BULL WHARF, BLL'79 - INTERIM DENDROCHRONOLOGY REPORT

by Jennifer Hillam, July 1981.

Thirteen oak timbers (Table 1) were sampled and sent to Sheffield for tree-ring analysis. The functions of the timbers was not always known: BLL 21 was a radially-split piece, thought possibly to be a re-used boat timber. Such timbers have frequently been found during excavations in the City of London (eg the Custom House site: Tatton-Brown, 1974). BLL 22-28, a group of thin radial planks, could have been bucket staves, whilst BLL 30, 31, 32, 33 and 35 were components of a 14th century revetment, although it was not known for certain if they all came from the same revetement. BLL 30-32 were horizontal planks from a revetment, and BLL 35 a front brace, possibly re-used, but the relationship of BLL 33 to the other timbers was unknown.

The samples were cleaned and the ring widths measured (details of method and techniques are given in Morgan, forthcoming). The number of growth rings per sample varied markedly: BLL 22 was relatively wide-ringed with only 37 rings, whilst BLL 21 was narrow-ringed with 213 rings. The remainder had between 66 and 131 rings and their average ring width was approx. 1-2mm (Table 1; the ring widths are also listed in the Appendix).

The ring sequences were plotted on transparent semi-logarithmic graph paper. Crossmatching was found by sliding one graph over another until the position of best fit was identified. A computer program (Baillie & Pilcher, 1973) was also used to save time and to provide a measure of the correlation between two curves. The program calculates the value of Student's t, a value of 3.50 or over indicating a match, provided that it is accompanied by an acceptable visual match. BLL 23 and BLL 28 were almost identical (t = 14.86) and must have come from the same tree, if not from the same timber. The other 'bucket stave' ring sequences also crossmatched with BLL 23/28 (Fig. 1), giving a total sequence of 119 years. The mean curve is plotted in Figure 2.

The ring curves from the horizontal planks (BLL 30-32) matched each other to give a second mean curve of 113 years (Fig. 3). The agreement between the sequences is high (Fig. 4), producing t-values of 6.11, 7.94 and 8.38 for 31/32, 30/31 and 30/32 respectively.

BLL 21, 33 and 35 did not appear to match with either of the two master curves. These, plus the two masters, were therefore next compared with several dated reference chronologies. The 'bucket stave' mean matched well with two German curves (Hollstein, 1965; Huber & Giertz-Siebenlist, 1969) when its rings spanned the period AD 1219-1337 (Table 2, Fig. 2). The BLL 30/31/32 ring sequence proved to be earlier: it dated to AD 1090-1202 and matched well with three chronologies from Germany, one from Ireland and one from London (Table 2, Fig. 4). The matching potential of

London tree-ring sequences is discussed more fully elsewhere (Hillam & Herbert, 1980), but in general they tend to match well over long distances. As is illustrated here, there are high agreements between London curves, and those from Germany and from Ireland.

No reliable dating was found for BLL 21, 33 or 35. Not only were they tested against those chronologies mentioned in Table 2, but they were also compared with chronologies of earlier date, from the Saxon period. As no positive results were found, it is not possible to deduce whether BLL 21 and BLL 35 were in fact re-used timbers.

The years spanned by the dated Bull Wharf timbers, and their estimated felling dates are set out in Table 3. Exact felling dates are only possible if the bark edge is present, that is if no wood is removed when the timber is dressed. However, the number of rings in the outer zone of an oak tree, the sapwood, is relatively constant so that if the heartwood-sapwood boundary is preserved, then a fairly accurate felling date can be estimated. Such was the case with samples 30-32: BLL 30 had two rings of sapwood. The number of sapwood rings is taken to be 32 ± 9 years (after Baillie, 1973; the reasons for using this value are given in Hillam, 1979 and forthcoming). The felling date for timbers 30-32 is therefore AD 1232 ± 9. As timber was not usually seasoned until very recently, unless it was to be used for furniture or panelling (eg Hollstein, 1965), construction is likely to have followed soon after felling.

Sapwood had been removed from all the 'bucket

staves'. This was frequently done as sapwood is more susceptible to insect and fungal attack. In this case, the terminus post quem was calculated for the felling date by adding 32±9 years to the date of the last measured ring, i.e. AD 1337. Thus the 'bucket stave' timbers were felled some time after AD 1360.

