4. FIELD INVESTIGATIONS, CORING AND SAMPLING

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In the world-wide search for a type locality and sediment profile, which could serve as a world standard section for the Pleistocene/Holocene boundary, the Holocene Commission selected the isostatic uplifted area of south-western Sweden as probably ideal. As a result of this decision, a pilot study was first carried out in the broad region pointed out by the Commission in order to find the most suitable site for the final coring and closer investigations.

During May and June 1973, 27 probing holes were drilled at 14 sites, from Göteborg in the south to Strömstad in the north (Fig. 4:1, Table 4:1). Three of the sites were immediately found to be of no further interest. On the remaining sites about 160 samples from 13 holes were collected by means of an helical auger for a rapid survey at the Geological Survey of Sweden (Cato 1973). Lithostratigraphical and biostratigraphical (pollen and diatoms) results indicated that Solberga (hole 7, 57° 57′ 05″ N Lat., 11° 47′ 42″ E Long., 2 m above sea level) and Brastad (hole 12, 58° 23′ 39″ N Lat., 11° 31′ 20″ E Long., 45 m above sea level) were the most suitable sites for further studies (Miller and Robertsson 1974). The other sites were rejected in consequence of the occurrence of disturbed layers, sandy layers, sequences consisting of highly sensitive (quick) clay, artesian pressure at the soil-bedrock contact, lack of Pleistocene sediments, or other unsuitable conditions (Table 4:1).

Hence, two azimuthally oriented cores were taken at each of the sites Solberga (27.3 m long) and Brastad (15.1 m long) in April 1977 (Cato 1977), one for various analyses, one to be stored at 91 % humidity and constant temperature at the Department of Marine Geology, Göteborg. The cores, 66 mm in diameter, were taken by a Swedish Foil Piston Corer (Kjellman *et al.* 1950), which permits taking continuous cores of up to 30 m length (Figs. 4:2 and 4:3). This is possible only because the friction between core and pipe is reduced partly by the 0.1 mm steel foils, partly by hydraulic injection of paraffin oil into the system.

The 1–2 m thick dry crust of the clay was removed before coring, in order not to create a hard plug in the head of the corer. A few meters from, and on each side of the corer, two pollen-traps (Tauber 1967) were mounted 80 cm

TABLE 4:1. Summary of results and information from the pilot study along the Swedish West-Coast in 1973.

