Cleaning Up the Farm: A Later Medieval Archaeofauna from Gjögur, a Fishing Farm of NW Iceland

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Introduction

This paper presents a brief overview of archaeological excavations at the site of Gjögur, situated on the Northwest coast of Iceland, and presents preliminary results of the analysis of animal bone collections from the upper context from Gjögur, compared with results from the excavation of nearby fishing booths at Akurvík. The sites of Akurvík and Gjögur have radio-carbon dates spanning the 12th-15th century A.D., but this paper compares only the later medieval contexts (Akurvik upper layers 1 sigma calibrated to 1420-1475 AD; Gjögur upper layers 1 sigma calibrated to 1390-1450 AD). Analysis

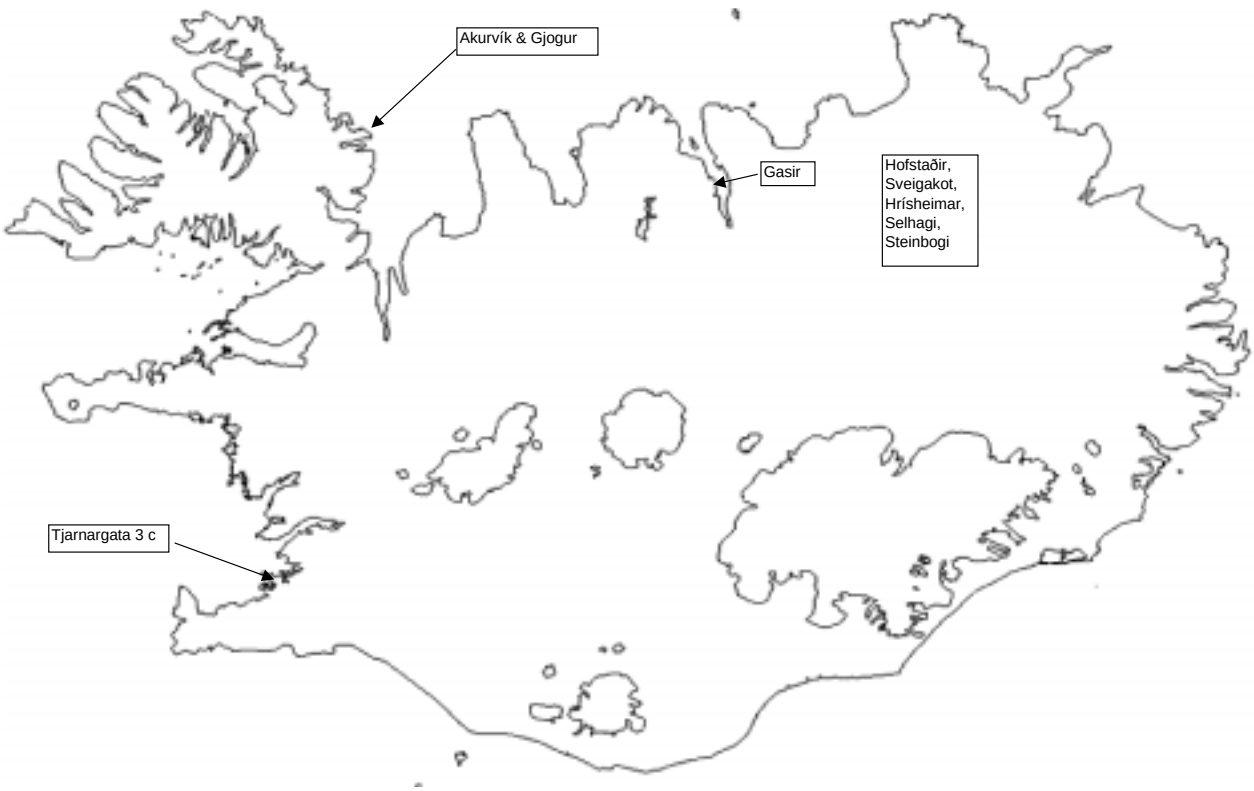

Fig. 1. Outline map of Iceland with archaeological sites, used for comparative purposes in this report, indicated. The sites mentioned in the text are Akurvík and Gjögur (NorthWest fjords), the Hofstadir, Sveigakot, Hrísheimar, Selhagi, Steinbogi (Lake Myvatn area), Gásir (Eyjafjord), and Tjarnargata 3c (under modern Reykjavik in the South West).

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of the later phase of the Akurvík site concentrated on a thick layer of fish bone (SU 22). This 20-30 cm – thick layer is associated with a small turf structure interpreted as one of a series of superimposed seasonal fishing "booths"- lightly built structures designed to temporarily house a boat's crew but not a farming household (Edvardsson *et al*. 2004). Gjögur is only 3 km from Akurvik, but was a permanent farm occupied from early settlement times to the present, and its structures and midden form a "farm mound" nearly 3 meters deep. These two roughly contemporary archaeofauna thus come from two very different site types: a seasonal specialized fishing station and a permanent farm.

NW Iceland is characterized by deep fjords and high mountains with little flat pasture land. Subsistence in this area has long reflected a strong maritime orientation. Ongoing archaeological survey and excavation work by Ragnar Edvardsson (Edvardsson 1996, 2002, 2004a,b) and the CUNY investigations in 1987-90 indicate that this area has many deeply stratified farm mound ruins as well as early specialized fishing stations ("booths"), that may reflect an early commercial fishery. In later historic times, the NW was known as a center for both subsistence and commercial fisheries for gadids, herring, and basking sharks (Steindórsson 1996).