References:

Baillie M.G.L. 1973, A recently developed Irish tree-ring chronology. Tree Ring Bulletin 33, 15-28.

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Delorme A. 1972, Dendrochronologische untersuchungen an eichen des Südlichen Weser- und Leineberglandes. Dissertation: Forestry Faculty, Göttingen (1972).

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Hollstein E. 1965, Jahrringchronologische Datierung von Eichenhölzen ohne Waldkante. Bonner Jahrbuch 165, 12-27. The chronology is also published in Hollstein's book: Mitteleuropaische Eichenchronologie, Zabern (1980), Mainz am Rhein.

Huber B. & Giertz-Siebenlist V. 1969, Unsere tausendjährige Eichenchronologie durchschnittlich 57 (10-150) - fach belegt. Sitz.Ost.Akad.Wiss. 178, 37-42.

Morgan R.A., Tree-ring dating of the medieval waterfronts at the Seal House site. In J. Schofield, Excavations at Seal House, City of London, 1974-6. LAMAS special paper (forthcoming).

Tatton-Brown T. 1974, Excavations at the Custom House site, City of London, 1973. Trans. LAMAS 25, 219pp..

Legends to Tables and Figures

Table 1: Details of all the Bull Wharf timbers examined at Sheffield; sketches not to scale.

Table 2: Agreement values for the dating of the two BLL master curves.

Table 3: Bull Wharf tree-ring dates.

Figure 1: Bar diagram illustrating the years spanned by the 'bucket stave' ring sequences.

Figure 2: Ring plot of the 'bucket stave' mean (BLL) with matching sequences from Germany: A - West German oak chronology (Hollstein, 1965); B - chronology from Munich area (Huber & Giertz-Siebenlist, 1969).

Figure 3: Years spanned by the ring sequences of the horizontal planks, BLL 30-32. Sapwood is represented by hatching.

Figure 4: Matching tree-ring curves: BLL 30, 31 and 32 with their mean curve, plus the corresponding section of the Seal House curve, also from the City of London (Morgan, forthcoming).

Appendix: Listing of the ring width data from Bull Wharf. The first two lines identify the sample and, where possible, give its date range; the third line is the number of growth rings in the sample and the fourth, and subsequent, lines are the ring width values in 0.1mm.

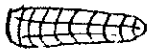
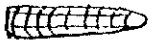
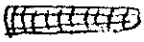
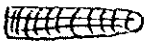
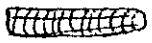
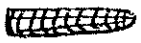
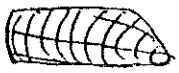
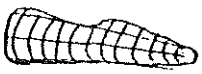
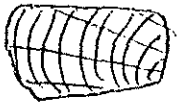
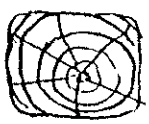
no.	no. of rings	sapwood rings	average width(mm)	sketch	dimensions (cm)	function
21	213	2	0.71		2-3 x 16	re-used boat timber?
22	37	-	2.91		1.5 x 12	bucket stave?
23	96	-	0.98		2 x 10	"
24	66	-	1.28		1.5 x 9.5	"
25	75	-	1.24		1.5 x 10	"
26	67	-	1.34		1.5 x 10	"
27	81	-	1.15		2 x 10	"
28	103	-	0.96		2 x 10	"
30	113	2	1.77		5 x 23	horizontal plank from revetment
31	75	-	2.03		4-6 x 30	"
32	85	-	2.05		4.5 x 20	"
33	131	3	1.36		11-13 x 15-17	revetment timber? - unrelated
35	74	-	2.41		22 x 25	revetment: front brace - re-used?

Table 1

Reference chronology	t-value(years of overlap)	
	'bucket stave' mean (AD 1219 -1337)	30/31/32 AD 1090-1202
Dublin (Baillie, 1977)	2.16 (88)	4.24 (113)
Munich (Huber & Giertz-Siebenlist, 1969)	4.06 (119)	4.66 (113)
North Germany (Delorme, 1972)	1.64 (119)	6.68 (113)
Seal House, London (Morgan, forthcoming)	no overlap	6.25 (104)
West Germany (Hollstein, 1965)	6.52 (119)	4.61 (113)

