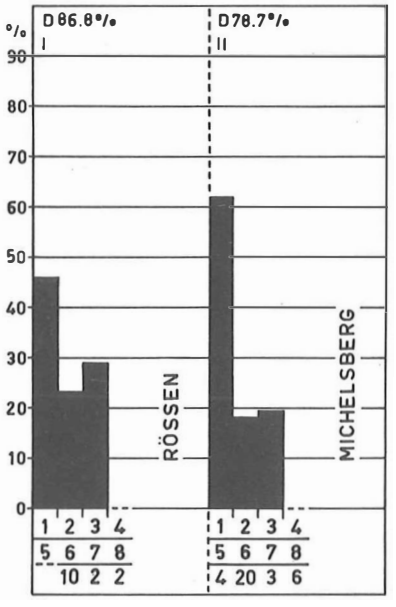


Diagram LXVIII.

The percentages of the five most important domesticated animals (cattle, sheep, goat, pig and dog) when the sum of the bones has been put at 100, and the percentages of aurochs, red deer, wild boar and other species when their sum has been put at 100, in Bohemia, Slovakia and Liechtenstein.

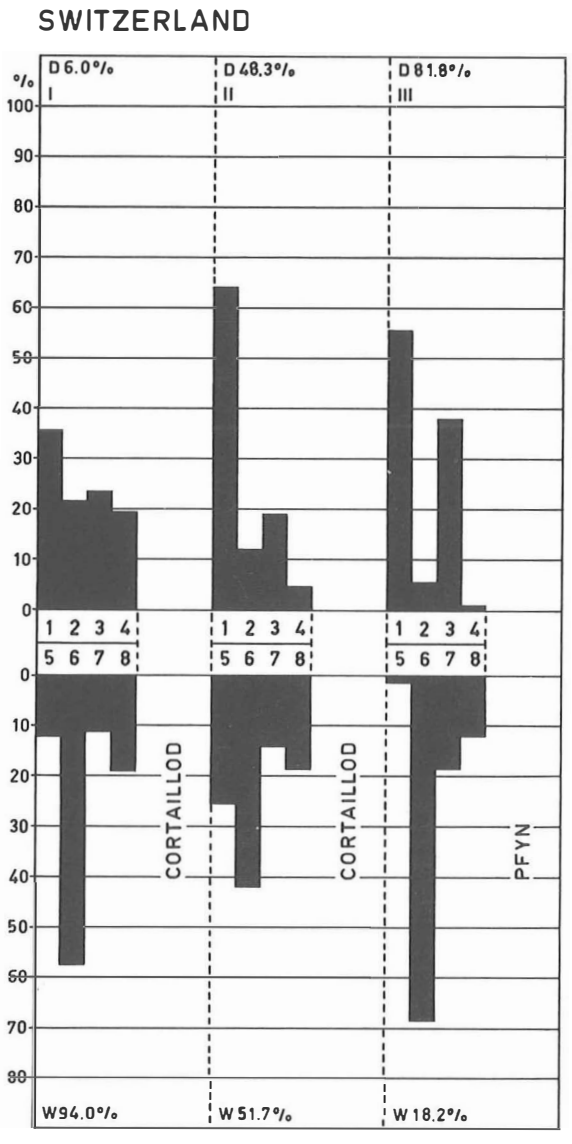
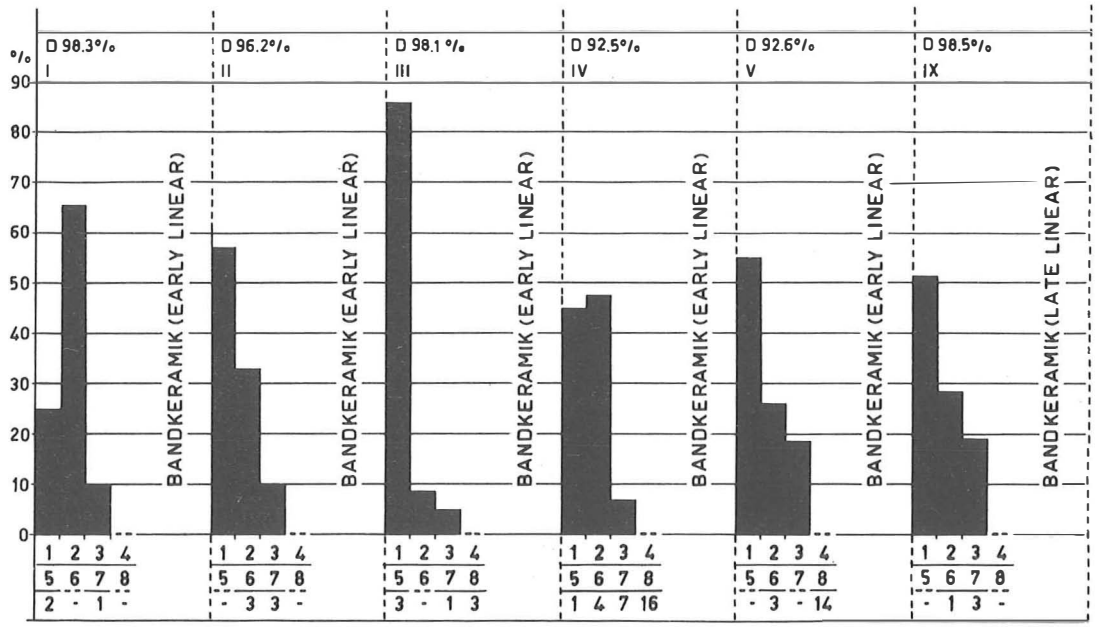


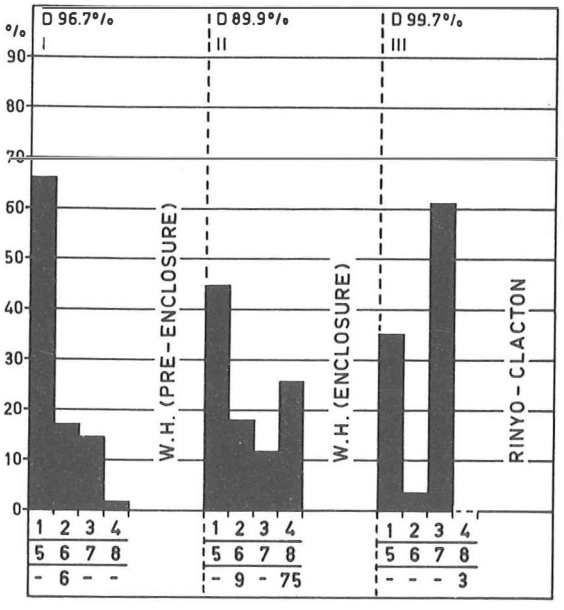
Diagram LXIX.

The percentages of the five most important domesticated animals (cattle, sheep, goat, pig and dog) when the sum of the bones has been put at 100, and the percentages of aurochs, red deer, wild boar and other species when their sum has been put at 100, in Switzerland.

CENTRAL GERMANY



ENGLAND



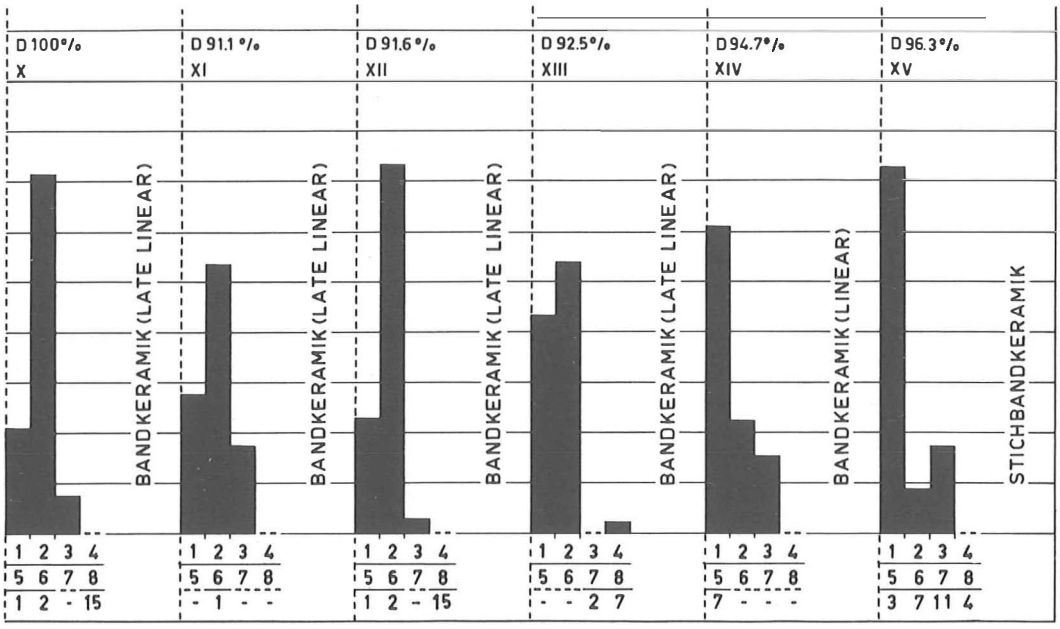


Diagram LXX. The percentages of the five most important domesticated animals (cattle, sheep, goat, pig and dog) when the sum of the bones has been put at 100, and the percentages of aurochs, red deer, wild boar and other species when their sum has been put at 100, in Central Germany.

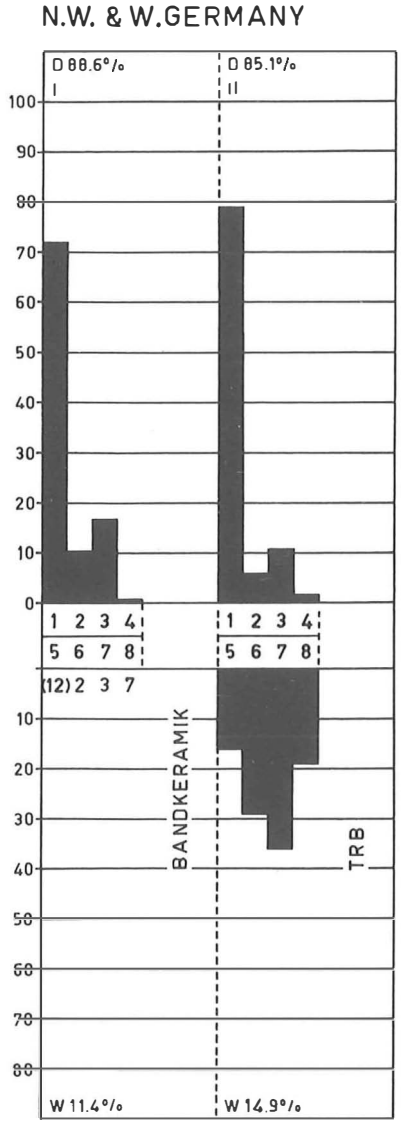


Diagram LXXI. The percentages of the five most important domesticated animals (cattle, sheep, goat, pig and dog) when the sum of the bones has been put at 100, and the percentages of aurochs, red deer, wild boar and other species when their sum has been put at 100, in N.W. Germany and England.

ticated animals of the settlements can be compared with each other independently of the degree the farmers depend on hunting for their meat supply. Most investigators just calculate the percentages of all the mammals together, sometimes even including birds, which gives an untrue picture.