The Site and Excavations 1990

In the summer 1990, an international interdisciplinary team directed by McGovern for CUNY and the *National Museum of Iceland* carried out survey, excavation, and paleoenvironmental research in Árneshreppur, Strandasysla, North-West Iceland (fig. 1). The investigations included two small-scale excavations, located at the end of the peninsula between Reykjarfjörður and Norðurfjörður, both of which produced substantial archaeofauna dominated by fish. One excavation sampled an eroding 18 meter long profile at the coastal site of Akurvík with small turf structures and dense concentrations of fish bones (Amundsen, *et al.* 2004). The other excavation centered on the deeply stratified midden associated with the farm mound at Gjögur 3 km south-west of Akurvík, which had been sampled by a first stage survey team in 1988. The objectives of the 1990 investigations were to clarify the nature and date of the deposits at Gjögur, draw profiles and recover useful collections of artifacts and animal bones. Despite a shortened season and some challenging weather, large bone collections and a small number of artifacts were recovered from both sites.

The Gjögur mound was disturbed by a *súrhey* (silage) pit that was dug into it to produce hay storage in the 1960's. The silage pit occupied the northeastern edge of the mound, mainly cutting through midden deposits, but the northwestern corner also disturbed a wall feature of one of the earlier building phases. Surface mapping suggested that the midden deposit sampled in 1990 may be only one of several deep cultural deposits on the site, which clearly retains considerable untapped archaeological potential. The 1990 Gjögur excavation crew used a natural stratigraphy and 5 cm mechanical levels for the upper 50-75 cm (ending depths varied according to local topography). Due to the placement of the silage pit, the profile was exposed and later used to excavate back from. The profiles provided by the ca 4x5 m silage pit intrusion proved exceptionally useful, and investigations in 1990 concentrated on the eastern edge of the exposure (furthest from the house ruins), combining a horizontal and vertical excavation strategy. Due to poor drainage, time constraints, and safety issues, the 4x2 meter 1990 excavation had to be stopped at the depth of 2.2, meters-well above the bottom of the cultural deposit. A core taken from the bottom of the unit indicated an additional 80 cm of cultural deposit coming down to a Holocene beach gravel natural substrate. Thus the current Gjögur sample does not extend to the base of the cultural deposit, and represents approximately the top 2/3 of the midden. The excavated material was 100% sieved through a 4 mm mesh and a sample of approximately 5% was sieved through a 1 mm mesh as a control check.

Phasing of the Gjögur Midden

Even though the farm mound at Gjögur is located behind a modern farm that had been active in the late 20th century as a shark fishing center, and structures on the farm mound itself were reportedly occupied down to 1860, the portion of the midden excavated in 1990 does not appear to extend into the early modern period. The absence of characteristic 17th-19th century Icelandic artifacts such as

Table 1. AMS radiocarbon assay results from Gjögur, based on terrestrial mammal bone (sheep or goat).

Table 1 Gjögur AMS Radiocarbon Assay Results All samples caprine (sheep or goat) bone, calibration OxCal 3.9 AMS, bone collagen extraction		
context	***Upper***	***Lower***
stratigraphic position	25-30 cm below surface	SU 63
sample number	GU 9742	GU 9743
delta C13	-21,40%	-20,40%
C14 age	525 +/- 55 BP	750 +/-55 BP
1 sigma calibrated range	1320-1350 (15.6%) 1390-1450 (52.6%)	1220-1295 AD (68.2%)
2 sigma calibrated range	1300-1470 (95.4%)	1160-1320 (88.5%) 1350-1390 (6.9%)

imported pottery, glass, and clay pipes, which were recovered in substantial numbers at a nearby farm excavation at Finnbogastaðir (Perdikaris, *et al.* 2003; Edvardsson *et al.* 2004) combined with the calibrated 14th-15th century range of the upper AMS radiocarbon date suggest a late 15th or early 16th century terminus date for significant refuse deposition on this part of the site.

A composite bone comb side-plate was encountered in context (SU 43) approximately in the middle of the 1990 exposure, which stylistically dates to after AD 1200 (Amorosi et. al., 1996). Near the bottom of the excavated profile (still ca 80 cm above the non-cultural surface) a base shard of a rounded steatite vessel was recovered from context SU 60. While steatite artifacts of this sort are usually associated with Viking Age occupations in Iceland, some later imports are known and it is also quite possible that this battered fragment is residual evidence of earlier occupation of the site. Other artifacts recovered (worked whalebone, whetstones, iron nails) are not temporally diagnostic. The AMS radiocarbon calibrated one sigma range of AD 1220-1295 taken from the lowest part of the exposed profile (SU 63) suggests that the lower layers of the exposed midden deposit date to the 13th century, while the upper layers are 14th and 15th century. For the purpose of this paper, the excavated stratigraphic units are broken down into 2 analytical units: upper and lower, with respective radiocarbon dates listed in Table 1.

Zooarchaeology: Presence and Abundance of Species

This preliminary report focuses on the upper context at Gjögur, and does not attempt to present the complete archaeofauna (which may exceed 150,000 identifiable fragments). Table 2 presents an overview of the taxa identified and the NISP count for the upper contexts at Gjögur and Akurvik (SU22).

Even though domestic mammals, sea mammals, some birds, and mollusks are present, both contexts are dominated by fish.

