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THE PREHISTORIC EXPANSION OF FARMING INTO "ARCTIC" NORWAY: A CHRONOLOGY BASED ON ^{14}C DATING

OLAV SVERRE JOHANSEN
Institute of Social Sciences, University of Tromsø, Norway

and

KARL-DAG VORREN
Institute of Biology and Geology, University of Tromsø, Norway

ABSTRACT. Palynologic and archaeologic studies using ^{14}C dating indicate that elements of farming were introduced even further north than the Arctic Circle during the Neolithic period, ca 4000 BP. A second stage with heavier reliance on farming and with probable establishment of permanent farmsteads is dated to 2000–2500 BP.

INTRODUCTION

North Norway includes the counties of Nordland, Troms, and Finnmark between 65° and 71° 10′ N. Most of the area of ca 100,000km^2 is north of the Arctic Circle (66° 33′ N). However, the climate could hardly be called arctic because the Gulf Stream brings temperate water northwards along the coast. In most areas the growth period is long enough for barley to ripen.

Traditionally people relied on fish, meat, and dairy products from domestic animals, mainly sheep and cattle. Sealing, whaling, and hunting of land mammals were important in some districts, and cereals were also grown on a small scale. This general type of economy was probably established by 2000–2500 BP[1] and prevailed into the 19th century. However, in the Early Medieval period, AD 1000–1350, trade was established with Bergen and dried fish exchanged for cereals. The Saami people (Lapps) depended mainly on fishing, hunting, and gathering until the 17th century when nomadic reindeer herding was adopted by most groups.

EARLY FARMING IN SCANDINAVIA

The existence of Stone age farming groups in South Scandinavia was suggested by scholars already in the 19th century. During the last 25 years, a firm chronology based on ^{14}C dates for the introduction and expansion of farming in the south has been established. The early horizon associated with the Funnel Beaker tradition is dated between 5300 and 5000 BP. An expansion into Middle Scandinavia seems to have taken place between 4300 and 3900 BP and is associated with the Battle Axe tradition.

Early farming groups cultivated barley and primitive wheats and raised cattle, sheep, goats, and pigs. The role of diffusion *vs* immigration in the introduction and spread of a farming economy is still much debated. In North Norway, however, until 10–15 years ago, most scholars assumed that people depended on fishing, hunting, and gathering until AD 200–400. Immigration of farmers from southwest Norway was postulated on the basis of similarities in artifact types, monuments, burial customs, and place

[1] All dates given in BP years are conventional, uncalibrated ^{14}C years calculated with a half-life of 5570 ± 30 years.

names. This Germanic Iron age culture could be traced along the coast as far as 69° to 70° N (Sjøvold, 1962). To the north and east, a mainly fishing and hunting tradition, the Saami Iron age culture, prevailed (Simonsen, 1982).

The chronology presented here indicates that farming into North Norway, even to the north of the Arctic Circle, was introduced in the Stone age prior to 3500 BP.

PALYNOLOGY, ARCHAEOLOGY, AND ^{14}C DATING

Research during the last ten years has provided very important new information about the early farming economy in the far north. Most of the results were produced through both palynology and archaeology. Osteologic and macrofossil analysis have also provided crucial data. There is a heavy reliance on ^{14}C dating for chronology.

The first pollen diagrams indicating a much older tradition for farming than earlier assumed were published by Vorren in 1975. Pollen of cereals and pollen taxa indicating grazing from Bakkan (Fig 1, Table 1, 11) were dated to 3070 ± 70 BP (T-1635). This finding led to a cooperation between palynology and archaeology, and since 1975 the co-authors of this report have published several papers dealing with the introduction and spread of farming in the north (Vorren, 1975, 1979, 1983, 1985; Johansen, 1979a,