		Position					Lithostratigraphical notes						Biostratigraphical notes			
Locality	Hole No	Lat	Long	Dates of coring	Ground surface (m above sea level)	Pene-tration (m)	Clay	Dry crust (m)	Layers of sand/gravel (cm)	Shell-frag-ments, shell-layer	Peat/ gyttja	Bot-tom	No of Samp-les	Sampled levels (cm)	Probable age of sampled levels	Observed redeposition or disturbed layers
Harestad	1	57°48′57″N	11°51′48″E	1973-05-22	5–10	22.8	x	2.0	140–145			hard	1	1083	Not det.	
	2	57°49′37″N	11°50′05″E	1973-05-22	5–10	>30.5	x	1.8				–	–	–	–	–
Lycke	3	57°51′57″N	11°43′20″E	1973-05-23	0–5	>31	x	2.0				–	–	–	–	x
Solberga	4	57°55′49″N	11°47′45″E	1973-05-23	5–10	15.7	x	2.0				hard	9	1045–1515	Pleistocene	–
	5	57°56′36″N	11°47′48″E	1973-05-24	5–10	>31.5	x	1.2				–	–	–	–	x
	6	57°56′46″N	11°48′34″E	1973-05-24	0–5	5.5	x	1.2		440		sand	7	320–440	Not det.	x
	7	57°57′05″N	11°47′42″E	1973-05-25 -28	0–5	27.2	x	1.2				sand/till	18	1738–2698	Pleistocene/ Holocene	–
Tegneby	8	58°10′00″N	11°34′27″E	1973-05-29	25–30	24.9	x	–				hard	–	–	–	x
	9	58°09′57″N	11°34′27″E	1973-05-29	25–30	19.9	x	–	700–730			hard	–	–	–	x
	10	58°09′56″N	11°33′42″E	1973-05-30	25–30	20.8	x	1.5				hard	9	155–2070	Holocene	–
Morlanda	11	58°10′57″N	11°30′23″E	1973-06-04	5–10	19.4	x	2.0	700–750 980–1000 980–1000 1460–1480 1520–1570 etc.			hard	12	143–1938	Holocene (?)	x
Brastad	12	58°23′39″N	11°31′20″E	1973-06-05	40–45	17	x	0.5				hard	13	170–1674	Pleistocene/ Holocene	–
Bro	13	58°25′39″N	11°28′00″E	1973-06-06	5–10	12	x	1.5		215–220		sand	21	145–1240	Holocene	–
Härnäset	14	58°21′15″N	11°22′24″E	1973-06-07	10–15	>30.4	x	2.0				–	–	–	–	x
	15	58°21′55″N	11°23′21″E	1973-06-07	0–5	11.5	x	1.8	910–955			gravel	15	145–1025	Holocene	–
	16	58°21′57″N	11°23′25″E	1973-06-07	0–5	7.8	x	–				hard	–	–	–	x
Askum	17	58°25′34″N	11°19′45″E	1973-06-08	15–20	>21.3	x	1.5				–	–	–	–	x
Tossene	18	58°26′49″N	11°22′48″E	1973-06-08	35–40	4.0	x	2.5				hard	–	–	–	x
	19	58°26′54″N	11°23′00″E	1973-06-08	35–40	7.8	x	1.5				hard	–	–	–	x
	20	58°26′54″N	11°22′58″E	1973-06-08	35–40	8.4W	x	1.5	805–815			hard	17	138–838	Holocene	–
Gullov	21	58°31′41″N	11°23′21″E	1973-06-12	35–40	>25	x	2.0				sand	–	–	–	x
	22	58°31′18″N	11°23′02″E	1973-06-12	35–40	>21	x	–				–	–	–	–	x
Gerum	23	58°40′26″N	11°22′00″E	1973-06-13	10–15	21.7	x	1.8				hard	15	138–2135	Holocene	–
	24	58°41′55″N	11°21′42″E	1973-06-14	15–20	>23.6	x	–				–	–	–	–	x
	25	58°41′16″N	11°22′00″E	1973-06-14	15–20	28.3	x	–				sand	–	–	–	x
Långeby	26	58°43′39″N	11°11′51″E	1973-06-15	0–5	12.6	x	–	50–385	x	0–35	sand	18	135–1182	Holocene	x
Råssö	27	58°50′18″N	11°11′20″E	1973-06-15	0–5	8	x	–	290–363 705–etc.	x	0–200 490–562	sand	8	290–790	Holocene	x

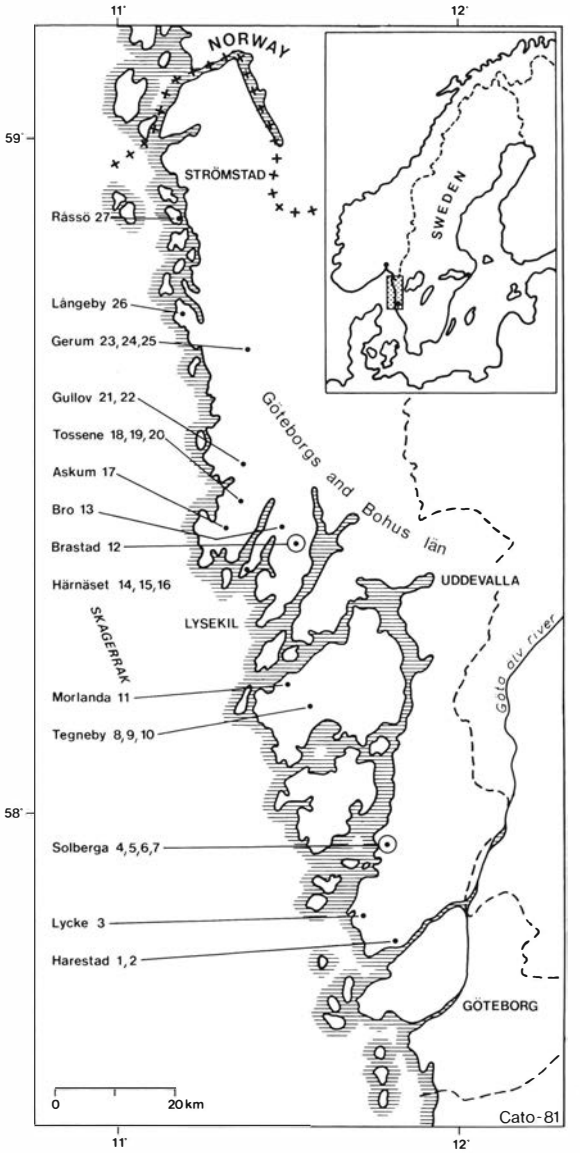

Fig. 4:1. Sites investigated during the pilot study in south-western Sweden, 1973.

above the ground. The purpose was to detect the composition of the recent pollen rain.

