Ralska-Jasiewiczowa M., Goslar T., Madeyska T. & Starkel L. (eds), 1998. Lake Gościąż, central Poland. A monographic study. Part 1. W. Szafer Institute of Botany, Polish Academy of Sciences, Kraków.

APPENDIX

CALENDAR AND RADIOCARBON AGES OF SAMPLES COLLECTED FROM THE LAKE GOŚCIĄŻ SEDIMENTS

Discussion of environmental the Late-Glacial and Holocene environmental changes, presented in Chapters 7 and 8, relies mostly on analyses of samples from the sediment cores G1/87 and G2/87 pulled out from the central deep of the lake (see Chapter 4). These were the analyses of pollen and other plant microfossils, zooplankton, diatoms, oxygen and carbon stable isotopes, elemental composition etc. The sample numbers are given on the appropriate diagrams in Chapters 7 and 8 for selected samples.

The Table A.1 gives ages for all the samples in this basic set (on cal BP as well as on AD/-BC scales), together with their uncertainties. The age of samples from the lower part of the profile (samples 1–238) was derived by varve counting in the Floating Varve Chronology (FVC), which was fixed in time by correlation of varve and tree-ring thickness. This correlation was supported by the AMS 14C datings of terrestrial macrofossils, wiggle-matched to the radiocarbon calibration curve (Goslar, Chapters 6.2, 6.3 and 6.4)*.

The uncertainty of age varies along the profile. It is the smallest for the 2636-yr long varved sequence (samples 183–230), which was accurately dated by correlation with the tree-ring chronologies (see Goslar, Chapter 6.3). The minimum uncertainty for these samples reflects the thickness of sample itself (10 years). The age error of older samples increases gradually, what reflects the cumulative character of error of varve counting. The chronology for the upper section of the profile (above the FVC, samples 238A-287) relies on varve counting too, but it is additionally constrained at the both ends, as the age of both the top sediments and the top of the FVC is known. Therefore the age uncertainty is the largest around the middle of the upper section. The error for the youngest samples (275–287) is especially small, since this part of long cores was correlated with the precise chronology of cores taken from the uppermost sediments by the freezing *in situ* technique (Goslar, Chapter 9.2).

Radiocarbon ages of samples were derived from their calendar ages, using the ^{14}C calibration curves published in the Calibration Issue of *Radiocarbon* (1993). Since we could show (Goslar et al., Chapter 7.7) that the age of the pine calibration curve (Kromer & Becker 1993) was not correct, we used the combined ^{14}C data from the Lake Gościąż sediments and from the pine curve as the calibration data for older samples (78–115), properly shifted with respect to its original position. The calibration used for the oldest samples (1–77) relies on the Lake Gościąż ^{14}C dates, combined with the coral calibration data (Bard et al. 1993).

REFERENCES

Bard E, Arnold M, Fairbanks RG & Hamelin B, 1993. ^{230}Th-^{234}U and ^{14}C ages obtained by mass spectrometry on corals. *Radiocarbon* 35: 191–199.

Björck S, Kromer B, Johnsen S, Bennike O, Hammarlund D, Lemdahl G, Possnert G, Rasmussen TL, Wohlfarth B, Hammer CU & Spurk M, 1996. Synchronised terrestrial-atmospheric deglacial records around the North Atlantic. *Science* 274: 1155–1160.

Goslar T & Mądry W. 1998. Using the Bayesian method to study the precision of dating by the 'wiggle matching' procedure. *Radiocarbon* 40: 551–560.

Kromer B, Becker B, 1993. German oak and pine ^{14}C calibration, 7200–9439 BC. *Radiocarbon* 35: 125–135.

Radiocarbon, 1993. Calibration Issue, *Radiocarbon* 35: 1–244.

* Recently, Goslar and Mądry (1998) presented an improvement of the wiggle-matching technique, and updated the calendar-year age of the FVC, through the match to the revised oak chronology (Björck et al., 1996). Accordingly, the age of the Younger Dryas/Preboreal transition has been adjusted to 11510±40 cal BP. This precise adjustment, independent on the tree-ring-varve thickness correlation, strongly supports the chronological model used in this book.

Table A.1. The calendar and radiocarbon ages of samples collected from the combined profiles G1/87 – G2/87 of sediments in the central deep of Lake Gościąż.

