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Fish bones from excavations at Alms lane, Norwich

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Introduction

Excavations at Alms Lane have provided an excellent opportunity for examining fish remains from medieval Norwich. The site underwent major changes in use, beginning as a dumping ground for iron waste (periods 1-3) and developing into a intensely occupied area of the town (periods 4 onwards). It has been possible to examine both the general characteristics of the fish consumed by people in medieval Norwich and to look closely for diachronic and spatial differences in fish exploitation.

During the excavation samples of many layers were examined for fish bones and other small remains by sieving soil samples to 1 mm using a modified Sīrāf sieving tank (Kenward, Hall and Jones 1980). Each sample weighed approximately 15 kg (roughly one 12 litre bucketful), accurate records of sample weight were not taken. An attempt was made to sample as many layers as possible in order to analyse the distribution of fish bones by phase and context type. A total of 244 samples were collected and processed; 166 (from 152 contexts) produced 3315 identifiable fish remains. Over 100 identifiable bones were collected from phases 3-11 (inclusive).

Two contexts stand out as different from the majority. Context 2422 was a large stone rubble-lined pit from tenement A filled in phase 11. This cesspit was one of the few which contained occupation debris; most pits were back-filled rapidly with building rubble. Twelve separate samples were collected from a central column in the fills of cesspit 2422

in order to examine changes in the numbers and kinds of fish remains deposited during the filling of the feature. Context 1520 comprised the fill of a green glazed pottery vessel apparently found *in situ* within building C1. Although found on a hearth there was no sooting on the outside of the vessel which may indicate that it was not being used as a cooking pot at the time it was abandoned. The fills of the pot were carefully removed and sieved for small bones and other remains.

The majority of the bones were identified by the author during the course of the excavation. Difficult determinations, e. g. cyprinid pharyngeal bones, were checked by Mr A. C. Wheeler of the British Museum (Natural History). A group of small samples were recently identified using the reference collection of the Environmental Archaeology Unit, University of York. The identifications were processed using the computer database management system 1022. A full list of identified bones with their measurements is given by context and phase in microfiche. The generic and specific nomenclature of fish follows Wheeler, 1969.

Results

The assemblage of fish bones collected from this site was dominated by remains of marine fish. Almost two thirds of the identifed bones were from adult herring, *Clupea harengus* L. In addition, substantial numbers of remains from cartilaginous fish, Elasmobranchii, eel, *Anguilla anguilla* L., whiting, *Merlangius merlangus* (L.), cod, *Gadus morhua* L., and flatfish, Pleuronectidae, were present. At least two species of cartilaginous fish were present; spur-dog, *Squalus acanthias* (L.), and thornback ray, *Raja clavata* L. A few marine species were represented by small numbers of bones, e. g. sprat/young herring, cf. *Sprattus/Clupea*,

haddock, Melanogrammus aeglefinus (L.), ling, Molva cf. molva (L.), mackerel, Scomber scombrus L., gurnard, Triglidae, horse mackerel, Trachurus trachurus (L.) and sole, Solea solea (L.). Sprats or young herring were identified by 21 vertebral centra and a group of small scales. The vast majority of the sprat/young herring remains were found in the fill of the pottery vessel, context 1520, these are recorded in Table 00 as Clupeidae. Some vertebrae were identified as ?sprat. In order to prepare the rank order diagrams the numbers of bones identified as small Clupeidae and ?sprat were added and designated '?sprat'.

Exclusively freshwater fish, pike, Esox lucius L., cyprinids (including roach, Rutilus rutilus (L.), and tench, Tinca tinca (L.)) and perch, Perca fluviatilis L., represent only 2% of the identified bones. Of the fish which live in salt or freshwater eel was present in substantial numbers; salmonid, Salmo sp., and stickleback, Gasterosteus aculeatus L., bones were very rare.

The diversity of the fish assemblage (number of taxa present in each phase) was plotted against the number of samples (fig 01). Figure 01 clearly shows that the number of taxa present is positively correlated to the number of samples examined. At approximately 15 samples the curve levels off, indicating that phases with less than 15 samples are likely to contain only the most common fish remains.

The data have been analysed by phase (see table 01). At first sight there did not appear to be any significant deviation from the pattern described above for the site as a whole. The early phases (1-3) contained rather fewer bones than phases 4-11, the periods of most intense occupation. Only the most common taxa were present in the phases 1 and 2. There did not appear to be any major change in the kinds of fish present on the site during phases 4-11. However, there were some small variations

in the numbers of less common taxa (pike, cyprinids, haddock, ling, perch and sole), but the abundant fish, herring, whiting, cod, eel and flatfish, appeared in greatest numbers in all phases. Domestic dwellings were not constructed on the site until phase 5, a period when fish remains were found to be more abundant.

The bones were recovered from a large number of different kinds of features. These were grouped into three categories: pits, layers laid down within buildings (including hearths), and miscellaneous layers e.g. yards deposits. As the site was divided into tenements it was also possible to examine the distribution of fish bones by feature kind and tenement. Details showing how the samples were grouped are given in table 00 in microfiche.

Tenement A encompassed pit 2422 which produced a large number of bones. While there did not appear to be any significant differences in the numbers or kinds of bones deposited as the feature was filled, a relatively large number of bones from exclusively freshwater fish (pike, roach, tench and perch) were present. In this context it seems likely that the stickleback bone was also from a fish caught in freshwater. The other pits from this tenement produced small groups of bones typical of the overall assemblage.

Tenement B produced very few fish bones from pits while the pits in tenement C are characteristic of the site in general. During phase 9 an area on the Muspole Street frontage (plot 3) is thought to have been used as an alehouse and included two cesspits. The fish bones from this area of the site were unexceptional.

The kinds of fish bones recovered from layers laid down with houses in both tenements A and B (phases 4-7) conform to the pattern obseerved for the site as a whole. However, the absence of fish remains in houses in phases 8 onwards in both tenements is notable.

Building C1 is particularly interesting because it contains context 1520, a pot the fill of which included a large number of fish remains. Bones from the heads of at least 8 adult herring together with sprat/young herring vertebrae and scales dominated this assemblage. When the pot was emptied it was clear that herring remains were concentrated at the base of the vessel. The bulk of the fill of the pot produced a small number of bones. Unfortunately, it was not possible to separate the bones from the basal fill from those found in the body of the pot, but it is thought that the small number of non-herring bones came from the soil filling the vessel.

Miscellaneous deposits (i.e. those that were neither pit-fills nor deposits within buildings) from all tenements produced fish bone assemblages typical of the site.

The size of the fish present in the deposits has been assessed by comparing archaeological remains with bones of modern specimens of known length. A total of twelve whiting dentaries (lower jaw bones) were measured using vernier calipers. The measurement taken was the depth of the dentary as described for cod by Wheeler and Jones (1976). A group of 17 modern whiting dentaries from fish of known total length were aslo measured and their dentary depth plotted against total length of the fish (fig 02). The modern whiting ranged from 10 cm to 44 cm total length. A regression line was fitted to the plot and the length of the archaeological fish estimated. The length of the fish was found to be highly positively correlated with the depth of the dentary bone (r =

0.996). The smallest whiting from Alms Lane was approximately 28 cm long while the largest measured in the region of 63 cm total length. The majority were between 30 and 45 cm long. Table 00 gives the measurements and estimated lengths of the archaeological specimens. Using a graph showing the relationship of cod premaxillae size and fish length (Wheeler and Jones, 1976) the 5 cod premaxillae (upper jaws) were sized. Four of the cod were large fish (90-105 cm total length) with one smaller animal approximately 45 cm long. Measurements of cod vertebrae indicate that the majority of the fish measured between 50 and 100 cm total length. Bones of both the head and body suggest that whole fresh fish were imported. Details of other measured bones are available from the archive of fish records. All the other fish represented at Alms Lane appear to be from animals of average size.

Discussion

There can be little doubt that the medieval and post-medieval occupants of the Alms Lane site ate a large amount of herring, and that marine fish, notably cartilaginous fish, whiting, cod and flatfish, figured as a prominent dietary ingredients. Bones of all the marine fish present at Alms Lane were also found in excavations at Great Yarmouth (Wheeler and Jones 1976), and it seems probable that fish were imported from the East Coast. (Details of the biology, fisheries and problems of differential preservation of the principal species are discussed in the Great Yarmouth report.)

Eel appears to be the only fish which was locally available and consumed in large numbers. Exclusively freshwater fish appear to have been insignificant as a major food item, although they must have added

occasional interest to medieval fare.

The numbers and kinds of fish bones deposited at Alms Lane do not show many changes through time, neither do they vary greatly with the type of layer sampled. Even the influx of Dutch immigrants did not appear to have influenced the kinds of fish remains incorporated into deposits on the site. This suggests that during the whole of the medieval occupation herring, whiting, cod, eel and flatfish were the most important food species, and that the remains of these fish were scattered indiscriminately across the site.

Evidence from Whitefriars Street Car Park (421N), Pottergate (149N), The Lower Close (300N), Botolph Street (281N) and Bacon House (172N) (table 00) shows that this pattern was characteristic for much of medieval Norwich.

It is interesting that the Whitefriars Street Car Park (421N) material is so similar to the occupation sites. At Whitefriars Street Car Park (421N) the bones were collected from deposits forming the river bank, a situation where rubbish from many households may have been mixed with remains of animals which died in the river. It therefore appears from the present study that the Whitefriars Street Car Park (421N) assemblage was composed mainly of domestic fish refuse.

While the general characteristics of the fish assemblage from Alms Lane did not appear to show major changes, localized differences in the abundance of some species, and the distribution of bones in deposits of different kinds have been revealed.

Some of these differences may be artefacts of the sampling and analyses. For example, whiting, a species which is present in almost every phase, is most abundant in phases 4 and 5, perhaps suggesting a

greater consumption of this species. By contrast, whiting bones were less common in pit 2422 than in most other context groups.

Relatively large numbers of remains of freshwater fish recovered from pit 2422 and may reflect a preference for these animals. Pike, tench, roach, perch and stickleback are today present in the Wensum. It is impossible to be certain that all these fish were eaten, in particular, the stickleback is likely to have been discarded with the entrails of a larger animal.

Fishing for freshwater fish was governed by local laws for in 1292/3 there is a mention of illegal nets being set across the river at Surlingham (Hudson, 1892). The Rolls of Pleas for 1350 mention a certain 'David fishmonger' who was a dealer in freshwater fish (Hudson, op. cit.). In the same work in 1390/1 there is a mention of perch, roach and pike being stolen. These references make it clear that freshwater fish were taken from the Wensum in substantial numbers - sufficient to occupy at least one fishmonger. The number of bones of freshwater fish recovered from Alms Lane is small compared to the numbers of bones from marine fish. The implication must be that the fish bones collected from this site are but a small fraction of the bones brought onto site during the periods investigated. In this light species which occur as small numbers of bones reflect the diversity of fish species consumed, but it would be unwise to attempt to assess their significance in people's diet.