Table 2. Summary of bones from 13th-15th century contexts at Akurvík (SU22) and Gjögur (AU1). "Small terrestrial mammal" includes bones of small dog or small caprines. "Medium Terrestrial mammal" includes bones of large dog, caprines, or pigs. Both categories at Akurvík are probably in fact sheep or goat. "Large Terrestrial Mammal" category includes bones of cow and horse-sized mammals. NISP (Number of Identified Specimens) included fragments identifiable to a useful taxonomic level, TNF includes all fragments."

	AU1- Gjögur NISP	*Context 22-Akurvík* NISP	AU1-Gjögur % NISP	*Context 22-Akurvík* % NISP
Domestic Mammals	86	15	0,77	0,02
Seals	34	8	0,30	0,01
Whale	20	1.528	0,18	1,53
Birds	23	124	0,21	0,12
Fish	8.960	93.349	80,29	93,48
Shellfish	2.037	4.834	18,25	4,84
total NISP	11.160	99.858		
Medium terrestrial mammal	146	23		
Small terrestrial mammal	1	4		
Large terrestrial mammal	10			
Unidentifiable mammal fragment	143	119		
Unidentifiable bone fragment	344	1.085		
total TNF	12.004	101.089		

Table 3. Mammal bones from 13th-15th century contexts at Akurvík (SU22) and Gjögur (AU1). All of the unidentified seal bones could also be Phoca vitulina L. by size. The whale bone fragments were heavily fragmented (often cut and chopped) and may represent single or multiple individuals.

Table 3 Scientific Names	English common names	AU1- Gjögur	*Context 22-Akurvík*
Bos taurus L	Cattle	7	
Equus caballus L	Horse	2	
Sus scrofa L.	Pig	1	
Ovis aries L.	Sheep	28	4
Caprine	Sheep or Goat	48	11
Phoca vitulina L	Harbor or common seal	18	4
Phocidae sp.	Seal species indetermina	16	4
Eubaleanus glacialis L.	Northern Right whale		1
Cetacea sp.	Whale species indetermi	20	1528

Mammals

Domestic mammals present in the Gjögur assemblage (Table 3) support Gjögur's documented status as a farm, despite the overwhelming proportion of fish bone recovered. Edvardsson (2002) has presented a statistical argument based on the early 18th century land register *Jarðabók,* which demonstrates that the Northwest in the 18th century had the lowest ratio of domestic stock to humans in all Iceland, and that most farms did not maintain nearly enough sheep or cattle to provision the recorded size of their households. In the Jarðabók register, Akurvík is not mentioned, and Gjögur had only a few sheep and no cattle. As table 3 demonstrates, cattle were present in the later medieval contexts at Gjögur, though they made up a small portion of the overall collection.

As the mammals present are highly fragmented and few, it is difficult at present to use this collection to generalize about herding practices. The ap-

Table 4. Bird bones from 13th-15th century contexts at Akurvík (SU22) and Gjögur (AU1). The unidentified gull species could come from several medium-sized species, and the unidentified bird bones are of gull-small alcid size range.

Table 4 ***Scientific Name***	***English***	AU1- Gjögur	*Context 22-Akurvík*
Anatidae sp.	Duck sp.		1
Charadrius hiaticula L.	Ringed plover		
Phalacrocorax carbo L.	Cormorant		1
Sula bassana L.	Gannet		1
Larus marinus L.	Greater black backed gull		
Larus sp.	Gull sp	2	18
Alcidae sp.	Auk sp		1
Alca torda L.	Razorbill		1
Uria sp.	Murre or Guillemot	9	4
Fratercula arctica	Puffin	1	
Falco rusticolus	Gyrfalcon	1	
Aves sp.	Bird species indet	10	97
	total	23	121

Table 5. Fish bones from 13th-15th century contexts at Akurvík (SU22) and Gjögur (AU1). The gadid family elements are all potentially from Atlantic cod.

Table 5 Fish ***Scientific Names***	***English***	AU1- Gjögur NISP	*Context 22-Akurvík* NISP	AU1-Gjögur % Gadid
Gadus morhua L.	Atlantic cod	2.626	4.981	95,60
Pollachius virens L.	Saithe	38	92	1,38
Melanogramus aeglfinus L.	Haddock	69	528	2,51
Molva molva L.	Ling	10	81	0,36
Brosme brosme L.	Torsk	4	7	0,15
Gadidae, species indeterminate.	Gadid family	1.807	6.356	
Hippoglossus hippoglossus L.	Halibut	31	19	
Scophthalmus rhombus L.	Brill	-	4	
Pleuronectidae sp.	Skate sp	1	4	
Anarchichas lupus L.	Wolfish	1	78	
Rajidae	Ray sp	7	5	
Salmonidae	Salmonid family	10	1	
Fish, species & family indeterminate	Fish species	4.356	81.193	
	total fish	8.960	93.349	

proximately 11 : 1 ratio of caprine (sheep and goat bones) to cattle bones suggest the outlines of the later sheep-dominated herding strategy of this district (Edvardsson *et al.* 2004), but at present NISP counts are too low for a reasonable quantification of relative abundance of domestic stock at Gjögur. It is entirely possible that all the domestic mammal bones in the Akurvík later medieval collection in fact represent smoked or pickled cuts of meat brought as provisions rather than live animals maintained on site. A few caprine bones at Gjögur that came from a young neonatal lamb and a neonatal cow humerus suggest a dairying emphasis clearly visible in larger contemporary Icelandic collections (Perdikaris *et al.* 2002, McGovern 2001). Pig, horse and cattle bones are recovered at Gjögur but seem to be absent at fishing booths at Akurvík. The single pig bone may reflect a late example of Icelandic pig keeping or possibly imported preserved meat.