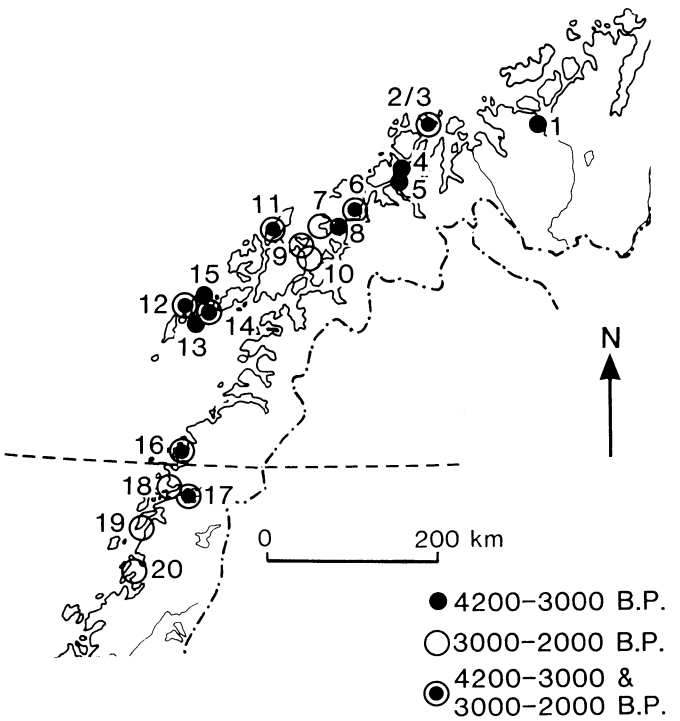

Fig 1. Pollen sites with ^{14}C dates earlier than 2000 BP

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TABLE 1
^{14}C dates from pollen diagrams indicating the introduction and repeated establishment of cereal agriculture and traces of grazing in North Norway

Site		^{14}C dates			
		Neolithic-Early Bronze age		Late Bronze age-Pre-Roman Iron age	
No.*	Name	Date	Lab no.	Date	Lab no.
1	Isnestoften (3)**	3420 ± 100	T-4359		
2	Vannareid (3&4)	3520 ± 50	T-2547		
3	Korsnes (3&4)			2280 ± 140	T-4054
4	Tromsø (10)	3420 ± 40	T-3492		
5	Berg (3)	3920 ± 90	T-4363		
6	Torslia (2)	3420 ± 70	T-1988		
7	Hofsøy (1&2)			2955 ± 140	GX-3822
				2240 ± 80	T-2863
8	Vinja (7)	3870 ± 80	T-4880		
9	Elgsnes (7)			2940 ± 80	T-4604
10	Møkkeland (3)			2410 ± 90	T-4130
11	Bakkan (1)	3070 ± 80	T-1635	2360 ± 110	T-1912A
12	Bøstad (2)	3740 ± 50	T-2223	2430 ± 130	T-2609
13	Ramsvik (8)	3060 ± 90	T-753		
14	Moland (5&6)	4120 ± 50	T-4145	2800 ± 50	T-3268
15	Årstrand (5&6)	4280 ± 130	T-2913		
		3990 ± 90	T-2912		
16	Tjong (5)	4160 ± 80	T-3724	2050 ± 60	T-3310
17	Sund (5)	3570 ± 80	T-3739	2690 ± 70	T-3616
18	Frydenlund (3)			2560 ± 70	T-4607
19	Skar (9)			2280 ± 70	T-4878
20	Tilrem (5)			2600 ± 60	T-3441

* Site nos. refer to sites in Fig 1.

** Nos. in parentheses cite references: (1) Vorren, 1975; (2) Vorren, 1979; (3) Vorren, 1983; (4) Vorren, 1985; (5) Vorren & Nilssen, 1982; (6) Nilssen, 1983; (7) Vorren & Alm, 1985; (8) Moe, 1983; (9) Wiik, 1985; (10) Fimreite, 1980.