The most clear change in bone distribution is to be found in tenements A and B. There appears to be a change in the kind of deposits which contained fish remains. Until phase 8 most fish bones were found on floors or in other layers within buildings. In phases 8-11 fish remains were only recovered from pit fills located outside buildings. This may indicate a deliberate attempt to keep houses clean and concentrate rubbish

disposal in pits. There is unequivocal evidence that rubbish was carted off the site from period 11 onwards (see p.) and it is likely that much rubbish was removed from the site at earlier periods.

Conclusions

The pattern of fish consumption does not appear to have changed from the beginning of the mid 12th and mid 18th century, a period in which saw the transition of the site from a suburban derelict wasteland to a intensely occupied part of the town. This remarkable discovery has been made possible because of a excavation strategy which included an extensive sampling program combined with well-defined phasing and archaeological interpretation.

Acknowledgements

The bulk of the samples were sorted by volunteers on the excavations in Norwich during periods of wet weather. We gratefully acknowledge the finacial assistance of the Deparment of the Environment during the study.

References

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Table 00

Measurements of whiting dentaries from Alms Lane, Norwich

Context number	Measurement in mm	Approximate total length in cm
1039	3.4	33
272	4.2	40
275	4.3	41
1520	3.2	31
1405	4.8	45
1488	4.3	41
1489	6.8	63
281	2.85	28
742	3.2	31
1296	3.2	31
272-860	5.1	47
34	2.8	28

The total length of whiting has been calculated by using the formula T.L. = (M X 8.93) + 2.49.

Where T.L. = total length in centimetres, M = dentary depth in millimetres, 8.93 = the slope of fig. 00, and 2.49 = the intercept of the regression line in fig. 00.

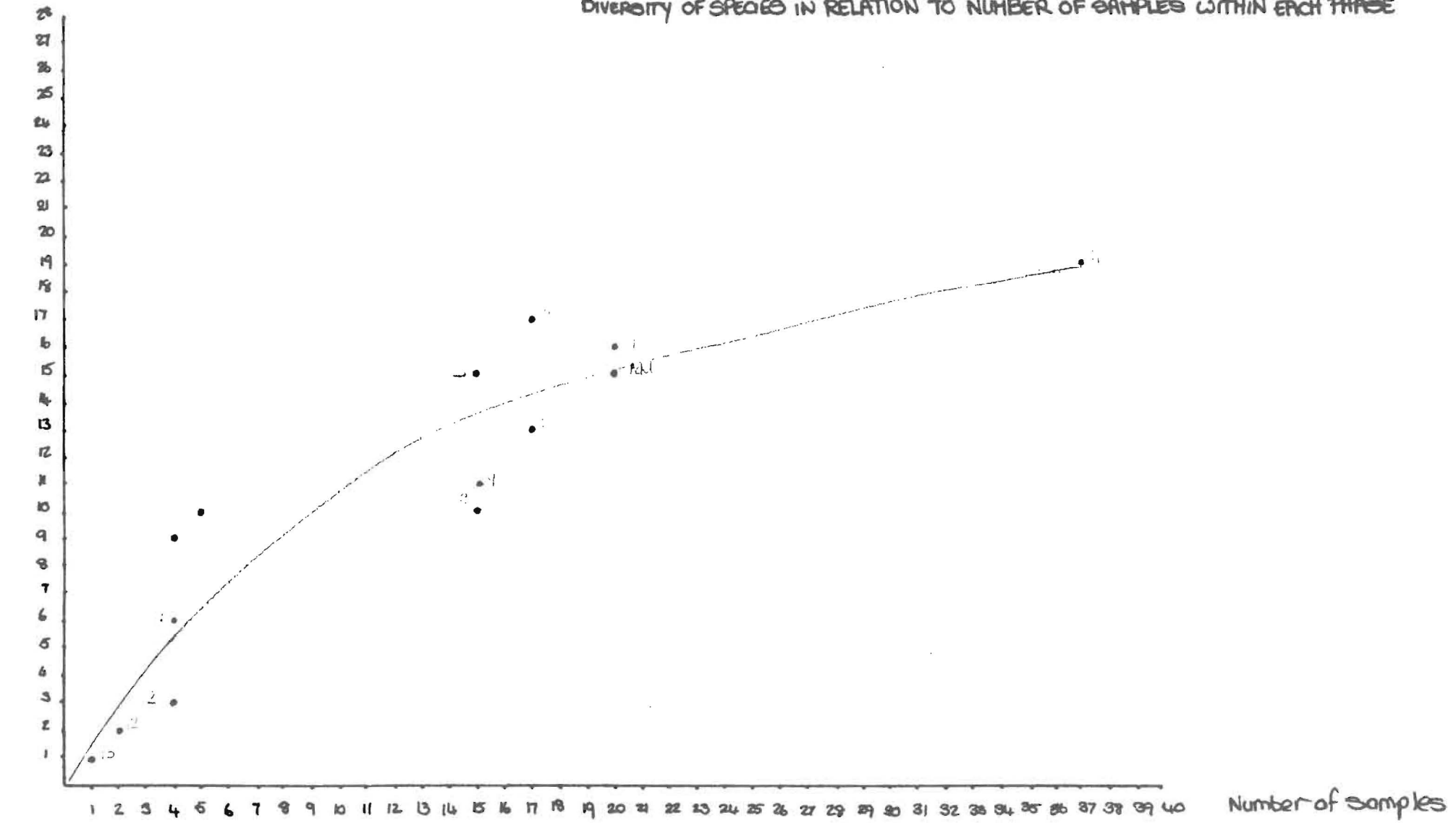
The regression statistics and the correlation coefficient (r) were calculated using the computer package STATPACK.

March, 1984

Fig 01

ALMS LANE - 302 N

DIVERSITY OF SPECIES IN RELATION TO NUMBER OF SAMPLES WITHIN EACH PHASE

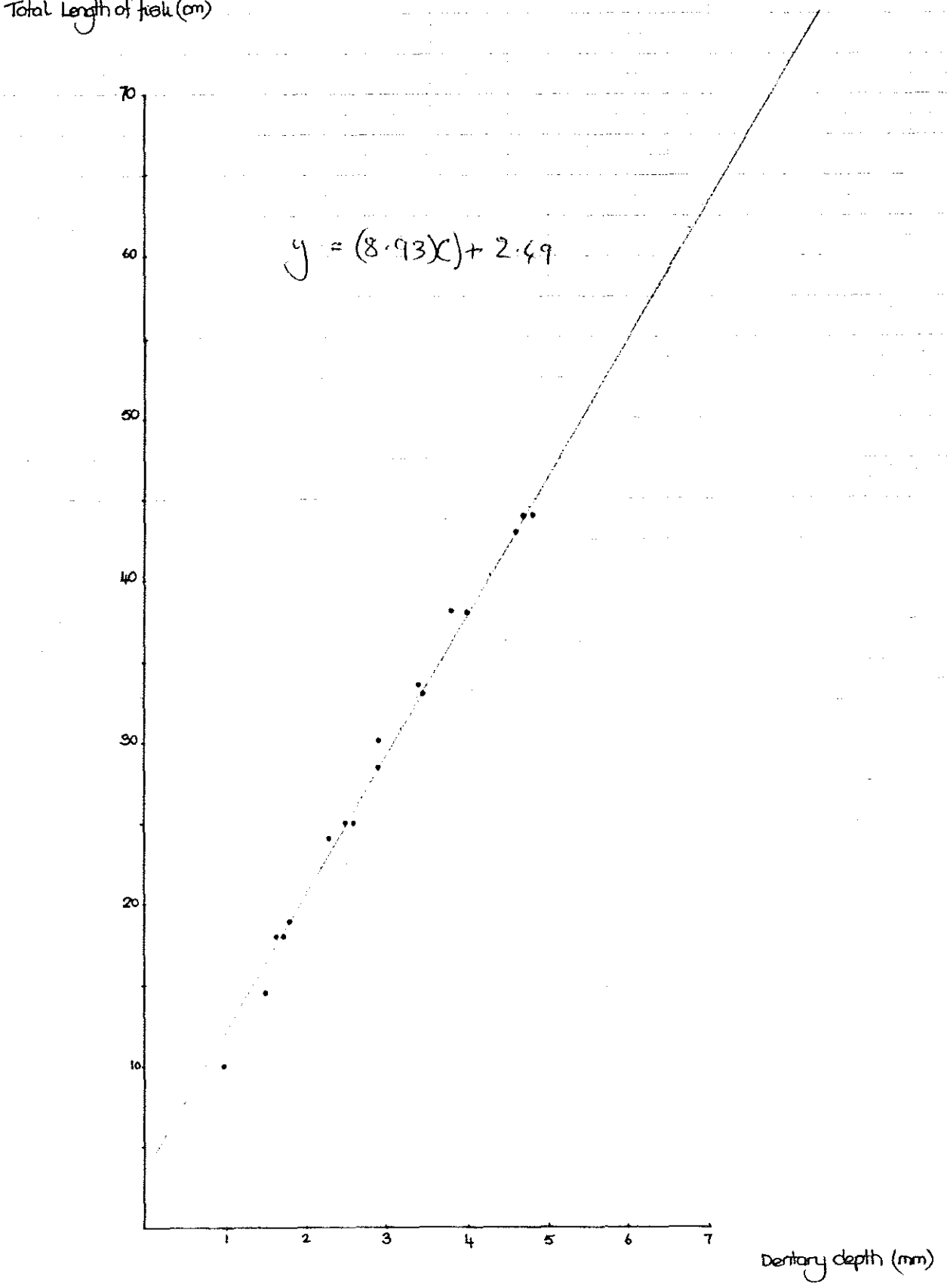


302N Table 01

TOTAL NUMBER OF BONES FROM EACH PHASE

Total Number of bones 3,315	EUROPEAN BRANCHIA	BAR DOG	THORNBACK RAY	CLUPEIDAE	SPRAT	HERRING	SALMONIDAE	PIKE	CYPRINIDAE	TENCH	ROACH	EEL	GADIDAE	WHITING	COD	HADDOCK	LING	PERCH	HORSE MACKEREL	MACKEREL	TRIGLIDAE	STICKLEBACK	PLEURONECTIDAE	PLAICE	SOLE
PHASE 1						14						1	1	2	8					2 1					
PHASE 2	1		1			34							1		2 3					1					
PHASE 3	3		8			168 8	1					11 1		10 3	16 8					2 2	1		6		
PHASE 4	5 2	1	9	14 #100	4	289 195		1	7 2			27 2	9	40 12	35 11	3			1	5 1			17 2	1	2
PHASE 5	3	1	2			113 8		P	1			10	1 2	72 11	14 2		3	1		1			19 3	1	
PHASE 6	5		5	1		131 14			1			21	3 1	10 2	8 2		1			2			13		2
PHASE 7	4 1	1	1 4		1	262 30		1	7 1			36 2	6	16 7	22 2	1 1				3			8 1	1	1
PHASE 8	1		4			71 1					2 1	11 2	1	12 2	9	1				4			1		
PHASE 9	3		5			150 18			1		3 3	28 3		20 1	10 4	1 1				5 1			12		
PHASE 10	5		1			83 4			3 2			3			2	1							1		2
PHASE 11	8		1	1		355 109		1 1	3	1 3	2 9	24 4	2 1	3 2	6 10			1 3		9 2		1	18 4	1	
PHASE 12																—							1 2		
PHASE 13						1 4																			
ADDITIONAL-15	3		1			79 1		2	1			23 2	2	7 1	6 2	3	1	1 2		1			10		
TOTAL	47	3	43	12	11	2176	1	7	28	4	20	212	30	233	184	12	5	8	1	42	1	1	118	4	7

RELATIONSHIP BETWEEN DENTARY DEPTH AND TOTAL LENGTH OF FISH IN WHITING ~~FROM NORWICH~~ = 302 N.



r = 0·996

* ALSO STURGEON, SHAD, SMELT, JOHN DORY, TURBOT – <1%.
§ CONGER EEL – 3.7%.
† ALSO SMELT – 1.3%.