Harbor (Common) seal (*Phoca vitulina*) colonies are present all along the coast of Strandasysla, and both young and adults were regularly taken down to early modern times by clubbing and netting (Edvardsson *et al.* 2004; Woollett 2004a). At farm sites such as Svalbard in North-East Iceland bones of harbor seal pups far outnumber adults, indicating a systematic predation upon pupping grounds in spring and an opportunistic encounter hunt of adults during other seasons (Woollett 2004b). Gjögur harbor seal bones come both from adults and pups, both probably taken by clubbing at pupping beaches, while Akurvík harbor seal bones are exclusively from adult animals, suggesting netting or encounter hunting outside the spring pupping season. A major difference between the two sites is the large amount of whale bone present at the Akurvík site. Much of this material consists of small pieces of worked whalebone that cannot be identified to species level, but one northern right whale vertebra was used as a corner support for the booth structure that generated the SU 22 midden deposit. It is unclear if the Akurvík booths were the base for active pursuit of great whales (no blubber rendering residue was observed in any of the long profiles) or if the bones of stranded whales were being particularly heavily exploited for craftwork and shelter construction.

Birds

Table 4 presents the count of bird bones identified at Gjögur and at Akurvík. Bird bones make up a small portion of the archaeofauna, and the species represented are all associated with local shoreline communities today (mainly gull species and auk family). The unusual find is represented by a single bone from gyrfalcon. Icelandic gyrfalcon was the property of King of Denmark and Iceland, being a prized possession of kings and emperors in medieval times and a highly controlled export item (see discussion in Harrison *et al*, this volume). A similar bone has been recovered from the 14th c trading site of Gásir in Eyjafjörður (Harrison *et al.* 2004).

Fish

Table 5 demonstrates the relative abundance of the identified gadids in Gjögur and Akurvík collections, which are overwhelmingly Atlantic cod. Such dominance by a single species (especially cod in the N Atlantic) would serve as an indicator of a commercialized or commercializing fishery concentrating on a single species that can be standardized and commoditized for export (see Perdikaris *et al.* in press; Perdikaris 1998 for discussion; Simpson *et al*., 2000).

The quantity of fish bones recovered at Gjögur (over 80%) seems to indicate that fishing was a major activity in 15th century Gjögur. A limited number of flatfish species, salmonids, skates and a single Greenlandic shark (tooth) were identified in the recovered archaeofauna, but gadid (cod family) fish dominate the collection and definitely make up most of the fish bones not assignable securely to family. The majority of the gadid fish are Atlantic cod, distantly followed by haddock. While Gjögur and Akurvík are very different types of occupation, both show an overwhelming dominance of cod fish in their later medieval archaeofauna.

Fish Skeletal Element Distribution

Skeletal element distribution is often used as an aid in identifying specialized fish butchery and processing techniques that may disproportionately deposit cranial and some vertebral elements at landing/processing centers and concentrate other vertebral elements at consumption areas (see discussion in Perdikaris *et al.* 2002, Amundsen *et al. in press*). As Figure 2 illustrates, cranial cod bones greatly outnumber axial (vertebral) elements both at Gjögur and Akurvik (MAU adjusted for body part frequency in the live animal, (Grayson 1984)). This