Table 2

no.	date span (AD)	felled (AD)
22	1269 - 1305	after 1360
23/28	1219 - 1321	"
24	1250 - 1315	"
25	1263 - 1337	"
26	1269 - 1335	"
27	1249 - 1329	"
30	1090 - 1202	1232±9
31	1113 - 1187	"
32	1097 - 1181	"

Table 3

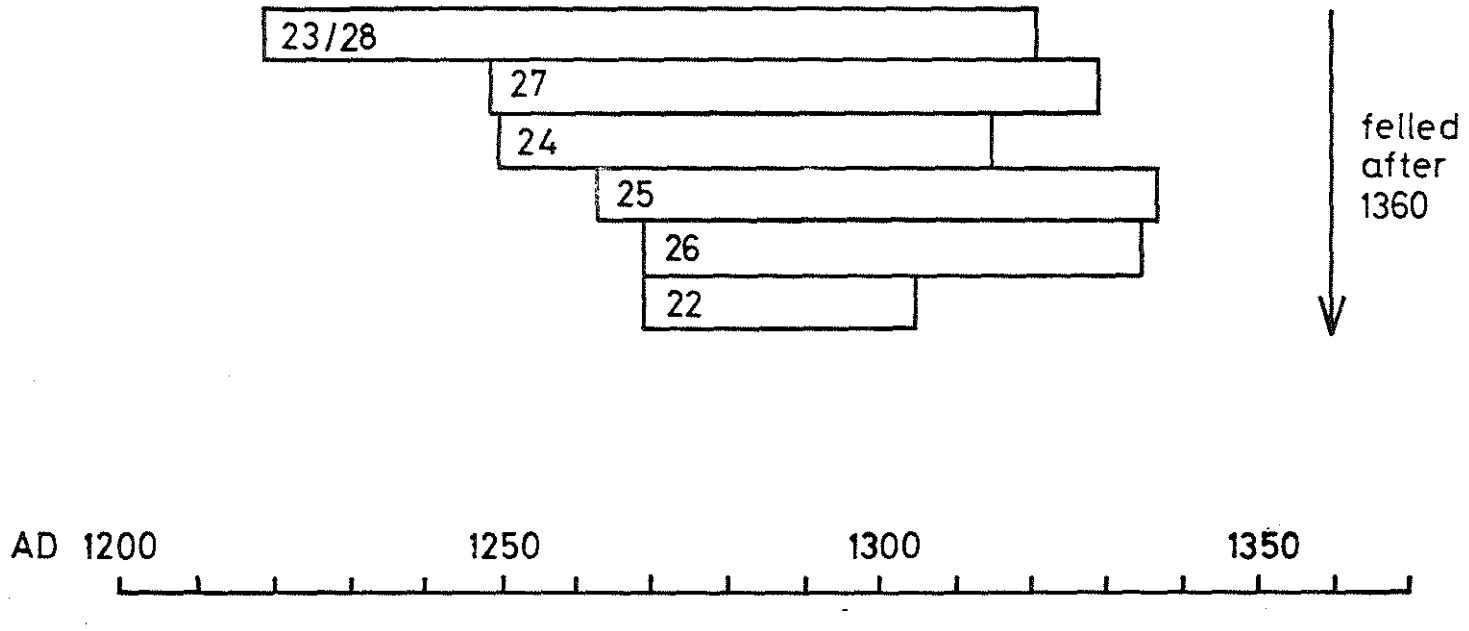
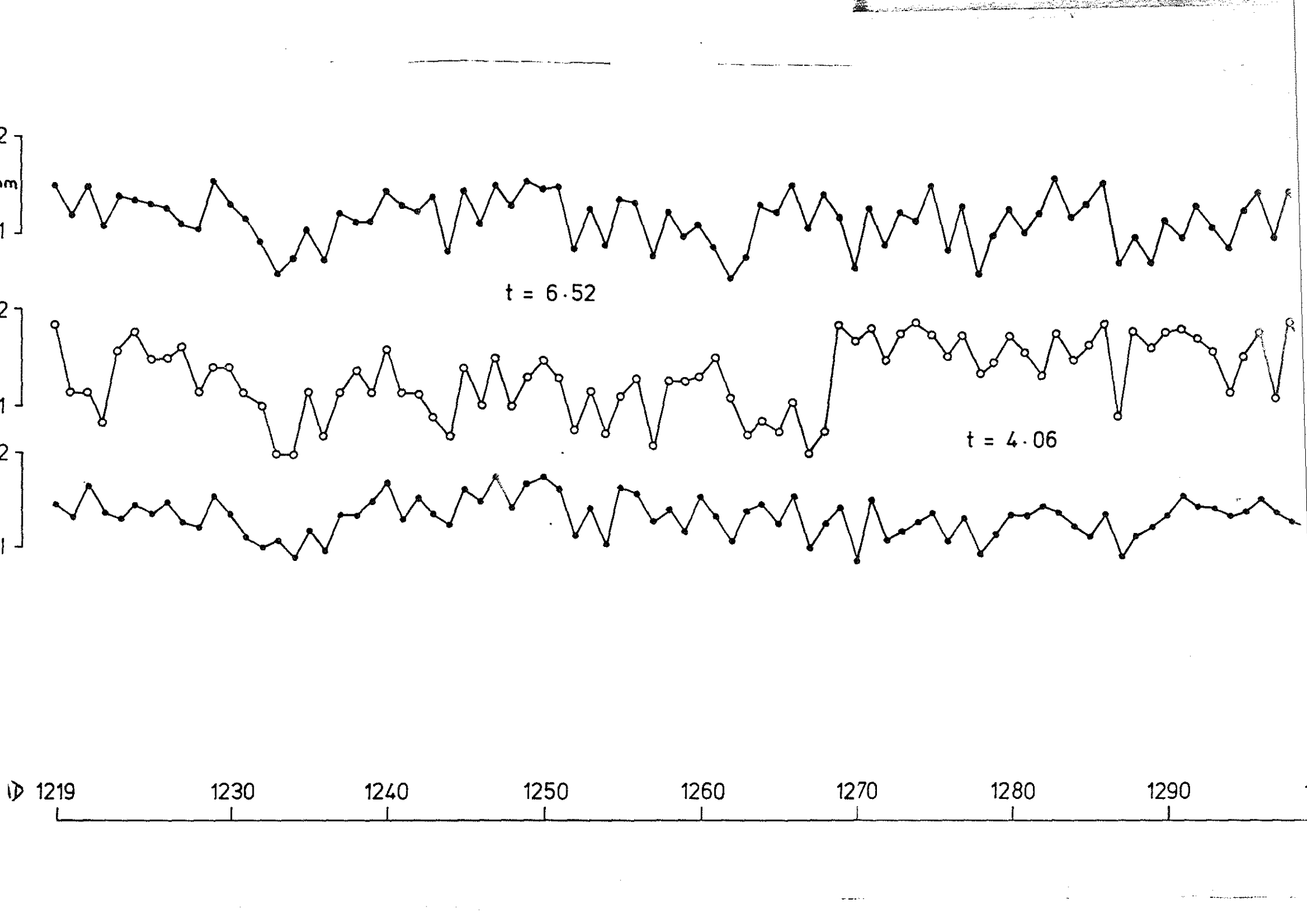