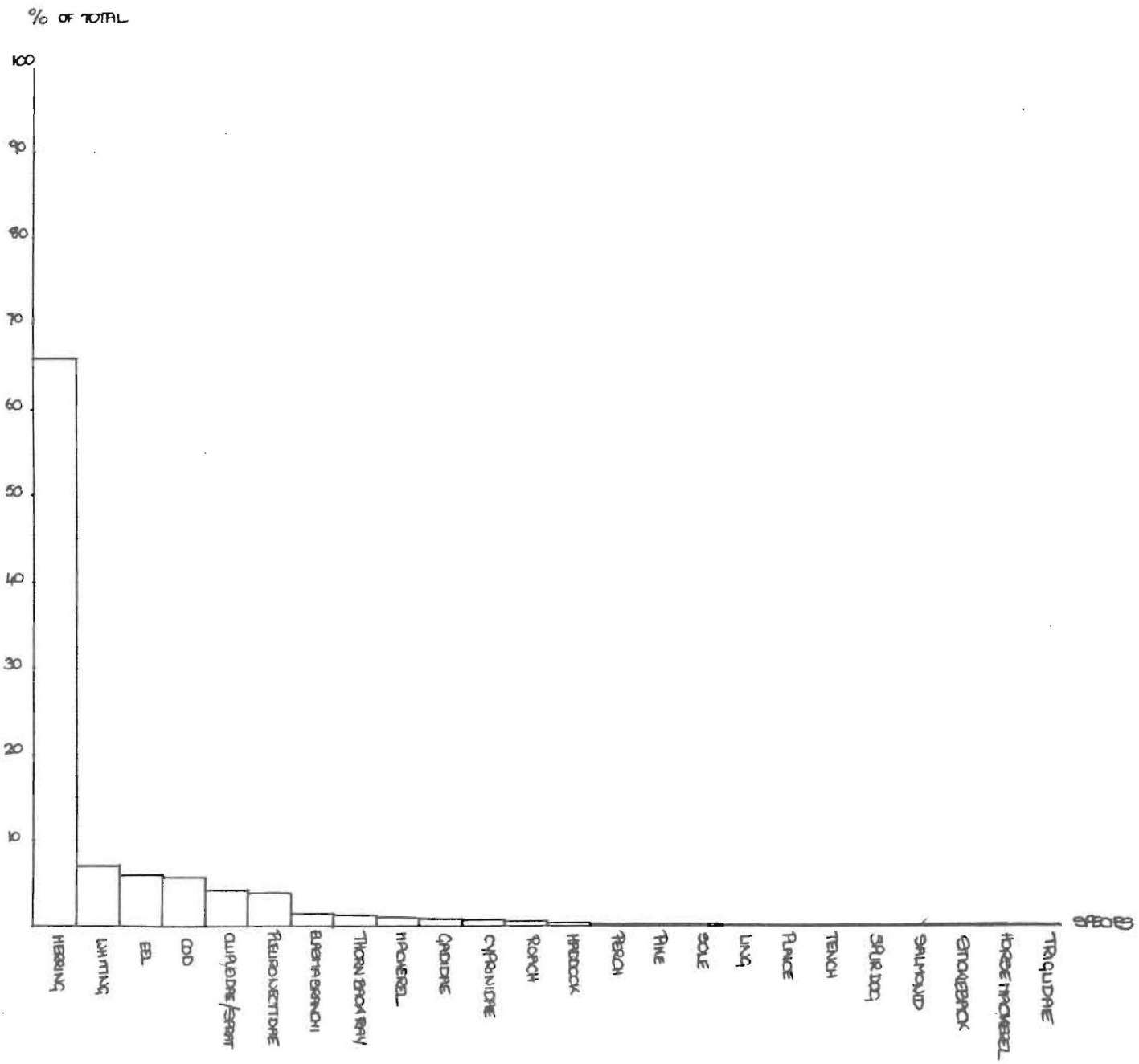
TABLE 00

% OF SPECIES FROM VARIOUS SITES

	ELASMOBRANCHII	BAR. DOG	THORNBACK RAY	CLUPEIDAE	SPRAT	HERRING	SALMONIDAE	PIKE	CYPRINIDAE	TENCH	ROACH	EEL	GADIDAE	WHITING	COD	HADDOCK	LING	PERCH	HORSE MACKEREL	MACKEREL	TRIGLIDAE	STICKLEBACK	PLEURONECTIDAE	PLAICE	SOLE	BASS
ALMS LANE 302N 3315	1.4	<1	1.3	3.7		65.6	<1	<1	<1	<1	<1	6.4	<1	7.0	5.6	<1	<1	<1	<1	1.25	<1	<1	3.6	<1	<1	
WHITEFRIARS 412N 507	3.2		1.0			56.6	<1	<1	<1			8.5	<1	9.1	8.5				<1	1.0			7.9	<1		<1
POTTERGATE 149N 1514	3.6		<1			58.6		<1	3.8		<1	19.8		4.0	3.6			1.3		1.4			4.6		<1	<1
LOWER CLOSE 300N 655	1.1		1.1			82.9						1.5	<1	2.1	7.5	<1			<1	1.7			1.4			
BOTOLPH ST. 281N 367	1.9		1.9			70.3		<1	5.7		<1	5.2		1.6	3.0			<1		<1			7.9			
BACON HOUSE 112N 457	3.5		2.0			59.3	<1	<1	1.8		<1	6.1		16.4	2.8		<1	1.1		<1			4.4			
* WESTMINSTER ABBEY 402	<1		<1			23.1		<1	3.0			7.5		17.2	6.7	4.5	<1			<1	<1		19.4	2.2	4.7	2.2
† PERTH HIGH ST. 219	2.3					54.3	2.3					2.7			5.5	7.8	<1						22.8			
HAITHABU 12 912																										
TOTAL																										