When the percentages of the domesticated and the wild animals are considered several things can be observed. In Greece the small ruminants often played a very important role; the same is found for a number of the Bandkeramik settlements in Central Germany. A tall the other sites the cattle are the most important domesticated animals; in some cases the pig is the second in importance, in other the small ruminants. The aurochs was very important as game, only in Hungary, while in all other countries the red deer was most important. The very high percentage of aurochs remains found at the sites of the Herpály culture has influenced the percentages of domestic cattle slaughtered, which are somewhat lower then in the other Hungarian sites. The picture given by the percentages of wild and domestic animals of these two sites is very much the same. The horse, cat and rabbit were not yet known as is the case with the domesticated birds. To explain all the differences between the various settlements is impossible at the moment; much more should be known about the environments of every site. It is also impossible to find a pattern relating to the predominance of wild animals over domestic ones at present. The predominance of stock-breeding in the Early and Middle Neolithic is contrary to the opinion, until now vaguely stated, that farmers, alongside raising crops, only gradually took to stock-breeding, having in earlier periods only relied on hunting for their meat supply. Neither the idea of Nobis (1955) that the geographical position of a settlement, nor the idea of Bökönyi (1958) that the cultural affinities of the inhabitants of a settlement, determine the composition of the domesticated animals proves always true. Nor can the existence of secondary Neolithic cultures as postulated by Piggott (1954) explain the difference between the two groups in the Late Neolithic and Eneolithic period; the site of Durrington Walls in England, that should be secondary Neolithic, showed predominantly domesticated animals, whereas the sites of the Herpály culture in Hungary, which cannot be described as secondary Neolithic, show a high percentage of hunted animals.

CHAPTER V

CHRONOLOGICAL AND ECOLOGICAL SURVEY OF THE FAUNAL ASSEMBLAGES

The first traces of habitation, dated to about 2400 B.C., were found by Modderman (1956) and Glasbergen (1961). From the foregoing Chapter it will be clear that at this date farming and stock-breeding were firmly established in Europe, and it is impossible to expect the inhabitants of this backward coastal region to have made any spectacular contribution to domestication. Only in historical times did they become the well known cattle-breeders they are at present.

In the southern part of this area, in the delta of the great rivers, Eneolithic people lived on the narrow, slightly raised banks of the creeks (Vlaardingen and Hekelingen). In the north they occupied a coastal barrier surrounded by tidal flats (Zandwerven). The people living at the former sites were hunters who practised additional stock-breeding. The people from Zandwerven were mainly stock-breeders (Chapter III, A, B, C).

Glasbergen (1961) ascribed all these sites to the Vlaardingen culture. According to Glasbergen this culture is a secondary Neolithic culture. However, Mesolithic hunters living on the narrow banks along creeks in the midst of extensive bogs might keep pigs and dogs, but no domestic cattle and small ruminants (the lack of any bones of the aurochs shows that the surroundings were not suitable for the larger Bovidae). At the same time people at Zandwerven belonging to the same culture were stock-breeders. So it is more likely that late Eneolithic farmers of the higher sandy soils moved to the west for some reason and adapted themselves to a great extent to their surroundings in the delta region, though still keeping some domesticated animals, while the farmers on open grassland in the north remained stock-breeders.

After this first penetration of farmers into the coastal area, this area has been continually inhabited. It was not till the Middle Ages that man began to interfere with his surroundings by building dikes, lowering the water level, draining lakes and reclaiming marshes; in early times people had to keep to the higher situated coastal regions and the narrow banks along the creeks. Only during some drier periods it was possible to live on the peat as happened in the pre-Roman Iron Age in the neighbourhood of Vlaardingen.

At all sites domestic cattle are the most important animals (Tables 40, 41; diagram I), second comes the domestic pig at late Eneolithic Vlaardingen and Heke-

lingen, Middle Bronze Age Vogelenzang, Roman Valkenburg, Early Medieval Rijnsburg, in Late Medieval Huis te Merwede and Amsterdam. In all other cases the small ruminants, usually sheep, come second. So from the Bronze Age till the Early Middle Ages the small ruminants were second in importance. This is the case both at sites lying on the somewhat higher sandy, probably wooded, coastal area, and at those on the creek banks and on the open peat.

So from the Bronze Age till the Early Middle Ages there is a common way of stock-breeding independent of the surroundings in which people lived. The Roman Castellum at Valkenburg offers a different picture, probably because the garrison kept domestic pigs to meet their demand for pork. At Early and Late Medieval sites one cannot any longer count on the bones giving a clear idea of the way stock-breeding was practised. In the Late Medieval castle Huis te Merwede and the city of Amsterdam, the high percentages of domestic pig can be explained by the facts first that these animals were kept and fattened easily for the yearly slaughtering (that this was the case is shown by the fact that no remains of animals younger than 19 months have been found and that orders are known to have been issued in the towns prohibiting the letting of pigs roam through the streets), and secondly that for some reason the slaughtering of sheep was as much as possible reduced in Medieval towns in Holland (Unger, 1916). Perhaps this is connected with the manufacture of cloth, which had been an important merchandise for the Frisians from Roman times (the coastal area from Brugge to the Weser was called Frisia). Frisian traders were found all over Europe, in the Early Middle Ages even in Rome, where they had their own loggia (Lewis, 1958). With the rise of the urban centres the manufacture of cloth was moved to the cities, with the result that cloth became an industrial product and was not woven by the peasants who kept the sheep. In this connection it is interesting to observe that together with the other finds utensils belonging to a "shearer" were found in Amsterdam (Van Regteren Altena, 1966).

Domestic cattle grew gradually smaller reaching their smallest size in Roman Age, but remains of larger cattle dating from the same time have been found. This was probably due to influence of the Romans, who were excellent cattle-breeders. Cattle tended to grow larger again during the Early and Late Middle Ages (diagrams XLVI, XLIX, LV–LVII), only the horn-cores became smaller continuously (diagrams XLIV, XLV).

At first the small ruminants were kept in small quantities only, but from the Bronze Age onward they were second in importance (Tables 40, 41) after the domestic cattle, a fact which can probably be linked with the new fashion of woolen garments (Chapter III*a*, 20). Both goat and sheep were kept in small quantities in the late Eneolithic period, but goat outnumbered sheep. At later times sheep were kept usually and goats only occasionally. Goats may have been kept for milking, whereas domestic cattle

were kept mainly for the supply of meat, fat and hides. Even in the Early Middle Ages milk was not drunk, although milk dishes were known; cheese was used at an early date, but butter was supposed to be only for the rich till the Late Middle Ages (Baudet, 1904). The domestic pig must have been kept only for the supply of meat and fat; the animals were mostly slaughtered young (Table 43; diagram X). Like domestic cattle, pigs grew smaller from Late Eneolithic times onward, to become larger again at Medieval times.

The dog has been found at almost all settlements (Table 47; diagram LXI). At Vlaardingen it is the small breed of dog generally found in Neo- and Eneolithic settlements, usually called the turbary dog. At Hekelingen two bones of what may have been a large dog or a wolf have been found. At Roman Valkenburg four groups of dog were found, ranging from a miniature dog via a smaller and larger form of the turbary dog to a larger dog (Chapter III*a*, 4). The Medieval dog remains are too few to provide a good impression of the dogs in those days.

The two horse bones that were found at late Eneolithic Hekelingen are no base to found any conclusions on about the nature of the horse. But as the environment was unsuitable for horses these remains may belong to a domestic horse. The bones found at the somewhat later Langeveld near Lisse belong partly to a very young (6 months) individual, which may be considered a strong indication for domestication. In the Roman Castellum at Valkenburg, three possibly groups could be distinguished, a small native horse, and two larger forms (Chapter III*a*, 14). The remains at the other sites are too scanty to give a clear idea.

The first known domesticated cat was found at Valkenburg either from the Roman or the Carolingian period.

One bone belonging to domesticated rabbit in all probability has been found at the Castle Huis te Merwede.

The first known domestic fowl bone has been found in the settlement layers at the Amsterdam Waterworks near Bloemendaal dating from the pre-Roman Iron Age, *i.e.* not taking into account the femur found at late Eneolithic Vlaardingen.

There are strong indications that domesticated goose and duck were kept by the Romans at their castellum at Valkenburg (Chapter III*b*, 10, 17, 18).

The domestic swan and the pigeon are known from the castle Huis te Merwede and the city of Amsterdam. In the Middle Age swans were commonly consumed (Baudet, 1904).

Wild animals were found in great numbers at late Eneolithic Vlaardingen and Hekelingen. Remains of red deer are most numerous followed by wild boar and beaver. Of the carnivores remains of fox, brown bear, polecat, otter and marter were found. Remains from sand seal and gray seal show that sea mammals were hunted as well. Fowling was important; at least thirteen species were caught, among them ducks and white-tailed eagles were the most numerous, Dalmation pelicans the most exotic.

Fishing for the anadromous sturgeon was important but other species were also caught.

In the following periods hunting was of no importance; occasionally a red deer, a wild boar, a roe deer, or a fox was caught. Red deer antlers were collected in small quantities and used for the manufacture of various objects. The oldest known trophy of a red deer antler was found at the castle Huis te Merwede (Plate XIII).

Fowling was still important in the Middle Ages. Falconry was practised in catching herons and other species. Bitterns, herons, cranes, spoon-bills and ducks are among the species used in the Dutch kitchen as mentioned by Baudet (1904).

DIER EN MENS IN HOLLANDS VERLEDEN

Een onderzoek naar de dierenwereld in prehistorische en vroeg-historische tijden in de provincies Noord- en Zuid-Holland.

