EVIDENCE FOR PROCESSING OF FLATFISH AT RAVERSIJDE, A LATE MEDIEVAL COASTAL SITE IN BELGIUM

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Summary

*The remains of several houses and related structures of a 15th century coastal village have been found at Raversijde, Belgium. Fauna is extremely well preserved and occurs throughout the site, in and outside the houses, in pits, in ditches, etc. A pit with organic and inorganic refuse contained a fine lens near its top with a high concentration of fish remains. They belong almost exclusively to plaice (*Pleuronectes platessa*), whereas the other faunal assemblages from the site comprise a wide variety of fish species. Thousands of plaice remains, belonging to approximately 130 individuals have been investigated and showed that the skeletons are incomplete. Only head and tail elements, together with stomach contents (shells of* Donax vittatus*), have been deposited; cut marks behind the head and near the caudal fin occur frequently. The high concentration of these remains and the absence of admixture with other faunal remains or archaeological objects indicate that the deposit reflects a single event. It is believed that these fish bones are the remnants of processed plaice. The reconstructed size of the majority of the fish is between 30 and 40 cm total length. It is not clear whether the fish bodies have been consumed elsewhere at the site or if they have been further processed for future consumption and export inland.*

Résumé

La préparation de poissons plats à Raversijde, site côtier du bas Moyen Âge en Belgique.

*Les vestiges de nombreuses habitations et structures associées d'un village côtier du XVe siècle ont été découverts à Raversijde, en Belgique. La faune, extrêmement bien préservée, est présente un peu partout sur le site, à l'intérieur et à l'extérieur des habitations, dans des fosses, des fossés, etc. Une fosse remplie de déchets organiques et inorganiques comportait près de la surface une fine couche à forte concentration de restes de poissons. Ceux-ci appartenaient presque exclusivement à la plie (*Pleuronectes platessa*), alors que les autres assemblages fauniques du site se composaient d'une grande variété d'espèces de poissons. Des milliers de restes de plies, représentant environ 130 individus, ont été étudiés et ont montré que les squelettes étaient incomplets. Le dépôt n'était composé que des éléments du crâne et de la queue, ainsi que du contenu de l'estomac (coquilles de* Donax vittatus*); des traces de découpe apparaissent fréquemment à l'arrière de la tête et près de la nageoire caudale. La forte concentration de ces restes et l'absence d'autres restes fauniques ou d'objets archéologiques indiquent un dépôt en une seule phase. Nous pensons que ces ossements de poisson constituent les déchets de la préparation de plies. La reconstitution de la taille indique que la majorité des poissons mesure entre 30 et 40 cm de longueur totale. Nous n'avons pas pu déterminer si les poissons ont été consommés quelque part sur le site, ou s'ils ont subi une préparation plus avancée en vue d'une consommation ultérieure et d'une exportation vers l'intérieur du pays.*

Zusammenfassung

Zur Verarbeitung von Schollen in Raversijde, einer spätmittelalterlichen Küstensiedlung in Belgien.

*In Raversijde, Belgien, sind Überreste einiger Häuser und damit verbundener Strukturen eines Küstendorfes des 15. Jahrhunderts ausgegraben worden. Die Überreste der Fauna sind extrem gut erhalten. Sie kommen im gesamten Siedlungsbereich, inner- und außerhalb der Häuser sowie in Gruben und Gräben vor. Eine mit organischen und anorganischen Abfällen verfüllte Grube enthielt im oberen Bereich eine Linse mit einer großen Konzentration an Fischresten. Sie stammen fast ausschließlich von der Scholle (*Pleuronectes platessa*), während die anderen Faunenensembles ein breiteres Spektrum enthalten. Tausende Überreste der Scholle, sie stammen von etwa 130 Individuen, konnten untersucht werden, wobei festgestellt wurde, daß die Skelette unvollständig sind. Nur Kopf- und Schwanzteile wurden zusammen mit Mageninhalten (Muscheln der Art* Donax vittatus*) deponiert. Schnittspuren hinter dem Kopf und nahe der Schwanzflosse konnten regelmäßig beobachtet werden. Die hohe Konzentration dieser Überreste, das Fehlen von archäologischen Funden und Vermischungen mit anderen Knochenresten belegen, daß die Deponierung auf einmal erfolgt sein muß. Es wird angenommen, daß diese Fischknochen die Überreste weiterverarbeiteter Schollen sind. Die rekonstruierte Länge der Tiere liegt bei 30-40 cm. Es ist nicht klar, ob die Fische am Ort verspeist oder ob sie zum späteren Verzehr, d.h. Export, weiterverarbeitet worden sind.*

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Key Words

Archaeozoology, Fish, Processing, Medieval.