Sample no.	Age cal BP	AD/-BC	Age ^{14}C BP
^{14}C age based on tentative Gościąż-pine calibration			
1	12857 ± 90	-10908 ± 90	10930 ± 150
5	12812 ± 88	-10863 ± 88	10920 ± 150
10	12782 ± 86	-10833 ± 86	10900 ± 150
15	12751 ± 83	-10802 ± 83	10880 ± 150
20	12721 ± 81	-10772 ± 81	10850 ± 150
25	12690 ± 79	-10741 ± 79	10800 ± 150
30	12659 ± 77	-10710 ± 77	10760 ± 150
35	12623 ± 75	-10674 ± 75	10700 ± 200
40	12564 ± 70	-10615 ± 70	10560 ± 200
45	12533 ± 68	-10584 ± 68	10530 ± 200
50	12502 ± 66	-10553 ± 66	10500 ± 200
55	12450 ± 64	-10501 ± 64	10420 ± 200
60	12387 ± 62	-10438 ± 62	10360 ± 200
65	12349 ± 60	-10400 ± 60	10330 ± 200
68	12314 ± 58	-10365 ± 58	10310 ± 200
69	12239 ± 57	-10290 ± 57	10280 ± 150
70	12192 ± 56	-10243 ± 56	10270 ± 150
71	12136 ± 56	-10187 ± 56	10270 ± 150
72	12091 ± 56	-10142 ± 56	10270 ± 150
73	12045 ± 55	-10096 ± 55	10260 ± 150
74	11997 ± 55	-10048 ± 55	10240 ± 150
75	11947 ± 54	-9998 ± 54	10220 ± 150
76	11895 ± 54	-9946 ± 54	10180 ± 150
77	11850 ± 53	-9901 ± 53	10130 ± 100
78	11802 ± 53	-9853 ± 53	10080 ± 50
79	11751 ± 53	-9802 ± 53	10040 ± 50
80	11701 ± 52	-9752 ± 52	10020 ± 50
81	11656 ± 52	-9707 ± 52	10000 ± 50
82	11608 ± 51	-9659 ± 51	10000 ± 50
83	11558 ± 51	-9609 ± 51	10000 ± 50
	YD/PB	YD/PB	YD/PB
84	11508 ± 50	-9559 ± 50	10000 ± 50
85	11458 ± 49	-9509 ± 49	10000 ± 50
86	11408 ± 49	-9459 ± 49	10000 ± 50
87	11358 ± 48	-9409 ± 48	9980 ± 50
88	11308 ± 48	-9359 ± 48	9920 ± 50
89	11258 ± 48	-9309 ± 48	9800 ± 50
90	11208 ± 47	-9259 ± 47	9750 ± 50
91	11158 ± 47	-9209 ± 47	9670 ± 50
92	11108 ± 47	-9159 ± 47	9600 ± 50
93	11058 ± 46	-9109 ± 46	9580 ± 50
94	11008 ± 46	-9059 ± 46	9570 ± 50
95	10958 ± 45	-9009 ± 45	9570 ± 50
96	10908 ± 45	-8959 ± 45	9580 ± 50
97	10858 ± 45	-8909 ± 45	9560 ± 50
98	10808 ± 44	-8859 ± 44	9500 ± 50
99	10758 ± 44	-8809 ± 44	9460 ± 50
100	10708 ± 44	-8759 ± 44	9430 ± 50
101	10658 ± 43	-8709 ± 43	9380 ± 50
102	10608 ± 43	-8659 ± 43	9340 ± 50
103	10558 ± 43	-8609 ± 43	9300 ± 50
104	10508 ± 42	-8559 ± 42	9250 ± 50
105	10459 ± 42	-8510 ± 42	9230 ± 50
108	10396 ± 40	-8447 ± 40	9210 ± 50
109	10346 ± 40	-8397 ± 40	9180 ± 50
110	10296 ± 39	-8347 ± 39	9100 ± 70
110.02	10246 ± 38	-8297 ± 38	9000 ± 100
110.04	10211 ± 38	-8262 ± 38	9000 ± 150
110.05	10151 ± 38	-8202 ± 38	8970 ± 150
110.06	10111 ± 38	-8162 ± 38	8950 ± 150
111	10036 ± 38	-8087 ± 38	8920 ± 150
112	9986 ± 38	-8037 ± 38	8900 ± 150
113	9936 ± 37	-7987 ± 37	8880 ± 100
114	9886 ± 37	-7937 ± 37	8870 ± 100
115	9836 ± 37	-7887 ± 37	8850 ± 100
^{14}C age based on oak radiocarbon calibration			
116	9786 ± 36	-7837 ± 36	8820 ± 60
117	9736 ± 36	-7787 ± 36	8770 ± 30
118	9686 ± 36	-7737 ± 36	8760 ± 40
119	9636 ± 35	-7687 ± 35	8710 ± 50
120	9586 ± 35	-7637 ± 35	8680 ± 20
121	9546 ± 34	-7597 ± 34	8640 ± 40
122	9496 ± 34	-7547 ± 34	8570 ± 70
123	9446 ± 34	-7497 ± 34	8430 ± 70
124	9396 ± 33	-7447 ± 33	8360 ± 60
125	9346 ± 33	-7397 ± 33	8330 ± 30
126	9296 ± 33	-7347 ± 33	8290 ± 20
127	9246 ± 32	-7297 ± 32	8290 ± 30
128	9196 ± 31	-7247 ± 31	8210 ± 50
129	9146 ± 31	-7197 ± 31	8180 ± 40
130	9096 ± 30	-7147 ± 30	8150 ± 20
131	9046 ± 30	-7097 ± 30	8190 ± 50
132	8996 ± 30	-7047 ± 30	8100 ± 80
133	8946 ± 29	-6997 ± 29	7970 ± 50
134	8896 ± 29	-6947 ± 29	7930 ± 20
135	8846 ± 29	-6897 ± 29	7940 ± 20
136	8796 ± 28	-6847 ± 28	7950 ± 40
137	8746 ± 28	-6797 ± 28	7950 ± 30
138	8696 ± 27	-6747 ± 27	7920 ± 40
139	8646 ± 27	-6697 ± 27	7920 ± 20
140	8596 ± 27	-6647 ± 27	7880 ± 20
141	8546 ± 26	-6597 ± 26	7830 ± 30
142	8496 ± 26	-6547 ± 26	7770 ± 30
143	8446 ± 26	-6497 ± 26	7760 ± 40
144	8396 ± 25	-6447 ± 25	7680 ± 50
145	8346 ± 25	-6397 ± 25	7610 ± 50
146	8296 ± 25	-6347 ± 25	7520 ± 50
147	8246 ± 24	-6297 ± 24	7470 ± 30