KORTE SAMENVATTING

In dit werk wordt het beendermateriaal (± 10000 gedetermineerde stukken) behandeld, dat gevonden werd bij opgravingen van nederzettingen van het late Eneolithicum tot de Middeleeuwen en van grafheuvels uit de Brons- en IJzertijd, in de provincies Noord- en Zuid-Holland (kaart I, II, III, IV en V).

Na de laatste ijstijd werd de zeespiegel regelmatig hoger en ontstond het zuidelijke deel van de Noordzee. Gedurende het vroege Subboreaal werden strandwallen gevormd langs de zuidwestelijke, centrale en noordwestelijke delen van de Nederlandse kust (Pons, Jelgersma, Wiggers & De Jong, 1963). Ongeveer 2400 v. Chr. werd het Hollandse kustgebied voor het eerst bewoond. In het zuiden woonde men op de smalle, enigszins verhoogde oeverbanken langs de kreken (Vlaardingen, Hekelingen), in het noorden op een strandwal omgeven door een uitgestrekt waddengebied en moerassen (Zandwerven).

Algemeen wordt aangenomen dat domesticatie en het uitoefenen van veeteelt voor het eerst in het Midden-Oosten plaats vond. Hoewel hierover veel gespeculeerd en geschreven is, zijn weinig betrouwbare gegevens bekend (Reed, 1961). Beter is het gesteld met de kennis van het optreden van de eerste veetelers in Europa dat gekoloniseerd werd in vier fasen door boeren die oorspronkelijk uit het Midden-Oosten kwamen. In de eerste en tweede fase (vroeg Neolithicum) vestigden zich boeren in de vruchtbare vlakten van Thessalië en Macedonië in Griekenland. In de volgende eeuwen namen zij bezit van de Balkan noordelijk tot in Hongarije. In de derde fase (midden Neolithicum) vestigden zich Bandkeramische boeren zover als de loess gronden reiken ten noorden van de Alpen. Gedurende de eerste drie fasen hadden de mensen een gemengd boerenbedrijf en wild was van ondergeschikt belang voor hun vleesvoorziening (Tabel 49; Diagram LXIII).

Na de verspreiding van Bandkeramische boeren over een groot deel van Europa viel de Bandkeramische cultuur uiteen in locale groepen (laat Neolithicum) die zich in de volgende periode (Eneolithicum) hergroepeerden tot enkele grotere eenheden. Hoewel boeren van enkele van de locale groepen van de gedesintegreerde Bandkeramische cultuur in Europa zich ook buiten het loess gebied vestigden (Rössener cultuur) waren het boeren van de nieuwe eenheden die zich als eersten over die delen van

Europa verspreidden die tot dan schaars bewoond werden door Mesolithische jagers en vissers. Gedurende deze vierde kolonisatiefase had een differentiatie plaats van groepen die op oude wijze door slacht van huisdieren aan vlees kwamen en in groepen die zich in meer of mindere mate aanpasten aan hun omgeving en op jacht gingen (Tabel 49; Diagram LXIII). Een gelijke differentiatie kan opgemerkt worden in de gebieden die in de eerste drie fasen gekoloniseerd werden.

De opeenvolging van de verschillende culturen waarvan de veeteelt in hoofdstuk IV besproken werd is algemeen bekend, terwijl C 14 metingen ons tegenwoordig de ongeveer juiste data van hun optreden leert kennen.

Zo kan aangenomen worden dat het vroege Neolithicum loopt van het einde van het 7de millenium v. Chr. tot ± 4400 v. Chr., het midden Neolithicum van ± 4400 v. Chr. tot ± 4000 v. Chr., het late Neolithicum van ± 4000 tot ± 3500 v. Chr. en dat het Eneolithicum ± 3500 v. Chr. aanvangt.

De nomenclatuur van de opeenvolgende perioden is hoofdzakelijk gegrond op het werk van E. en J. Neustupný (1961) zoals deze werd uitgewerkt voor Tsjechoslowakije. Daar echter in Tsjechoslowakije de oudste Neolithische culturen die op de Balkan gevonden worden, tot nu toe niet werden aangetroffen (Proto-Sesklo, Starčevo, Körös enz.) verdeelden deze auteurs het Neolithicum in vroeg (Bandkeramiek) en laat (Stichbandkeramik, Lužianky, Lengyel) Neolithicum. Deze perioden zullen hier midden en laat Neolithicum genoemd worden terwijl ik vroeg Neolithisch de oudste Neolithische culturen noem die ten zuiden van Tsjechoslowakije gevonden worden. Op deze wijze is het mogelijk Europa als één geheel te overzien. Van Italië, Spanje, Portugal, Frankrijk en Engeland zijn geen of weinig goed gepubliceerde gegevens bekend over veeteelt in de besproken perioden. Het was hierdoor niet mogelijk West-Europa in de beschouwing te betrekken.

De eerste bewoning in Holland was laat Eneolithisch. De bewoners van Vlaardingen en Hekelingen waren veetelers die echter voor een groot deel van jacht afhankelijk waren voor hun vleesvoorziening, terwijl de bewoners van Zandwerven hoofdzakelijk veetelers waren (Hoofdstuk II, A, B, C). Glasbergen (1961) schreef deze nederzettingen toe aan de Vlaardingen cultuur die hij als secundair Neolithisch beschouwt. Wanneer echter Mesolithische jagers in het Zuid-Hollandse deltagebied ten dele overgegaan zouden zijn op veeteelt, zouden zij in dat milieu varkens en honden gehouden hebben maar geen runderen, schapen en geiten (het ontbreken van de oeros toont aan dat de omgeving niet geschikt was voor grote runderen). Waarschijnlijker is dat laat Eneolithische boeren, om welke reden ook, van de hogere zandgronden naar het westen trokken en zich in het deltagebied in hoge mate aan het milieu aanpasten terwijl de boeren op het grasland in het noorden veetelers bleven.

Na dit eerste doordringen van boeren in het kustgebied bleef dit onafgebroken bewoond. Het was echter niet voor de Middeleeuwen dat de mens op grote schaal in het landschap begon in te grijpen door het aanleggen van dijken, verlaging van de

grondwaterspiegel, drooglegging van meren en ontginning van moerassen. Daarvoor was men gedwongen op het hoger gelegen duingebied en op de smalle oeverbanken langs de kreken te wonen. Slechts gedurende drogere perioden was het mogelijk zich op het veen te vestigen.

Runderen waren steeds de belangrijkste huisdieren (Tabellen 40, 41; Diagram I). In het laat Eneolithische Vlaardingen en Hekelingen, midden Bronstijd Vogelenzang (Hoofdstuk III, E), Romeins Valkenburg (Hoofdstuk III, O), vroeg Middeleeuws Rijnsburg (Hoofdstuk III, R, S, T) en in laat Middeleeuws Huis te Merwede en Amsterdam (Hoofdstuk III, U, V) kwam het varken op de tweede plaats, in alle andere gevallen de kleine herkauwers, schaap en geit. Dat wil zeggen dat vanaf de Bronstijd tot de vroege Middeleeuwen dezelfde vorm van veeteelt beoefend werd onafhankelijk van het feit dat de boeren woonden op de zandige, waarschijnlijk beboste duinstrook, de oeverwallen of het open veen. Alleen het Romeinse Castellum Valkenburg geeft een ander beeld. Dat het varken hier op de tweede plaats komt is mogelijk toe te schrijven aan het garnizoen dat zelf varkens hield om aan een extra vraag naar varkensvlees te kunnen voldoen. In het laat Middeleeuwse kasteel Huis te Merwede en de stad Amsterdam kunnen de hoge varkenspercentages verklaard worden, ten eerste door het feit dat men geen varkens meer fokte maar alleen eenjarige varkens vetmestte voor de najaarsslacht (zie de weinige resten van jonge varkens, Diagram X) en ten tweede dat in de Hollandse steden het slachten van schapen zoveel mogelijk werd tegengegaan (Unger, 1916). Mogelijk hangt dit samen met de lakenweverij, laken was een belangrijk handelsobject in die tijd.

Jacht was alleen belangrijk in Vlaardingen en Hekelingen. Vogelvangst in Vlaardingen, Hekelingen, Zandwerven, Valkenburg en Amsterdam.

Runderen werden in de periode van het Eneolithicum tot de Romeinse tijd steeds kleiner (Hoofdstuk III*a*, 21), terwijl zij gedurende de vroege en late Middeleeuwen weer in grootte toenamen (Diagrammen XLVI, XLIX–LI, LV–LVII), alleen de horenpitten bleven ook in deze perioden kleiner worden (Diagrammen XLIV, XLV).

Zowel geiten als schapen (Hoofdstuk III*a*, 20) werden in kleine aantallen in het Eneolithicum gehouden. In de latere perioden nam vooral het aantal schapen toe, wat misschien in verband staat met het in de mode komen van wollen kleding.

Het varken (Hoofdstuk III*a*, 15, 16) werd alleen gehouden voor het verkrijgen van vlees en vet. De dieren werden meestal jong geslacht en er zijn duidelijke aanwijzingen voor najaarsslacht (Tabel 43, Diagram X). Evenals de runderen werden ook de varkens kleiner vanaf het Eneolithicum om in de Middeleeuwen weer in grootte toe te nemen (Tabellen XIII, XVII–XXIV). De kiezen bleven echter ook in de Middeleeuwen kleiner worden (Tabellen XI, XII, XIV).

De hond (Hoofdstuk III*a*, 4) werd in alle perioden gevonden (Tabel 47). In Vlaardingen is het de kleine „turf" hond die algemeen in Neolithisch en Eneolithisch

Europa wordt aangetroffen. In Romeins Valkenburg werden vier groepen gevonden, een dwerghondje, een kleinere en grotere vorm van de ,,turf'' hond en een middelgrote hond.

De twee beenderen van een paard (Hoofdstuk III*a*, 14) gevonden te Hekelingen laten niet toe te zeggen of het om een gedomesticeerde of wilde vorm gaat. In het Romeinse Valkenburg konden drie groepen onderscheiden worden, een klein inheems paard en twee grotere groepen. De resten gevonden in de andere vindplaatsen zijn te gering om iets over te zeggen.

De eerste gedomesticeerde kat (Hoofdstuk III, 11) werd in Valkenburg gevonden, het is echter niet zeker of het tot de Romeinse of Karolingische Periode behoort.

Een tibia van een naar alle waarschijnlijkheid gedomesticeerd konijn werd gevonden in Huis te Merwede (Hoofdstuk III*a*, 1).