Mots clés

Archéozoologie, Poisson, Découpe, Moyen Âge.

Schlüsselworte

Archäozoologie, Fisch, Verarbeitung, Mittelalter.

Introduction

Archaeological excavations have been carried out in Raversijde (fig. 1) since April 1992 by the Institute of the Archaeological Heritage of the Flemish Community in close cooperation with the Provincial Government of West-Flanders (Pieters, 1992, 1993). A large part of the site is located within the grounds of the Raversijde Provincial Domain and corresponds to the abandoned Medieval fishing-village known in historical sources as "Walraversijde". Archaeological data registered in the sixties and seventies by Mr. E. Cools and Mrs. A. Mortier on the present-day beach have demonstrated that "Walraversijde" goes back in time at least to the period of the 10th to 12th centuries. The village was located on a former coastal island known as "Testerep" which stretched from Westend to Ostend. This long narrow island, which already existed in the 10th century, was separated from the mainland by the Groot Geleed, a creek which flowed into the river Ijzer and which penetrated deep inland roughly parallel with the present coastline in order to join the seashore at the level of Ostend. In the 14th and 15th centuries this former coastal island was ravaged by numerous storm-tides which badly damaged the coastline. Many pieces of land, also at "Walraversijde", disappeared into the sea with their settlements (Choqueel, 1950). During this period habitation had to be moved inland. The construction of the so-called Gravejansdijk can be situated in this context. Works, ordered by Duke John the Fearless, started at the beginning of the 15th century and consisted of a strengthening and heightening of the existing dikes which were converted into one great whole. The excavations, carried out since 1992, are situated in the inland part of the settlement behind the Gravejansdike. Walraversijde prospered mostly in the 15th century. This period of high conjuncture gradually came to an end as a result of religious strives. This historical information (Vlietinck, 1889; Verhulst, 1964) is confirmed by the archaeological data. The numismatic material comprises mainly coins from the period of John the Fearless (1405-1419) and Philip the Good (1419-1467), indicating that the inhabitation of the inland area began with the building of the Gravejansdike at the beginning of the 15th century. The archaeological finds also suggest that this sector was abandoned at the end of the 15th century. This may have been related to the military troubles with Maximilian of Austria, governing at this time in the Franc of Bruges.

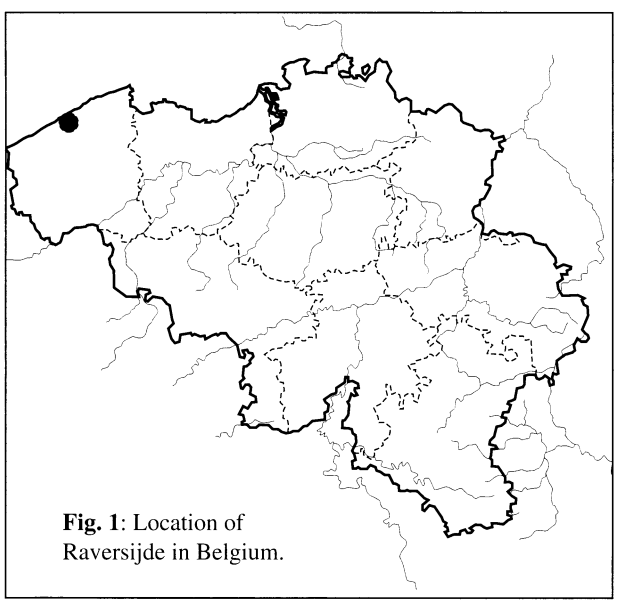

Fig. 1: Location of Raversijde in Belgium.