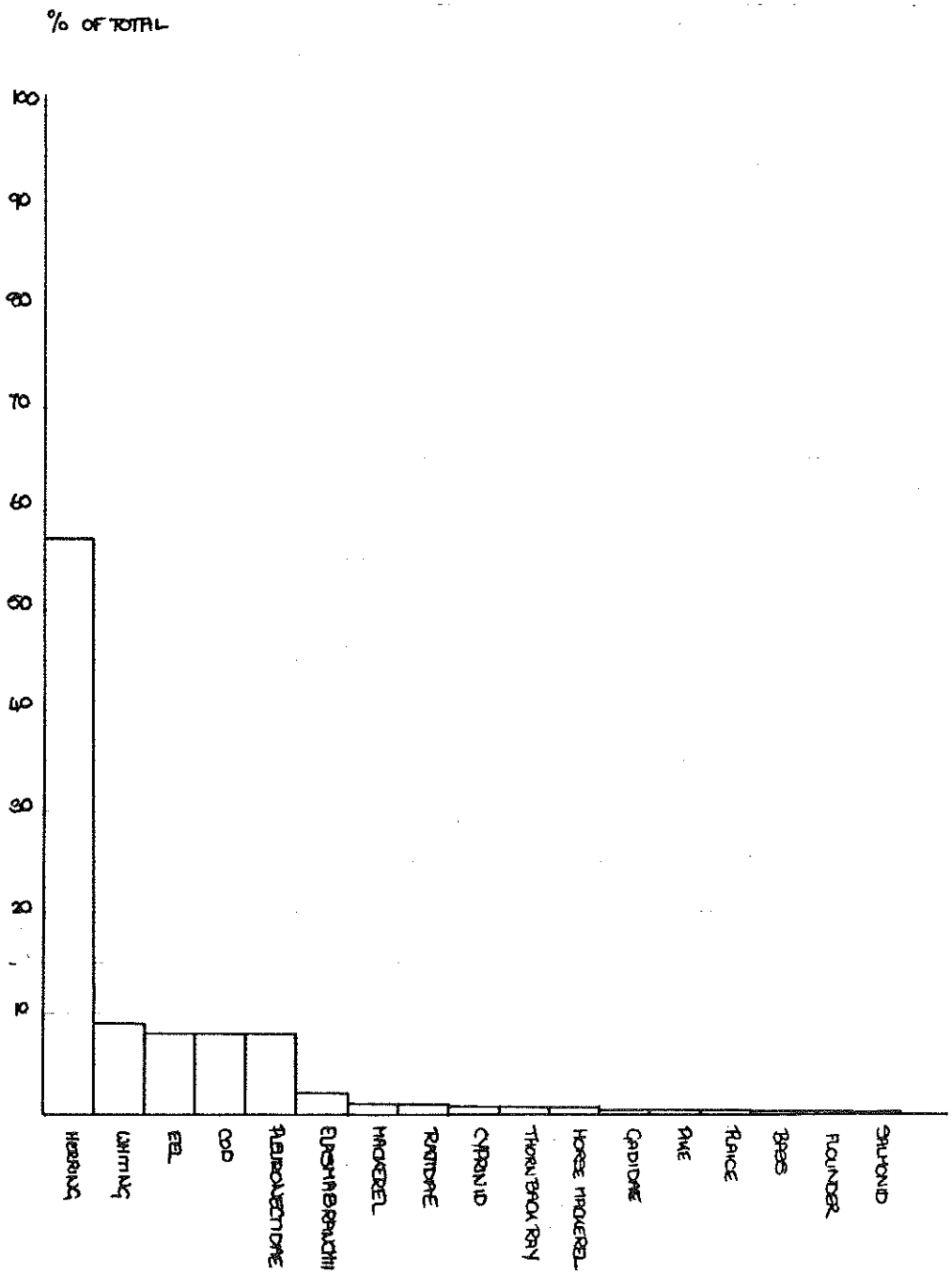
ALMS LANE 302 N

% OF SPECIES IN RANK ORDER OF ABUNDANCE



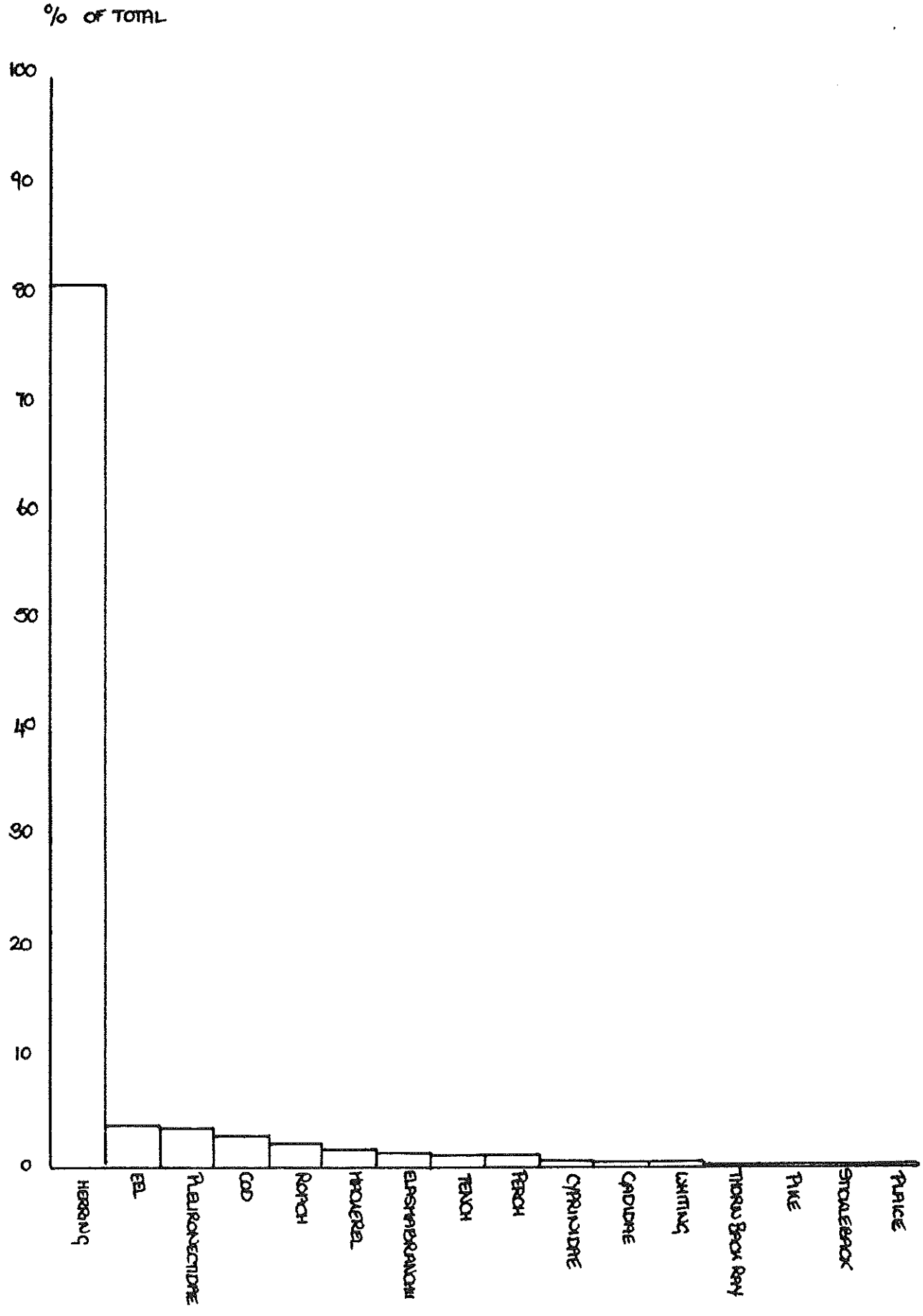
WHITEFRIARGATE - NORWICH

% OF SPECIES IN RANK ORDER OF ABUNDANCE



CONTEXT 84

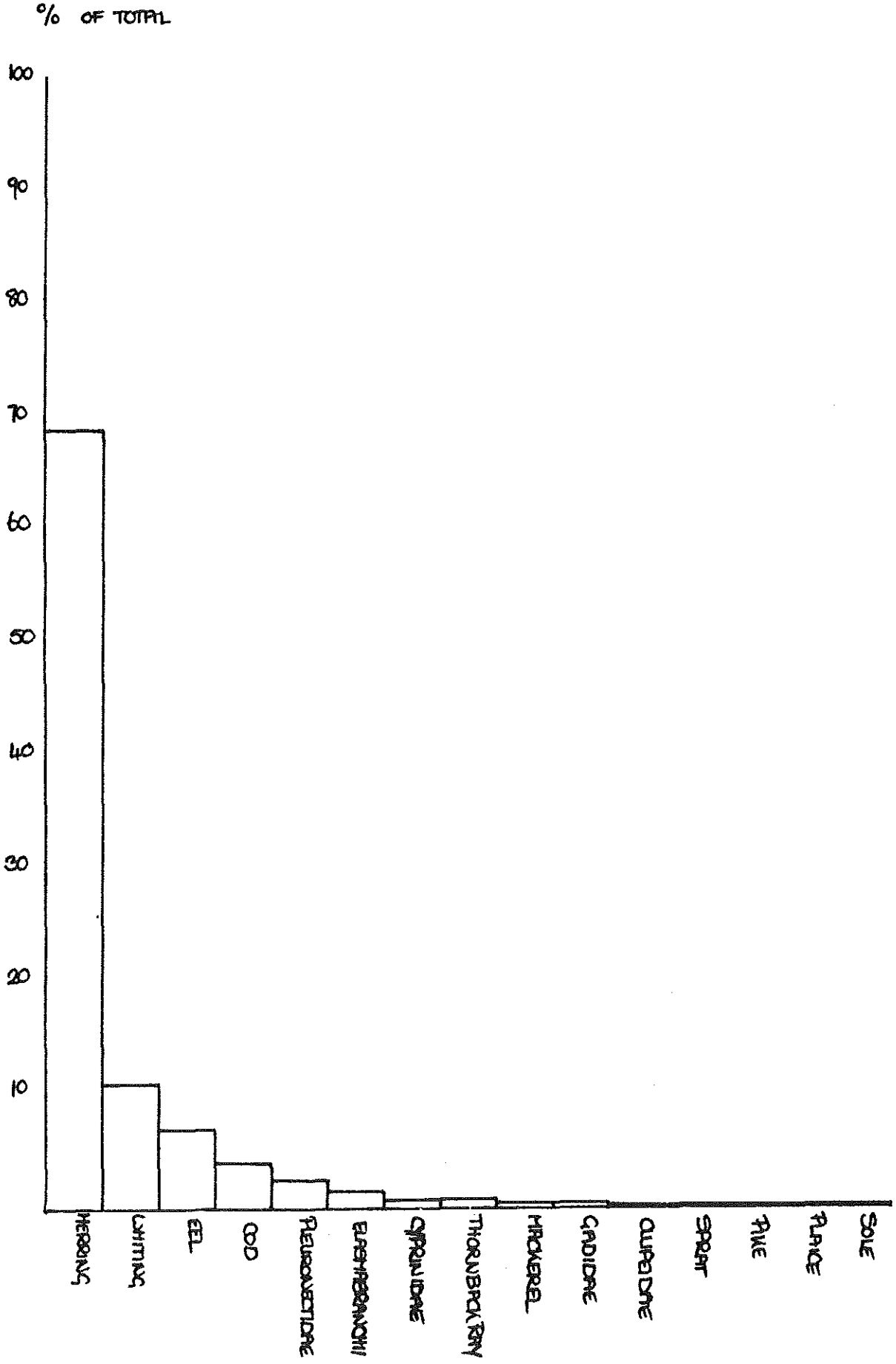
SPECIES IN RANK ORDER OF ABUNDANCE



302 N

FLOORS ETC FROM TENEMENT A

SPECIES IN RANK ORDER OF ABUNDANCE



15	69	727	VERTEBRAL CENTRUM	1	.0	.0	Gadus morhua L.
15	69	727	VERTEBRAL CENTRUM	1	.0	.0	Cyprinidae
15	69	727	DENTARY	1	20.5	.0	Anguilla anguilla (L.)
15	69	727	VERTEBRAL CENTRUM	8	.0	.0	Anguilla anguilla (L.)
15	69	727	VERTEBRAL CENTRUM	14	.0	.0	Clupea harengus L.
15	69	727	VERTEBRAL CENTRUM	1	.0	.0	Scomber scombrus L.
15	69	727	VERTEBRAL CENTRUM	1	4.5	.0	Esox lucius L.
15	69	727	VERTEBRAL CENTRUM	4	4.0	.0	Pleuronectidae
15	69	727	PREMAXILLA	1	4.3	.0	Merlangius merlangus (L.)
15	69	727	VERTEBRAL CENTRUM	2	4.6	.0	Merlangius merlangus (L.)
15	70	728	VERTEBRAL CENTRUM	2	.0	.0	Anguilla anguilla (L.)
15	70	728	VERTEBRAL CENTRUM	7	.0	.0	Clupea harengus L.
15	70	728	VERTEBRAL CENTRUM	1	5.0	.0	Melanogrammus aeglefinus (L.)
15	70	728	VERTEBRAL CENTRUM	2	.0	.0	Pleuronectidae
15	70	728	VERTEBRAL CENTRUM	1	.0	.0	Pleuronectidae
15	76	753	VERTEBRAL CENTRUM	1	.0	.0	Gadus morhua L.
15	76	753	VERTEBRAL CENTRUM	6	.0	.0	Clupea harengus L.
15	76	753	DERMAL OSSICLE	1	.0	.0	Raja clavata L.
15	81	761	VERTEBRAL CENTRUM	1	.0	.0	Cyprinidae
15	81	761	VERTEBRAL CENTRUM	2	.0	.0	Anguilla anguilla (L.)
15	81	761	VERTEBRAL CENTRUM	2	.0	.0	Clupea harengus L.
15	81	761	VERTEBRAL CENTRUM	2	5.2	.0	Melanogrammus aeglefinus (L.)
15	81	761	PREOPERCULUM	1	.0	.0	Perca fluviatilis L.
15	81	761	PREOPERCULUM	1	.0	.0	Perca fluviatilis L.
15	81	761	VERTEBRAL CENTRUM	1	.0	.0	Perca fluviatilis L.
15	81	761	VERTEBRAL CENTRUM	2	-1.0	.0	Pleuronectidae

NOTES;

THE VALUE δ' HAS BEEN GIVEN TO THE COLUMN 'NUMBER' WHEN THE NUMBER OF FRAGMENTS WAS NOT COUNTED.

M1 = MEASUREMENT 1 IN MM FOR VERTEBRAE THIS IS THE MAXIMUM WIDTH OF THE ARTICULATING FACE OF THE CENTRUM.
OTHER BONES WERE MEASURED USING POINTS DESCRIBED BY ROSENLUND AND MORALES (1979).

M2 = FOR VERTEBRAE THIS IS ALSO VERTEBRAL WIDTH (ONLY TAKEN WHEN MORE THAN ONE VERTEBRA IS PRESENT).
OTHER BONES WERE MEASURED USING POINTS GIVEN BY ROSENLUND AND MORALES (1979).