Een femur van een huishoen (Hoofdstuk III*b*, 28) werd gevonden in de nederzettingssporen uit de voor Romeinse IJzertijd op het terrein van de Amsterdamse Waterwerken bij Bloemendaal. In de daarop volgende perioden komt het huishoen algemeen voor.

Er zijn sterke aanwijzingen dat de gedomesticeerde gans en eend door de Romeinen in Valkenburg gehouden werden (Hoofdstuk III*b*, 10, 17, 18). De gedomesticeerde zwaan en duif zijn bekend uit het Huis te Merwede en de stad Amsterdam (Hoofdstuk III*b*, 24, 25, 31). In de Middeleeuwen werden zwanen algemeen gegeten.

Resten van wilde dieren werden in grote hoeveelheden gevonden in Eneolitisch Vlaardingen en Hekelingen. Resten van het edelhert waren het talrijkst, gevolgd door wild zwijn en bever (Hoofdstuk III*a*, 17, 16, 3). Van de carnivoren werden resten van de vos, bruine beer, bunzing, otter, marter en wilde kat gevonden (Hoofdstuk III*a*, 5, 6, 7, 8, 9 en 10). Resten van gewone en grijze zeehond laten zien dat ook op marine zoogdieren gejaagd werd (Hoofdstuk III*a*, 12, 13).

De vangst van vogels was belangrijk, resten van tenminste 13 soorten (Tabel 48, Diagram LXII) werden gevonden waaronder die van wilde eenden (Hoofdstuk III*b*, 9, 10) en zee-arenden (Hoofdstuk III*b*, 27) het talrijkst waren, die van de kroeskoppelikaan (Hoofdstuk III*b*, 4) het meest exotisch.

De vangst van de anadrome steur (Hoofdstuk III*c*, 1) was belangrijk, maar ook andere vissoorten werden gevangen.

In de volgende perioden was jacht onbelangrijk. Een enkel edelhert, wild zwijn, ree of vos werd buit gemaakt. Geweien van het edelhert werden in kleine hoeveelheden verzameld voor het vervaardigen van verschillende voorwerpen.

De jacht op vogels was in de Middeleeuwen nog belangrijk. Reigers werden gejaagd met de vogel. Roerdompen, reigers, kraanvogels, lepelaars en eenden (Hoofdstuk III*b*, 7, 5, 29, 8, 9, 10) zijn soorten die algemeen in de Hollandse keuken van de Middeleeuwen gebruikt werden.

ЖИВОТНЫЕ И ЧЕЛОВЕК В ПРОШЛОМ ГОЛЛАНДИИ

Исследование окружающего человека мира животных в доисторические и раннеисторические времена в провинциях Северная и Южная Голландия.

Краткий обзор

В этом труде рассматривается материал костных остатков /± 10.000 установленных экземпляров/, найденных в провинциях Северная и Южная Голландия при раскопках поселений, относящихся к периоду от позднего энеолита до средних веков, и при раскопках курганов эпохи бронзы и железа карты 1, 2, 3, 4 и 5/.

После последнего ледникового периода уровень моря постепенно поднимался и возникла южная часть Северного моря. Во время раннего субарктического периода, образовались вдоль юго-западной, центральной и северо-западной части побережья Нидерландов песчаные валы /Понс, Иелгерсма, Виггерс и Де Ионг, 1963/. Впервые побережье Нидерландов стало обитаемым приблизительно 2400 лет до н.э. В южной части страны поселения находились на узких, немного возвышенных отмелях вдоль заводей /Влардинген, Хекелинген/, а в севеной части-на песчаных валах, окруженных мелями и болотами /Зандвервен/.

Общепринято считать, что доместикация и занятие скотоводством впервые имело место на Среднем Востоке. Несмотря на то, что этот вопрос неоднократно рассматривался и что по этому вопросу много написано, относительно этого вопроса имеется мало достоверных данных /Реед, 1961/. Лучше обстоит дело со сведениями о первых скотоводах в Европе, которая четырехкратно заселагась земледельцами, первоначально прибывшихи со Среднего Востока. В первой и во второй фазе /ранний неолит/ земледельцы сёлились в Греции на плодородных равнинах фессалии и Македонии. В течение следующих веков они заняли северную часть Балканского полуострова вплоть до Венгрии. В третьей фазе /средний неолит/ земледельцы периода ленточной керамики поселились на лёссовых землях к северу от Альп. В течение трёх первых фаз люди занимались смешанным земледельно-скотоводческий, а охота с целью снабжения мясом имела для них второстепенное значение /Таблица 19, диаграмма L XIII/.

После того как земледельцы периода ленточной керамики расселились на значительной части Европы, культура ленточной керамики распалась на местные группы /поздний неолит/, которые в течение следующей эпохи /энеолит/ снова объединились в несколько больших групп. Хотя земледельцы некоторых местных групп периода дезинтегрированной культуры линейно-ленточной в Европе селились также вне лёссов областей /культура Рёссенская, в тех

частях Европы, которые до сих пор были скудно заселены охотниками и рыболовами периода мезолита, первыми расселились земледельцы новых образований. Во время этой четвёртой фазы заселения происходит разделение населения на группы и, которые добывали мясо старым способ он убоя домашних животных, и на группы, которые в большей или меньшей степени приспособились к окружающей обстановке и занялись охотой /Таблица 49, диаграмма L XIII /. Подобное разделение наблюдается также в областях, которые были заселены в течение первых трёх фаз.

Последующие различные культуры, скотоводство которых рассматривается в главе V, общеизвестны, причем анализы по С14 могут нам дать в настоящее время довольно точную дату их возникновения.

Таким образом, может быть принято, что ранний неолит продолжался от конца 7-го тысячелетия до н.э. до ± 4400 до н.э., средний неолит-от ± 4400 до н.э. до ± 4000 до н.э., поздний неолит–от ± 4000 до ± 3500 до н.э., а энеолит начался ± 3500 до н.э.

Деление последующих периодов основывается главным образом на труде Е. и И. Неуступны /1961/. Это деление была разработано для Чехословакии. Однако из–за того, что в Чехословакии до сих пор не встречались остатки культур древнего неолита, которые были найдены на Балканах /Прото–Сескло, Старцево, Кёрёс и т.д./, эти авторы разделили неолит на ранний /обручная керамика/ и поздний /узорчато-обручная керамика, Лужианки, Ленгиел/. Эти периоды мы называем средний и поздний неолит, так как культуры раннего неолита являются культурами древнего неолита, найденными к югу от Чехословакии. Это даёт нам возможность рассматривать всю Европу одновременно.

О скотоводстве в рассматриваемые периоды в Италии, Испании, Португалии, франции и Англии не имеется достоверных данных, а те которые опубликованы, недостаточны. По этой причине нельзя было включить в рассмотрение Западную Европу.

Первое поселение в Голландии/ в южной и северной её провинциях/ относится к периоду позднего энеолита. Жители Флардингена и Хекелингена были скотоводами, которые, однако, для снабжения мясом в значительной степени зависели от охоты, в то время как основным занятием жителей Зандвервена было скотоводство /глава III, A, B, C/. Гласберген /1962/ относит эти поселения к флардингерской культуре, которую он рассматривает как культуру вторичного неолита. Когда, однако, охотники периода мезолита в областях южно-голландской дельты частично перешли к скотоводству, они стали держать свиней и собак, но не держали крупного рогатого скота, овец и коз /отсутствие зубров указывает, что окружающая среда не подходила для крупного рогатого скота/. Более вероятно, что земледельцы периода позднего энеолита по каким–то причинам переселились с более высоких песчаных земель на запад и в значитель-

ной степени приспособились в областях дельты к окружающей обстановке, в то время как земледельцы на открытых лугах, на севере, остались скотоводами.

После этого первого проникновения земледельцев в прибрежные области, в этих областях без перерыва обитают люди. Однако не раньше средних веков путём постройки плотин, понижения уровня подпочвенных вод, осушения озёр и освоения болот, начинается в большом масштабе изменение ландшафта человеком. До этого времени человек был принуждён жить на расположенных выше дюнах и на узких прибрежных отмелях вдоль заводей. Только в течение более сухих периодов было возможно селиться на торфяниках.

Важнейшими домашними животными всегда являлся крупный рогатый скот /Таблица 40, 41; диаграмма I/. Во Флардингене и Хекелингене периода позднего энеолита, в фогелензанге средней эпохи бронзы /глава Ш, Е/, римском фалькенбурге /глава III,О/, в Рейнсбурге периода раннего средневековья /глава Ш, R. S. T./ и в Хаус те Мерведе и Амстердаме периода позднего средневековья /глава Ш, И, V / свинья занимает второе место, во всех других случаях на втором месте находятся мелкие жвачные животные – овца и коза. Это свидетельствует о том, что начиная с бронзового века до раннего средневековья сохранялась та же самая форма скотоводства, вне зависимости от того, жили ли земледельцы в песчаной, вероятно покрытой лесом, полосе дюн, на прибрежных валах или на открытых торфяниках. Единственно римская крепость Фалкенбург представляет собой другую картину. То, что свинья здесь занимает второе место, возможно объяснить тем, что чужой гарнизон сам держал свиней, чтобы удовлетворить экстренные потребности в свином мясе. В ранне средневековой крепости Хаус те Мерведе и в городе Амстердаме высокий процент свиней может быть объяснен, во–первых, тем, что здесь больше не разводили свиней, а выкармливали только одну свинью для осеннего убоя /см. незначительное количество остатков поросят, диаграмма X/, и, во–вторых, тем, что в голландских городах, по мере возможности, поощряли убой овец /Унгер, 1916/. Возможно, что это имело место в связи с производством сукна, которое являлось в то время важным торговым объектом.

Охота играла роль только во Флардингене, а также в Хекелинге. Птицеводство – во Флардингене, Хекелингене, Зандвервене, Фалкенбурге и Амстердаме.

В период с энеолита до римской эпохи крупный рогатый скот становился всё меньше /глава III а, 21/, он снова увеличивается в эпоху раннего и позднего средневековья /диаграммы XLVI, XLIX – LI, LV – LVII/, единственно основа рогов становится меньше и в эти периоды /диаграмма XLIV, XLV /.

В эпоху энеолита держались в небольших количествах как козы, так и овцы /Глава III а, 20/. В позднейшие периоды увеличивается количество овец, что, может быть, находится в связи со входящей в моду шерстяной одеждой.