Fig. 1


t = 6·52
t = 4·06
1219
1230
1240
1250
1260
1270
1280
1290

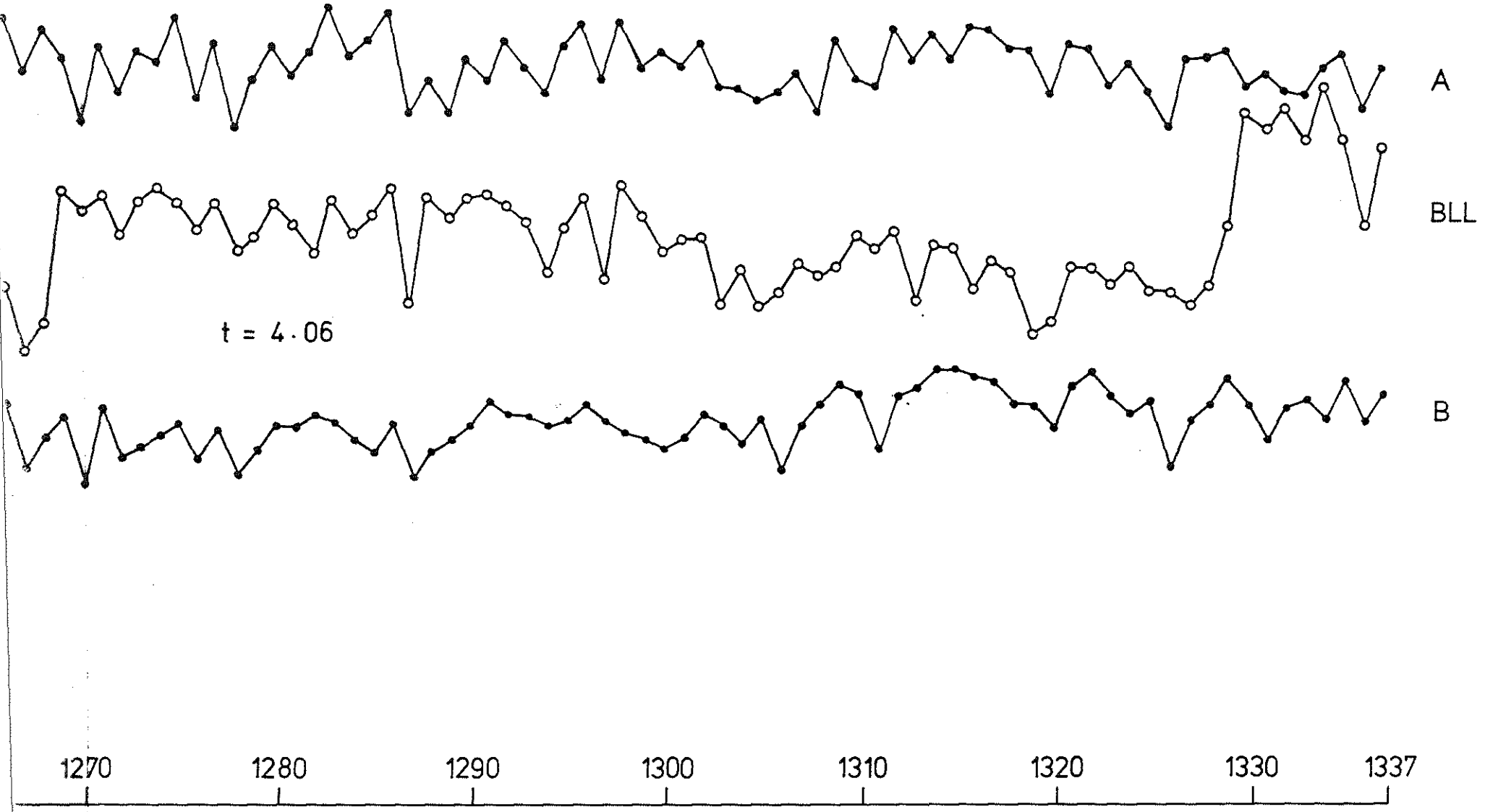


Fig 2