MINUS VALUES: -2 = SMALL INDIVIDUAL
-3 = MEDIUM SIZED INDIVIDUAL
-4 = LARGE INDIVIDUAL

ANDREW A. C. JONES, 23/3/84.

ARCHIVE OF FISH BONE IDENTIFICATIONS FROM ALMS LANE, NORWICH

ORDERED BY PHASE

PHASE	SAMPLE NUMBER	CONTEXT NUMBER	BONE	NUMBER	M1	M2	FISH NAME
1	142	966	VERTEBRAL CENTRUM	7	18.2	7.1	Gadus morhua L.
1	142	966	VERTEBRAL CENTRUM	5	.0	.0	Clupea harengus L.
1	142	966	VERTEBRAL CENTRUM	2	.0	.0	Scomber scombrus L.
1	142	966	VERTEBRAL CENTRUM	2	.0	.0	Merlangius merlangus (L.)
1	187	966	SPHENOID	1	-4.0	.0	Gadidae
1	187	966	VERTEBRAL CENTRUM	8	.0	.0	Clupea harengus L.
1	187	966	DERMAL DENTICLE	1	.0	.0	Scomber scombrus L.
1	84	771	VERTEBRAL CENTRUM	1	.0	.0	Anguilla anguilla (L.)
1	89	834	VERTEBRAL CENTRUM	1	8.5	.0	Gadus morhua L.
1	89	834	VERTEBRAL CENTRUM	1	.0	.0	Clupea harengus L.
2	104	873	CRANIAL BONE	3	.0	.0	Gadus morhua L.
2	104	873	VERTEBRAL CENTRUM	1	20.0	.0	Gadus morhua L.
2	104	873	VERTEBRAL CENTRUM	1	10.0	.0	Gadus morhua L.
2	104	873	VERTEBRAL CENTRUM	1	.0	.0	Elasmobranchii
2	104	873	VERTEBRAL CENTRUM	21	.0	.0	Clupea harengus L.
2	104	873	DERMAL DENTICLE	1	.0	.0	Raja clavata L.
2	131	884	CRANIAL BONE	1	-4.0	.0	Gadidae
2	131	884	VERTEBRAL CENTRUM	2	.0	.0	Clupea harengus L.
2	131	884	VERTEBRAL CENTRUM	10	.0	.0	Clupea harengus L.
2	131	884	VERTEBRAL CENTRUM	1	.0	.0	Scomber scombrus L.
2	64	884/9	VERTEBRAL CENTRUM	1	.0	.0	Clupea harengus L.
3	120	882	PREMAXILLA	1	17.0	.0	Gadus morhua L.
3	120	882	VERTEBRAL CENTRUM	1	.0	.0	Gadus morhua L.
3	120	882	VERTEBRAL CENTRUM	1	20.0	.0	Gadus morhua L.
3	120	882	VERTEBRAL CENTRUM	2	-2.0	.0	Gadus morhua L.
3	120	882	VERTEBRAL CENTRUM	1	.0	.0	Gadus morhua L.
3	120	882	VERTEBRAL CENTRUM	1	13.1	.0	Gadus morhua L.
3	120	882	VERTEBRAL CENTRUM	1	-2.0	.0	Elasmobranchii
3	120	882	CRANIAL BONE	5	.0	.0	Clupea harengus L.
3	120	882	VERTEBRAL CENTRUM	35	.0	.0	Clupea harengus L.
3	120	882	VERTEBRAL CENTRUM	3	.0	.0	Clupea harengus L.
3	120	882	VERTEBRAL CENTRUM	10	.0	.0	Clupea harengus L.
3	120	882	VERTEBRAL CENTRUM	43	.0	.0	Clupea harengus L.
3	120	882	DENTARY	1	.0	.0	Scomber scombrus L.
3	120	882	PREMAXILLA	1	.0	.0	Scomber scombrus L.
3	120	882	VERTEBRAL CENTRUM	1	.0	.0	Scomber scombrus L.
3	120	882	DERMAL DENTICLE	1	.0	.0	Raja clavata L.
3	120	882	VERTEBRAL CENTRUM	1	.0	.0	Merlangius merlangus (L.)
3	136	849	PREMAXILLA	1	14.5	.0	Gadus morhua L.
3	136	849	VERTEBRAL CENTRUM	2	.0	.0	Gadus morhua L.
3	136	849	VERTEBRAL CENTRUM	8	.0	.0	Clupea harengus L.
3	136	849	VERTEBRAL CENTRUM	1	.0	.0	Merlangius merlangus (L.)
3	144	849	VERTEBRAL CENTRUM	3	.0	.0	Clupea harengus L.
3	144	849	DERMAL DENTICLE	1	.0	.0	Raja clavata L.
3	162	1039	CRANIAL BONE	3	.0	.0	Gadus morhua L.
3	162	1039	VERTEBRAL CENTRUM	3	-4.0	.0	Gadus morhua L.
3	162	1039	VERTEBRAL CENTRUM	5	.0	.0	Anguilla anguilla (L.)
3	162	1039	VERTEBRAL CENTRUM	1	.0	.0	Elasmobranchii
3	162	1039	SCALE	0	.0	.0	Clupea harengus L.
3	162	1039	CRANIAL BONE	0	.0	.0	Clupea harengus L.
3	162	1039	VERTEBRAL CENTRUM	36	.0	.0	Clupea harengus L.
3	162	1039	VERTEBRAL CENTRUM	1	.0	.0	Scomber scombrus L.

3	162	1039	VERTEBRAL CENTRUM	4	-3.0	.0	Pleuronectidae
3	162	1039	DERMAL DENTICLE	3	.0	.0	Raja clavata L.
3	162	1039	VERTEBRAL CENTRUM	2	.0	.0	Merlangius merlangus (L.)
3	163	1039	MAXILLA	1	.0	.0	Gadus morhua L.
3	163	1039	VERTEBRAL CENTRUM	1	.0	.0	Gadus morhua L.
3	163	1039	VERTEBRAL CENTRUM	9	.0	.0	Clupea harengus L.
3	163	1039	CRANIAL BONE	1	.0	.0	Triglidae
3	164	886-8	VERTEBRAL CENTRUM	1	.0	.0	Anguilla anguilla (L.)
3	164	886-8	VERTEBRAL CENTRUM	1	.0	.0	Clupea harengus L.
3	166	1039	VERTEBRAL CENTRUM	1	12.0	.0	Gadus morhua L.
3	166	1039	VERTEBRAL CENTRUM	1	.0	.0	Gadus morhua L.
3	166	1039	DENTARY	1	.0	.0	Anguilla anguilla (L.)
3	166	1039	VERTEBRAL CENTRUM	2	.0	.0	Anguilla anguilla (L.)
3	166	1039	VERTEBRAL CENTRUM	8	.0	.0	Clupea harengus L.
3	166	1039	DENTARY	1	3.4	.0	Merlangius merlangus (L.)
3	180	1086	VERTEBRAL CENTRUM	5	.0	.0	Clupea harengus L.
3	180	1086	VERTEBRAL CENTRUM	1	8.0	.0	Pleuronectidae
3	180	1086	VERTEBRAL CENTRUM	1	10.5	.0	Salmonidae
3	180	1086	CRANIAL BONE	1	.0	.0	Merlangius merlangus (L.)
3	180	1086	VERTEBRAL CENTRUM	2	.0	.0	Merlangius merlangus (L.)
3	196	1078	VERTEBRAL CENTRUM	3	.0	.0	Anguilla anguilla (L.)
3	198	1084	DERMAL DENTICLE	1	9.3	7.9	Raja clavata L.
3	207	1454	DERMAL DENTICLE	1	21.0	.0	Raja clavata L.
3	229	1497	PREMAXILLA	1	-4.0	.0	Gadus morhua L.
3	229	1497	VERTEBRAL CENTRUM	2	.0	.0	Clupea harengus L.
3	229	1497	DERMAL DENTICLE	1	.0	.0	Raja clavata L.
3	242	1504	PHARYNGEAL TOOTH	1	-4.0	.0	Gadus morhua L.
3	242	1504	VERTEBRAL CENTRUM	1	.0	.0	Gadus morhua L.
3	242	1504	VERTEBRAL CENTRUM	1	.0	.0	Elasmobranchii
3	242	1504	VERTEBRAL CENTRUM	3	.0	.0	Clupea harengus L.
3	242	1504	MAXILLA	1	.0	.0	Merlangius merlangus (L.)
3	242	1504	VERTEBRAL CENTRUM	4	.0	.0	Merlangius merlangus (L.)
3	243	1511	VERTEBRAL CENTRUM	1	16.4	.0	Gadus morhua L.
3	243	1511	OTIC BULLA	1	.0	.0	Clupea harengus L.
3	243	1511	VERTEBRAL CENTRUM	2	.0	.0	Clupea harengus L.
3	243	1511	VERTEBRAL CENTRUM	1	-3.0	.0	Pleuronectidae
4	0	542	DORSAL SPINE	1	-3.0	.0	Squalus acanthias (L.)
4	102	869	VERTEBRAL CENTRUM	1	.0	.0	Gadus morhua L.
4	102	869	VERTEBRAL CENTRUM	2	.0	.0	Clupea harengus L.
4	102	869	VERTEBRAL CENTRUM	1	.0	.0	Merlangius merlangus (L.)
4	103	871	VERTEBRAL CENTRUM	1	-2.0	.0	Clupea harengus L.
4	103	871	VERTEBRAL CENTRUM	2	-4.0	.0	Clupea harengus L.
4	103	871	VERTEBRAL CENTRUM	1	.0	.0	Merlangius merlangus (L.)
4	106	272	PARASPHENOID	1	-4.0	.0	Gadus morhua L.
4	106	272	VERTEBRAL CENTRUM	1	6.9	.0	Gadus morhua L.
4	106	272	VERTEBRAL CENTRUM	2	.0	.0	Gadus morhua L.
4	106	272	CRANIAL BONE	2	.0	.0	Anguilla anguilla (L.)
4	106	272	VERTEBRAL CENTRUM	2	.0	.0	Anguilla anguilla (L.)
4	106	272	VERTEBRAL CENTRUM	1	6.5	.0	Elasmobranchii
4	106	272	VERTEBRAL CENTRUM	16	.0	.0	Clupea harengus L.
4	106	272	DENTARY	1	4.2	.0	Merlangius merlangus (L.)
4	106	272	VERTEBRAL CENTRUM	1	.0	.0	Merlangius merlangus (L.)
4	111	479	VERTEBRAL CENTRUM	1	19.0	.0	Gadus morhua L.
4	111	479	VERTEBRAL CENTRUM	1	-3.0	.0	Gadus morhua L.
4	111	479	VERTEBRAL CENTRUM	1	.0	.0	Clupea harengus L.
4	113	481	VERTEBRAL CENTRUM	3	.0	.0	Clupea harengus L.
4	126	917	PARASPHENOID	1	.0	.0	Gadus morhua L.
4	126	917	CRANIAL BONE	1	.0	.0	Gadus morhua L.
4	126	917	VERTEBRAL CENTRUM	12	.0	.0	Clupea harengus L.
4	126	917	VERTEBRAL CENTRUM	2	.0	.0	Pleuronectidae

