

however, is of earlier date: the ears of the terminal animal head and the speckling technique would indicate that they belong to the 9th century.<sup>22</sup> Strap-ends of this form are common in that century, but the main field is usually filled with animal or semi-geometric motifs. The only other strap-end decorated with a human figure which I know of was found at Selsey, Sussex,<sup>23</sup> but the figures on it are comparable to those on the Fuller brooch and the Abingdon sword<sup>24</sup> and bear little relation to the man on the York strap-end.

The figure portrayed on this strap-end is too small and too naïve to warrant any significant stylistic judgements. Its 9th-century date, however, would seem unquestionable on the basis of the form of the ears at the terminal. The metals of which it is composed compare with those inlaid on the blades of the 9th-century scramasaxes from Sittingbourne and Battersea.<sup>25</sup>

A 9th-century date can also be given, with little hesitation, to the second strap-end. It is merely a slightly more stylized version of other strap-ends bearing zoomorphic ornament found in York,<sup>26</sup> and is most closely paralleled in another Yorkshire find, that from Whitby Abbey.<sup>27</sup>

In view of the date of the strap-ends it is not impossible that they were lost at the same time as the coin of Burgred (died 874), which was also found on the site. It might not be altogether fanciful to connect their loss with one of the Viking campaigns in Yorkshire in the middle years of the 9th century, but such a thesis cannot be proved.

DAVID M. WILSON

#### MEDIEVAL DENDROCHRONOLOGY IN THE U.S.S.R. (FIG. 74)

Dendrochronology in the U.S.S.R. is a new development. B. A. Kolchin,<sup>28</sup> its leading exponent, pays a tribute to our previous work in England as described in this journal (*Med. Archaeol.*, I (1957), 78-95, and III (1959), 288-90). It must, nevertheless, be admitted that the Russian advances are now far more rapid than our own. In 1959 a laboratory of dendrochronology was set up in the U.S.S.R. and by 1961 more than 2,500 samples had been collected from Novgorod alone.

The earlier archaeological investigations at Novgorod were summarized in this journal (*Med. Archaeol.*, IV (1960), 173-4). Coins, lead seals and birch-bark documents, together with the effects of fires datable from the chronicles, had already led to the establishment of an extremely close chronology. Most of the timber specimens were derived from the approximately dated wooden pavements of the medieval streets of old Novgorod, and Kolchin has convincing cross-dated curves representing the neighbouring pine-forests from c. 890 to c. 1410.<sup>29</sup> A relative floating chronology was first established, and, later, timber from churches, for which building dates (1300-1421) are recorded in the chronicles, was used to fix the absolute scale.

The conspicuous depressions in the curve reflecting narrow rings or pairs of narrow rings could thus be dated to the years 1032, 1055, 1075, 1085, 1086, 1102, 1103, 1111, 1112, 1120, 1132, 1133, 1155, 1162, 1163, 1176, 1191, 1192, 1210, 1211, 1212, 1219,

<sup>22</sup> For the ears cf. *ibid.*, pl. iv, d; for the speckling cf. *ibid.*, pl. xxxvi.

<sup>23</sup> L. F. Salzmann, 'Excavations at Selsey 1911,' *Sussex Archaeol. Coll.*, LV (1912), 60, pl. v. It now appears to be lost.

<sup>24</sup> Wilson, *op. cit.* in note 17, pls. xlv, no. 153, and vi, b.

<sup>25</sup> *Ibid.*, pls. xxii, no. 36, and xxx, no. 80.

<sup>26</sup> D. M. Waterman, 'Late Saxon, Viking and early medieval finds from York,' *Archaeologia*, xcvi (1959), fig. 10.

<sup>27</sup> Cf. Wilson, *op. cit.* in note 17, pl. xl, no. 119.

<sup>28</sup> *Soviet Archaeology*, 1962 (1), pp. 95-139; *Materials and Researches on the Archaeology of the U.S.S.R.* (1963), nos. 117 and 123; 'Dendrochronological method in archaeology' (in English) at 6th International Congress of Prehistoric and Protohistoric Sciences, Moscow.

<sup>29</sup> *Materials and Researches on the Archaeology of the U.S.S.R.* (1963), no. 123, fig. 1.