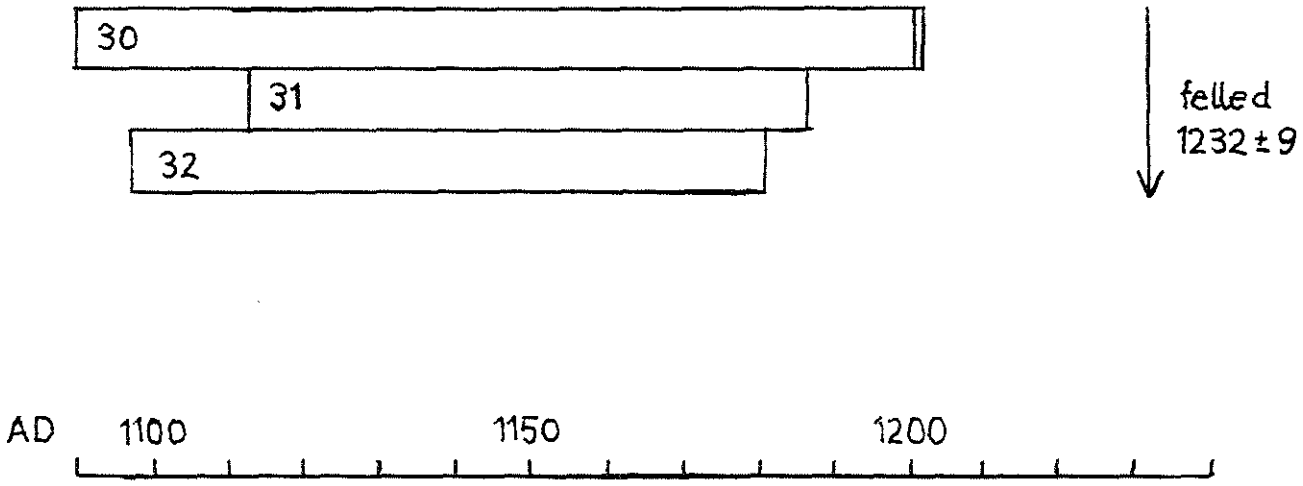


FIG. 3

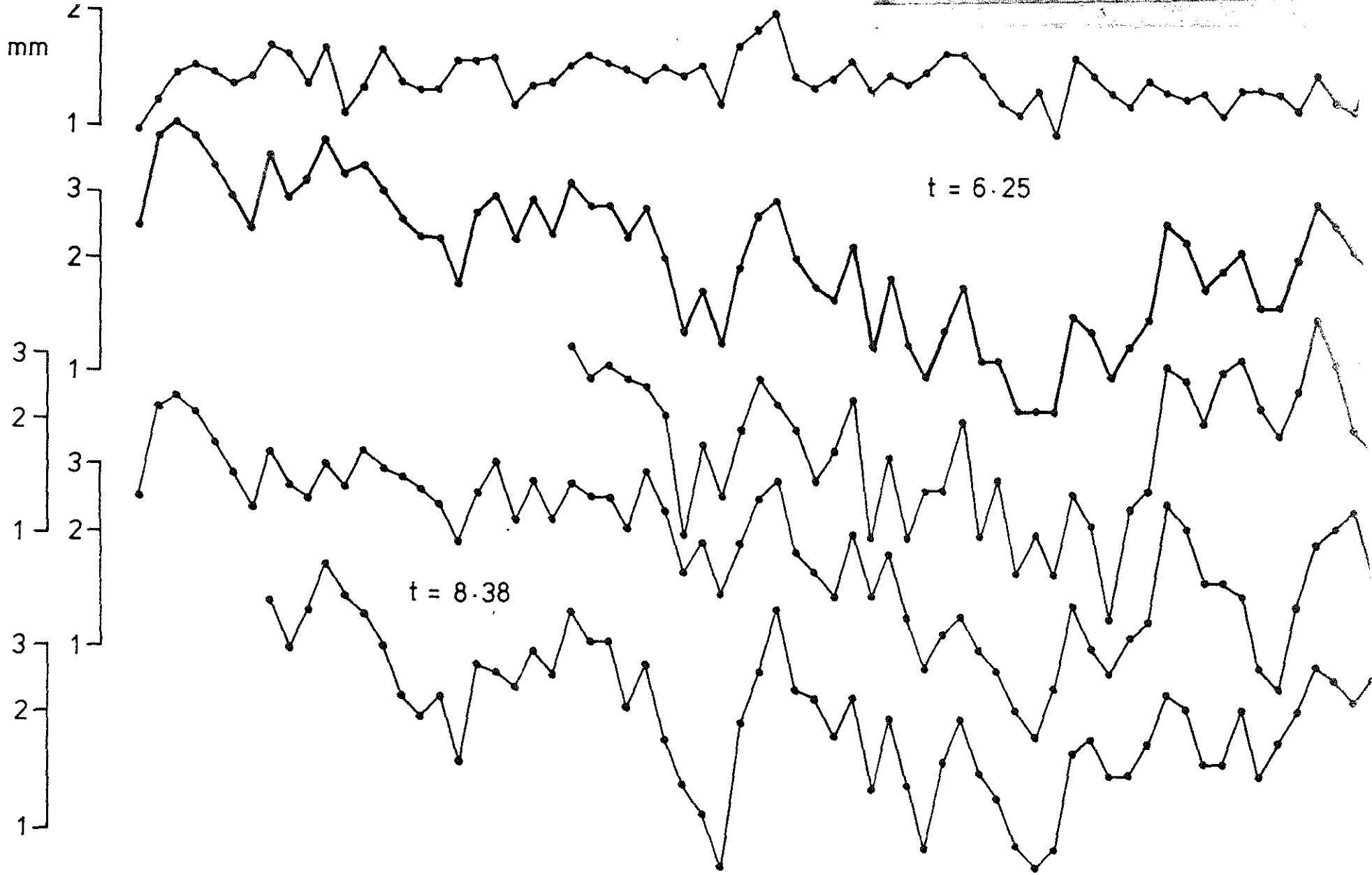
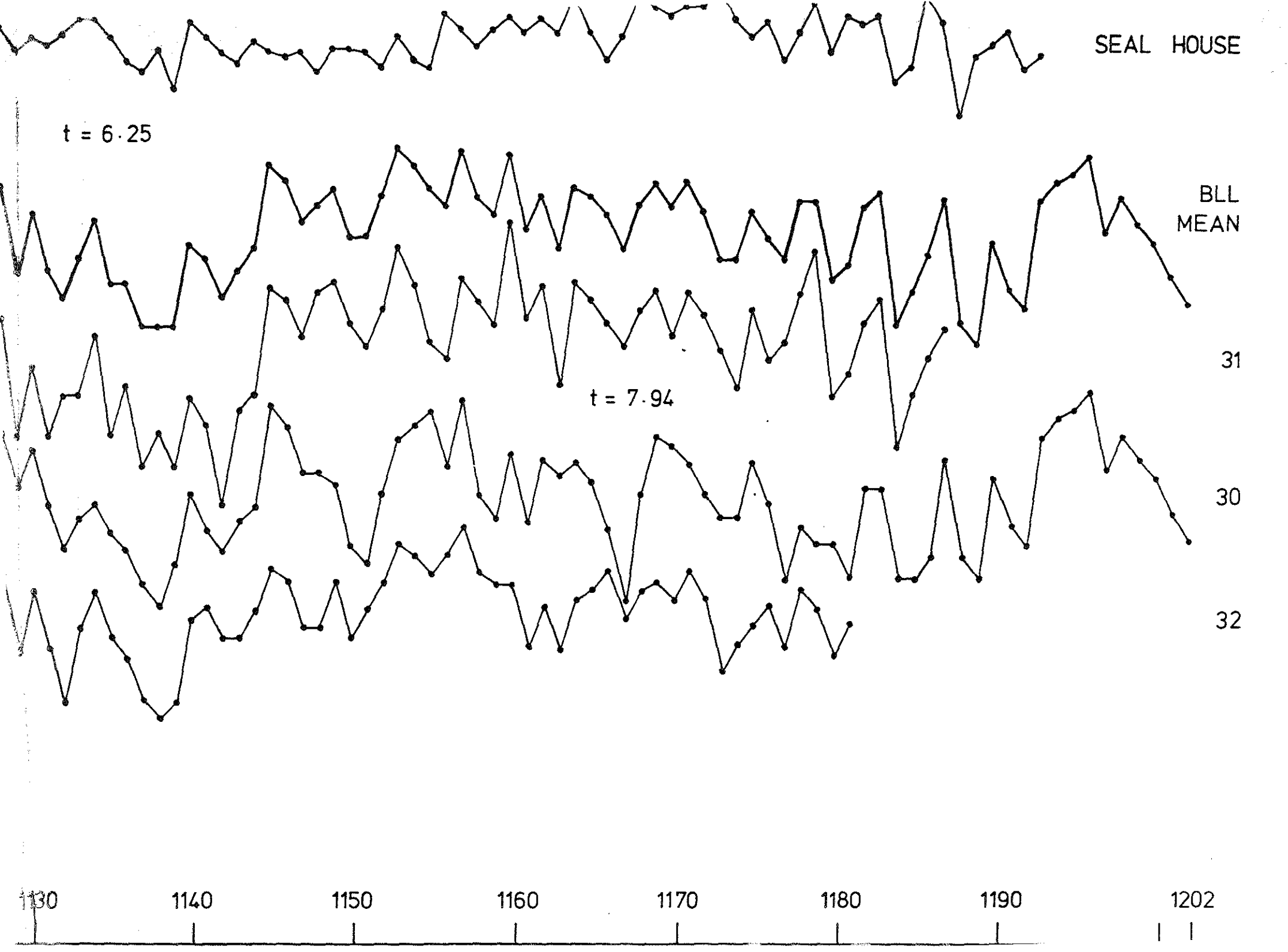


Fig 4


SEAL HOUSE
t = 6·25
BLL
MEAN
31
t = 7·94
30
32
1130
1140
1150
1160
1170
1180
1190
1202