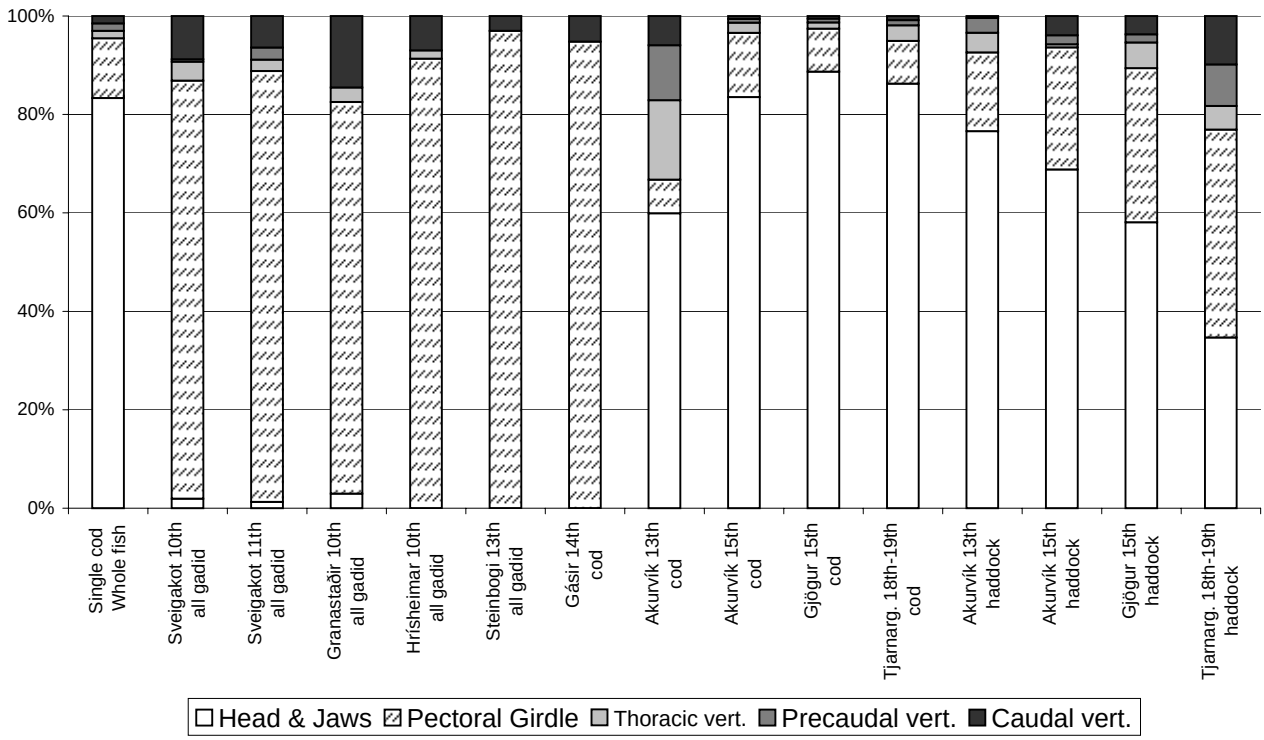

Fig. 2. A comparison of the distribution of grouped fish skeletal elements for the larger 9th-11th century inland Myvatn area archaeofauna (Sveigakot, Hofstadir, Hrísheimar), a 13th century Myvatn area archaeofauna from Steinbogi, the 14th century trading site of Gásir, the 18th-19th century deposits at Tjarnargata 3 c (Tjarnarg.) under modern Reykjavik, and the two sites of Akurvík and Gjögur in the West Fjords. MAU (NISP/natural element frequency in the skeleton)% is used to allow comparison of different sample sizes and to normalize the different element frequencies in the natural skeleton. The graph presents a breakdown of the grouped elements (head at bottom, tail at top) of head and jaws (most likely to be discarded at preserved fish production locations), the pectoral girdle (the cleithrum, scapula, and bones immediately around these elements, usually traveling with preserved gadid products), and the thoracic, precaudal, and caudal vertebral series.

pattern suggests considerable fish processing waste at both sites producing a surplus of head bones, and the removal of vertebral elements. There is also a comparative shortage of cod caudal vertebrae in both assemblages. Caudal vertebrae were often included in exported prepared fish products. Once again, it seems that there is a pattern forming that excludes certain parts of fish, presumably those included in a product exported and consumed elsewhere.

Size Reconstruction

Live length reconstructions for Atlantic cod were carried out for dentary and premaxilla, employing the widely used Wheeler & Jones (1989) regressions. From Gjögur 99 dentaries and 89 premaxillae were measured. Both elements provided closely similar distributions (Fig. 3). Fig. 4 presents the distribution of the dentary from various sites in the North Atlantic, comparing Gjögur, Miðbær, late medieval layers of a farm on the island of Flatey in Breiðafjörður (Amundsen, *in press*), Finnbogastaðir, 18th century farm., 18th-19th century Tjarnargata 3c (probable producer site) and Akurvik (Amundsen, *et al., in press*). For reference, the approximate limits of the 'stockfish window' (ca 60-110 cm live length) are included. Fish smaller than this window over dry, and fish much larger simply rot. However, smaller size fish can be ideal for preparing in the split open fashion (klipfisk) with or without the aid of salt. The Miðbær reconstructed cod length appears to reflect a subsistence fishery aimed at smaller cod, possibly taken close to the island, with negligible component of larger cod suitable for drying. Element distribution of cod from Miðbær also suggests on site consumption of whole cod. The site of Finnbogastaðir is a farm 15 km to the North-East of Akurvík, and the 18th century levels sampled in 1990 produced a substantial archaeofauna from a period comparatively rich in supporting documentary evidence (Edvardsson *et al.*