During the coring, the corer was carefully held in position. Every 5 m, a new 5 m tube was mounted on top of the descending pipe, without interrupting the coring process. The coring process did not stop until firm bottom (till, glaciofluvial deposits, bedrock *etc.*) was reached. Afterwards the whole corer was withdrawn and dismounted in the splices between the 5

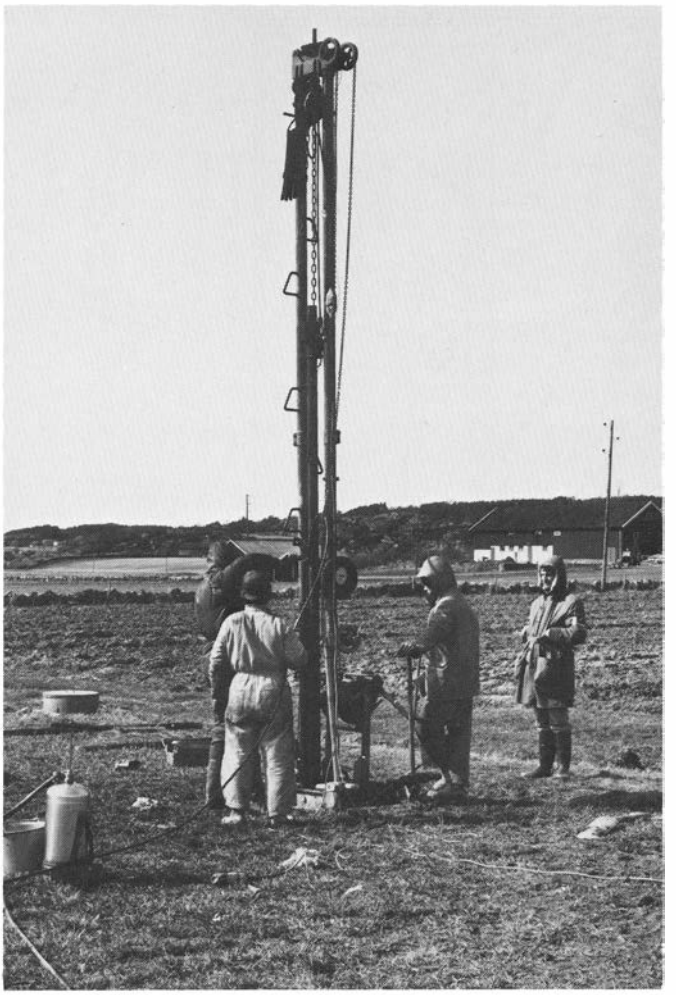

Fig. 4:2. Taking of one of the Foil Piston Cores at Solberga (N. Knaverstad) on April 14th, 1977.

m sections. The pipes were sealed with muffs and the sediments from the splice muffs were kept separately in plastic foil. The bearing north on every 5 m tube was then transferred, to the 5 m sections, and indicated by means of small plastic plugs (±2°) in the sediment. The 5 m sections were then finally cut into 3–4 core sections, and sealed in airtight plastic (polyethyl) foil at the site before further transport to the laboratory.

At the Prehistoric Museum, Moesgård, Denmark, radiography was performed on the Solberga and Brastad cores, followed by preliminary measurements of the natural remanent magnetization (NRM) at the

Fig. 4:3. Processing of one of the Foil Piston cores at Solberga (N. Knaverstad) on April 14th, 1977.

Geophysical Laboratory, University of Aarhus, Denmark. These records were then used as structural and lithological indicators during the subsequent opening and sampling of the cores at the Department of Micropalaeontology, University of Aarhus. The cores were photographed (both in colour and in black and white), examined, described, and classified before the bulk density and water content were determined and the final palaeomagnetic subsampling was carried out. The colour descriptions were made with the help of the GSA Rock-Color Chart. Finally the core sections were cleaned of paraffin oil and cut into 5 cm pieces, which were subsampled for physical, geochemical and biostratigraphical studies together with ^{14}C-datings. Altogether, about 1 100 subsamples from 110 levels of the Solberga and Brastad cores were taken and distributed among members of the project. The remaining samples were stored at the Department of Marine Geology in Göteborg.