About 30 ares of the medieval dwelling centre have been excavated thus far, revealing the ground-plan of ten houses (fig. 2). Most of them have a simple rectangular form and are standing parallel to one another. The buildings were probably of wood with a thatched roof and with only the base of the walls in brick. The houses stand on three "dwelling-islands" which are separated from each other by a three to four metre wide ditch. The orientation of the ditch (NW-SE/NE-SW) has determined the orientation of the houses. The supply of drinking water was provided by barrel waterwells. To the east and to the north-east of the buildings, a large rubbishpit has been detected. This pit, with a diameter of several decameters, is surrounded by a belt of smaller rubbishpits. We report here on the fish remains in one of those smaller pits situated to the north-east of building n° 2 (fig. 2).

The pit has a surface of about 10 square metres (fig. 3) and is filled with two completely different archaeological layers. The bottom layer (C) contains few archaeological remnants and consists of clayey sediments reworked by man. The upper layer, about 75 cm thick, black, and with a sandy texture, contains many archaeological remnants: brick fragments, charcoal, pottery, and lots of animal remains. It represents a layer of household refuse. A lens, with a volume of about 21 litres and with a very high concentration of fish remains, was found in the black layer.

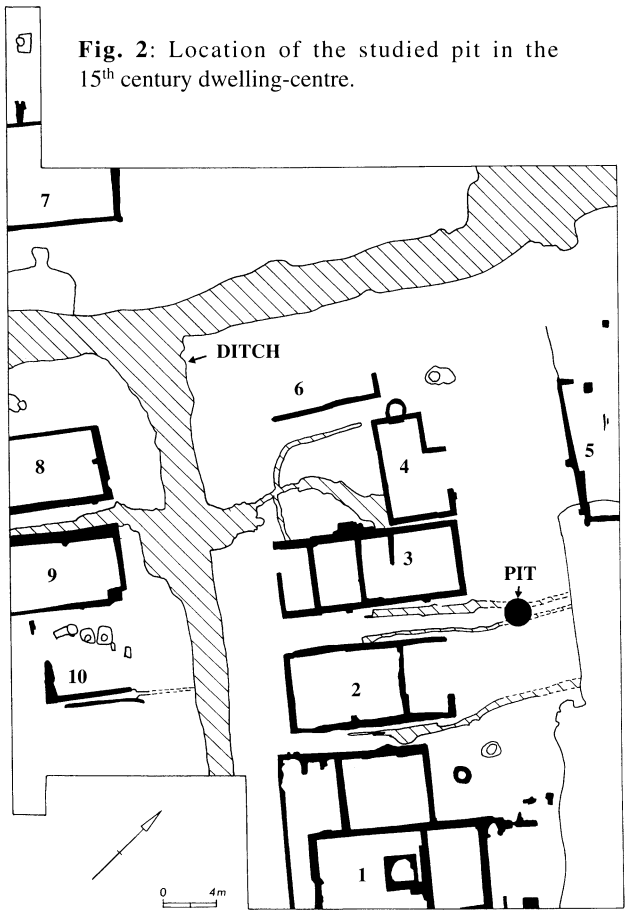

Fig. 2: Location of the studied pit in the 15th century dwelling-centre.

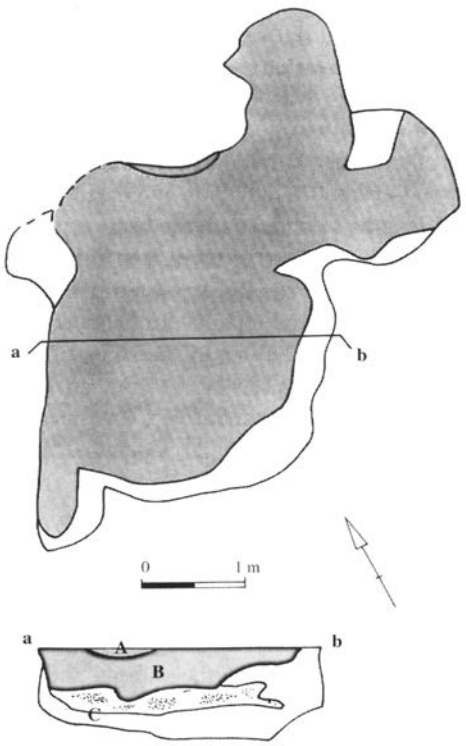

Fig. 3: Schematic drawing of the surface and a cross-section of the 15th century pit: A, lens with high concentration of fish remains; B, black layer; C, bottom layer with reworked clayey sediments.

The bones of this lens (A) have been studied and compared to the fish remains from the black layer (B).