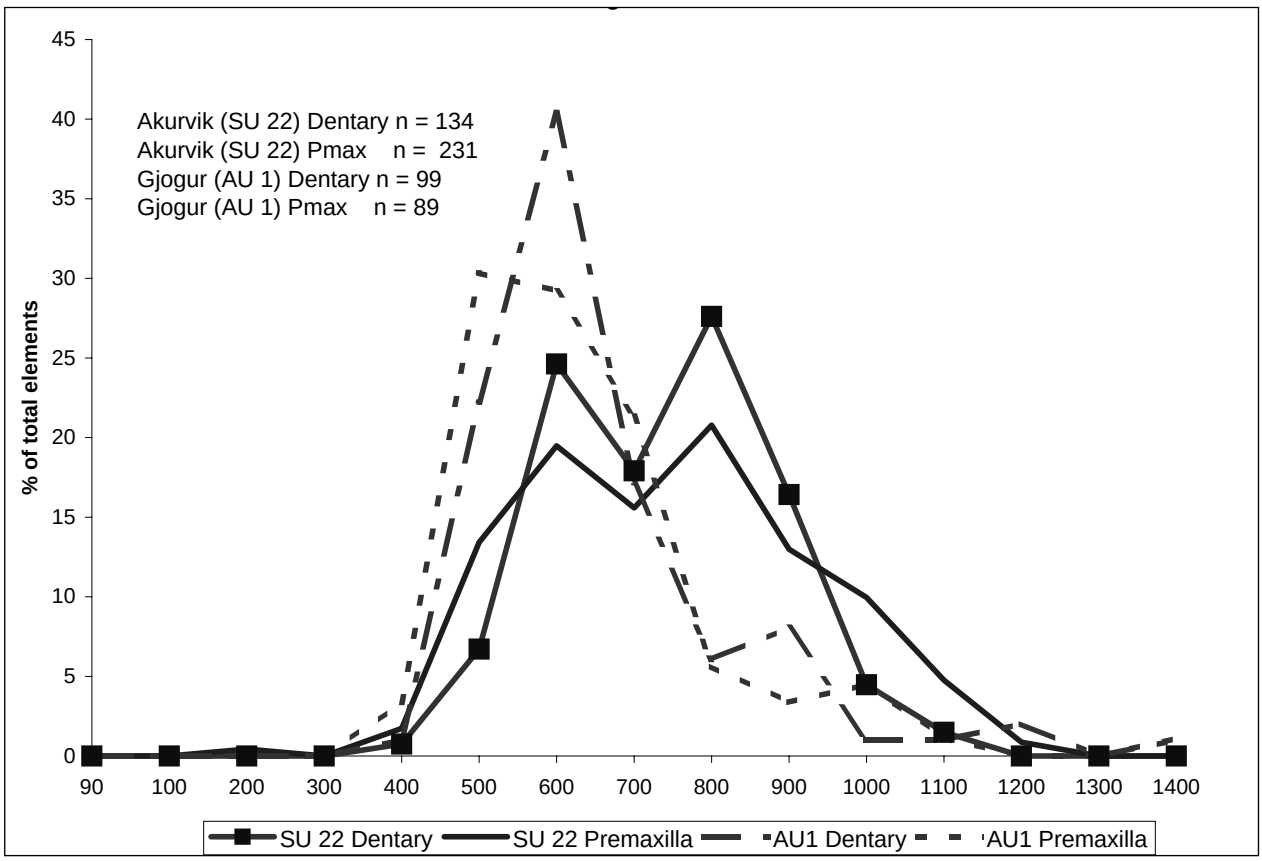

Fig. 3. A comparison of reconstructed live length (in cm) for cod from 13th-15th century contexts at Akurvík (SU22) and Gjögur (AU1) based on measurements of premaxilla (Pmax) and dentary, following methods of Wheeler & Jones (1989). The open box encloses the "stockfish window"; the size range most suitable for the production of stockfish and other air dried preserved fish products."

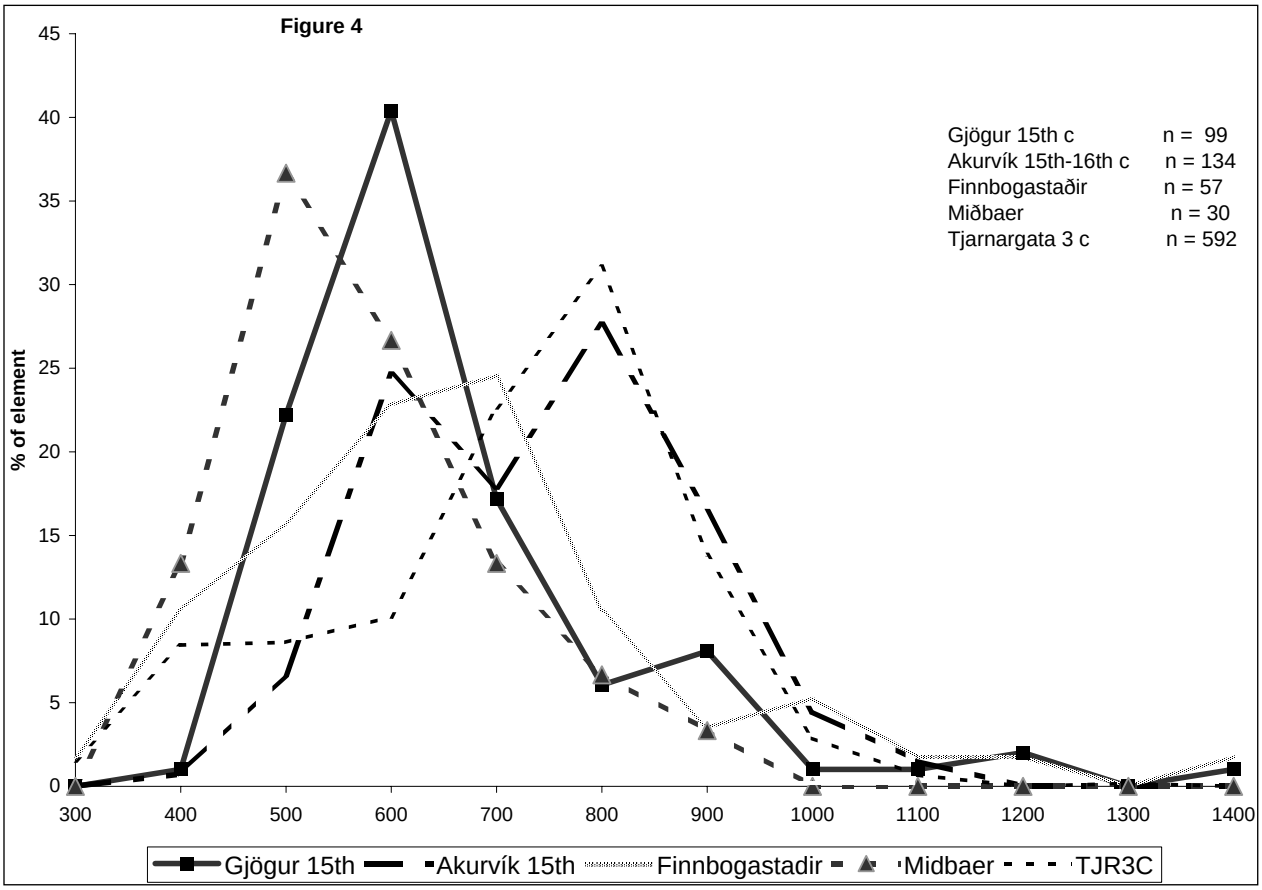

Fig. 4. A comparison of reconstructed live length (in cm) for cod from Akurvík, Gjögur, Finnbogastadir, Midbaer and Tjarnargata 3 c based on dentary measurements following Wheeler & Jones (1989). The open box encloses the size range most suitable for dried fish production, illustrating the range of patterns reflected in these diverse sites.