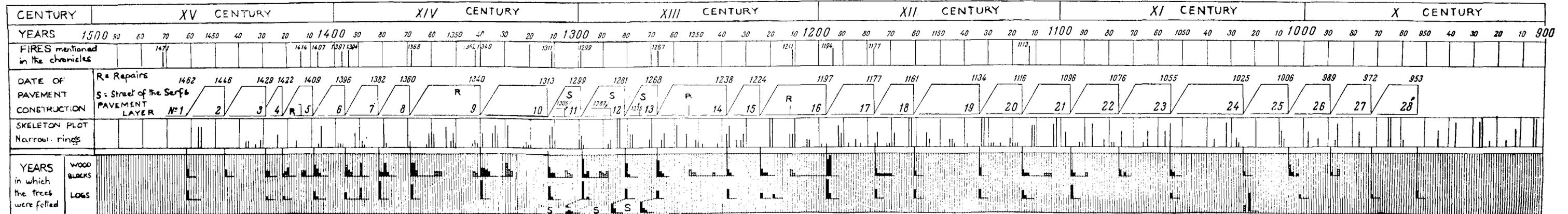
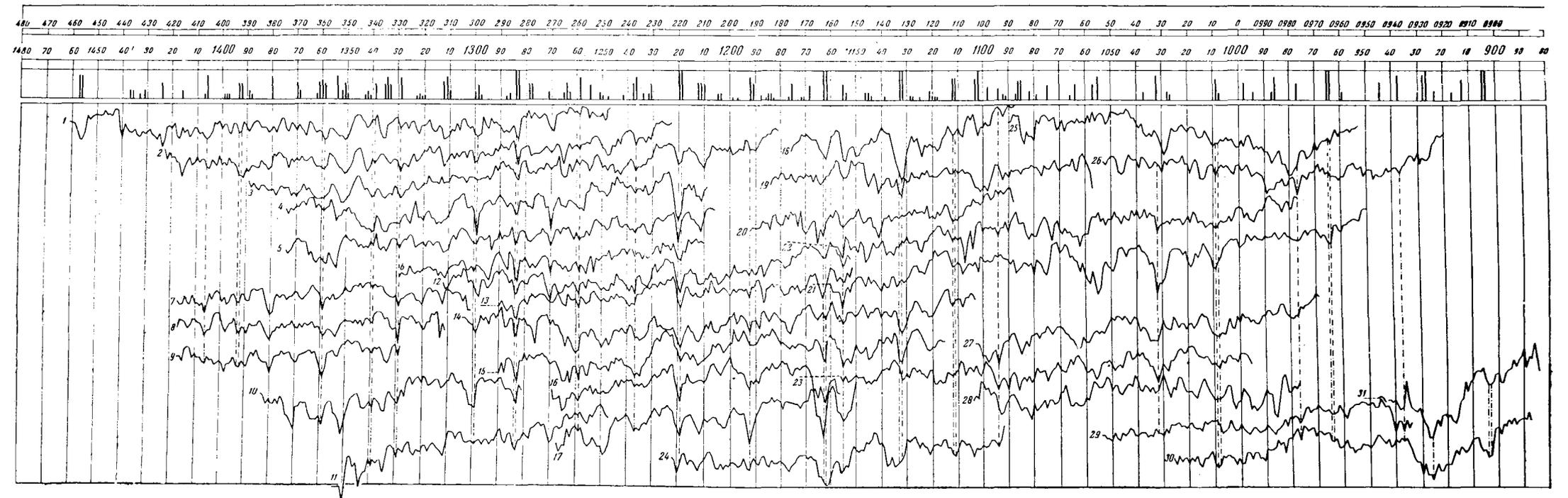


FIG. 74

CHART ILLUSTRATING MEDIEVAL DENDROCHRONOLOGY IN THE U.S.S.R.\* (p. 216 f.)