The studied samples

The sediment from the lens had been sampled separately and represented a volume of approximately 21 litres. A residue of 2067 grams was obtained after sieving on a series of meshes ranging from 2 mm to 0.25 mm. Fish bones represented about half of the weight, the rest being mainly coarse sediment particles and mollusc remains. As fish remains were so abundant it was decided to take a sub-sample for analysis. About one third (650 grams) of the material was investigated in detail. In addition, we studied all the fish remains that were hand-collected from the rest of the pit.

Table 1 indicates the number of fish remains identified from the lens and from the layers adjacent to the lens. The high concentration of fish remains in the lens is obvious: this material comes from a volume of approximately 7 litres. In the following paragraphs we will first concentrate on the very abundant flatfish remains from the lens and, then, on the rest of the material.

The plaice remains from the lens

The fish remains from the lens belong almost exclusively to flatfishes of the family Pleuronectidae, and, more precisely, to the group of plaice/flounder/dab. Osteologically these three species are difficult to separate (Heinrich, 1987; Bødker-Enghoff, 1989). We carried out species identifications on the basis of otoliths, right dentaries, urohyals and pterotics, and found that only plaice was present. The intraskeletal distribution of the plaice remains from the lens is indicated in table 2. The minimum number of individuals (MNI) based on the most frequently represented complete element (i.e., the basioccipital) is 39. This figure is for the sub-sample. If we use the number of otoliths from the whole sample (110 right and 102 left specimens) and correct for the underrepresentation of these elements if compared to basioccipitals, then the MNI for

the whole lens can be estimated at about 130.

It was noticed during the analysis of the material that there was not only a strong predominance of one species, but also that there was little variation in the size of specimens. This is illustrated in figure 4 where the greatest widths of the basioccipital are plotted. The approximate corresponding total lengths are indicated. Figure 5 shows the total lengths calculated on the basis of the greatest posterior width of the first vertebra, and using the regression equation published by Bødker-Enghoff (1989). In both cases, most of the total lengths are between 30 and 40 cm. All studied remains belonged to fishes of this size-class with the exception of a few bones from smaller individuals: two caudal and two precaudal vertebrae are from a fish of 7-8 cm long and a basioccipital, a palatine, a branchial element and a precaudal vertebra are from an individual of approximately 15 cm long.

Clues to an explanation for the almost exclusive presence of plaice and for the small variation in size can be found in the intraskeletal distribution (tab. 2) and in the study of the cutmarks. The data from table 2 show that head elements predominate the sample and that vertebrae are heavily underrepresented. Among the precaudal vertebrae, we observed that the first one is best represented and that the second, third and fourth ones become gradually less abundant (see also fig. 6). It was difficult to establish the position of the remaining precaudal vertebrae, especially since the apophyses were often absent. The unidentified precaudal vertebrae listed in table 2 are such centra of which the position could not be established but also include a large number of small fragments (neural arches, apophyses) which may be derived from the anteriorly situated precaudals. We also identified the position of the caudal vertebrae as precisely as possible. The urostyle is best represented, followed by the penultimate vertebrae and the antepenultimate vertebrae. The remaining caudal vertebrae could be separated in two categories, namely those "far from the tail" with heavy haemal arches and those "close to the tail" with lightly built haemal arches. It is obvious that both types of caudal vertebrae are heavily underrepresented if compared to the number of urostyles (see also fig. 6).

Cutmarks were observed in eleven instances on the cleithra. Nine of them were seen midway the bone, two others near the proximal end. Six complete cleithra occur as well. Of the six preserved *os anale* fragments, at least four had been cut through, mostly near the distal end. Numerous transverse cuts were observed on the vertebrae as well. Two second precaudal vertebrae had been cut through as well as 14 other precaudals of which the position could not be established since only small pieces of them were preserved. Among the caudal vertebrae, we observed cutmarks on the urostyle (2 cases), the penultimate vertebra (4), the antepenultimate vertebra (2) and on the other caudals "close to the tail" (6).