2004a). This collection reflects what is known to have been both limited production of stockfish for purchase of imported goods and rent payment and subsistence fishing for cod and haddock. The substantial "tail" of smaller cod in the Finnbogastaðir distribution probably reflects the strong subsistence component of this collection. Gjögur farm mound's upper layer seems to reflect a mix of strategies, despite the strong "producer" signal provided by its cod element distribution patterns. The interplay of the demands of household provisioning, fishing crew provisioning, and specialist production (potentially aimed at multiple markets) clearly produces a series of overlapping zooarchaeological patterns, which makes the interpretation of archaeofauna from such multi-functional sites challenging.

Mollusks and Arthropods

Table 6 presents the molluscan and arthropod remains recovered from the two contexts. Clam and mussel shells were highly fragmented, along with scallop, barnacle and periwinkle. It seems likely that these shells were not so much food remnants as bait material (Claassen 1998; Arni Einarsson, pers. comm.).

Discussion: Gjögur and Subsistence Fishing

Analysis of the Gjögur collection is ongoing, and later work may change some conclusions presented here. However, the broad outlines of the later medieval archaeofauna seem clear and these raise a

Table 6. Shellfish remains from contexts 13th-15th century contexts at Akurvík (SU22) and Gjögur (AU1). The large number of unidentified molluscs are probably nearly all in fact also mussel, but broken into very small fragments."

Table 6		AU1- Gjögur	*Context 22-Akurvík*
Scientific Name	English	NISP	NISP
Buccinum Undatum	Whelk	5	
Chlamydus sp	Scallop	6	

				%	
Scientific Name	***English***	AU1- Gjögur	*Context 22-Akurvík*	AU1- Gjögur	*Context 22-Akurvík*
Balanus sp.	Barnacle	58		2,80	
Mytilus edulis	Mussel	538	1835	25,95	37,96
Mya sp.	Clam sp.	573	504	27,64	10,43
Mollusc sp.	Shellfish sp.	893	2495	43,08	51,61
Total Molluscs		2073	4.834	100,00	100,00

series of questions affecting our understanding of the intensified fishing of late medieval Iceland. The continuous layers of the midden profile at Gjögur, as well as surviving documentary sources, indicate that the nature of human occupation at Gjögur was very different from Akurvík: a permanent long established farm rather than a seasonally occupied collection of huts. It would be reasonable to anticipate substantial differences in the archaeofauna from these two sites, as the Gjögur midden is the product of a wide range of activities carried out year round to provision a household while the ephemeral Akurvík booths existed for a few weeks to shelter boat crews involved exclusively in fishing and marine hunting. The very high overall proportions of fish at both sites is thus somewhat surprising, as is the strong concentration upon cod in the Gjögur archaeofauna, which shows a limited gadid species diversity at least as restricted as in the Akurvík fish collection. Such a concentration upon cod is characteristic of medieval commercial fisheries in Norway (Perdikaris 1999) and of fully commercial fisheries in early modern Iceland (Perdikaris. 1996; Edvardsson *et al.,* 2004a; Amundsen, *in press*;). This specialization and associated reduction in species diversity in the landed catch was part of the process of high medieval (12th-14th century) commoditization, which transformed the natural diversity of subsistence catch seen in Norwegian Iron Age and Viking Age Icelandic archaeofauna into a focused effort to land the species most desirable on the international market.

Element distribution analysis demonstrates that both Akurvík and Gjögur were regularly exporting some form of preserved fish (with cleithra and lower vertebrae traveling to distant consumers), and these two later medieval archaeofauna are more similar to each other in their pattern of processing than they are to either the earlier 12th-13th century contexts at Akurvík or the later 18th century deposits at the nearby Finnbogastaðir site. The Gjögur farm was apparently regularly producing some form of preserved cod product far beyond the immediate subsistence needs of its household, with a cod element "production profile" suggesting fish cutting and preparation techniques very similar to those of the specialized Akurvík fishing site.