Свиньи /глава IIIа, 15, 16/ держались единственно для получения мяса и

жира. Подвергались убою преимущественно молодые животные и имеются определённые указания на то, что убой происходил осенью /таблица 43, диаграмма X/. Подобно крупному рогатому скоту, начиная с периода энеолита, уменьшаются и свиньи, а в средние века они снова становятся больше /таблица XIII, XVII,/. Однако коренные зубы становятся меньше и в средние века /таблица XI, XII, XIV/.

Собаку /глава III а, 4/ мы находим во все периоды /Таблица 47/. Во Флардингене находится малая "торфяная" собака, которая повсеместно встречается в Европе в периоды неолита и энеолита. В римском Флардингене найдены четыре группы собак: карликовая собака, меньшего и большего вида "торфяная" собака, и средняя собака.

По костным остаткам двух лошадей /глава IIIа, 14/, найденным в Хекелингене, нельзя определить, относятся ли они к домашнему или дикому виду. В римском Фалкенбурге можно было определить три группы: одна малая местная лошадь и два бóльших вида. Остатки, найденные в других раскопках, слишком незначительны, чтобы о них говорить.

Первая кошка /глава III, II/ была найдена в Фалкенбурге, но с уверенностью нельзя сказать, относится ли она к римскому периоду или же к эпохе Каролингов.

В Хаус те Мерведе была найдена голень, по всей вероятности, домашнего кролика /глава III а, I/.

Бедро домашней курицы /глава III в, 28/ было найдено в остатках поселений из доримской эпохи железа на территории Амстердамских гидросооружений возле Блумендаля. В последующие периоды домашняя курица встречается повсеместно.

Имеются достоверные указания на то, что римляне в Фалкенбурге держали домашних гусей и уток /глава III в, 10, 17, 18/. Домашние лебеди и голуби известны из Хаус те Мерведе и города Амстердама /глава III в, 24, 25, 31/. В средние века лебеди повсеместно употреблялись в пищу.

Остатки диких животных были найдены в большом количестве во Флардингене и Хекелингене периода энеолита. Остатки благородного оленя были самые многочисленные, за ними следовал кабан и бобр /глава IIIа, 17, 16, 3/. Из хищных животных были найдены остатки лисицы, бурого медведя, хорька, выдры, куницы и дикого кота /глава IIIа, 5, 6, 7, 8, 9 и 10/. Остатки обыкновенного и серого тюленя свидетельствуют о том, что имела место охота также на морских млекопитающих /глава IIIа, и12, 13/.

Важное место занимало птицеводство; были найдены остатки по меньшей мере 13-ти видов птиц /глава 48, диаграмма XLVIII/, из которых наиболее многочисленны остатки дикой утки /глава IIIв, 9, 10/ и орлана-белохвоста /глава IIIв, 27 диаграмма 77, 801/, а наиболее экзотические – кудрявого пеликана /глава IIIв, 4/.

Важное место занимала ловля осетра, но также происходила ловля других видов рыб.

В последующие периоды охота теряет своё значение. Имеет место охота на одиночных благородных оленей, кабанов, косуль и лисиц. Собираются в небольших количествах рога благородного оленя для изготовления различных предметов.

По-прежнему остаётся важной в средние века охота на птиц. В средние века повсеместно употребляются в голландской кухне такие виды птиц как – большая выпь, цапля, журавль, колпица и утки /глава IIIв, 7, 5, 29, 8, 9, 10/.

List of the animals discussed

Mammalia			*Млекопитающие*
Alces alces (L.)	– elk	– eland	– Лось
Balaenoptera physalus (L.)	– common rorqual	– gewone vinvis	– Финвал
Bos primigenius Bojanus*	– aurochs	– oeros	– Зубр
Bos taurus L.	– domestic cattle	– rund	– Крупный рогатый скот
Canis familiaris L.	– dog	– hond	– Собака
Capra hircus L.	– goat	– geit	– Коза
Capreolus capreolus (L.)	– roe deer	– ree	– Косуля
Castor fiber L.	– beaver	– bever	– Бобр
Cervus elaphus L.	– red deer	– edelhert	– Благородный олень
Equus caballus L.	– horse	– paard	– Лошадь
Eubalaena glacialis (Borovski)*	– Biscayan right wahle	– noordkaper	– Северный кит
Felis catus L.	– cat	– huiskat	– Кошка
Felis libica Forster*	– Lybian cat	– Lybische kat	– Ливийский кот
Felis silvestris Schreber	– wild cat	– wilde kat	– Дикий кот
Globicephalus melas (Traill)*	– pilot whale	– griend	– Гренландский кит
Grampus orca (L.)*	– killer whale	– zwaardwalvis	– Дельфин-касатка
Halichoerus grypus (Fabricius)	– grey seal	– grijze zeehond	– Серый тюлень
Lepus europaeus Pallas	– brown hare	– haas	– Заяц русак
Lupus lupus L.*	– wolf	– wolf	– Волк
Lutra lutra (L.)	– otter	– otter	– Выдра
Martes martes (L.)	– pine marten	– boommarter	– Куница
Mystacoceti	– right whales and rorquals	– baardwalvissen	– Полосатик
Oryctolagus cuniculus (L.)	– rabbit	– konijn	– Кролик
Ovis aries L.	– sheep	– schaap	– Овца
Odontoceti	– toothed whales	– tandwalvissen	– Зубастые киты
Putorius lutreola L.	– European mink	– nerts	– Норка
Putorius putorius (L.)	– polecat	– bunzing	– Хорёк
Phoca vitulina (L.)	– sand seal	– gewone zeehond	– Обыкновенный тюлень
Phocoena phocoena (L.)	– common porpoise	– bruinvis	– Морская свинья
Sibbaldus musculus (L.)*	– blue whale	– blauwe vinvis	– Голубой полосатик
Sus domesticus L.	– pig	– varken	– Свинья
Sus scrofa L.	– wild boar	– wild zwijn	– Кабан
Sus vitatus L.*	– Indian wild boar	– Indisch wild zwijn	– Индийский кабан
Tursiops truncatus (Montague)	– bottle-nosed dolphin	– tuimelaar	– Дельфин
Ursus arctos L.	– brown bear	– beer	– Бурый медведь
Vulpes vulpes (L.)	– fox	– vos	– Лисица

Aves			*Птицы*
Anas clypeata L.	– shoveler	– slobeend	– Широконоска
Anas crecca L.	– teal	– wintertaling	– Чирок
Anas platyrhynchos domesticus L.	– duck	– eend	– Утка
Anas platyrhynchos L.	– mallard	– wilde eend	– Дикая утка
Anas querquedula L.	– garganey	– zomertaling	– Чирок-трескунок
Anas strepera L.	– gadwall	– krakeend	– Серая утка
Anser albifrons (Scopoli)	– white-fronted goose	– kolgans	– Казарка белолобая
Anser anser (L.)	– grey lag-goose	– grauwe gans	– Серый гусь

* Not found in the sites described in this volume.

Anser anser domesticus (L.)	– domestic goose	– huisgans	– Домашний гусь
Anser fabalis (Latham)	– bean goose	– rietgans	– Шпорцевый гусь
Anser fabalis brachyrhynchus (Baillin)	– pink-footed goose	– kleine rietgans	– Малый шпорцевый гусь
Ardea cinerea L.	– heron	– blauwe reiger	– Цапля
Botaurus stellarus (L.)	– bittern	– roerdomp	– Выпь-бугай
Branta bernicla (L.)	– brent goose	– rotgans	– Чёрная казарка
Branta leucopsis (Bechstein)	– barnacle goose	– brandgans	– Казарка белощёкая
Buteo buteo (L.)	– buzzard	– buizerd	– Канюк
Columba livia domesticus Gmelin	– pigeon	– huisduif	– Голубь
Columba palumbus L.	– wood pigeon	– houtduif	– Лесной голубь
Corvus cornix L.*	– hooded crow	– bonte kraai	– Хохлатая ворона
Corvus corone L.	– carrion crow	– zwarte kraai	– Чёрная ворона
Corvus frugilegus L.*	– rook	– roek	– Грач
Corvus monedula L.	– jackdaw	– kauw	– Галка
Cygnus cygnus (L.)	– whooper swan	– wilde zwaan	– Лебедь-кликун
Cygnus olor (Gmelin)	– mute swan	– knobbelzwaan	– Лебедь-шипун
Egretta alba (L.)	– great white heron	– grote zilverreiger	– Большая белая цапля
Fulica atra L.	– coot	– meerkoet	– Лысуха
Gallus gallus domesticus L.	– domestic fowl	– hoen	– Курица
Gavia stellata (Pontoppidan)	– red-throated diver	– roodkeelduiker	– Краснозобая гагара
Grus grus (L.)	– crane	– kraanvogel	– Журавль
Haliaeëtus albicilla (L.)	– white-tailed eagle	– zeearend	– Орлан-белохвост
Mergus merganser L.	– goosander	– grote zaagbek	– Крохаль
Pelecanus crispus Bruch	– Dalmatian pelican	– kroeskoppelikaan	– Кудрявый пеликан
Platalea leucorodia L.	– spoonbill	– lepelaar	– Колпица
Phalacrocorax carbo (L.)	– cormorant	– aalscholver	– Большой баклан
Pterodroma sp.	– petrel	– stormvogel	– Буревестник
Tadorna tadorna (L.)	– shelduck	– bergeend	– Пеганка

Pisces — *Рыбы*

Acipenser sturio L.	– sturgeon	– steur	– Осетр
Esox lucius L.	– pike	– snoek	– Щука

Mollusca — *Моллюски*

Buccinum undatum L.	– whelk	– wulk	– Волнистый рожок
Cardium edule L.	– cockle	– kokkel	– Сердцевидка
Littorina littorea (L.)	– common periwinkle	– gewone aliekruik	– Обыкновенная литорина
Mytilus edulis L.	– mussel	– mossel	– Мидия
Ostrea edulis L.	– oyster	– oester	– Устрица
Spisula subtruncata (Da Costa)	– cut through shell	– halfgeknotte strandschelp	– Резевница
Succinea cf. elegans Risso	– amber snail	– barnsteenslak	– Янтарная улитка
Unio pictorum L.	– painters unio	– schildersmossel	– Пёстрая мидия

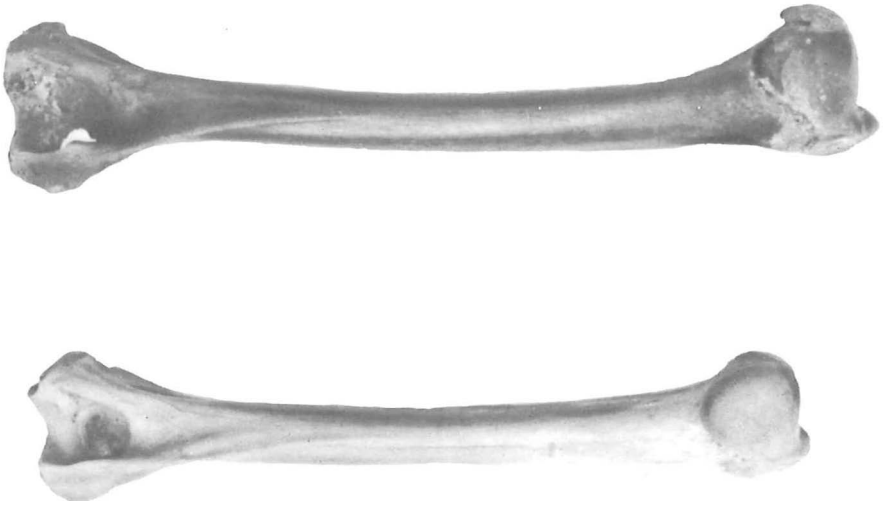
Cephalopoda — *Головоногие моллюски*

Sepia officinalis L.	– inkfish	– zeekat	– Каракатица

b. Lutra lutra: maxilla and mandibula (A).

a. Oryctolagus cuniculus: tibia (U).

a. Canis familiaris: scapula (2 ×), femur (3 ×) and tibia (A).

