



subclade Z93 has three downstream subclades, Z94, L342.2 and L657. All four subclades populate mainly the Middle East, India, and some locations in the eastern part of the Russian Plain, hence, it is called the South-Eastern branch (Map 3). It arose in Europe ~5700 ybp and migrated along with the future Aryans across the Russian Plain to the south, east, and south-east between 5000 and 3500 ybp.

The haplotype tree of the R1a-Z93 clade is shown in Figure 4. Its Jewish R1a1 branch includes more than half of the whole tree (104 haplotypes out of 203 haplotypes); all the Jewish haplotypes are related to the downstream subclade L342.2. The Bashkir and the Kyrgyz branches also have the same L342.2. In fact, L342.2 is the predominant subclade in the Z93 clade, embracing 98% of its haplotypes. Only a few haplotypes on the tree and one English lineage of closely related individuals are L342.2 negative, which tells us the initial state of Z93.

Bearers of Z93 are spread from England through Armenia, Oman, and Kuwait, all the way to Khakassia in South Siberia; the latter (or his ancestors) apparently was a migrant from the Russian Plain. Six currently known representatives have the following base haplotype

13 24 16 11 11 15 12 12 10 13 11 30—15 9 9/10 11 11 24 14 20 31 12 15 15 15—11/12 11 19 22/23 16 16 18 17 35 40 13 11—11 8 17 17 8 12 10 8 11 10 12 22 22 15 10 12 12 13 8 13/14 23 21 12 12 11 13 10 11 12 13

All six have 111 mutations from the base haplotype which gives $111/6 \cdot 12 = 154 \rightarrow 177$ generations, or 4425 ± 630 years to their common ancestor. In fact, they belong to different mi-

nor sub-branches, which split from the trunk at the very beginning of the Z93 subclade, and their actual TMRCA is expected to be 5000 years (or more) before the present.

Most of the haplotype tree is L657 negative. An example of L657- base haplotype of an available 20-haplotype Asian branch in the 111 marker format is given below:

13 25 16 11 11 14 12 12 10 13 11 30—15 9 10 11 11 24 14 20 32 12 15 15 16—11 12 19 23 16 16 18 19 34 38 13 11—11 8 17 17 8 11 10 8 11 10 12 22 22 15 10 12 12 13 8 14 23 21 13 12 11 13 11 11 12 13—32 15 9 15 12 26 27 19 12 12 13 12 10 9 12 11 10 11 11 30 12 13 24 13 9 10 19 15 19 11 23 15 12 15 24 12 23 19 10 15 17 9 11 11

An example of L657+ base haplotype of an available Asian branch is as follows:

13 25 16 10 11 14 12 12 10 13 11 30—16 9 10 11 11 24 14 20 32 12 15 15 17—12 11 19 23 15 17 17 19 36 40 14 11—11 8 17 17 8 11 10 8 11 10 12 22 22 15 10 12 12 13 8 12 23 21 12 12 11 13 11 11 12 12

The first base haplotype is apparently ancestral to the branch, consisting of haplotypes from Turkey, Saudi Arabia, Qatar, the United Arab Emirates, Palestine, India, Kazakhstan, Iraq, Pakistan, Poland, Germany, and one from Tatar Russia. 20 of 67-marker haplotypes in the branch contain 354 mutations, which place their common ancestor at $354/20 \cdot 12 = 148 \rightarrow 174$ generations, or 4350 ± 490 ybp. Fourteen 111-marker haplotypes in the branch contain 381 mutations, which place their common ancestor at $381/14 \cdot 198 = 139 \rightarrow 162$ generations, or 4050 ± 460 ybp.

The second sub-branch is non-symmetrical, and contains six haplotypes from Saudi Arabia with a common ancestor of only 315 ± 110 ybp, and one very different haplotype from India, with an apparent common ancestor for all L657+ haplotypes of 2700 ybp. There are 16 mutations between the two L657+ and



Map 3.

The map of the South-Eastern branch, depicting birthplaces of the furthermost ancestors recorded in available databases. Magenta pins denote a parent Z93 branch, red and green pins correspond to Bashkir and Kyrgyz branches, respectively. The rest of the branch (L342.2 positive) is marked by deep-blue pins. The most represented Ashkenazy Jewish branch (not shown) covers densely an area of historical Polish-Lithuanian Commonwealth.