Both the later medieval NW fishing booth site at Akurvik and the contemporary coastal farm at Gjögur appear to be producing both stockfish-sized cod and a limited number of smaller klipfisk-size fish. Perhaps significantly, while the Akurvík cod length reconstructions show a clear bimodal distribution with one spike squarely in the stockfish "window", the reconstructed peak distributions for cod length at the Gjögur farm site fall at or just below its lower limit. While both sites were strongly focused upon cod fishing; made use of similar fish processing strategies, and evidently exported much of their catch, the Akurvík site would have produced substantial amounts of prime international quality stockfish, and the Gjögur site would not have done so. Both sites were producing substantial amounts of smaller cod, which also seem to

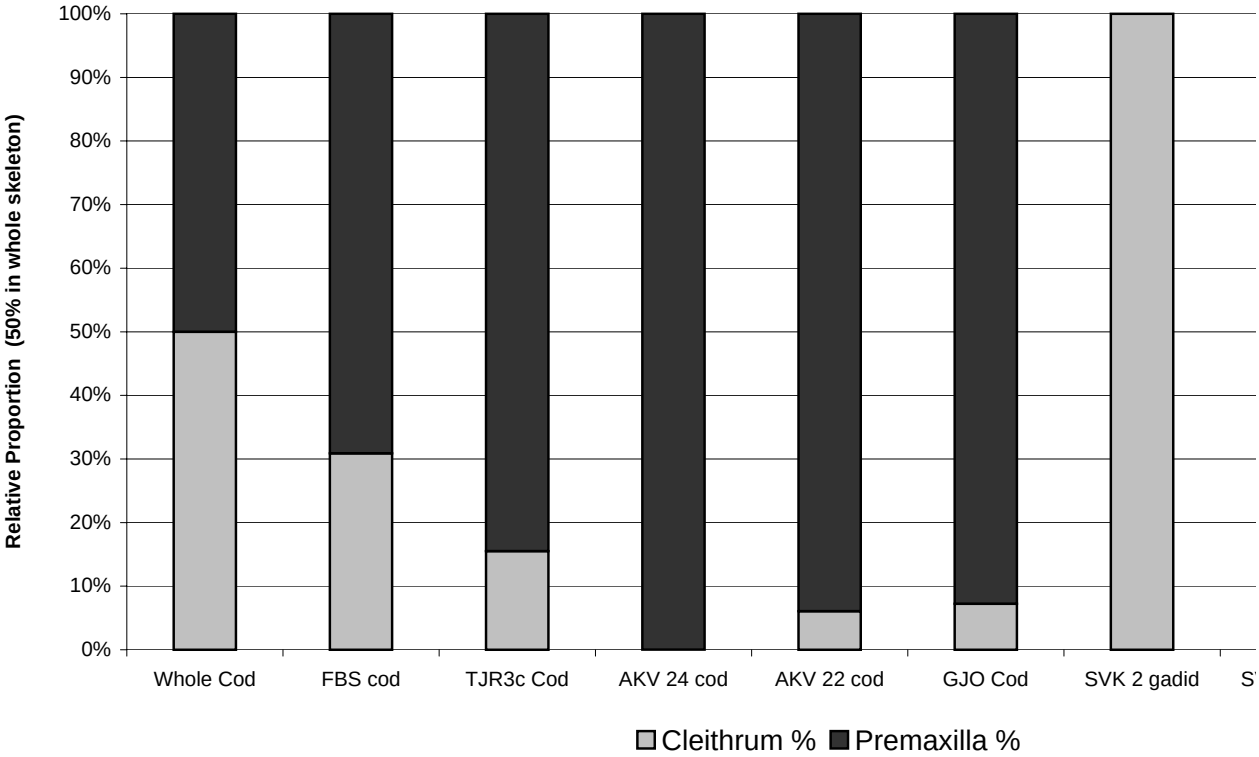

Fig. 5. A comparison of relative proportions of cleithrum and premaxilla cod bones, both of which are dense, recoverable and identifiable, from Akurvík, Gjögur, Finnbogastadir, Tjarnargata 3 c, Sveigakot and. The proportion should represent as many premaxilla bones as there are cleithrum bones.

have been processed for preservation rather than being eaten locally as fresh catch. By contrast, the 18th c household at Finnbogastaðir was consuming most of its bycatch of haddock and small cod, as is evident from the higher concentrations of cod cleithra in this archaeofauna (Fig. 5). It seems that in the 14th-15th century, smaller cod (around 50-60 cm in live length) were not bycatch to be consumed by fishers who used the larger cod for trade and tribute, but a desired primary catch. In the later Middle Ages (at least in this district) these smaller cod were the target of their own deliberate fishery effort; – an effort that produced a pattern of production and consumption different from both Iron Age/Viking Age patterns and from the later fully commercial patterns of the early modern period.

There is a general pattern of increasing proportion of fish bone relative to domestic mammal bone from early medieval to early modern times in most Icelandic archaeofauna in all portions of the country, a pattern usually ascribed to increasing subsistence use of marine resources in response to climate fluctuation, soil erosion, and changing social forces (Amorosi, *et al.* 1996; Perdikaris *et al. in press*,). Edvardsson (2002, 2004b) has argued that NW Iceland played a critical role in fulfilling these growing Icelandic subsistence needs in the later Middle Ages, and has documented the role of powerful chieftains in managing the production and distribution of fish and other marine products from the NW into the rest of the country. Edvardsson has argued that the "ethnographic present" of the impoverished 18th-19th century subsistence fisher-farmers is a poor model for the greater wealth and economic complexity of high medieval Iceland. Were two fish distribution systems in operation at the same time in the 14th-15th centuries in Strandasýsla; – one serving a long established (but evolving) Icelandic market and the other aimed at the growing international fish trade? Are the fish bone collections from both the "fishing farm" at Gjögur and from the seasonal fishing booths at Akurvík 3 km away similar because they represent different parts of the same system of surplus fish production – perhaps managed as a unified enterprise? These questions require further work in both the field and laboratory, and new faunal collections now being excavated in the West Fjords will cer-

tainly add to our understanding of complex interactions of economy, climate, and fishing in this key area of the North Atlantic.

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