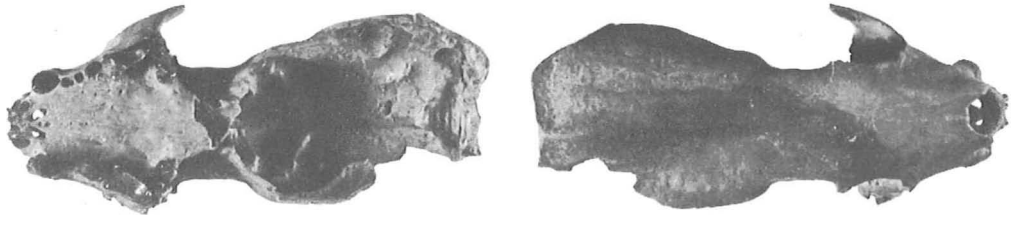


b. Canis familiaris: humerus (2 ×) (A).

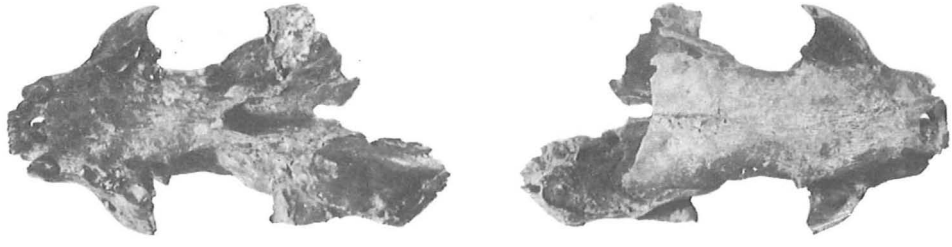
a. Putorius putorius: mandibula (2 ×) (A).

b. Ursus arctos: skull (A).

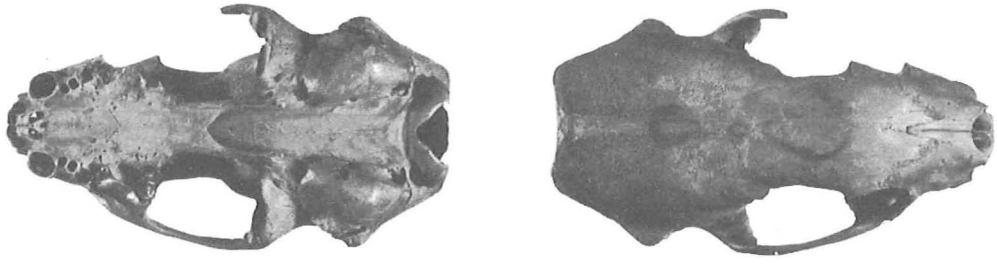
a. Putorius putorius: skull G 19^{d} (A).



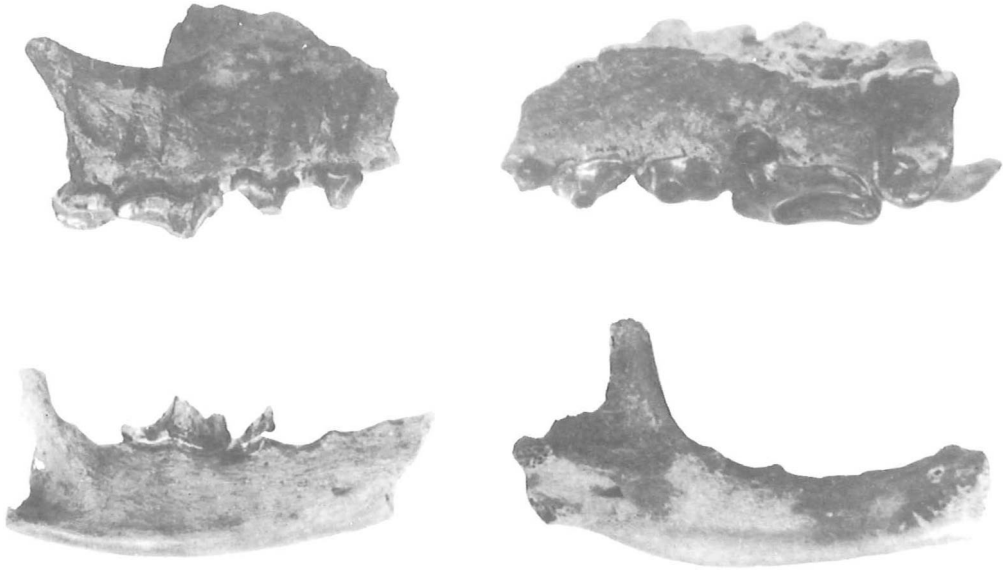
b. Putorius putorius: skull F 18^{c} (A).



c. Putorius cf. putorius: skull F 17^{a} (1) (A).



d. Putorius putorius: skull G 21^{a} (A).



a. Martes martes: maxilla, mandibula (2 ×) (B).

b. Martes martes: skull (2 ×), mandibula (2 ×), scapula, femur (A).

a

b

Felis silvestris: mandibula (A).

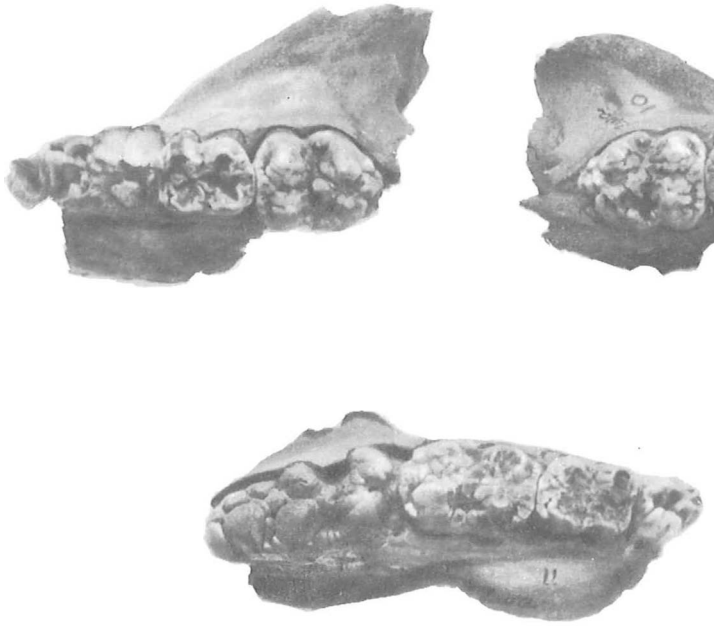
a. Felis silvestris: scapula, humerus (4 ×), radius (2 ×), ulna (2 ×) (A).

b. Felis catus: scapula, humerus, tibia, fibula, vertebrae (U).

Halichoerus grypus: skull, humerus, pelvis (A).

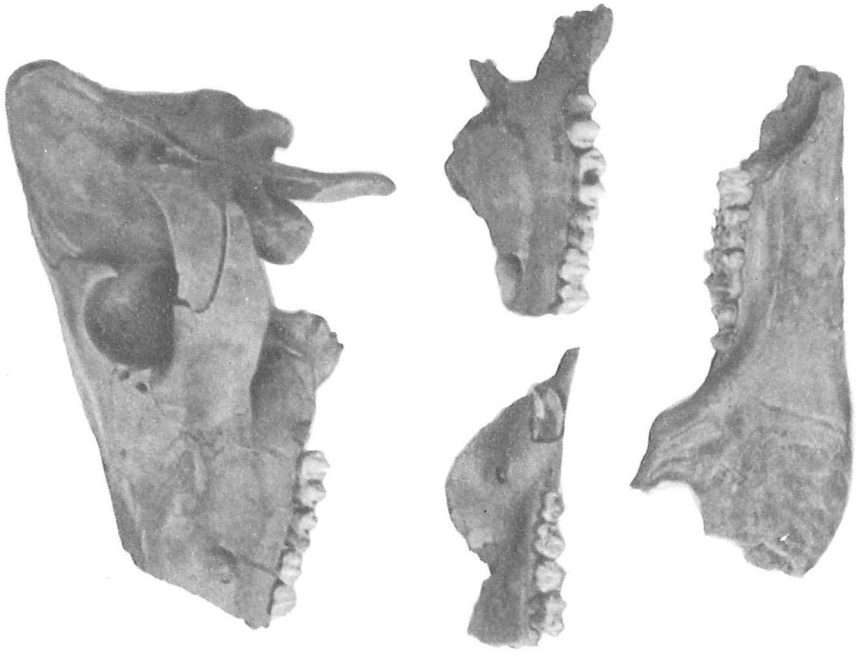
a. Equus caballus: metapodia (O).

b. Equus caballus: radius (D).

