REIMER, Toni Tripp, 1946-
GENETIC DEMOGRAPHY OF AN URBAN GREEK IMMIGRANT COMMUNITY.

The Ohio State University,
Ph.D., 1977
Anthropology, cultural

University Microfilms International, Ann Arbor, Michigan 48106

© Copyright by
Toni Tripp Reimer
1977
GENETIC DEMOGRAPHY OF AN URBAN GREEK IMMIGRANT COMMUNITY

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree Doctor of Philosophy in the Graduate School of the Ohio State University

By

Toni Tripp Reimer, B.S., M.S., M.A., R.N.

* * * * *

The Ohio State University

1977

Reading Committee:
Dr. Frank E. Poirier, Chairman
Dr. Erika Bourguignon
Dr. Paul Sciulli

Approved By

Frank E. Poirier
Adviser
Department of Anthropology
ACKNOWLEDGMENTS

The cooperation and assistance of a number of individuals contributed to the preparation of this dissertation. I truly appreciate Dr. Paul Sciulli, who provided direction and assistance in all phases of this research. I am greatly indebted to Dr. Frank E. Poirier for encouraging my efforts throughout graduate school and for his thorough editing of this dissertation. I also thank Dr. Erika Bourguignon, who initially led me to see the importance of integrating the biological and cultural aspects of anthropology.

I am most grateful to the people of the Greek community of Columbus for their cooperation and continuing friendship. In particular, I wish to express my sincere thanks to Father A. Sarris and Mrs. Kosmos (Diana) Synadinos.

Finally, I wish to acknowledge Ms. Randy B. Pollack, whose support and assistance made the preparation of this manuscript possible.
VITA

December 14, 1946 . . . Born – Ames, Iowa

1969. . . . . . . . . . . B.S. in Nursing, University of Maryland, College Park, Maryland


1972-1973 . . . . . . Research Associate, Nursing School, The Ohio State University, Columbus, Ohio

1973. . . . . . . . . . . M.S. in Nursing, The Ohio State University, Columbus, Ohio

1973-1976 . . . . . . Teaching Associate, Department of Anthropology, The Ohio State University, Columbus, Ohio

1974. . . . . . . . . . . M.A. in Anthropology, The Ohio State University, Columbus, Ohio

1976-1977 . . . . . . Project Research Director, Department of Anthropology, The Ohio State University, Columbus, Ohio

1977-present. . . . . Assistant Professor, Nursing School, University of Iowa, Iowa City, Iowa