The other fish remains

Since the boundaries of the lens were not always very clear, some admixture with sediment from the surrounding layers may have occurred. This probably explains why a relatively small number of bones from other species were found among the plaice remains (tab. 1). These are essentially the same species as those found in the adjacent layers. Dermal denticles indicate the presence of thornback ray and of another ray species. The eel is represented by vertebrae and by some cranial elements of individuals ranging in size from 10 to 60 cm standard length (SL). The majority of the herring bones are from individuals between 15 and 30 cm SL but several remains are from smaller specimens (5-10 cm SL and 10-15 cm SL). Such a large size variation is not observed in herring from Belgian inland sites where the reconstructed sizes are usually between 20 and 30 cm SL. A similar phenomenon has been observed in Germany (Benecke, 1982) and is related to the fact that a selection is made of the herring for the purpose of processing and trade. The three gadid species typical for Belgian sites are present, namely cod, haddock and whiting. The whiting bones are from individuals measuring between 10 and 30 cm SL, whereas the cod and haddock remains fall within the size-range usually observed at inland sites. The haddock bones are from individuals

Table 1: Species list of the pit: A, sub-sample from the lens; B, layers adjacent to the lens. Figures indicate number of fragments.

	A	B
thornback ray (*Raja clavata*)	1	–
ray (*Raja* sp.)	1	–
eel (*Anguilla anguilla*)	9	6
herring (*Clupea harengus*)	44	5
cod (*Gadus morhua*)	–	12
whiting (*Merlangius merlangus*)	3	–
haddock (*Melanogrammus aeglefinus*)	1	4
unidentified gadids (Gadidae)	1	16
unidentified gobiids (Gobiidae)	4	–
plaice (*Pleuronectes platessa*)	183	–
flounder (*Platichthys flesus*)	–	1
plaice/flounder/dab (Pleuronectidae)	9624	110
carp (*Cyprinus carpio* cf. *domestica*)	–	1
total identified	9871	155
unidentified fish	5450	240

Table 2: Intraskeletal distribution of the plaice remains from the studied sub-sample.

NEUROCRANIUM		hyomandibular	91	coracoid	29
ethmoid	36	upper hypohyal	75	postcleithrum	25
nasal	16	lower hypohyal	81	scapula	29
prefrontal	66	interhyale	54	supracleithrum	46
vomer	30	interopercular	86	pectoral lepidotrich	94
frontal	67	opercular	76		
alisphenoid	36	preopercular	26	**PELVIC GIRDLE**	
epiotic	48	subopercular	15	basipterygium	60
exoccipital	76	symplectic	22	ventral lepidotrich	121
opisthotic	7	urohyal	34		
parietal	32			**VERTEBRAL COLUMN**	
posttemporal	55	**BRANCHIAL REGION**		1st vertebra	34
prootic	49	basibranchial I	22	2nd vertebra	30
pterotic	60	basibranchial II	40	3rd vertebra	22
sphenotic	60	basibranchial III	29	4st vertebra	9
supraoccipital	10	ceratobranchial I	42	unidentified precaudal vertebra	100
supratemporal	102	ceratobranchial II	56	caudal vertebra 'far from tail'	24
basioccipital	39	ceratobranchial III	73	penultimate vertebra	20
parasphenoid	34	ceratobranchial IV	47	antepenultimate vertebra	8
		ceratobranchial V	71	other caudals 'close to tail'	15
OROMANDIBULAR REGION		epibranchial I	39	urostyle	25
angular	34	epibranchial II	43	epurale 1	8
articular	82	epibranchial III	54	epurale 2	5
dentary	104	epibranchial IV	55	hypurale 1	16
ectopterygoid	79	hypobranchial I	55	hypurale 2	22
entopterygoid	40	hypobranchial II	64	precaudal or caudal vertebra	30
maxilla	96	hypobranchial III	64	rib	59
metapterygoid	9	pharyngobranchial I	39		
palatine	63	pharyngobranchial II	58	**MEDIAN FINS**	
premaxilla	86	pharyngobranchial III	66	anal or dorsal lepidotrich	233
quadrate	72	pharyngobranchial IV	48	anal or dorsal pterygiophore	204
loose jaw teeth	262	unidentified branchial elements	54	1st anal pterygiophore	6
		gillraker	52	caudal lepidotrich	986
HYOID REGION		loose branchial teeth	1819		
basihyal	37			**OTHERS**	
branchiostegal	494			sagitta	65
ceratohyal	65	**PECTORAL GIRDLE**		scale	20
epihyal	74	cleithrum	142	unidentified lepidotrich	1350

between 40 and 60 cm SL, the cod bones are from fish between 80 and 110 cm SL, and, in one instance from a smaller specimen of 50-60 cm SL. Remarkable among the flatfish remains from the bottom layer of the pit is the high number of anal bones (8 out of 36 remains). All the foregoing data indicate that we are dealing with another type of refuse (kitchen or table refuse) than the material from the lens (butchery refuse). The black layer (B) of the pit yielded still another interesting find: a typical opercular bone from a domestic carp of 30-40 cm SL was found.