4	126	917	DERMAL DENTICLE	4	.0	.0	Raja clavata L.
4	126	917	VERTEBRAL CENTRUM	1	.0	.0	Merlangius merlangus (L.)
4	138	275	VERTEBRAL CENTRUM	1	11.2	.0	Gadus morhua L.
4	138	275	VERTEBRAL CENTRUM	1	20.0	.0	Gadus morhua L.
4	138	275	VERTEBRAL CENTRUM	15	.0	.0	Clupea harengus L.
4	138	275	DERMAL DENTICLE	1	.0	.0	Raja clavata L.
4	138	275	DENTARY	1	4.3	.0	Merlangius merlangus (L.)
4	138	275	VERTEBRAL CENTRUM	4	.0	.0	Merlangius merlangus (L.)
4	143	987	PHARYNGEAL TOOTH	1	.0	.0	Gadus morhua L.
4	143	987	VERTEBRAL CENTRUM	3	.0	.0	Clupea harengus L.
4	143	987	VERTEBRAL CENTRUM	1	.0	.0	Scomber scombrus L.
4	143	987	VERTEBRAL CENTRUM	1	4.4	.0	Esox lucius L.
4	143	987	VERTEBRAL CENTRUM	1	.0	.0	Merlangius merlangus (L.)
4	145	987	CLEITHRUM	1	.0	.0	Gadus morhua L.
4	145	987	VERTEBRAL CENTRUM	3	.0	.0	Clupea harengus L.
4	145	987	VERTEBRAL CENTRUM	1	.0	.0	Merlangius merlangus (L.)
4	149	1007	VERTEBRAL CENTRUM	1	.0	.0	Clupea harengus L.
4	149	1007	VERTEBRAL CENTRUM	1	.0	.0	Pleuronectidae
4	150	492	VERTEBRAL CENTRUM	2	.0	.0	Anguilla anguilla (L.)
4	150	492	VERTEBRAL CENTRUM	13	.0	.0	Clupea harengus L.
4	150	492	VERTEBRAL CENTRUM	1	-2.0	.0	Pleuronectidae
4	150	492	VERTEBRAL CENTRUM	1	.0	.0	Merlangius merlangus (L.)
4	150	492	VOMER	1	.0	.0	Merlangius merlangus (L.)
4	156	492	BRANCHIOSTEGAL RAY	1	-4.0	.0	Gadidae
4	156	492	VERTEBRAL CENTRUM	13	.0	.0	Clupea harengus L.
4	157	478	VERTEBRAL CENTRUM	1	13.0	.0	Gadus morhua L.
4	157	478	VERTEBRAL CENTRUM	7	.0	.0	Clupea harengus L.
4	157	478	VERTEBRAL CENTRUM	1	.0	.0	Pleuronectidae
4	158	478	DENTARY	1	.0	.0	Gadus morhua L.
4	158	478	VERTEBRAL CENTRUM	6	-2.0	-4.0	Gadus morhua L.
4	158	478	VERTEBRAL CENTRUM	1	.0	.0	Elasmobranchii
4	158	478	CRANIAL BONE	1	.0	.0	Clupea harengus L.
4	158	478	VERTEBRAL CENTRUM	11	.0	.0	Clupea harengus L.
4	158	478	VERTEBRAL CENTRUM	2	.0	.0	Pleuronectidae
4	158	478	DERMAL DENTICLE	1	.0	.0	Raja clavata L.
4	195	1405	VERTEBRAL CENTRUM	1	-4.0	.0	Gadus morhua L.
4	195	1405	VERTEBRAL CENTRUM	1	.0	.0	Anguilla anguilla (L.)
4	195	1405	CRANIAL BONE	2	.0	.0	Clupea harengus L.
4	195	1405	VERTEBRAL CENTRUM	6	.0	.0	Clupea harengus L.
4	195	1405	DERMAL DENTICLE	1	.0	.0	Raja clavata L.
4	195	1405	DENTARY	1	4.8	.0	Merlangius merlangus (L.)
4	195	1405	VERTEBRAL CENTRUM	1	.0	.0	Merlangius merlangus (L.)
4	219	1803	VERTEBRAL CENTRUM	1	.0	.0	Merlangius merlangus (L.)
4	220	1487	ARTICULAR	1	.0	.0	Gadus morhua L.
4	220	1487	VERTEBRAL CENTRUM	1	9.7	.0	Gadus morhua L.
4	220	1487	CRANIAL BONE	2	.0	.0	Clupea harengus L.
4	220	1487	VERTEBRAL CENTRUM	4	.0	.0	Clupea harengus L.
4	220	1487	VERTEBRAL CENTRUM	2	.0	.0	Merlangius merlangus (L.)
4	221	1488	BRANCHIOSTEGAL RAY	0	.0	.0	Gadus morhua L.
4	221	1488	CLEITHRUM	1	.0	.0	Gadus morhua L.
4	221	1488	FIN RAY	1	.0	.0	Gadus morhua L.
4	221	1488	VERTEBRAL CENTRUM	1	11.2	.0	Gadus morhua L.
4	221	1488	VERTEBRAL CENTRUM	1	8.2	.0	Gadus morhua L.
4	221	1488	VERTEBRAL CENTRUM	1	.0	.0	Anguilla anguilla (L.)
4	221	1488	VERTEBRAL CENTRUM	23	.0	.0	Clupea harengus L.
4	221	1488	BASIOCCIPITAL	1	.0	.0	Merlangius merlangus (L.)
4	221	1488	DENTARY	1	4.3	.0	Merlangius merlangus (L.)
4	221	1488	VERTEBRAL CENTRUM	2	.0	.0	Merlangius merlangus (L.)
4	222	1489	VERTEBRAL CENTRUM	2	.0	.0	Gadus morhua L.
4	222	1489	VERTEBRAL CENTRUM	2	.0	.0	Clupea harengus L.

4	222	1489	VERTEBRAL CENTRUM	2	.0	.0	Melanogrammus aeglefinus (L.)
4	222	1489	DENTARY	1	6.8	.0	Merlangius merlangus (L.)
4	223	1490	VERTEBRAL CENTRUM	6	-4.0	.0	Gadus morhua L.
4	223	1490	VERTEBRAL CENTRUM	2	.0	.0	Anguilla anguilla (L.)
4	223	1490	VERTEBRAL CENTRUM	1	3.4	.0	Elasmobranchii
4	223	1490	VERTEBRAL CENTRUM	24	.0	.0	Clupea harengus L.
4	223	1490	VERTEBRAL CENTRUM	1	9.5	.0	Melanogrammus aeglefinus (L.)
4	223	1490	VERTEBRAL CENTRUM	2	-3.0	.0	Pleuronectidae
4	223	1490	VERTEBRAL CENTRUM	1	.0	.0	Merlangius merlangus (L.)
4	224	1479	BRANCHIOSTEGAL RAY	1	.0	.0	Gadus morhua L.
4	224	1479	PHARYNGEAL TOOTH	1	.0	.0	Gadus morhua L.
4	224	1479	VERTEBRAL CENTRUM	5	-4.0	.0	Gadus morhua L.
4	224	1479	VERTEBRAL CENTRUM	14	.0	.0	Clupea harengus L.
4	224	1479	VERTEBRAL CENTRUM	1	-2.0	.0	Pleuronectidae
4	224	1479	VERTEBRAL CENTRUM	1	-3.0	.0	Pleuronectidae
4	224	1479	ARTICULAR	1	.0	.0	Merlangius merlangus (L.)
4	224	1479	DENTARY	1	.0	.0	Merlangius merlangus (L.)
4	224	1479	MAXILLA	1	.0	.0	Merlangius merlangus (L.)
4	224	1479	CRANIAL BONE	0	.0	.0	Merlangius merlangus (L.)
4	224	1479	VERTEBRAL CENTRUM	7	.0	.0	Merlangius merlangus (L.)
4	225	1484	CERATOHYAL	1	-3.0	.0	Clupea harengus L.
4	225	1484	VERTEBRAL CENTRUM	1	-3.0	.0	Clupea harengus L.
4	225	1484	VERTEBRAL CENTRUM	1	-3.0	.0	Merlangius merlangus (L.)
4	226	1492	VERTEBRAL CENTRUM	2	-2.0	.0	Gadus morhua L.
4	226	1492	VERTEBRAL CENTRUM	1	.0	.0	Anguilla anguilla (L.)
4	226	1492	VERTEBRAL CENTRUM	7	.0	.0	Clupea harengus L.
4	226	1492	VERTEBRAL CENTRUM	2	.0	.0	Merlangius merlangus (L.)
4	228	1486	VERTEBRAL CENTRUM	1	-3.0	.0	Merlangius merlangus (L.)
4	241	1520	QUADRATE	1	3.8	.0	?Rutilus rutilus (L.)
4	241	1520	VERTEBRAL CENTRUM	1	1.5	.0	?Sprattus sprattus (L.)
4	241	1520	VERTEBRAL CENTRUM	3	1.9	.0	?Sprattus sprattus (L.)
4	241	1520	VERTEBRAL CENTRUM	14	2.0	1.4	?Sprattus sprattus (L.)
4	241	1520	CLEITHRUM	1	-2.0	.0	Cyprinidae
4	241	1520	VERTEBRAL CENTRUM	3	2.7	1.9	Cyprinidae
4	241	1520	VERTEBRAL CENTRUM	3	2.1	2.2	Anguilla anguilla (L.)
4	241	1520	VERTEBRAL CENTRUM	8	-3.0	.0	Anguilla anguilla (L.)
4	241	1520	VERTEBRAL CENTRUM	2	5.2	.0	Elasmobranchii
4	241	1520	INTERMUSCULAR BONE	1	-4.0	.0	Gadidae
4	241	1520	ARTICULAR	1	-3.0	1.5	Clupea harengus L.
4	241	1520	ARTICULAR	7	-3.0	.0	Clupea harengus L.
4	241	1520	ARTICULAR	6	-3.0	.0	Clupea harengus L.
4	241	1520	CERATOHYAL	1	13.0	.0	Clupea harengus L.
4	241	1520	CERATOHYAL	15	-3.0	.0	Clupea harengus L.
4	241	1520	CLEITHRUM	1	-3.0	.0	Clupea harengus L.
4	241	1520	CLEITHRUM	2	-3.0	.0	Clupea harengus L.
4	241	1520	DENTARY	7	-3.0	.0	Clupea harengus L.
4	241	1520	DENTARY	7	-3.0	.0	Clupea harengus L.
4	241	1520	ETHMOID	1	-3.0	.0	Clupea harengus L.
4	241	1520	EPIHYAL	1	-3.0	.0	Clupea harengus L.
4	241	1520	EPIHYAL	6	-3.0	.0	Clupea harengus L.
4	241	1520	EPIHYAL	6	-3.0	.0	Clupea harengus L.
4	241	1520	HYOMANDIBULAR	1	-3.0	.0	Clupea harengus L.
4	241	1520	HYOMANDIBULAR	14	-3.0	.0	Clupea harengus L.
4	241	1520	MAXILLA	8	-3.0	.0	Clupea harengus L.
4	241	1520	MAXILLA	8	-3.0	.0	Clupea harengus L.
4	241	1520	OPERCULUM	1	2.1	.0	Clupea harengus L.
4	241	1520	OPERCULUM	11	-3.0	.0	Clupea harengus L.
4	241	1520	OPERCULUM	8	-3.0	.0	Clupea harengus L.
4	241	1520	POST CLEITHRUM	2	-3.0	.0	Clupea harengus L.
4	241	1520	POST CLEITHRUM	5	-3.0	.0	Clupea harengus L.