Table A.1. *Continued*.

Sample no.	Age cal BP	AD/-BC	Age ^{14}C BP
148	8196 ± 24	-6247 ± 24	7470 ± 30
149	8146 ± 23	-6197 ± 23	7390 ± 60
150	7994 ± 23	-6045 ± 23	7270 ± 40
151	7944 ± 23	-5995 ± 23	7180 ± 50
152	7844 ± 22	-5895 ± 22	7040 ± 40
153	7774 ± 22	-5825 ± 22	6980 ± 20
154	7744 ± 22	-5795 ± 22	6960 ± 20
155	7694 ± 21	-5745 ± 21	6920 ± 30
156	7644 ± 21	-5695 ± 21	6860 ± 30
157	7594 ± 21	-5645 ± 21	6800 ± 20
158	7544 ± 20	-5595 ± 20	6700 ± 60
159	7494 ± 20	-5545 ± 20	6640 ± 40
160	7444 ± 19	-5495 ± 19	6590 ± 20
161	7394 ± 19	-5445 ± 19	6510 ± 70
162	7344 ± 19	-5395 ± 19	6440 ± 20
163	7294 ± 18	-5345 ± 18	6430 ± 30
164	7244 ± 18	-5295 ± 18	6360 ± 20
165	7174 ± 18	-5225 ± 18	6220 ± 40
166	7144 ± 17	-5195 ± 17	6170 ± 30
167	7094 ± 17	-5145 ± 17	6200 ± 40
168	7044 ± 16	-5095 ± 16	6200 ± 20
169	6996 ± 16	-5047 ± 16	6120 ± 20
170	6944 ± 16	-4995 ± 16	6100 ± 20
171	6884 ± 15	-4935 ± 15	6040 ± 20
172	6836 ± 15	-4887 ± 15	5980 ± 20
173	6784 ± 15	-4835 ± 15	5970 ± 20
174	6734 ± 14	-4785 ± 14	5900 ± 30
175	6684 ± 14	-4735 ± 14	5850 ± 20
176	6634 ± 14	-4685 ± 14	5780 ± 20
177	6584 ± 13	-4635 ± 13	5780 ± 20
178	6534 ± 13	-4585 ± 13	5760 ± 20
179	6484 ± 12	-4535 ± 12	5700 ± 20
180	6434 ± 12	-4485 ± 12	5670 ± 20
181	6384 ± 11	-4435 ± 11	5560 ± 20
182	6334 ± 11	-4385 ± 11	5570 ± 20
183	6286 ± 10	-4337 ± 10	5470 ± 30
184	6234 ± 10	-4285 ± 10	5430 ± 20
185	6184 ± 10	-4235 ± 10	5350 ± 30
186	6134 ± 10	-4185 ± 10	5350 ± 20
187	6084 ± 10	-4135 ± 10	5290 ± 20
188	6034 ± 10	-4085 ± 10	5290 ± 30
189	5984 ± 10	-4035 ± 10	5240 ± 20
190	5934 ± 10	-3985 ± 10	5200 ± 30
191	5884 ± 10	-3935 ± 10	5090 ± 30
192	5834 ± 10	-3885 ± 10	5040 ± 20
192A	5753 ± 10	-3804 ± 10	5050 ± 30
192B	5703 ± 10	-3754 ± 10	4970 ± 20
192C	5653 ± 10	-3704 ± 10	4930 ± 30
193	5603 ± 10	-3654 ± 10	4870 ± 30
194	5508 ± 10	-3559 ± 10	4790 ± 20
195	5463 ± 10	-3514 ± 10	4710 ± 30