1981, 1982a). There are also important contributions by other scholars (Fimreite, 1980; Moe, 1983; Nielssen, 1983; Wiik, in press). Further research by the authors in collaboration with other scholars should be mentioned (Vorren & Nilssen, 1982; Hultgreen, Johansen & Lie, 1984; Vorren & Alm, in press). Tables 1 and 2 list 40 ^{14}C dates older than ca 2000 BP. Except for GX-3822, all samples were measured at the Trondheim Radiocarbon Laboratory.

EVIDENCE FROM POLLEN DIAGRAMS

Figure 1 consists of 20 sites where ^{14}C dated pollen diagrams indicate farming activities earlier than 2000 BP. Many of the diagrams come from sites where Iron age monuments indicate a long tradition of permanent settlement. In some cases, archaeologic excavations and pollen analysis were done at the same site. Some results are byproducts of diagrams made for the study of vegetational history, in general. The northernmost site, Isnestoften (no. 1), lies at 70° 05′ N.

The concept of "farming" as deduced from pollen diagrams is based partly upon occurrence of indicators of field cultivation such as cereals and anthropochorous weeds, and partly upon increase or establishment of

TABLE 2
^{14}C dates from archaeologic excavations at sites with indications of early farming activity (*cf* Fig 3)

Site	^{14}C dates			
	Neolithic-Early Bronze age		Late Bronze age-Pre-Roman Iron age	
Name	Date	Lab no.	Date	Lab no.
Stiurhelleren (4)	4170 ± 100	T-4356		
	4170 ± 80	T-4826		
	4320 ± 100	T-4827		
	4380 ± 40	T-4357		
Hofsøy (1)	3060 ± 80	T-3028	1950 ± 60	T-2336
	3250 ± 60	T-2627		
Storbåthallaren (3)			2050 ± 60	T-2267
			2740 ± 80	T-2268
Frydenlund			2980 ± 110	T-4980
Moland (1&2)			1960 ± 100	T-2629
			2010 ± 150	T-2119
Bøstad (1&2)			2150 ± 80	T-1673

(1) Johansen, 1979b; (2) Johansen, 1982b; (3) Utne, 1973, 1979; (4) Hultgreen, Johansen & Lie, 1984

pollen from so-called "apophytes." Apophytes are taxa that have a spontaneous distribution area at or around the pollen site. The opening up of the forest and establishment of pastures are, generally speaking, more easily traced than field cultivation. Charcoal curves may be of importance for independent evaluation of human impact on the landscape. There are, however, complex methodologic problems involved when pollen diagrams are used for the interpretation of anthropogenic activity. These problems will be addressed elsewhere (Vorren, K-D, The impact of early agriculture on the vegetation of North Norway, *in* Behre, K-E, ed, Interpretation of anthropogenic indicators in pollen diagrams: INQUA comm for the study of the Holocene, Wilhelmshaven, ms in preparation). The simplified pollen diagram from Bøstad (Fig 2) may serve as a typical North Norwegian example. There are only faint traces of field cultivation for the period 4000–3000 BP. Pastures are more easily deduced and domesticated animals may have a longer tradition at this site than cereal agriculture. Heavier human impact on the landscape is seen in a horizon with a ^{14}C date of 2430 ± 130 BP (T-2609) (Table 1, 12), and this is interpreted as resulting from the establishment of a permanent farmstead on the site.

ARCHAEOLOGIC EVIDENCE

Agricultural implements are rare outside South Scandinavia prior to 1500–2000 BP, but other important data may be found: plow marks indicating fields, charred seeds of cereals, and bones of domesticated animals. Such evidence has only become available in North Norway during the last 10 years and is still rare. A considerable number of artifacts proving contact with Stone age groups in the south have been found in North Norway, however. These are mainly axes and adzes belonging to the Late Middle and Late Neolithic periods, 3500–4300 BP (Johansen, 1979a). Continuous con-