4	241	1520	PREOPERCULUM	1	-3.0	.0	Clupea harengus L.
4	241	1520	PREOPERCULUM	9	-3.0	.0	Clupea harengus L.
4	241	1520	PREOPERCULUM	8	-3.0	.0	Clupea harengus L.
4	241	1520	POST TEMPORAL	1	-3.0	.0	Clupea harengus L.
4	241	1520	QUADRATE	7	-3.0	.0	Clupea harengus L.
4	241	1520	QUADRATE	3	-3.0	.0	Clupea harengus L.
4	241	1520	SCALE	2	-3.0	.0	Clupea harengus L.
4	241	1520	SCALE	18	-3.0	.0	Clupea harengus L.
4	241	1520	SUBOPERCULUM	6	-3.0	.0	Clupea harengus L.
4	241	1520	SUBOPERCULUM	9	-3.0	.0	Clupea harengus L.
4	241	1520	UROHYAL	2	-3.0	.0	Clupea harengus L.
4	241	1520	VERTEBRAL CENTRUM	4	-3.0	.0	Clupea harengus L.
4	241	1520	VERTEBRAL CENTRUM	3	-3.0	.0	Clupea harengus L.
4	241	1520	VERTEBRAL CENTRUM	1	2.6	.0	Clupea harengus L.
4	241	1520	VERTEBRAL CENTRUM	1	3.6	.0	Clupea harengus L.
4	241	1520	VERTEBRAL CENTRUM	40	-3.0	.0	Clupea harengus L.
4	241	1520	VERTEBRAL CENTRUM	39	-3.0	.0	Clupea harengus L.
4	241	1520	SCUTE	1	-3.0	.0	Trachurus trachurus (L.)
4	241	1520	VERTEBRAL CENTRUM	1	-3.0	.0	Scomber scombrus L.
4	241	1520	VOMER	1	-3.0	.0	Pleuronectes platessa L.
4	241	1520	BASIOCCIPITAL	1	4.9	.0	Pleuronectidae
4	241	1520	VERTEBRAL CENTRUM	2	2.1	3.9	Pleuronectidae
4	241	1520	VERTEBRAL CENTRUM	1	-3.0	.0	Solea solea (L.)
4	241	1520	VERTEBRAL CENTRUM	1	3.4	.0	Solea solea (L.)
4	241	1520	DENTARY	1	3.2	.0	Merlangius merlangus (L.)
4	241	1520	QUADRATE	1	3.4	.0	Merlangius merlangus (L.)
4	241	1520	VERTEBRAL CENTRUM	1	-3.0	.0	Merlangius merlangus (L.)
4	241	1520	VERTEBRAL CENTRUM	2	-3.0	.0	Merlangius merlangus (L.)
4	241	1520	VERTEBRAL CENTRUM	1	4.3	.0	Merlangius merlangus (L.)
4	244	552	VERTEBRAL CENTRUM	1	.0	.0	Cyprinidae
4	244	552	VERTEBRAL CENTRUM	6	.0	.0	Clupea harengus L.
4	244	552	DERMAL DENTICLE	1	.0	.0	Raja clavata L.
4	245	1535	VERTEBRAL CENTRUM	1	16.8	.0	Gadus morhua L.
4	245	1535	VERTEBRAL CENTRUM	2	.0	.0	Clupea harengus L.
4	247	1565	VERTEBRAL CENTRUM	1	2.3	.0	Cyprinidae
4	248	1563	DERMAL DENTICLE	1	10.4	2.6	Raja clavata L.
4	249	552	INFERIOR PHARYNGEAL	1	-4.0	.0	Gadidae
4	249	552	VERTEBRAL CENTRUM	2	-3.0	.0	Clupea harengus L.
4	249	552	VERTEBRAL CENTRUM	1	3.7	.0	Clupea harengus L.
4	249	552	PREMAXILLA	1	-3.0	.0	Pleuronectidae
4	251	1639	DERMAL DENTICLE	1	.0	.0	Elasmobranchii
4	251	1639	VERTEBRAL CENTRUM	1	-3.0	.0	Clupea harengus L.
4	251	1639	VERTEBRAL CENTRUM	1	-3.0	.0	Pleuronectidae
4	251	1639	VERTEBRAL CENTRUM	1	-3.0	.0	Merlangius merlangus (L.)
4	282	1883	ARTICULAR	1	-4.0	.0	Gadidae
4	283	2165	VERTEBRAL CENTRUM	1	-3.0	.0	Anguilla anguilla (L.)
4	283	2165	VERTEBRAL CENTRUM	2	1.7	2.2	Anguilla anguilla (L.)
4	283	2165	CLEITHRUM	1	-3.0	.0	Clupea harengus L.
4	283	2165	OTIC BULLA	1	-3.0	.0	Clupea harengus L.
4	283	2165	VERTEBRAL CENTRUM	2	-3.0	.0	Clupea harengus L.
4	283	2165	MAXILLA	1	-3.0	.0	Scomber scombrus L.
4	283	2165	VERTEBRAL CENTRUM	2	-3.0	.0	Scomber scombrus L.
4	283	2165	VERTEBRAL CENTRUM	1	-3.0	.0	Merlangius merlangus (L.)
4	283	2165	VERTEBRAL CENTRUM	1	5.2	.0	Merlangius merlangus (L.)
4	283	2165	VERTEBRAL CENTRUM	1	-3.0	.0	Merlangius merlangus (L.)
4	287	2166	PREMAXILLA	1	-2.0	.0	Cyprinidae
4	287	2166	VERTEBRAL CENTRUM	2	1.8	2.1	Cyprinidae
4	287	2166	VERTEBRAL CENTRUM	3	-3.0	.0	Anguilla anguilla (L.)
4	287	2166	DERMAL DENTICLE	1	-3.0	.0	Elasmobranchii
4	287	2166	GILL RAKER	2	-4.0	.0	Gadidae

4	287	2166	PARASPHENOID	1	-4.0	.0	Gadidae
4	287	2166	TOOTH	2	-4.0	.0	Gadidae
4	287	2166	BASIOCCIPITAL	1	3.5	.0	Clupea harengus L.
4	287	2166	VERTEBRAL CENTRUM	1	-3.0	.0	Clupea harengus L.
4	287	2166	VERTEBRAL CENTRUM	2	-3.0	.0	Clupea harengus L.
4	287	2166	VERTEBRAL CENTRUM	1	-3.0	.0	Pleuronectidae
4	288	2172	VERTEBRAL CENTRUM	1	-3.0	.0	Clupea harengus L.
4	288	2172	VERTEBRAL CENTRUM	1	4.5	.0	Merlangius merlangus (L.)
4	288	2172	VERTEBRAL CENTRUM	2	-3.0	.0	Merlangius merlangus (L.)
4	289	2176	QUADRATE	1	1.5	.0	Clupea harengus L.
4	291	2191	VERTEBRAL CENTRUM	1	1.2	.0	Pleuronectidae
4	293	2172	VERTEBRAL CENTRUM	1	-3.0	.0	Anguilla anguilla (L.)
4	293	2172	VERTEBRAL CENTRUM	3	-3.0	.0	Clupea harengus L.
4	293	2172	VERTEBRAL CENTRUM	2	-3.0	.0	Clupea harengus L.
4	293	2172	VERTEBRAL CENTRUM	1	-3.0	.0	Scomber scombrus L.
4	68	929/8	VERTEBRAL CENTRUM	4	.0	.0	Clupea harengus L.
4	68	929/8	VERTEBRAL CENTRUM	1	9.1	.0	Pleuronectidae
5	0	478	DORSAL SPINE	1	-3.0	.0	Squalus acanthias (L.)
5	105	428	VERTEBRAL CENTRUM	2	.0	.0	Anguilla anguilla (L.)
5	105	428	BRANCHIOSTEGAL RAY	1	-4.0	.0	Gadidae
5	105	428	CRANIAL BONE	2	.0	.0	Clupea harengus L.
5	105	428	VERTEBRAL CENTRUM	3	.0	.0	Clupea harengus L.
5	135	936	VERTEBRAL CENTRUM	6	5.2	19.0	Gadus morhua L.
5	135	936	VERTEBRAL CENTRUM	2	.0	.0	Anguilla anguilla (L.)
5	135	936	VERTEBRAL CENTRUM	1	5.8	.0	Elasmobranchii
5	135	936	VERTEBRAL CENTRUM	15	.0	.0	Clupea harengus L.
5	135	936	VERTEBRAL CENTRUM	2	-4.0	.0	Pleuronectidae
5	135	936	VERTEBRAL CENTRUM	3	.0	.0	Merlangius merlangus (L.)
5	140	975	VERTEBRAL CENTRUM	1	17.3	.0	Gadus morhua L.
5	140	975	VERTEBRAL CENTRUM	7	.0	.0	Clupea harengus L.
5	182	1080	VERTEBRAL CENTRUM	1	-4.0	.0	Gadus morhua L.
5	182	1080	VERTEBRAL CENTRUM	1	.0	.0	Elasmobranchii
5	182	1080	VERTEBRAL CENTRUM	11	.0	.0	Clupea harengus L.
5	182	1080	VERTEBRAL CENTRUM	7	.0	.0	Merlangius merlangus (L.)
5	197	1083	VERTEBRAL CENTRUM	1	-4.0	.0	Gadus morhua L.
5	197	1083	VERTEBRAL CENTRUM	2	.0	.0	Anguilla anguilla (L.)
5	197	1083	SCALE	1	.0	.0	Clupea harengus L.
5	197	1083	CRANIAL BONE	2	.0	.0	Clupea harengus L.
5	197	1083	VERTEBRAL CENTRUM	19	.0	.0	Clupea harengus L.
5	197	1083	VERTEBRAL CENTRUM	1	.0	.0	Scomber scombrus L.
5	197	1083	VERTEBRAL CENTRUM	4	.0	.0	Merlangius merlangus (L.)
5	284	2167	DERMAL DENTICLE	1	.0	.0	Elasmobranchii
5	284	2167	HYOMANDIBULAR	1	-4.0	.0	Gadidae
5	284	2167	VERTEBRAL CENTRUM	1	-4.0	.0	Gadidae
5	284	2167	ARTICULAR	2	-3.0	.0	Clupea harengus L.
5	284	2167	CERATOHYAL	1	-3.0	.0	Clupea harengus L.
5	284	2167	DENTARY	1	-3.0	.0	Clupea harengus L.
5	284	2167	EPIHYAL	1	-3.0	.0	Clupea harengus L.
5	284	2167	HYOMANDIBULAR	1	-3.0	.0	Clupea harengus L.
5	284	2167	MAXILLA	1	-3.0	.0	Clupea harengus L.
5	284	2167	MAXILLA	1	-3.0	.0	Clupea harengus L.
5	284	2167	MAXILLA	1	-3.0	.0	Clupea harengus L.
5	284	2167	OPERCULUM	1	1.9	.0	Clupea harengus L.
5	284	2167	POST CLEITHRUM	2	-3.0	.0	Clupea harengus L.
5	284	2167	POST CLEITHRUM	1	-3.0	.0	Clupea harengus L.
5	284	2167	PREOPERCULUM	1	-3.0	.0	Clupea harengus L.
5	284	2167	QUADRATE	1	-3.0	.0	Clupea harengus L.
5	284	2167	SUBOPERCULUM	1	-3.0	.0	Clupea harengus L.
5	284	2167	UROHYAL	1	-3.0	.0	Clupea harengus L.
5	284	2167	VERTEBRAL CENTRUM	6	-3.0	.0	Clupea harengus L.

