1 piso B, 1040 Buenos Aires), Ciro Lafón (Peña 884, 1828 Banfield), and Fiz Fernández (Callao 1134, 6 piso, 1023 Buenos Aires).

■ The Finnish Anthropological Society is recommending that Juha Pentikäinen (Helsingin Yliopisto, Uskontotieteen jaosto, Luotsikatu 4.A.1. 00160 Helsinki 16) be included in the Commission on Ethnocide and Genocide.

Gene Dispersion in Man: The Indian Case

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The interpretation of the temporal and spatial variation of the gene frequencies of populations is one of the main aims of population genetics. Besides the systematic evolutionary pressures (mutation, admixture, selection), nonsystematic factors such as size, density, the nature of mate selection, and differential fertility and viability also play an important role in the genetic composition of a population. The pattern of choice of mate provides a fair amount of insight into the generational and spatial dynamics of a gene in a population. Cavalli-Sforza (1962) studied the distribution of the distances between the birthplaces of parents and offspring and found that one of its most important components is the distribution of marriage distances, defined as the distances between the birthplaces of spouses. The pattern of distribution and the central tendency of marriage distance, which regulates, to a large extent, the spatial distribution of genes, helps predict the nature of gene dispersion.

While Wright and Haldane (1948, cited in Sutter and Tran Ngoc Toan 1957) assumed that gene dispersion in natural populations was normal, Bateman (1950) demonstrated unequivocally that diffusionary processes in a natural population of living organisms are not normal in distribution and that gene dispersion, as a rule, is leptokurtic and positively skewed. Bateman (1962) further predicted that leptokurtosis will also be observed in man. Several workers have observed that the distribution of marriage distances in a number of human populations is in fact leptokurtic (e.g., Cavalli-Sforza 1958, Sutter and Tran Ngoc Toan 1957, Freire-Maia and Freire-Maia 1962, Boyce, Kuchemann, and Harrison 1967).

In a leptokurtic and positively skewed distribution, the frequency of marriages contracted at short distances is extremely large in comparison to the frequency of marriages contracted at longer distances. This makes the distribution of marriage distances asymmetrical and much more peaked than a normal distribution. In such a unimodal distribution the coefficient of kinship—that is, the probability that two randomly chosen individuals will share a common gene—decreases very rapidly with increase in distance. Where the distribution is multimodal, in contrast, the rate of decrease in the coefficient of kinship will be much slower and uneven, and the prediction of kinship at a given distance will be much more difficult.

The purpose of my study was to see whether the distribution of marriage distances is leptokurtic for the populations that have been studied in India.

To date, 51 populations—8 tribes, 3 religious communities, and 40 castes—from different parts of India (but primarily from Maharashtra) have been studied for the distribution of marriage distances. (In all these studies the distances were along travel routes and not as the crow flies; for details, see Basu 1973, Malhotra and Kanhere 1975, Pingle 1975, Sud, Bhalla, and Bhatia 1975, Reddy and Mukherjee 1975, Majumder 1977, Majumder and Malhotra 1979, Malhotra 1978, Mukherjee et al. 1978.) Their results can be summarized as follows:

1. In none of the 51 populations studied is the observed distribution of marriage distances normal.
2. Except in four groups—Brahmins, Punjabi Suds, Khatik Dhangars, and Jains—the general form of the distribution is leptokurtic and extremely positively skewed.
3. The mean matrimonial distances show a great deal of variation, the values ranging from 5.20 to 59.32 miles.
4. The mode in the majority of the groups is either at 0 or very close to it, mostly within 15 miles.

Thus, while a majority of the populations conform to the general rule of leptokurtosis, large deviations have been observed in four of them. In three of these—Brahmins, Punjabi Suds, and Jains—the distribution appears to be multimodal (figs. 1–3), while among the Khatik Dhangars it is clearly bimodal (fig. 4).

The Punjabi Suds and the Jains are a business community, while the Brahmins are priests and/or primarily white-collar workers. The Punjabi Suds, now widely dispersed in Punjab, have immigrated from formerly undivided Punjab. Their distribution appears rather uneven; in big towns and market

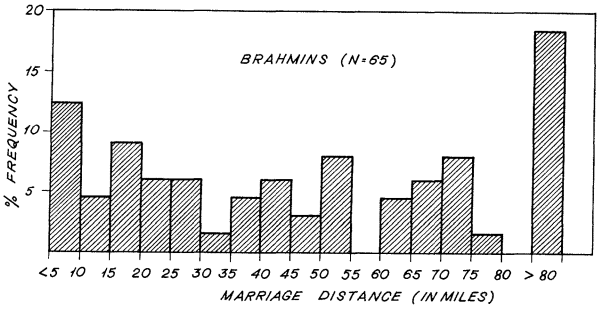

FIG. 1. Distribution of marriage distances among the Brahmins of Phaltan, Satara district, Maharashtra (redrawn after Malhotra and Kanhere 1975).

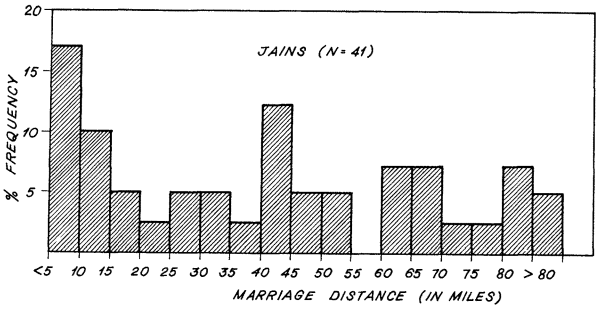

FIG. 2. Distribution of marriage distances among the Jains of Phaltan, Satara district, Maharashtra (redrawn after Malhotra and Kanhere 1975).