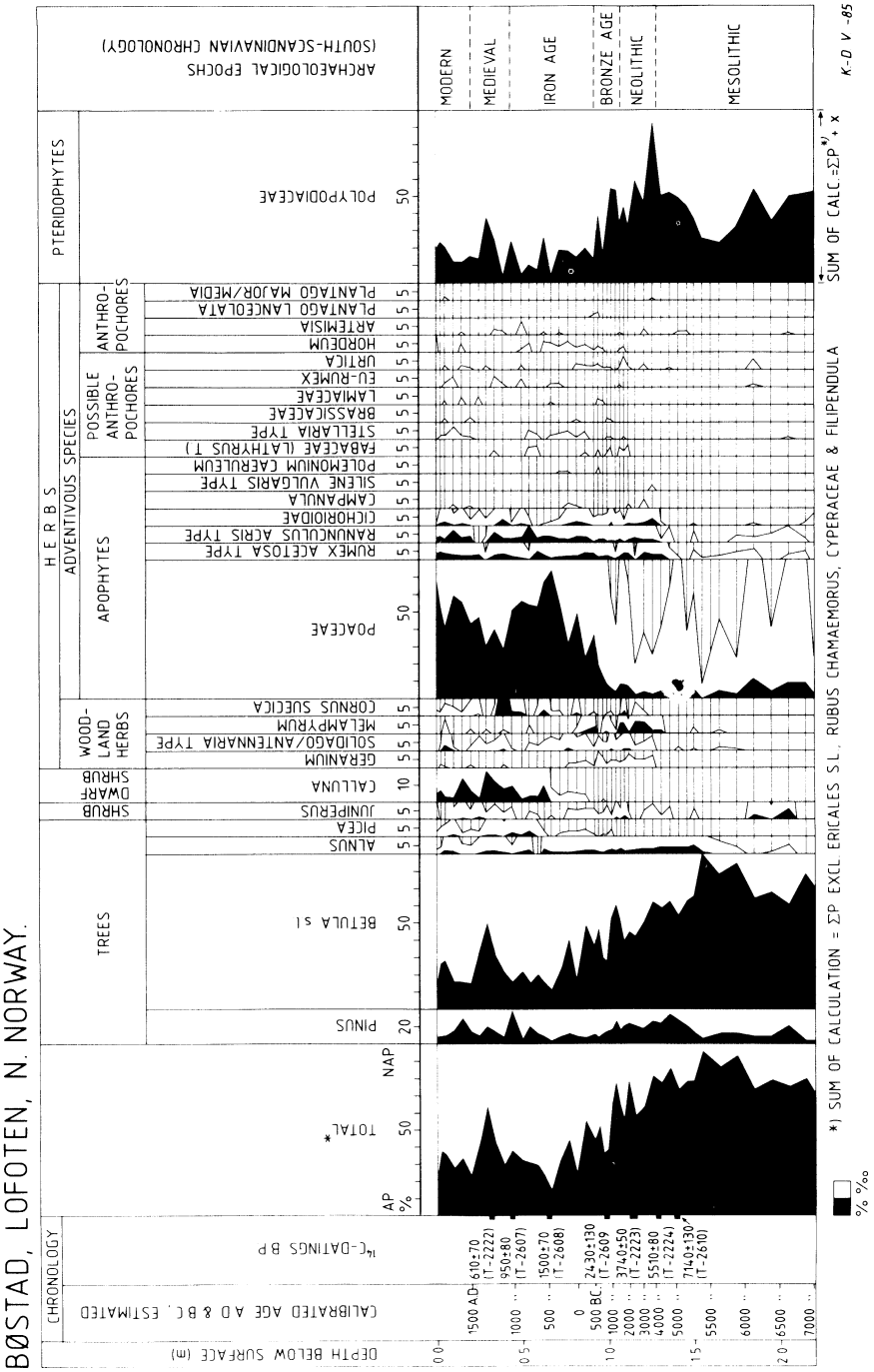

Fig 2. Simplified pollen diagram from Bøstad, Co Nordland

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tact with the south is indicated by some Bronze age (2500–3500 BP) metal artifacts, molds, rock carvings, and burials. But there are no imported objects from the Pre-Roman Iron age (2000–2500 BP) when more permanent farmsteads are believed to have been established. However, at some settlement sites with finds and monuments from the first millennium AD, ^{14}C dates may only indirectly be related to farming activity through their context. An evaluation of the data available shows that presently most of the information comes from pollen diagrams.