11	25-28	34/B5	CRANIAL BONE	0	.0	.0	Clupea harengus L.
11	25-28	34/B4	CRANIAL BONE	4	.0	.0	Clupea harengus L.
11	25-28	34/B1	CRANIAL BONE	4	.0	.0	Clupea harengus L.
11	25-28	34/B6	CRANIAL BONE	3	.0	.0	Clupea harengus L.
11	25-28	34/B1	VERTEBRAL CENTRUM	15	.0	.0	Clupea harengus L.
11	25-28	34/B1	VERTEBRAL CENTRUM	3	.0	.0	Clupea harengus L.
11	25-28	34/B5	VERTEBRAL CENTRUM	15	.0	.0	Clupea harengus L.
11	25-28	34/B1	VERTEBRAL CENTRUM	22	.0	.0	Clupea harengus L.
11	25-28	34/B4	VERTEBRAL CENTRUM	7	.0	.0	Clupea harengus L.
11	25-28	34/B3	VERTEBRAL CENTRUM	6	.0	.0	Clupea harengus L.
11	25-28	34/B7	VERTEBRAL CENTRUM	26	.0	.0	Clupea harengus L.
11	25-28	34/B2	VERTEBRAL CENTRUM	6	.0	.0	Clupea harengus L.
11	25-28	34/B1	VERTEBRAL CENTRUM	32	.0	.0	Clupea harengus L.
11	25-28	34/B8	VERTEBRAL CENTRUM	42	.0	.0	Clupea harengus L.
11	25-28	34/B6	VERTEBRAL CENTRUM	12	.0	.0	Clupea harengus L.
11	25-28	34/B8	PREMAXILLA	1	.0	.0	Scomber scombrus L.
11	25-28	34/B3	VERTEBRAL CENTRUM	1	.0	.0	Scomber scombrus L.
11	25-28	34/B7	VERTEBRAL CENTRUM	3	4.7	.0	Scomber scombrus L.
11	25-28	34/B8	VERTEBRAL CENTRUM	1	.0	.0	Scomber scombrus L.
11	25-28	34/B9	VERTEBRAL CENTRUM	2	.0	.0	Scomber scombrus L.
11	25-28	34/12	PREOPERCULUM	1	.0	.0	Perca fluviatilis L.
11	25-28	34/B1	PREOPERCULUM	1	.0	.0	Perca fluviatilis L.
11	25-28	34/B7	VERTEBRAL CENTRUM	1	10.0	.0	Esox lucius L.
11	25-28	34/B3	DENTARY	1	.0	.0	Pleuronectes platessa L.
11	25-28	34/B9	ANAL PTERYGIOPHORE	1	.0	.0	Pleuronectidae
11	25-28	34/B8	HYAL	1	.0	.0	Pleuronectidae
11	25-28	34/B9	HYAL	1	.0	.0	Pleuronectidae
11	25-28	34/B8	MAXILLA	1	.0	.0	Pleuronectidae
11	25-28	34/B7	VERTEBRAL CENTRUM	1	5.3	.0	Pleuronectidae
11	25-28	34/B7	VERTEBRAL CENTRUM	1	5.2	.0	Pleuronectidae
11	25-28	34/B5	VERTEBRAL CENTRUM	1	.0	.0	Pleuronectidae
11	25-28	34/B1	VERTEBRAL CENTRUM	1	.0	.0	Pleuronectidae
11	25-28	34/B8	VERTEBRAL CENTRUM	7	4.7	2.6	Pleuronectidae
11	25-28	34/12	PHARYNGEAL BONE	1	.0	.0	Rutilus rutilus (L.)
11	25-28	34/B1	PHARYNGEAL BONE	1	.0	.0	Rutilus rutilus (L.)
11	25-28	34/B1	PHARYNGEAL BONE	1	.0	.0	Rutilus rutilus (L.)
11	25-28	34/B8	PHARYNGEAL BONE	3	.0	.0	Rutilus rutilus (L.)
11	25-28	34/B1	PHARYNGEAL BONE	1	.0	.0	Rutilus rutilus (L.)
11	25-28	34/B1	VERTEBRAL CENTRUM	1	.0	.0	Gasterosteus aculeatus L.
11	25-28	34/B7	SCUTE	1	.0	.0	Raja clavata L.
11	25-28	34/B8	DERMAL DENTICLE	3	.0	.0	Tinca tinca (L.)
11	25-28	34/B2	PHARYNGEAL BONE	1	.0	.0	Tinca tinca (L.)
11	25-28	34/B2	VERTEBRAL CENTRUM	1	.0	.0	Merlangius merlangus (L.)
11	25-28	34/B1	VERTEBRAL CENTRUM	1	.0	.0	Gadus morhua L.
11	32	34/B2	CLEITHRUM	1	.0	.0	Gadus morhua L.
11	32	34/B2	POST TEMPORAL	1	.0	.0	Anguilla anguilla (L.)
11	32	34/B1	VERTEBRAL CENTRUM	0	.0	.0	Gadidae
11	32	34/B1	CRANIAL BONE	3	.0	.0	Clupea harengus L.
11	32	34/B1	CRANIAL BONE	1	.0	.0	Clupea harengus L.
11	32	34/B2	CRANIAL BONE	8	.0	.0	Clupea harengus L.
11	32	34/B2	VERTEBRAL CENTRUM	25	.0	.0	Clupea harengus L.
11	32	34/B1	VERTEBRAL CENTRUM	1	.0	.0	Perca fluviatilis L.
11	32	34/B1	MAXILLA	1	.0	.0	Perca fluviatilis L.
11	32	34/B2	VERTEBRAL CENTRUM	2	.0	.0	Gadus morhua L.
11	42	34/B1	INDETERMINATE FRAGMENT	1	.0	.0	Gadus morhua L.
11	42	34/B1	VERTEBRAL CENTRUM	1	.0	.0	Anguilla anguilla (L.)
11	42	34/B1	VERTEBRAL CENTRUM	0	.0	.0	Gadidae
11	42	34/B1	FIN RAY	5	.0	.0	Clupea harengus L.
11	42	34/B1	INDETERMINATE FRAGMENT	12	.0	.0	Clupea harengus L.
11	42	34/B1	CRANIAL BONE				

15	69	727	VERTEBRAL CENTRUM	1	.0	.0	Gadus morhua L.
15	69	727	VERTEBRAL CENTRUM	1	.0	.0	Cyprinidae
15	69	727	DENTARY	1	20.5	.0	Anguilla anguilla (L.)
15	69	727	VERTEBRAL CENTRUM	8	.0	.0	Anguilla anguilla (L.)
15	69	727	VERTEBRAL CENTRUM	14	.0	.0	Clupea harengus L.
15	69	727	VERTEBRAL CENTRUM	1	.0	.0	Scomber scombrus L.
15	69	727	VERTEBRAL CENTRUM	1	4.5	.0	Esox lucius L.
15	69	727	VERTEBRAL CENTRUM	4	4.8	.0	Pleuronectidae
15	69	727	PREMAXILLA	1	4.3	.0	Merlangius merlangus (L.)
15	69	727	VERTEBRAL CENTRUM	2	4.6	.0	Merlangius merlangus (L.)
15	70	728	VERTEBRAL CENTRUM	2	.0	.0	Anguilla anguilla (L.)
15	70	728	VERTEBRAL CENTRUM	7	.0	.0	Clupea harengus L.
15	70	728	VERTEBRAL CENTRUM	1	5.0	.0	Melanogrammus aeglefinus (L.)
15	70	728	VERTEBRAL CENTRUM	2	.0	.0	Pleuronectidae
15	70	728	VERTEBRAL CENTRUM	1	.0	.0	Pleuronectidae
15	76	753	VERTEBRAL CENTRUM	1	.0	.0	Gadus morhua L.
15	76	753	VERTEBRAL CENTRUM	6	.0	.0	Clupea harengus L.
15	76	753	DERMAL DENTICLE	1	.0	.0	Raja clavata L.
15	81	761	VERTEBRAL CENTRUM	1	.0	.0	Cyprinidae
15	81	761	VERTEBRAL CENTRUM	2	.0	.0	Anguilla anguilla (L.)
15	81	761	VERTEBRAL CENTRUM	2	.0	.0	Clupea harengus L.
15	81	761	VERTEBRAL CENTRUM	2	5.2	.0	Melanogrammus aeglefinus (L.)
15	81	761	PREOPERCULUM	1	.0	.0	Perca fluviatilis L.
15	81	761	PREOPERCULUM	1	.0	.0	Perca fluviatilis L.
15	81	761	VERTEBRAL CENTRUM	1	.0	.0	Perca fluviatilis L.
15	81	761	VERTEBRAL CENTRUM	2	-3.0	.0	Pleuronectidae

NOTES:

THE VALUE '0' HAS BEEN GIVEN TO THE COLUMN 'NUMBER' WHEN THE NUMBER OF FRAGMENTS WAS NOT COUNTED.

M1 = MEASUREMENT 1 IN MM FOR VERTEBRAE THIS IS THE MAXIMUM WIDTH OF THE ARTICULATING FACE OF THE CENTRUM.
OTHER BONES WERE MEASURED USING POINTS DESCRIBED BY ROSENLUND AND MORALES (1979).

M2 = FOR VERTEBRAE THIS IS ALSO VERTEBRAL WIDTH (ONLY TAKEN WHEN MORE THAN ONE VERTEBRA IS PRESENT).
OTHER BONES WERE MEASURED USING POINTS GIVEN BY ROSENLUND AND MORALES (1979).

MINUS VALUES: -2 = SMALL INDIVIDUAL
-3 = MEDIUM SIZED INDIVIDUAL
-4 = LARGE INDIVIDUAL

ANDREW K. G. JONES, 23/3/84.