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# Y-chromosomal STR haplotypes in an Arab population from Libya

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**Abstract.** We analyzed eight Y-chromosomal STRs (DYS385, DYS19, DYS 389I and II, DYS390, DYS391, DYS392, DYS393) in a population sample of 63 males from Tripolis (Libya) and found 63 different haplotypes. 

*Keywords:* Population data; Microsatellite; Short tandem repeat; Y-chromosome

## 1. Introduction

Y-chromosomal STRs are increasingly used in population genetic, linkage evolution and for forensic applications [1]. In the last years a large set of population data have been collected and multiplex protocols have been reported. However, an in-depth evaluation of their population genetic properties requires a large number of haplotype frequencies from as many populations as possible.

## 2. Material and methods

To establish a DNA database on Libyans, blood samples were taken from 63 unrelated Arab individuals, the area of Tripolis. DNA was extracted from these unrelated male blood samples according to standard Qiagen procedures QiAmp Blood Kit. Amplifications were

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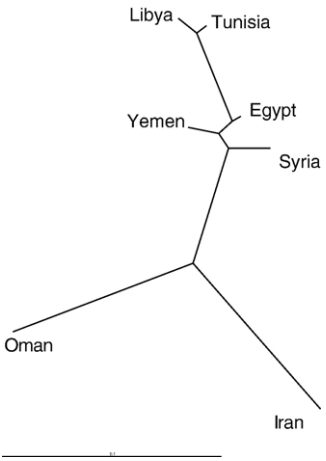


Fig. 1. Cluster analysis based upon $R_{ST}$ with data from Libya and six other Arab populations.

performed using fluorescent dye labelled primers according to Elmoznino and Prinz (http://www.ystr.org/europe/). A set of eight Y-chromosomal STR loci (DYS19, DYS389-I, DYS389-II, DYS390, DYS391, DYS392, DYS393, DYS385) were analyzed.

Table 1
Allelic frequencies and forensic efficiency parameters of Y-STR loci in 63 unrelated Libyans

| | DYS 19 | DYS 389 I | DYS 389 II | DYS 390 | DYS 391 | DYS 392 | DYS 393 | DYS 385-a | DYS385-b |
|---|---|---|---|---|---|---|---|---|---|
| Libya_1 | 15 | 12 | 30 | 24 | 10 | 10 | 13 | 14 | 15 |
| Libya_2 | 14 | 13 | 30 | 22 | 11 | 11 | 12 | 13 | 18 |
| Libya_3 | 14 | 13 | 30 | 22 | 11 | 11 | 12 | 13 | 18 |
| Libya_4 | 14 | 13 | 30 | 23 | 11 | 11 | 12 | 14 | 18 |
| Libya_5 | 13 | 12 | 29 | 25 | 11 | 11 | 13 | 16 | 18 |
| Libya_6 | 13 | 13 | 31 | 20 | 11 | 11 | 13 | 11 | 14 |
| Libya_7 | 13 | 14 | 30 | 24 | 11 | 11 | 13 | 13 | 14 |
| Libya_8 | 14 | 13 | 29 | 24 | 11 | 11 | 13 | 13 | 19 |
| Libya_9 | 15 | 14 | 30 | 24 | 10 | 13 | 13 | 13 | 15 |
| Libya_10 | 14 | 12 | 29 | 23 | 10 | 11 | 13 | 16 | 17 |
| Libya_11 | 15 | 13 | 30 | 22 | 10 | 11 | 14 | 14 | 15 |
| Libya_12 | 14 | 12 | 29 | 22 | 10 | 11 | 14 | 15 | 16 |
| Libya_13 | 14 | 13 | 29 | 22 | 11 | 11 | 12 | 13 | 16 |
| Libya_14 | 13 | 14 | 30 | 24 | 11 | 11 | 14 | 13 | 15 |
| Libya_15 | 13 | 13 | 29 | 22 | 10 | 11 | 13 | 13 | 16 |
| Libya_16 | 13 | 14 | 30 | 24 | 11 | 11 | 14 | 13 | 15 |
| Libya_17 | 14 | 13 | 29 | 24 | 11 | 12 | 12 | 11 | 14 |
| Libya_18 | 14 | 12 | 29 | 24 | 11 | 13 | 13 | 14 | 16 |
| Libya_19 | 14 | 13 | 31 | 24 | 11 | 11 | 14 | 14 | 14 |
| Libya_20 | 13 | 13 | 31 | 24 | 11 | 12 | 13 | 15 | 16 |
| Libya_21 | 14 | 13 | 30 | 23 | 11 | 11 | 14 | 13 | 19 |
| Libya_22 | 14 | 13 | 29 | 23 | 11 | 11 | 11 | 13 | 14 |
| Libya_23 | 15 | 13 | 30 | 23 | 10 | 13 | 14 | 13 | 14 |
| Libya_24 | 13 | 13 | 29 | 23 | 11 | 11 | 13 | 13 | 14 |
| Libya_25 | 14 | 12 | 28 | 22 | 10 | 11 | 12 | 13 | 18 |
| Libya_26 | 11 | 12 | 30 | 24 | 10 | 12 | 13 | 16 | 18 |
| Libya_27 | 13 | 13 | 29 | 24 | 10 | 10 | 13 | 12 | 13 |
| Libya_28 | 15 | 13 | 29 | 25 | 9 | 10 | 13 | 11 | 14 |
| Libya_29 | 13 | 14 | 30 | 18 | 9 | 10 | 13 | 12 | 13 |
| Libya_30 | 15 | 15 | 32 | 22 | 11 | 9 | 14 | 15 | 16 |
| Libya_31 | 13 | 15 | 31 | 23 | 9 | 10 | 13 | 12 | 14 |
| Libya_32 | 13 | 12 | 29 | 22 | 10 | 10 | 13 | 16 | 17 |
| Libya_33 | 15 | 12 | 30 | 25 | 10 | 10 | 12 | 13 | 14 |