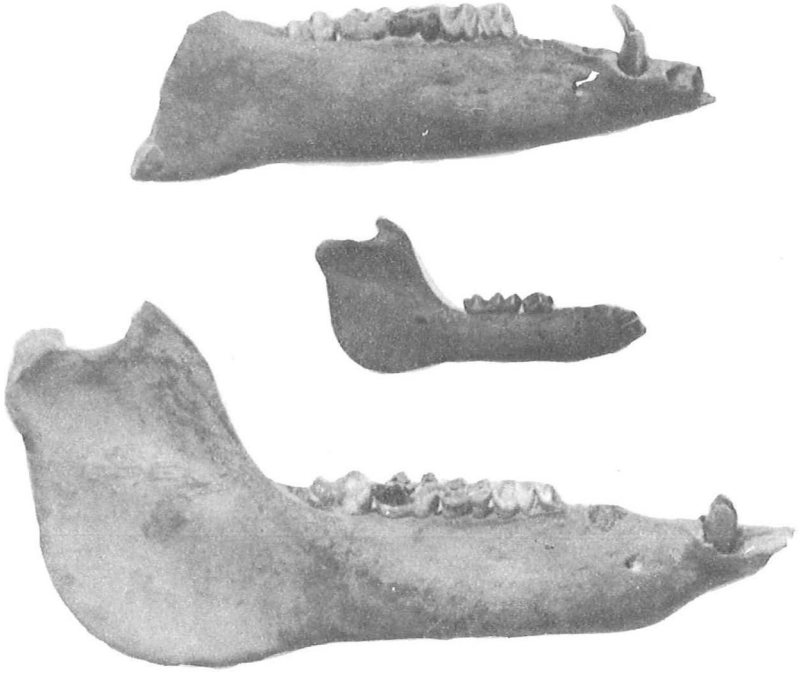


a. Sus domesticus: maxilla fragments (F).

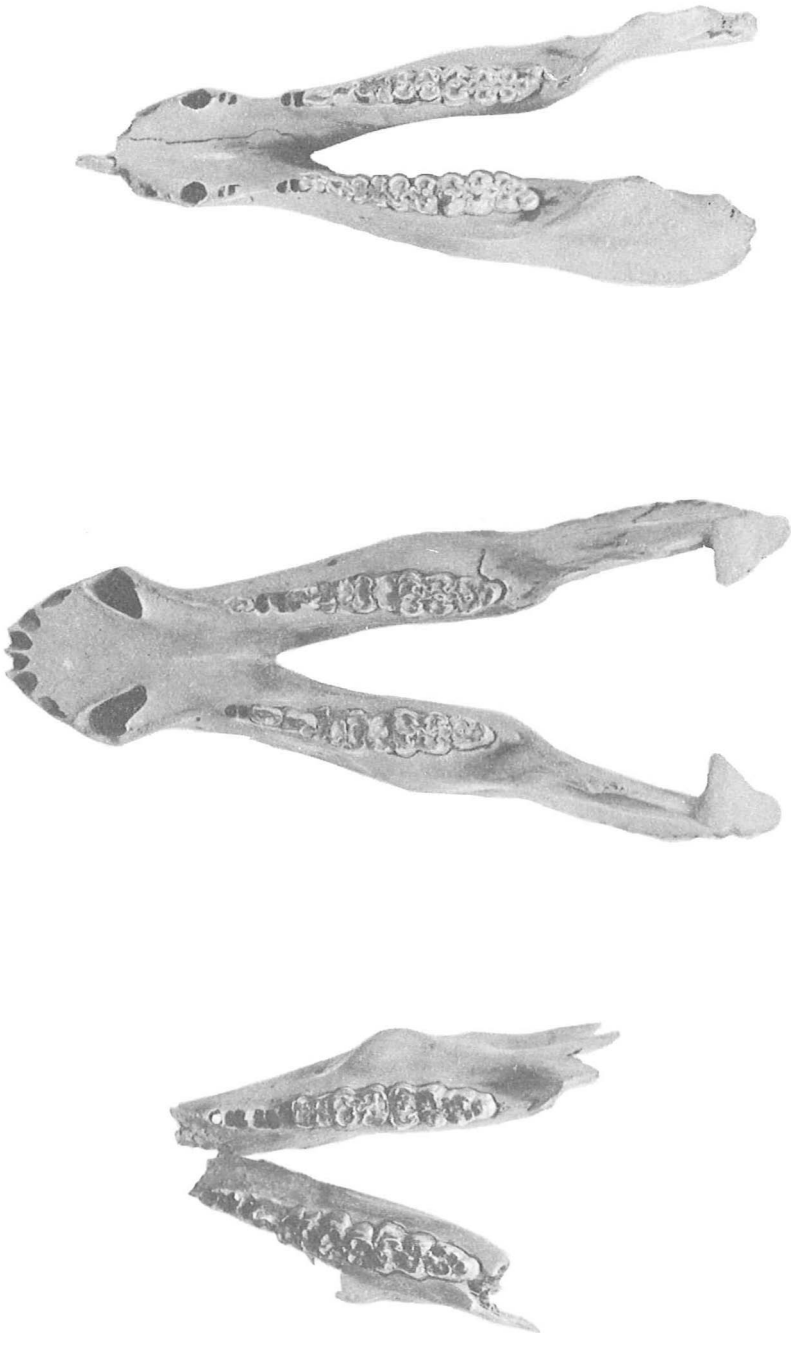
b. Sus scrofa: skull (2 ×), mandibula (O).



a. Sus domesticus: skull, maxilla (2 ×), mandibula (U).

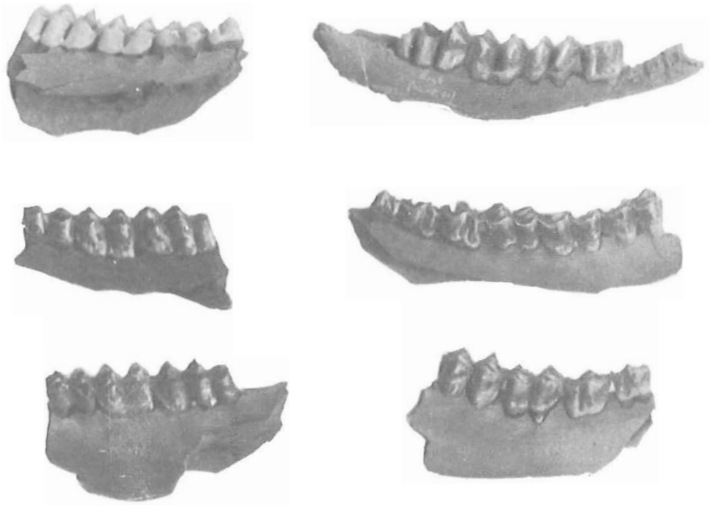


b. Sus domesticus: mandibulae, one of a 1 month old pig, two with M_3 erupting (U).



Sus scrofa: mandibula, ♀ and ♂ (A).

Cervus elaphus: antler (U).

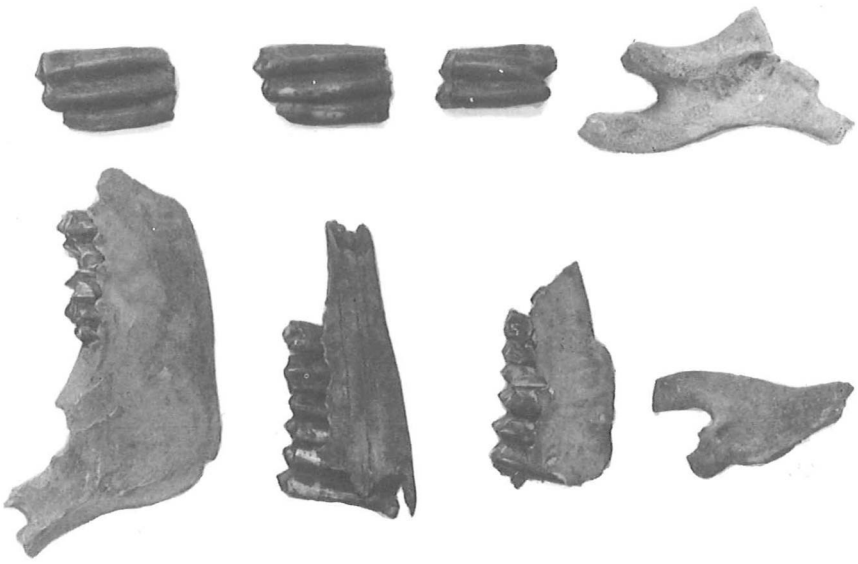


a. Cervus elaphus: mandibulae (A).

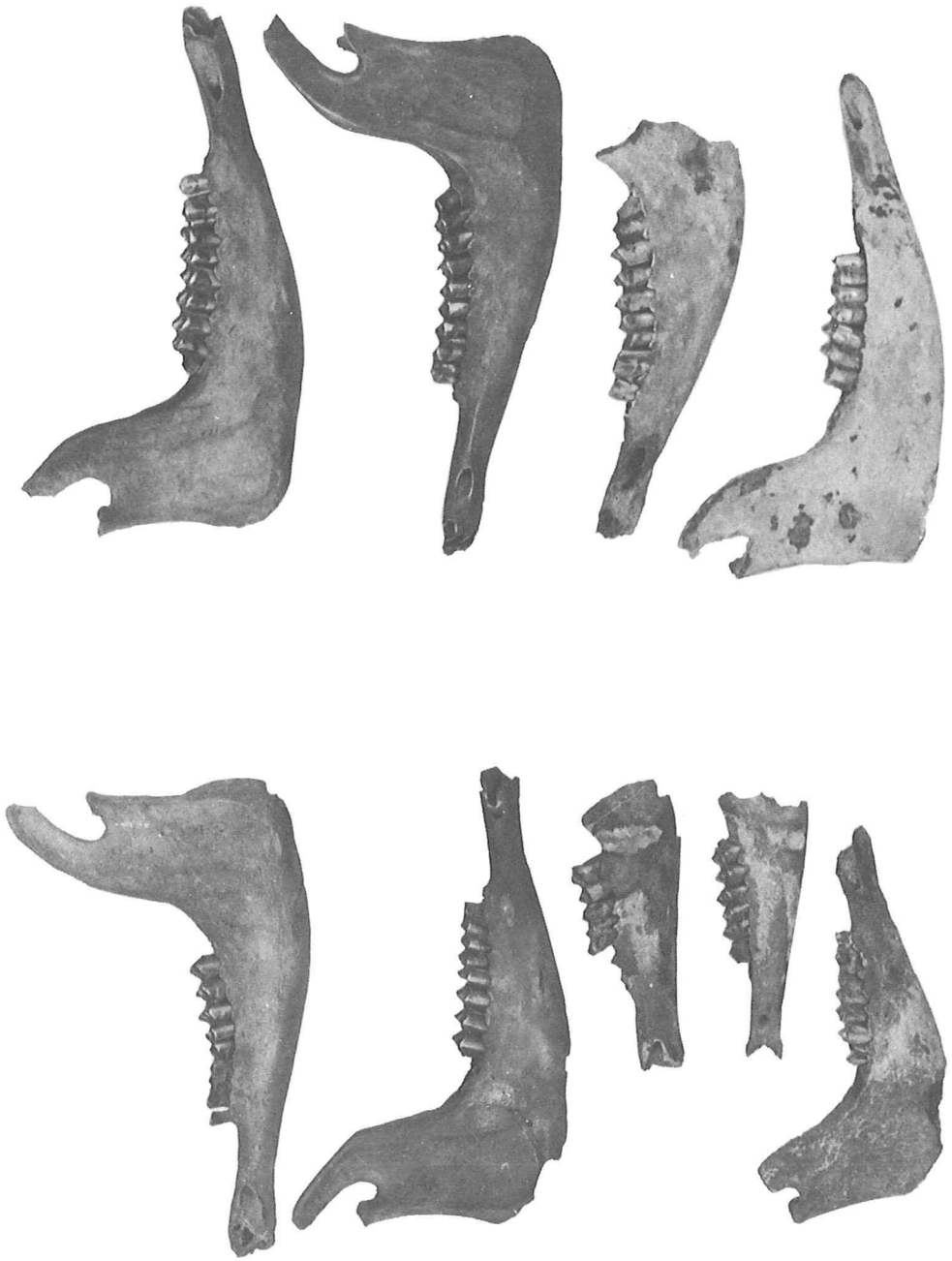
b. Cervus elaphus: mandibulae, two showing deformations round the alveoli (A).

