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.*, I (1957), 85–86). References to abnormal seasons in my marginal annotations to my own copy of the Novgorod chronicle[30] (which are largely based on the valuable chronology of Buchinsky[31]) 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[32] 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[33] has contrasted the curves with those of northern Scandinavia, whereas in Finland[34] 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,[35] 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

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

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

32 *Soviet Archaeology*, 1962 (1), pp. 113–39.

33 *J. Glaciology*, IV (1963), 449–451; cf. also *Results of Researches in the Programs of the International Geophysical Year*, no. 9 (1963).

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

35 *Scottish Forestry*, XV, no. 2 (1961), 63–71.

booklet contained the catalogue and a history of the city divided in the same way together with a valuable bibliography.[36] The history was written by Miss Barbara Green and Mr. R. N. R. Young. The dedication of the booklet to the late curator, Mr. Rainbird Clarke, is a sad reminder that this exhibition unhappily became a memorial to the man who originally planned it.

The site of Norwich is on the River Wensum in a loop just above its confluence with the River Yare, a geographically favourable site for a commercial city, since like that of London it was the lowest bridgeable or fordable point and about the highest limit of navigation for larger ships. The town had its origins in late Saxon settlements along the Wensum, one of the northern ones, Northwic, giving its name to the whole town. The rapidity of growth between 850 and 1050 was extraordinary. Recognition of the town's importance was marked by the establishment of a mint there (925–40), transference of the bishopric (1094), and by a royal charter (1194). By the 14th century the total circuit of the city walls (on the west and north) and river (on the east) was little short of four miles, slightly greater than the circuit of Roman and medieval London.

The exhibition made very skilful use of maps, some of which are reproduced in the booklet. A fascinating series illustrated the position of Norwich, in terms of population, relative to other English towns at various dates between 1086 and the present day. The names change like teams in the football league, the only constant factor being London's unchanging position at the top. In 1086 four towns on rivers of the eastern seaboard head the list: London, York, Lincoln and Norwich, the latter being the only town of non-Roman foundation. By the late 14th century London and York are still at the top but Norwich has been pushed into fifth place by a western port (Bristol) and a midland commercial town (Coventry)—assuming the population estimates are right. Other east-coast ports like Boston, King's Lynn, Yarmouth, Ipswich and Colchester had grown into importance but did not seriously challenge Norwich. Unlike Lincoln, which dropped out of the first division, Norwich continued to grow in Tudor and Stuart times. Part of the explanation is no doubt that the Wensum did not silt up, and part that there was a great influx of foreigners, Strangers, from the Low Countries in Elizabethan times, who brought new skills in cloth manufacture, the basis of the city's wealth at this time. Indeed the period from about 1660 to 1740 can be regarded as the golden age of Norwich, when it was probably the principal provincial city. The industrial revolution brought rapid increases of population in towns in the north and midlands (a chart in the exhibition compared the growth of Bradford and Norwich), which have pushed Norwich farther and farther down the league table, although it has itself grown, of course, to an impressive degree. Most visitors to Norwich would probably agree that its slower growth in the last 200 years has been greatly to its advantage, giving the city a much greater sense of continuity with its past.

The exhibition, which was largely concerned with trade, industry and local government, included several other very telling maps and diagrams: industries (1200–1500), markets and fairs (1200–1500), maps of imports and exports at various dates, and a series of graphic representations (figures in contemporary dress or copied in one case from the Bayeux tapestry) of city administration at various times. Other particularly striking items were the original charter of Richard I, the caricature of Norwich Jews in 1233, the great family tree of Norwich oligarchs, 1477–1605, a map of the counties of origin of Norwich apprentices, 1558–1603, and human bones affected by disease (exhibit 81).

In his foreword to the booklet the lord mayor recorded the names of the numerous individuals concerned directly, or indirectly by giving advice, in setting up the exhibition. They are certainly to be congratulated on the splendid result, and it is only to be hoped that other provincial cities will try to emulate this achievement.

M. W. THOMPSON

36 *Norwich—the Growth of a City, An Exhibition at the Castle Museum* (48 pp., 7 maps: Norwich Museums Committee, 1963).