CHAPTER 2
MATERIALS AND METHODS
Finger and palmar prints were obtained from the boys and girls attending the Middle and Higher Secondary Schools in the city of Mysore, during 1967. Sex and castewise figures of individuals from whom dermatoglyphic data were collected are given below (Table 2).

**TABLE 2**

Number of individuals from which complete sets of data collected are summarized by caste and sex.

<table>
<thead>
<tr>
<th>Caste group</th>
<th>Number of individuals</th>
<th>Male</th>
<th>Female</th>
<th>Total (M+F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smartha Brahman</td>
<td></td>
<td>110</td>
<td>108</td>
<td>218</td>
</tr>
<tr>
<td>Madhva Brahman</td>
<td></td>
<td>104</td>
<td>103</td>
<td>207</td>
</tr>
<tr>
<td>Sri Vaishnava Brahman</td>
<td></td>
<td>104</td>
<td>107</td>
<td>211</td>
</tr>
<tr>
<td>Lingayat</td>
<td></td>
<td>105</td>
<td>104</td>
<td>209</td>
</tr>
<tr>
<td>Vokkaliga</td>
<td></td>
<td>121</td>
<td>107</td>
<td>228</td>
</tr>
<tr>
<td>Adi Karnataka</td>
<td></td>
<td>104</td>
<td>104</td>
<td>208</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>648</td>
<td>633</td>
<td>1281</td>
</tr>
</tbody>
</table>
Rolled prints were taken of palms and finger tips, using printer's black ink. Unless otherwise stated, the data were read and analysed for the most part utilising the conventional methods of Cummins and Midlo (1943). No known blood relatives have been included in the present sample and all subjects were between seven and nineteen years of age. Statistical comparisons were carried out through chi-square (with Yates' correction where applicable) and 't' test. All characters are expressed as percentages, except the ridge-count, finger pattern intensity index and main-line index. The data of male and female subjects and those of each hand were calculated and tested separately. On account of severe scarring and indistinct prints, pattern type and ridge-count could not be determined in all cases.

The present account deals chiefly with the following dermatoglyphic traits: digital pattern types, pattern intensity index, digital ridge-counts, termination of main-lines A, B, C and D, main-line index, types and combinations of axial triradii, patterns in palmar configurational areas, ab and ad palmar ridge-counts.

2.1. Pattern types on fingers

As stated before finger prints were analysed according to the scheme suggested by Cummins and Midlo. All composite patterns, including twin loops, lateral pocket loops, central pocket loops and accidentals were combined in the whorl category. Radial loops and ulnar loops were counted both separately and jointly. The arch class includes both plain and tented arches as well as simulated loops which had a zero ridge-count.
2.2. Pattern intensity index and total ridge-count on fingers

In finger dermatoglyphics two useful and widely employed descriptive measures are pattern intensity index (P.I.I.) and total ridge-count (TRC). The pattern intensity index is average number of triradii occurring on fingers per individual. This index is a measure of complexity of pattern types.

The total ridge-count has been defined as \( TRC = \sum r_i \), where \( r_i \) ( \( i = 1, 2, \ldots \ldots \ldots 10 \) ) is the ridge-count on the \( i \)-th finger of an individual. Thus the total ridge-count is the sum of the single counts on all ten fingers of an individual. The ridge-counts on each finger have been determined according to the method described by Holt (1961). The ridge-count is the number of ridges which cross or touch a straight line running from the triradius to the core or centre of the pattern. The triradius itself is not included in the count, nor is the final ridge, if it forms the centre of the pattern. A ridge termination which meets the line is included in the count, and at the same principle when the line cuts through a point of bifurcation two ridges are counted. A ridge which terminate short of touching the line is not included. In a loop there is one count because of one triradius, while arches have a ridge-count of zero and in the case of whorls, which in general have two triradii, only the higher one of the two (or more) possible counts is taken into account. The ridge-counts are recorded separately for each finger, summed by hand, or totalled for both hands.
2.3. Palmar configurational areas and axial triradii

The palmar surface is divisible into six anatomically defined dermatoglyphic areas. These comprise the hypothenar area, the thenar area, and the four inter digital areas. A basic dermatoglyphic landmark found in both fingerprints and palmar patterns is the triradius. A triradius is a Y-shaped configuration found by the confluence of three ridge systems. Typically, there are four digital triradii on the palms immediately below the bases of the digits II, III, IV and V. The triradii are designated a, b, c, d, proceeding from the index finger to the little finger. In addition to digital triradii another triradius is usually found at the base of the palms, commonly in the depression between the thenar and hypothenar eminences, and is called the axial triradius, t. Other triradii are associated with patterns and sometimes accessory digital triradii occur. Occasionally two, or even three, axial triradii may be present. A triradius located near the centre of the palm is designated by the letter t". An intermediate triradius situated between t and t", is denoted by the symbol t'. In some palms one of the digital triradii, most commonly C, may be absent. The characteristic positions of the five principal palmar triradii and the five dermatoglyphic areas of the palm are illustrated in Figure 1.

Formulation of axial triradii and classification of palmar configurations on the hypothenar, the thenar/first inter digital and the second, third and fourth inter digital areas follow the guide lines
Fig. 1 The principal palmar triradii and the five dermatoglyphic areas of the palm.

Fig. 2 The main lines of the palm and the scheme of numbers for formulating palmar main-lines.
in Cummins and Midlo (1961: pp. 84 - 109). In Tables incidence of patterns in the palmar configurational areas indicate percentage frequencies counting true patterns (single loops, double loops or whorls) and vestiges. Open fields/arches are not considered to be as patterns.

2.4. Termination of main-lines and main-line index

The four digital triradii constitute anatomical landmarks from which the palmar main-line are derived. For this purpose the periphery of the palm is numbered in a standardised sequence from 1 to 13, beginning with the base of the palm below the thenar eminence and terminating with the area between the index finger and the thumb. The main-lines of the palm A, B, C, D and the scheme of numbers for formulating palmar main-lines are illustrated in Figure 2.

The individual terminations of the main-line for each Mysore caste are presented for lines A, B, C, and D. The main-lines C and D are, however, summarized and are presented in the form of modal types. The terminations of the C line were studied by grouping them into four modal types based on direction of their path as described by Plato (1970): Ulnar (terminations 9 - 13), Proximal (terminations X, x and 8) and Absent (when C triradius is absent). B/U is the ratio of the Radio/Ulnar types, and D line terminations are classified in three modal types 7, 9, 11 (Cummins and Midlo 1961).

The general direction of the ridges in all palms can be determined from two main-lines D and A, as combined in individual palms, is the
main-line index (MLI). This index is an expression of the direction of
a neutral line, its inclination being determined by the courses of
lines D and A. The index is not a proportion but a summation of values
describing the courses of these two main-lines and it furnishes conven­
ient information on the degree of transversality of lines A and D.
Values are assigned to the various positions round the periphery of the
palm where lines A and D may end (see Figure 81, p.114 : Cummins and
Midlo 1961).

2.5. ab and ad ridge-counts

Ridge-counts are often made on the digital areas of the palms.
Two such measures between two different digital triradii are employed
in the present study. These are the ab and ad ridge-counts. The respec­
tive inter-triradial ridge-counts were obtained by counting all ridges
cutting or touching the line joining the triradii ab and ad, excluding
triradial points. In case of presence of accessory triradius, higher
inter-triradial ridge-count value was taken into consideration.