Alces alces: mandibula (O).

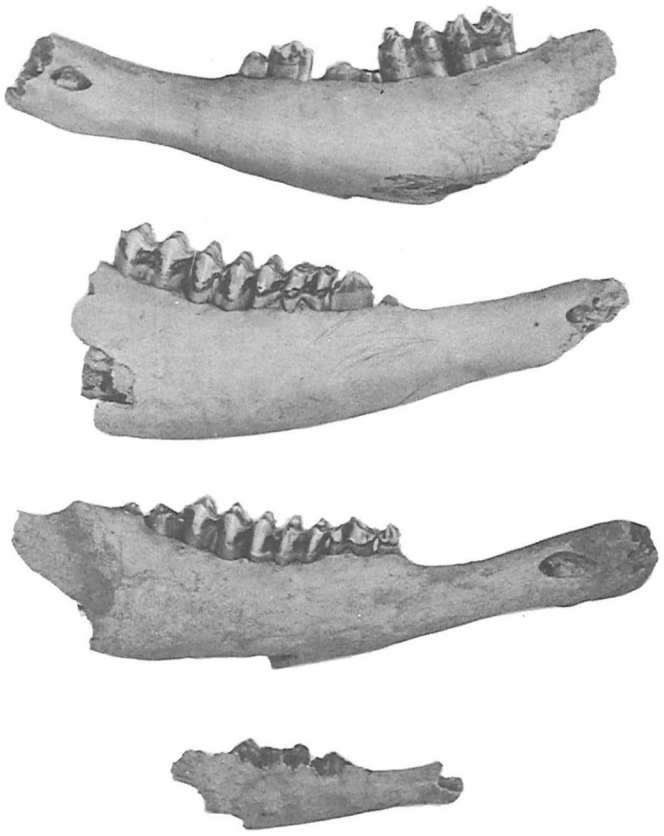
b. Capra/Ovis: mandibulae (F).



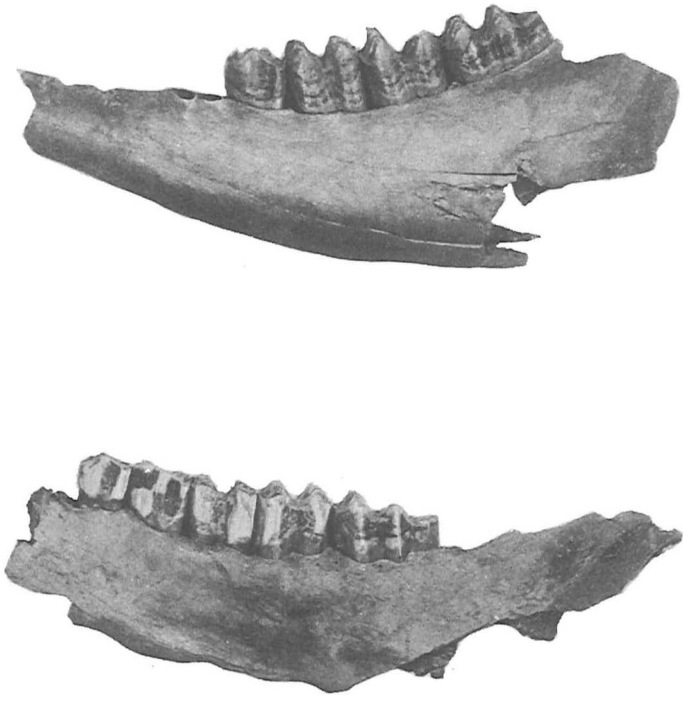
a. Capra/Ovis: mandibulae and loose teeth (A).



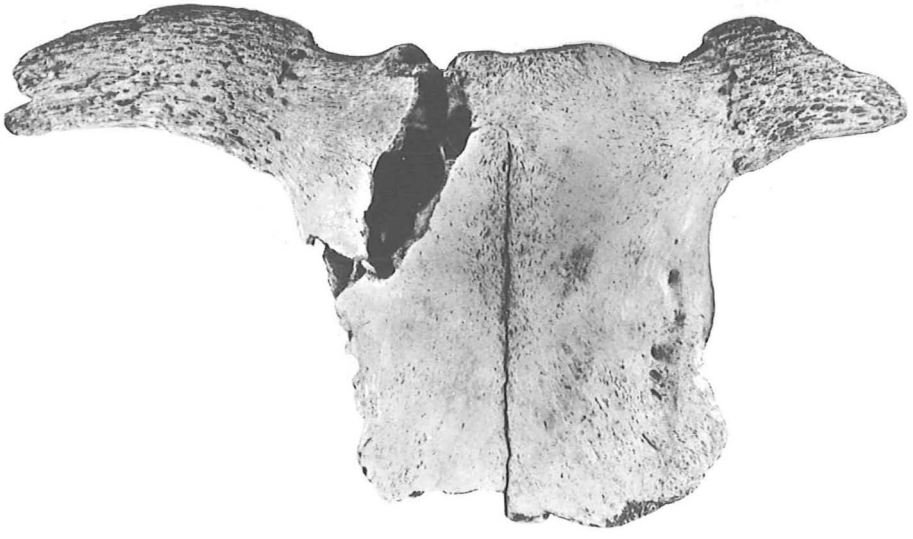
Capra/Ovis: mandibulae with teeth at different stages of eruption (U).



a. Bos taurus: mandibulae with teeth at different stages of eruption (A).

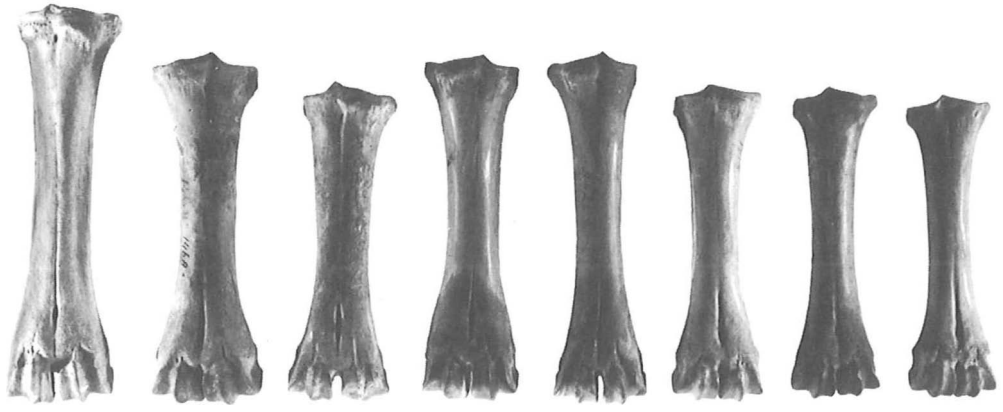


b. Bos taurus: mandibulae, with a set permanent teeth (A).



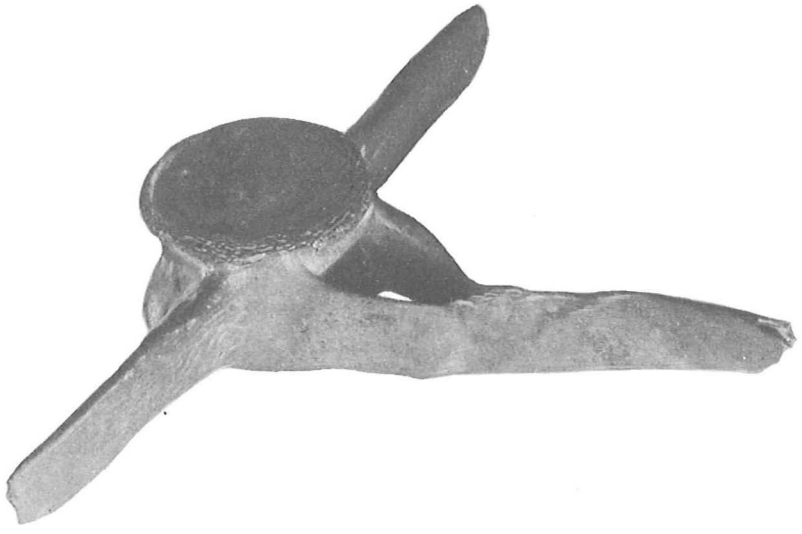
a. Bos taurus: skull fragment (G).

b. Bos taurus: fractured humurus (G).



a. Bos taurus: metacarpal bones (O).

b. Bos taurus: metatarsal bones (O).



a. Phocoena phocoena: vertebra (O).

b. Cetacea: bone fragments (O).

a. Gavia stellata: metacarpus (B).

b. Acipenser sturio: bony plates (O).

c. Mollusca: oister, whelk, unio,
and Cephalopoda: inner skeleton fragments (O).

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