THE INTRODUCTION OF FARMING

The oldest ^{14}C dates from pollen diagrams indicating farming (Fig 1) come from Berg (5), Vinja (8), Bøstad (12), Moland (14), Årstrand (15), and Tjong (16). The range of dates is 3740 ± 50 to 4160 ± 80 BP. The oldest occurrence of cereals at Årstrand is found in an horizon between T-2912 and -2913 (Table 1). These dates are in fair agreement with the chronology for the imported stone artifacts belonging to the Battle Axe tradition; ca 3900–4300 BP (Johansen, 1979a). So far, Stiurhelleren, (Fig 3) is the only Stone age site in the north where bones of sheep/goat and cattle are found together with charred seeds of cereals (barley). Four ^{14}C dates (Table 2) on shell from this rock shelter range from 4170 ± 100 to 4320 ± 40 BP. However, there are no South Scandinavian artifacts from Stiurhelleren and the diet was mainly fish and shellfish (Hultgreen, Johansen & Lie, 1984). At other sites in the same area, like Velsvåg and Konsvik (Fig 3), a mixture of

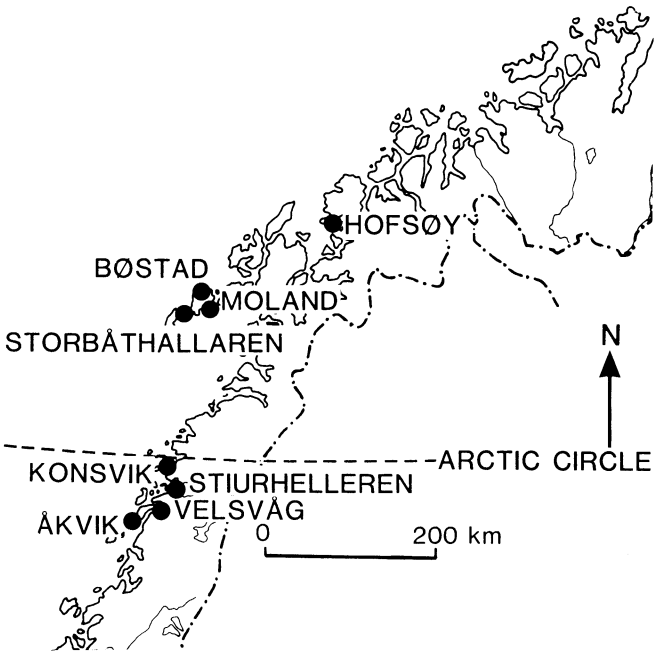

Fig 3. Important archaeologic sites

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North Scandinavian slate artifacts and axes and adzes of types belonging to the Battle Axe tradition has been observed. But these sites were destroyed before excavation could take place. Excavation of a similar site, Bjurselet, in North Sweden yielded bones of domesticated animals. And there are cereal pollen in a diagram from a bog close to the site. Strandholm, another North Swedish settlement site, has a tool kit very close to Battle Axe sites in the south. But this is the only site of this type as yet identified in North Scandinavia (Baudou, 1982). An influx, on a small scale, of farmers from the south seems likely between ca 3900 and 4300 BP. However, a mixture of tradition and economy probably took place so that the farming elements in the economy only played a minor role compared with fishing and hunting. For a more detailed discussion, see Johansen (1979a).

Domesticated animals may have been introduced among fisher–hunters along the Norwegian coast by 5000–5500 BP. There is some pollen evidence (*cf* Fig 2) that may support this suggestion, but as yet no bones of domesticated animals of that age have been found (Johansen, 1982a).