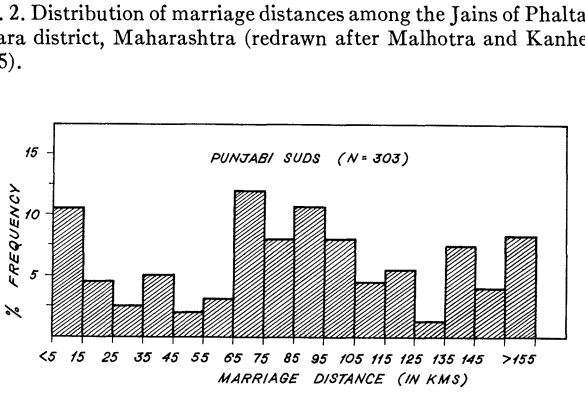

FIG. 3. Distribution of marriage distances among the Punjabi Suds of Punjab (redrawn after Sud, Bhalla, and Bhatia 1975).

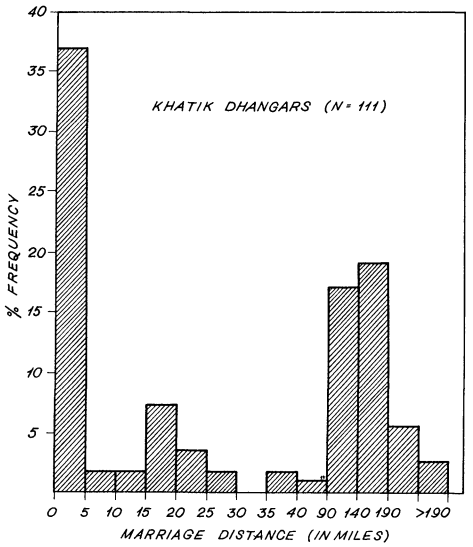

FIG. 4. Distribution of marriage distances among the Khatik Dhangars of west-central Maharashtra (redrawn after Majumder and Malhotra 1979).

centers the concentration is high, but in villages they are few or absent. The Jains, a religious isolate, also engage in business and white-collar work and are unevenly distributed over a wide territory—numerous in towns and certain temple places and scarce in villages. The Brahmins also have a rather uneven distribution; they are chiefly found in towns, big villages, and temple towns/villages. Thus these three groups have two things in common: relative to the total population of an area, their number is rather small, and because of constraints imposed by their professions their distribution is uneven. It is, therefore, safe to conclude that the multimodal distribution observed for these populations is largely due to their heterogeneous distribution.

In the case of Khatik Dhangars, found chiefly in west-central Maharashtra, we have fairly accurate knowledge of their distribution. They are present in large numbers in big cities like Bombay, Poona, and Nasik and considerably less numerous in small towns and market villages. In small villages, there may occasionally be one or two families, but mostly they are absent. This distribution is the result of their traditional occupation of meat selling. The observed bimodal distribution reflects the fact that in big cities, where their number is fairly large, it is often possible for them to select mates locally, but should they fail to find mates locally they have to travel long distances because Khatik Dhangars are scarce or absent in the intervening villages.

In conclusion, we are tempted to predict that in India, because of its unique social structure, we are likely to encounter more departures from the rule of leptokurtosis and that among the Brahmin castes and trading communities we will almost certainly observe multimodality in gene dispersion.

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Selection Intensity in the Sherpas

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26 VI 79

A bio-anthropological survey of fertility, mortality, physique, and certain clinical-haematological and blood-polymorphic traits was undertaken on the Sherpas of Upper Khumbu (10,000–14,000 ft.), Nepal, and of Kalimpong subdivision (3,000–7,000 ft.), Darjeeling district, West Bengal, to study the nature of altitudinal differences, if any, in this Himalayan population. The Sherpas are generally considered to have migrated from the high-altitude areas of central and eastern Tibet to the high altitudes of northeastern Nepal about 500 years ago (Oppitz 1974) and thence to the lower altitude of Darjeeling district about 200 years ago. Demographic data were collected by retrospective methods from 110 households in Upper Khumbu and 250 households in the Kalimpong subdivision. A detailed description of the population and of the methodology of the present study has been presented elsewhere (Gupta 1979).

Altitudinal variations in fertility and mortality patterns have been reported by, among others, Grahn and Kratchman (1963), Baker and Dutt (1972), Mazess (1975), and Abelson (1976). Such variations with respect to Crow's (1958) selection intensity, a composite index involving fertility and mortality parameters, have been reported for an Aymara-speaking population of Chile and for the Quechua of Peru (Cruz-Coke et al. 1966, Garruto and Hoff 1976, Cruz-Coke 1977). Data on selection intensity on the two altitudinal subgroups of the Sherpas are presented here.

The index of total selection intensity (I), which measures the maximum potential rate of change, assuming that variations in mortality and fertility are genetically determined and fitness is completely heritable, was computed for the two subgroups following Crow's (1958) formula. No test of significance of the difference between the two with respect to I was possible. The data are presented in table 1. It appears that in the Upper Khumbu subgroup, average number of live births per married woman aged 45 years and above ($\bar{X}$) is 4.53 and its variance