Processing of plaice for local consumption or for export?

The preponderance of head and tail elements and the location of the cutmarks behind the head and close to the caudal fin indicate that we are dealing with the remnants of processed fish. Heads and tails were systematically cut off (fig. 7) and deposited whereas the fish bodies where removed. The faunal remains also comprised a large number of shells of *Donax vittatus* which are believed to represent the stomach contents of the processed plaice. The high concentration of bones in the lens of the pit,

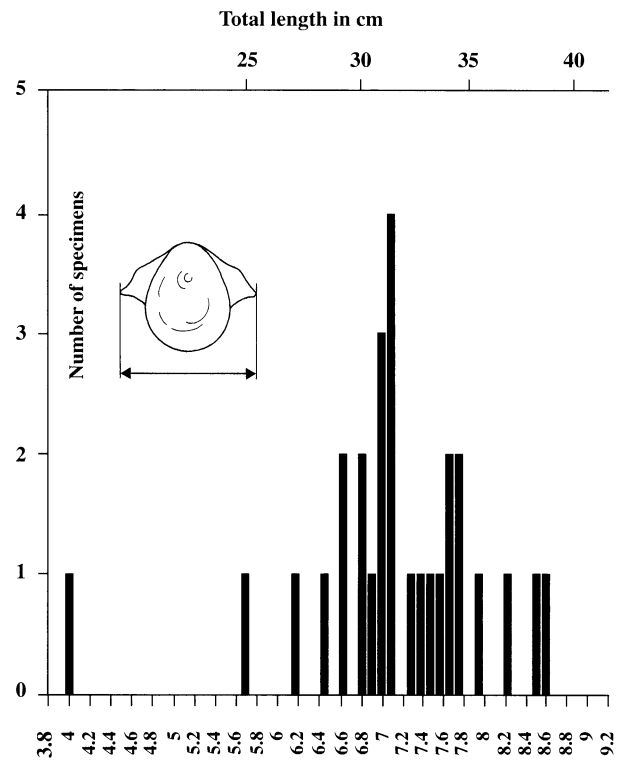

Fig. 4: Size distribution of the plaice based on the greatest width of the basiocccipital. The corresponding total lengths are indicated.

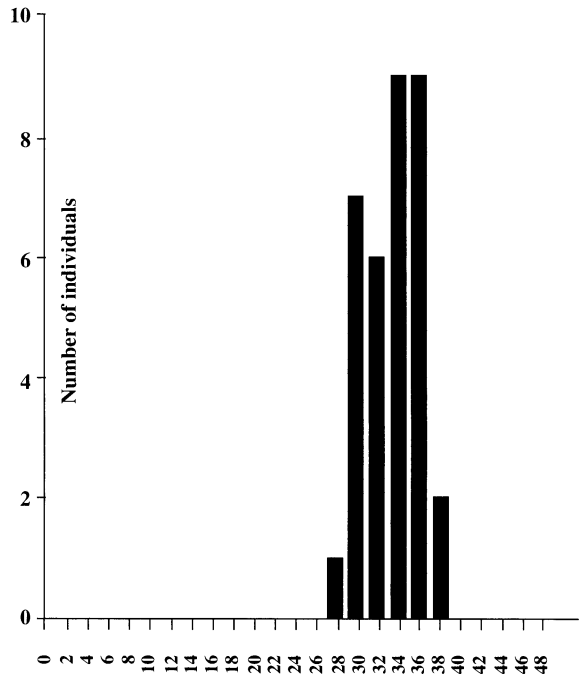

Fig. 5: Length distribution of the plaice based on the greatest posterior width of the first vertebra, using the regression equation of Bødker-Enghoff (1989).

belonging to about 130 individuals of similar size, is considered to reflect a single event. The systematic way in which this large number of fish of a single species were processed may indicate that they were prepared for other purposes than immediate, local consumption. Flatfish are presently still sold at the Belgian coast as beheaded dried fish, in which case, however, the tail is still attached. During the drying process, flatfish are suspended by a rope attached around the base of the caudal fin. The fact that tails were also cut off during the processing of the plaice from Raversijde seems to contradict the practice of drying. It is not excluded, however, that the processed plaice were suspended in another manner during drying than is done today.