Table A.1. *Continued*.

Sample no.	Age cal BP	AD/-BC	Age ^{14}C BP
195.1	5453 ± 10	-3504 ± 10	4680 ± 30
195.2	5443 ± 10	-3494 ± 10	4670 ± 30
195.3	5433 ± 10	-3484 ± 10	4650 ± 20
195.4	5423 ± 10	-3474 ± 10	4660 ± 20
196	5411 ± 10	-3462 ± 10	4660 ± 20
196.1	5403 ± 10	-3454 ± 10	4680 ± 20
196.2	5393 ± 10	-3444 ± 10	4680 ± 20
196.3	5383 ± 10	-3434 ± 10	4690 ± 20
196.4	5373 ± 10	-3424 ± 10	4700 ± 20
197	5361 ± 10	-3412 ± 10	4710 ± 20
198	5311 ± 10	-3362 ± 10	4600 ± 40
199	5261 ± 10	-3312 ± 10	4510 ± 20
200	5211 ± 10	-3262 ± 10	4480 ± 20
201	5161 ± 10	-3212 ± 10	4530 ± 20
202	5111 ± 10	-3162 ± 10	4520 ± 20
203	5061 ± 10	-3112 ± 10	4500 ± 20
204	5011 ± 10	-3062 ± 10	4440 ± 20
205	4961 ± 10	-3012 ± 10	4380 ± 20
206	4911 ± 10	-2962 ± 10	4400 ± 20
207	4861 ± 10	-2912 ± 10	4340 ± 40
208	4811 ± 10	-2862 ± 10	4160 ± 30
209	4761 ± 10	-2812 ± 10	4150 ± 30
210	4711 ± 10	-2762 ± 10	4170 ± 20
211	4661 ± 10	-2712 ± 10	4180 ± 20
212	4611 ± 10	-2662 ± 10	4140 ± 20
213	4561 ± 10	-2612 ± 10	4090 ± 20
214	4511 ± 10	-2562 ± 10	4020 ± 20
215	4461 ± 10	-2512 ± 10	4050 ± 20
216	4411 ± 10	-2462 ± 10	3940 ± 40
217	4361 ± 10	-2412 ± 10	3910 ± 20
218	4311 ± 10	-2362 ± 10	3890 ± 20
219	4261 ± 10	-2312 ± 10	3860 ± 20
220	4211 ± 10	-2262 ± 10	3810 ± 20
221	4161 ± 10	-2212 ± 10	3820 ± 20
222	4111 ± 10	-2162 ± 10	3770 ± 20
223	4061 ± 10	-2112 ± 10	3690 ± 20
224	4011 ± 10	-2062 ± 10	3730 ± 20
225	3961 ± 10	-2012 ± 10	3640 ± 20
226	3911 ± 10	-1962 ± 10	3620 ± 20
227	3861 ± 10	-1912 ± 10	3580 ± 20
228	3811 ± 10	-1862 ± 10	3490 ± 20
229	3711 ± 10	-1762 ± 10	3480 ± 20
230	3611 ± 10	-1662 ± 10	3360 ± 20
231	3561 ± 11	-1612 ± 11	3330 ± 20
232	3511 ± 11	-1562 ± 11	3320 ± 20
233	3461 ± 12	-1512 ± 12	3260 ± 40
234	3411 ± 13	-1462 ± 13	3210 ± 20
235	3361 ± 13	-1412 ± 13	3150 ± 30
236	3311 ± 14	-1362 ± 14	3070 ± 20
237	3261 ± 14	-1312 ± 14	3070 ± 30
238	3218 ± 15	-1269 ± 15	3020 ± 40

Table A.1. *Continued*.