(continued on next page)

Table 1 (*continued*)

| | DYS 19 | DYS 389 I | DYS 389 II | DYS 390 | DYS 391 | DYS 392 | DYS 393 | DYS 385-a | DYS385-b |
|---|---|---|---|---|---|---|---|---|---|
| Libya_34 | 14 | 14 | 31 | 22 | 11 | 10 | 12 | 12 | 18 |
| Libya_35 | 13 | 14 | 29 | 24 | 9 | 11 | 13 | 13 | 15 |
| Libya_36 | 13 | 14 | 30 | 24 | 9 | 11 | 13 | 13 | 15 |
| Libya_37 | 13 | 14 | 30 | 24 | 9 | 11 | 13 | 13 | 15 |
| Libya_38 | 15 | 14 | 31 | 20 | 10 | 12 | 14 | 12 | 17 |
| Libya_39 | 13 | 13 | 29 | 24 | 9 | 11 | 13 | 13 | 14 |
| Libya_40 | 13 | 14 | 30 | 23 | 9 | 11 | 13 | 13 | 17 |
| Libya_41 | 15 | 11 | 29 | 25 | 10 | 11 | 12 | 14 | 15 |
| Libya_42 | 13 | 12 | 29 | 24 | 11 | 11 | 13 | 17 | 17 |
| Libya_43 | 13 | 13 | 29 | 24 | 11 | 11 | 13 | 13 | 15 |
| Libya_44 | 13 | 14 | 30 | 25 | 11 | 11 | 13 | 13 | 14 |
| Libya_45 | 15 | 13 | 30 | 23 | 11 | 11 | 12 | 13 | 18 |
| Libya_46 | 14 | 13 | 30 | 24 | 11 | 12 | 12 | 13 | 20 |
| Libya_47 | 13 | 14 | 30 | 24 | 9 | 11 | 13 | 13 | 14 |
| Libya_48 | 13 | 14 | 30 | 25 | 9 | 11 | 13 | 14 | 15 |
| Libya_49 | 13 | 14 | 30 | 24 | 9 | 11 | 14 | 13 | 15 |
| Libya_50 | 13 | 14 | 30 | 24 | 9 | 11 | 14 | 13 | 15 |
| Libya_51 | 13 | 14 | 30 | 24 | 9 | 11 | 14 | 13 | 15 |
| Libya_52 | 16 | 12 | 29 | 22 | 10 | 10 | 14 | 16 | 16 |
| Libya_53 | 13 | 14 | 30 | 24 | 9 | 11 | 13 | 13 | 14 |
| Libya_54 | 13 | 14 | 29 | 24 | 9 | 10 | 13 | 13 | 15 |
| Libya_55 | 13 | 13 | 29 | 24 | 9 | 11 | 13 | 13 | 15 |
| Libya_56 | 14 | 14 | 30 | 23 | 11 | 11 | 12 | 13 | 13 |
| Libya_57 | 15 | 12 | 29 | 25 | 10 | 11 | 12 | 13 | 17 |
| Libya_58 | 13 | 14 | 30 | 24 | 9 | 11 | 13 | 13 | 15 |
| Libya_59 | 15 | 13 | 31 | 24 | 10 | 12 | 12 | 16 | 17 |
| Libya_60 | 13 | 14 | 30 | 24 | 9 | 11 | 13 | 13 | 14 |
| Libya_61 | 13 | 12 | 29 | 22 | 10 | 11 | 13 | 16 | 17 |
| Libya_62 | 15 | 12 | 31 | 25 | 10 | 11 | 12 | 14 | 15 |
| Libya_63 | 13 | 13 | 29 | 24 | 9 | 11 | 13 | 13 | 15 |

Amplification products were analyzed by capillary electrophoresis using the ABI 310® Genetic Analyzer according to the manufacturer's recommendations (Applied Biosystems) and the genotyper software.

Forensically relevant statistical analyses were calculated using the Arlequin software.

## 3. Results and discussion

Among the 63 Libyan males studied 63 different Y-STR haplotypes were observed (Table 1).

Cluster analysis based upon $R_{ST}$ revealed that the Y-STR core haplotype distribution of the Libyan group is close to the neighbouring Tunisian population whereas another North-African population (Egypt) and populations from the Near East (Syria, Yemen, Oman and Iran) are more distant, reflecting the growing geographical and cultural distance from Libya (Fig. 1).

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## Reference

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