Since the preliminary results show that a long break in sedimentation probably occurred in the Brastad core, this site had to be supplemented. Therefore in September 1980 three 6.5 m long cores were taken by means of a modified Russian Peat Sampler with 60 mm diameter (Tolonen 1968) at

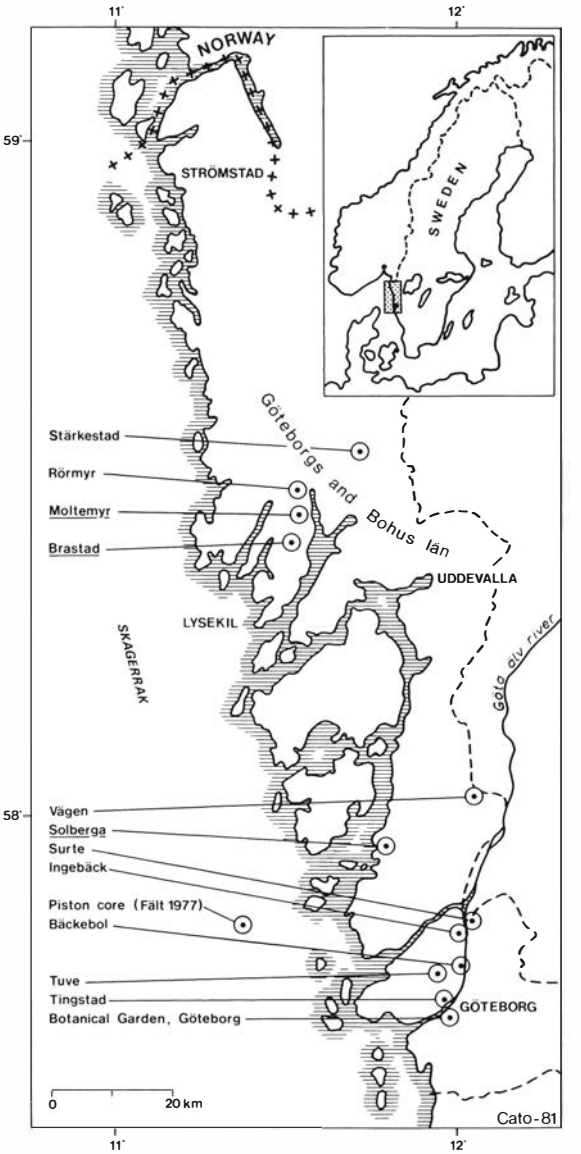

Fig. 4:4. Foil Piston Core stations 1977 and 1982 (underlined) and other sites in south-western Sweden mentioned in the forthcoming papers.

one of Fries' sites (Fries 1951:80), Moltemyr (58° 26′ 45″ N Lat, 11° 32′ 36″ E Long, 55 m above sea level, Fig. 4:4). The core sections were transported to the Geological Survey of Sweden, where they were subjected to the same process as the Solberga and Brastad cores. Subsamples 2.5 cm thick were distributed among members of the project, to be studied for geochemistry, ^{14}C-age, micro- and macropalaeontological successions. Palaeomagnetic studies were also carried out on one part of the core. At a later workshop

members of the project group decided that Moltemyr should be included in the programme. In June 1981 a 16.3 m long (probing depth >27 m) and azimuthally orientated core was therefore taken by means of the smaller Swedish Piston Corer (37 mm in diameter). New palaeomagnetic determinations and supplementary chemical, physical and micropalaeontological studies at deeper levels are now in progress. These additional analyses will not be presented in this context.

Knowledge of the vegetational succession around the Pleistocene/Holocene boundary of neighbouring terrestrial areas was essential for a correct, conventional zonation by pollen analysis in marine cores, as represented by Solberga, Brastad and Moltemyr. Two corings in limnic sediments at Vägen (58° 01′ 05″ N Lat., 12° 02′ 35″ E Long., 113 m above sea level) and Rörmyr (58° 28′ 55″ N Lat, 11° 31′ 30″ E Long, 115 m above sea level, Fig. 4:4) were therefore carried out, using a modified Russian Peat Sampler (see above), in August 1978 and September 1980. These cores were used for ^{14}C-datings, diatom and pollen analyses.

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