Sample no.	Age cal BP	AD/-BC	Age ^{14}C BP
End of floating varve chronology (FVC)			
238A	3200 ± 15	-1251 ± 15	3000 ± 40
239	3170 ± 20	-1221 ± 20	2990 ± 30
240	3120 ± 20	-1171 ± 20	2950 ± 20
241	3060 ± 20	-1111 ± 20	2930 ± 30
241A	3020 ± 20	-1071 ± 20	2910 ± 20
242	3000 ± 20	-1051 ± 20	2900 ± 20
243	2965 ± 20	-1016 ± 20	2860 ± 20
243A	2940 ± 25	-991 ± 25	2850 ± 30
244	2910 ± 25	-961 ± 25	2830 ± 20
245	2860 ± 25	-911 ± 25	2780 ± 40
246	2795 ± 25	-846 ± 25	2720 ± 40
246A	2750 ± 25	-801 ± 25	2620 ± 70
247	2730 ± 25	-781 ± 25	2550 ± 90
248	2695 ± 25	-746 ± 25	2510 ± 50
249	2645 ± 25	-696 ± 25	2490 ± 30
250	2590 ± 25	-641 ± 25	2500 ± 20
250A	2570 ± 25	-621 ± 25	2500 ± 20
251	2550 ± 25	-601 ± 25	2500 ± 20
251A	2510 ± 30	-561 ± 30	2480 ± 20
252	2485 ± 30	-536 ± 30	2470 ± 30
252A	2470 ± 30	-521 ± 30	2470 ± 30
253	2445 ± 30	-496 ± 30	2440 ± 20
254	2385 ± 30	-436 ± 30	2430 ± 30
255	2320 ± 30	-371 ± 30	2290 ± 100
255A	2300 ± 40	-351 ± 40	2240 ± 50
255B	2270 ± 40	-321 ± 40	2220 ± 30
255G	2090 ± 40	-141 ± 40	2130 ± 30
256	2030 ± 50	-81 ± 50	2070 ± 50
257	1950 ± 50	-1 ± 50	2020 ± 40
257A	1885 ± 50	65 ± 50	1950 ± 50
258	1840 ± 60	110 ± 60	1910 ± 70
259	1765 ± 60	185 ± 60	1840 ± 60

Table A.1. *Continued*.

Sample no.	Age cal BP	AD/-BC	Age ^{14}C BP
259A	1715 ± 60	235 ± 60	1810 ± 50
260	1600 ± 60	350 ± 60	1720 ± 60
260A	1550 ± 60	400 ± 60	1650 ± 70
261	1505 ± 60	445 ± 60	1640 ± 60
261A	1430 ± 60	520 ± 60	1550 ± 50
261B	1360 ± 50	590 ± 50	1510 ± 50
262	1305 ± 50	645 ± 50	1400 ± 100
263	1240 ± 50	710 ± 50	1310 ± 50
264	1075 ± 40	875 ± 40	1180 ± 40
265	820 ± 40	1130 ± 40	930 ± 20
266	725 ± 40	1225 ± 40	820 ± 40
267	685 ± 40	1265 ± 40	760 ± 80
268	630 ± 40	1320 ± 40	690 ± 90
269	565 ± 30	1385 ± 30	600 ± 60
270	485 ± 30	1465 ± 30	410 ± 40
271	425 ± 20	1525 ± 20	330 ± 30
272	360 ± 20	1590 ± 20	350 ± 20
273	325 ± 10	1625 ± 10	340 ± 20
274	275 ± 10	1675 ± 10	190 ± 20
275	190 ± 4	1755 ± 4	170 ± 20
276	134 ± 2	1816 ± 2	120 ± 20
277	111 ± 2	1839 ± 2	120 ± 20
278	89 ± 2	1861 ± 2	120 ± 20
279	65 ± 1	1885 ± 1	100 ± 20
280	42 ± 1	1909 ± 1	120 ± 20
281	25 ± 2	1925 ± 2	140 ± 20
282	10 ± 3	1940 ± 3	180 ± 20
283	0 ± 3	1950 ± 3	100 ± 100
284	-10 ± 3	1960 ± 3	
285	-20 ± 3	1970 ± 3	
286	-30 ± 3	1980 ± 3	
287	-35 ± 2	1985 ± 2	