Previous work on the fish remains from Raversijde yielded some possible evidence for the export of fish to inland sites. The inhabitants from Raversijde consumed the commercially less attractive species as well as the smaller specimens of the valuable species. The cod bones found in other parts of the site tend to be much smaller than those recovered from contemporaneous inland sites (Van Neer and Ervynck, 1994). Further research on this coastal village and on contemporaneous inland sites will be necessary to further substantiate our hypothesis that the processed plaice were meant for export. Thus far Raversijde did not yield contexts with only skeletal parts from the bodies of plaice but it is not excluded that future excavations will reveal such assemblages in household refuse. We believe, however, that the narrow size range of the plaice has to be considered as an indication for fish intended for export (Benecke, 1982). Thus far, we have no contemporaneous inland sites with large numbers of plaice remains (Van Neer and Ervynck, 1994) but on most of them, flatfish are represented by both cranial and postcranial elements. Better samples will be necessary in order to evaluate whether there is an underrepresentation of head and tail elements in kitchen refuse from late medieval towns, castles and abbeys further inland. Possibly, the find

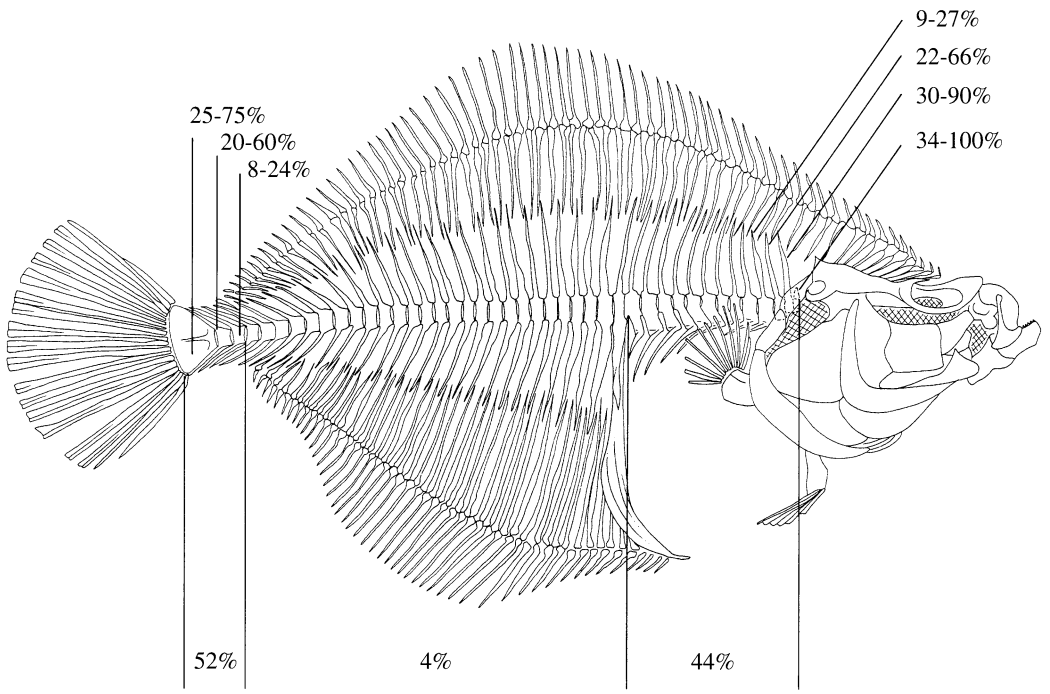

Fig. 6: The relative abundance of the different vertebrae in the sub-sample when the number of first vertebrae equals 100%.