THE SPREAD OF FARMING

Pollen evidence indicates that farming became more widespread during the Late Bronze age, 2500–3000 BP. However, the more-or-less sporadic occurrence of anthropochores and apophytes in most diagrams, indicate that a mainly fishing-hunting economy prevailed. Archaeologic finds and pollen evidence can be compared at Hofsøy (Fig 1, 7). ^{14}C dates on charcoal from two sites with Late Stone age North Scandinavian artifacts gave 3250 ± 60 (T-2627) and 3060 ± 80 BP (T-3028). The latter date comes from a pit that contained teeth of sheep/goat and cattle. A ^{14}C date of 2955 ± 40 (GX-3822) from a pollen diagram represents an horizon with minor traces of farming activity (Johansen, 1979b; Vorren, 1975). That the predominantly fishing-hunting economy existed even later is indicated by the age of two cattle bone samples from Storbåthallaren (Fig 3), 2740 ± 80 (T-2268) and 2050 ± 60 BP (T-2267). This rock shelter was used as a fishing and sealing station between 5000 and 2000 BP (Utne, 1973, 1979).

The pollen composition in some of the diagrams, especially that of Bakkan (Fig 1, 11) shows an increase in the reliance on field cultivation and domesticated animals already between 2500 and 3000 BP.

THE ESTABLISHMENT OF FARMSTEADS

Human interference with the landscape comparable to that seen in historic periods of the diagrams occurs for the first time ca 2000–2500 BP. There is a decrease in forest cover, grassland pastures become more common, and there is an increase in pollen of field weeds and cereals. There is hardly any doubt that this phase represents the transition to more permanent settlements and heavier reliance on farming. ^{14}C dates from excavations of Iron age farm yards support this interpretation. This change in economy is especially well documented in the following pollen diagrams (Table 1): Korsnes (no. 3, 2280 ± 140), Bakkan (no. 11, 2360 ± 110), Bøstad (no. 12; 2430 ± 130), Frydenlund (no. 18, 2560 ± 70), and Skar (no. 19, 2280 ± 60). At Moland (no. 14) the pollen evidence indicates that a

farmstead was established ca 2500 BP. The site was later deserted and a new settlement seems to have been founded ca 1700 BP (Nilssen, 1983, p 115–116).

Archaeologic excavations have been undertaken on Iron age farm yards close to the pollen sites at Hofsøy, Bøstad, Moland, and Frydenlund (Johansen, 1979a, 1982b). Some discrepancy is seen between charcoal ^{14}C dates from excavations and peat ^{14}C dates from the diagrams. This may be due to the fact that old wood is sometimes used for fuel. This is especially a problem when charcoal of coniferous trees is used for dating. The difference between the peat ^{14}C date from Frydenlund, 2560 ± 70 (T-4607), and the charcoal date, 2980 ± 110 (T-4980), may be due to the use of pine charcoal.

At Moland, plow marks made with an ard are associated with a ^{14}C date of 1960 ± 100 BP (T-2629) and a hearth is dated to 2010 ± 150 BP (T-2119). According to the pollen diagram, this is in between the two periods of farmstead establishments. But, in this case, charcoal of deciduous trees are used so that the dates may only be slightly too old. However, the date for the second settlement establishment in the diagram, 1700 ± 40 (T-3472), may be too young. Although only plant remains smaller than 1mm and soluble humic substances are allowed in peat samples, there may be some contamination of younger roots. This may also be the case at Hofsøy.

The opposite is the case at Bøstad: the oldest archaeologic ^{14}C date is 2150 ± 80 BP (T-1673), while the date for the probable farmstead establishment in the diagram is 2430 ± 130 BP (T-2609). But here, only a small portion of the settlement area was investigated. However, as our aim is to trace the broader outline in the cultural and economic development, such discrepancies are of minor importance.

CONCLUSION

The use of ^{14}C dated archaeologic evidence and pollen diagrams has changed our view of the early history of farming in the far north of western Europe. However, although the main outline seems clear, more research is needed to trace the details. Work is in progress on several new pollen diagrams and accelerator dating of charred seeds of cereals and bones of domesticated animals is planned.

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