From top, diagnostic narrow rings (skeleton plot); plots from wooden pavements: dated fires often necessitating renovation, dates of actual repairs in High St. and Serf St. (for 1360 read 1369), skeleton plot, felling dates of timber  
 After B. A. Kolchin, *Soviet Archaeology*, 1962 (1), figs. 4 and 12, p. 109, by courtesy

\* Prof. Kolchin has told me (personal communication, Oct. 1963) that several hundred samples are now available from Belo-ozher and Polotzk (N. of Minsk) and that many more have been collected from Russian churches.

1220, 1231, 1237, 1259, 1264, 1270, 1278, 1279, 1283, 1284, 1299, 1311, 1322, 1329, 1334, 1351, 1354, 1359, 1360, 1380, 1392, 1406, 1424.

I have applied to these dates the same check as previously applied to English oak (*Med. Archaeol.*, 1 (1957), 85-86). References to abnormal seasons in my marginal annotations to my own copy of the Novgorod chronicle<sup>30</sup> (which are largely based on the valuable chronology of Buchinsky<sup>31</sup>) showed the frequency-pattern as shown.

	y-2	Previous year	Narrow- ring year	Next year	y+2
Unusual seasons	5	9	13	6	3
Fires	4	10	14	13	8

References to fires also showed a frequency-pattern with a peak in the year of the narrow ring. Presumably these fires belonged to the first half of the year, as on the whole the meteorological anomalies of the narrow-ring years were of a maritime character with cool wet summers. In this latter respect the Russian conifers resemble those of north Scandinavia and are opposed to the pattern of English oak. Moreover, in Novgorod—again unlike England—the preceding years (except where narrow rings recurred in pairs) were on the whole drier and hotter than usual. Kolchin's absolute chronology is thus confirmed by an independent test.

The archaeology of medieval Novgorod is thus put on an exact chronological basis, and the dates of construction of the wooden pavements below Kusmodemyanskaya, Velikaya (High Street) and Kholopya (Serf Street) streets are now known. The first and most ancient pavement was laid down in the year 953. Successive dates are as follows: 972, 989, 1006, 1025, 1055, 1076, 1096, 1116, 1134, 1161, 1177, 1197, 1224, 1238, 1268, 1281, 1299, 1313, 1340, 1369, 1382, 1396, 1409, 1422, 1429, 1446 and 1462. The dates 1275, 1287 and 1306 refer to the pavements of Serf Street (see plan in *Materials and Researches*, no. 117, fig. 9, p. 16). Kolchin<sup>32</sup> has also checked that some of these pavements fit the known dates of fires in the chronicles.

Climatological dendrochronological work in Russia is also proceeding in the northern Urals on modern trees and V. N. Adamenko<sup>33</sup> has contrasted the curves with those of northern Scandinavia, whereas in Finland<sup>34</sup> G. Siren has established a new chronology from 1140 to 1950. In general, the cross-checking of conifers may be easier in NE. Europe than in this country,<sup>35</sup> but the outstanding success of the Novgorod project of Kolchin is worthy of comparison with that of Douglass in the American south-west, and it is to be hoped that Kolchin will now tackle the medieval timbers of other parts of the U.S.S.R.

D. J. SCHOVE

## NORWICH: THE GROWTH OF A CITY

An exhibition with this title illustrating 'the growth and economic development of Norwich' was held at the Castle Museum, Norwich, from 6 July to 29 September, 1963. The exhibits were divided into twelve sections: geographical position, early occupation, origins, late Saxon period and so on up to the present day. An accompanying

<sup>30</sup> R. Mitchell and N. Forbes (trans.), *The Chronicle of Novgorod, 1016-1471* (Camden Soc., 3 ser. xxv, London, 1914).

<sup>31</sup> I. E. Buchinsky, *The Past Climate of the Russian Plain* (2 ed., Leningrad, 1957).

<sup>32</sup> *Soviet Archaeology*, 1962 (1), pp. 113-39.

<sup>33</sup> *J. Glaciology*, iv (1963), 449-451; cf. also *Results of Researches in the Programs of the International Geophysical Year*, no. 9 (1963).

<sup>34</sup> *Communicationes Instituti Forestalis Fenniae*, 54 (2) (Swedish with English summary); and cf. also *New Scientist*, 4 July, 1963, no. 19, p. 346.

<sup>35</sup> *Scottish Forestry*, xv, no. 2 (1961), 63-71.