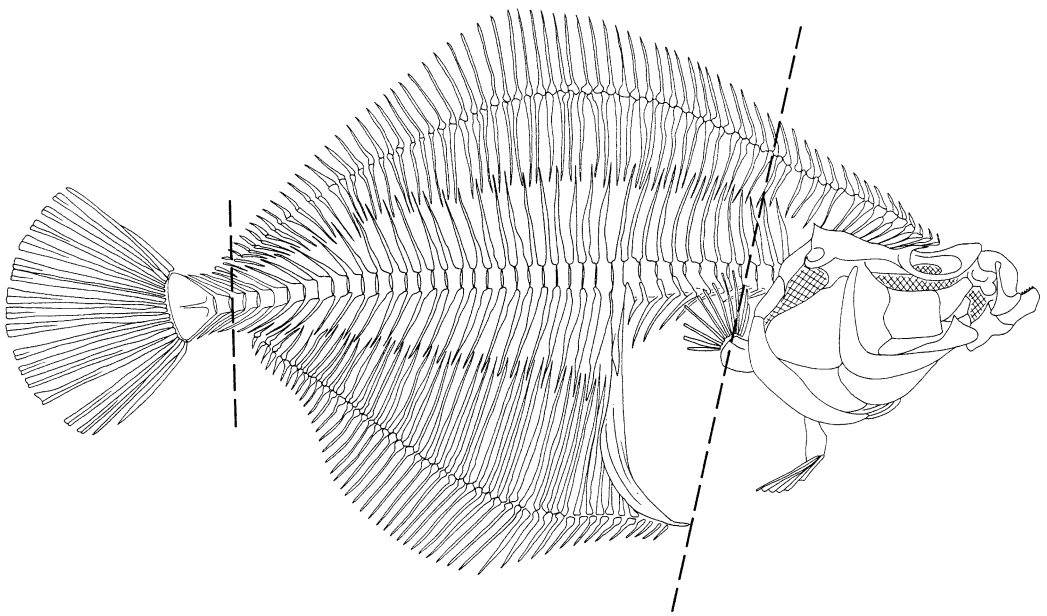

Fig. 7: Approximate levels at which head and tail of plaice were cut off.

of a carp bone may also be interpreted as a result of commercial relationships. Since there was certainly no dearth of fish at the coastal village, we are tempted to consider the carp as a curiosity that was brought to the village from an inland site, probably an abbey, where marine fish was delivered. An alternative explanation for the presence of this domestic species may be that it had been captured in the "Sluisvaart", a small watercourse formerly flowing in the North Sea at about 1.5 km south-west of the site. Today there is plenty of eel (also found at the site) and carp in this small river. If we accept that the carp came from nearby, this would mean that the species was already abundant in waters other than ponds by the middle of the 15th century. However, carp remains of this age have been attested on a few Belgian sites only which may indicate that the species was not yet widely distributed.

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Bibliography

BENECKE N., 1982.– Zur frühmittelalterlichen Heringsfischerei im südlichen Ostseeraum - ein archäozoologischer Beitrag. *Zeitschrift für Archäologie,* 16 : 283-290.

BØDKER-ENGHOFF I., 1989.– Fishing from the Stone Age settlement Norsminde. *Journal of Danish Archaeology*, 8 : 41-50.

CHOQUEEL A., 1950.– *Les civilisations préhistoriques et anciennes de la Flandre Occidentale d'après l'examen d'objets leur ayant appartenu*. Bruxelles : Editions du Temple.

HEINRICH D., 1987.– Untersuchungen an mittelalterlichen Fischresten aus Schleswig, Ausgrabung Schild 1971-1975. *Ausgrabungen in Schleswig, Berichte und Studien*, 6 : 1-222.

PIETERS M., 1992.– Archeologisch onderzoek te Raversijde (stad Oostende, prov. West-Vlaanderen) Interimverslag 1992. *Archeologie in Vlaanderen*, 2 : 247-264.

PIETERS M., 1993.– Laat-middeleeuwse landelijke bewoning achter de Gravejansdijk te Raversijde (stad Oostende, prov. West-Vlaanderen) Interimversag 1993. *Archeologie in Vlaanderen*, 3 : 281-298.

VAN NEER W. and ERVYNCK A., 1994.– New data on fish remains from Belgian archaeological sites. *In* : W. Van Neer ed., *Fish exploitation in the past*. Tervuren : Annales du Musée Royal de l'Afrique Centrale, Sciences Zoologiques, 274, p. 217-229.

VERHULST A., 1964.– *Het landschap in Vlaanderen in historisch perspectief.* Antwerpen.

VLIETINCK E., 1889.– Walraversijde. Een gewezen visschersdorp op de Vlaamsche kust. *Rond de Heerd*, 23-24 : 1-69.