PUBLICATIONS

<table>
<thead>
<tr>
<th>Year</th>
<th>Title</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1977</td>
<td>&quot;Variations in Alcohol Metabolism Among Three Human Populations.&quot;</td>
<td>In Summary of Research and Experimentation on Alcohol and Alcoholism, ed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Association of American Indian Social Workers, Sioux City, Iowa: Social Science Research Consultants.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>March Symposium.</td>
</tr>
</tbody>
</table>
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Chapter</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I.</strong></td>
<td><strong>INTRODUCTION.</strong></td>
</tr>
<tr>
<td></td>
<td>Goals</td>
</tr>
<tr>
<td></td>
<td>Sample.</td>
</tr>
<tr>
<td></td>
<td>Purpose</td>
</tr>
<tr>
<td></td>
<td>Outline</td>
</tr>
<tr>
<td></td>
<td>Summary</td>
</tr>
<tr>
<td><strong>II.</strong></td>
<td><strong>PERSPECTIVES ON THE RELATIONSHIP BETWEEN DEMOGRAPHY AND ANTHROPOLOGY</strong></td>
</tr>
<tr>
<td></td>
<td>The nature of demography.</td>
</tr>
<tr>
<td></td>
<td>Rationale for using demographic theory in anthropology.</td>
</tr>
<tr>
<td></td>
<td>Demographic contributions to anthropological subdisciplines.</td>
</tr>
<tr>
<td></td>
<td>Contributions demography can make to anthropology as a unified discipline.</td>
</tr>
<tr>
<td></td>
<td>Anthropological contributions to demographic theory.</td>
</tr>
<tr>
<td></td>
<td>Summary</td>
</tr>
<tr>
<td><strong>III.</strong></td>
<td><strong>THEORETICAL FRAMEWORK</strong></td>
</tr>
<tr>
<td></td>
<td>The relationship between demography and microevolution.</td>
</tr>
<tr>
<td></td>
<td>Population structure</td>
</tr>
<tr>
<td></td>
<td>Vital rates</td>
</tr>
<tr>
<td>Topic</td>
<td>Page</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Forces of microevolution</td>
<td>53</td>
</tr>
<tr>
<td>The significance of cultural factors to population studies</td>
<td>63</td>
</tr>
<tr>
<td>Cultural factors influencing fertility</td>
<td>64</td>
</tr>
<tr>
<td>Cultural factors influencing migration</td>
<td>72</td>
</tr>
<tr>
<td>Cultural factors influencing mortality</td>
<td>73</td>
</tr>
<tr>
<td>Summary</td>
<td>74</td>
</tr>
<tr>
<td>IV. THE GREEK COMMUNITY</td>
<td>75</td>
</tr>
<tr>
<td>History of Greek immigration into the United States</td>
<td>75</td>
</tr>
<tr>
<td>Factors promoting emigration</td>
<td>75</td>
</tr>
<tr>
<td>Pattern of Greek immigration</td>
<td>79</td>
</tr>
<tr>
<td>Historical and cultural characteristics of the Columbus Greek community</td>
<td>82</td>
</tr>
<tr>
<td>Geographical distribution</td>
<td>82</td>
</tr>
<tr>
<td>Education</td>
<td>82</td>
</tr>
<tr>
<td>Occupation</td>
<td>88</td>
</tr>
<tr>
<td>Family and kinship</td>
<td>89</td>
</tr>
<tr>
<td>Religion</td>
<td>98</td>
</tr>
<tr>
<td>World view</td>
<td>101</td>
</tr>
<tr>
<td>Summary</td>
<td>103</td>
</tr>
<tr>
<td>V. METHODOLOGY</td>
<td>105</td>
</tr>
<tr>
<td>Conduct of the research</td>
<td>105</td>
</tr>
<tr>
<td>Data collection</td>
<td>106</td>
</tr>
<tr>
<td>Documents</td>
<td>106</td>
</tr>
<tr>
<td>Structured interviews</td>
<td>107</td>
</tr>
<tr>
<td>Participant observation</td>
<td>111</td>
</tr>
<tr>
<td>Data analysis</td>
<td>112</td>
</tr>
<tr>
<td>Sources of error</td>
<td>112</td>
</tr>
<tr>
<td>Methods of analysis</td>
<td>115</td>
</tr>
<tr>
<td>Summary</td>
<td>117</td>
</tr>
<tr>
<td>VI. RESULTS</td>
<td>118</td>
</tr>
<tr>
<td>Population structure and movement</td>
<td>118</td>
</tr>
<tr>
<td>Age and sex distribution</td>
<td>118</td>
</tr>
<tr>
<td>Migration analysis</td>
<td>139</td>
</tr>
<tr>
<td>Marriage patterns</td>
<td>149</td>
</tr>
<tr>
<td>Marital status</td>
<td>149</td>
</tr>
<tr>
<td>Age at first marriage</td>
<td>153</td>
</tr>
<tr>
<td>Congruence in spouses' place of origin</td>
<td>156</td>
</tr>
<tr>
<td>Greek ancestry endogamy</td>
<td>159</td>
</tr>
<tr>
<td>Fertility patterns</td>
<td>162</td>
</tr>
<tr>
<td>Age of menarche</td>
<td>162</td>
</tr>
<tr>
<td>Rates of fertility</td>
<td>164</td>
</tr>
<tr>
<td>Topic</td>
<td>Page</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Reproductive wastage</td>
<td>171</td>
</tr>
<tr>
<td>Childspacing</td>
<td>175</td>
</tr>
<tr>
<td>Patterns of birth control</td>
<td>179</td>
</tr>
<tr>
<td>Mortality patterns</td>
<td>181</td>
</tr>
<tr>
<td>Mortality rates</td>
<td>181</td>
</tr>
<tr>
<td>Causes of death</td>
<td>189</td>
</tr>
<tr>
<td>Life table</td>
<td>193</td>
</tr>
<tr>
<td>Summary</td>
<td>198</td>
</tr>
</tbody>
</table>

**VII. DISCUSSION**

Effects of social and cultural factors on the population structure............. 199
  Effect on migration patterns ........................................ 200
  Effect on patterns of mortality .................................... 205
  Effect on fertility patterns ........................................ 207
  Effect on mate selection ........................................... 212
Microevolutionary implications of the changing population structure ........... 215
  Natural selection ................................................... 215
  Genetic drift ....................................................... 215
  Gene flow .......................................................... 224
  Inbreeding .......................................................... 230
Summary ............................................................... 235

**VIII. SUMMARY AND CONCLUSIONS**

Findings of the study .................................................. 236
  Demographic characteristics of the Columbus Greek community population structure .... 236
  Potential for microevolution within the Columbus Greek community .................. 240
  Inference of cultural influences on forces of microevolution ....................... 242
Summary ............................................................... 243
Implications for future research ...................................... 244

**APPENDIX**

A ................................................................. 247
B ................................................................. 249
C ................................................................. 250
D ................................................................. 253
LIST OF TABLES

1. Educational trends for males ................... 85
2. Educational trends for females .................. 86
3. Highest occupational status: males ............. 90
5. Age distribution table: 1910 ..................... 119
6. Age distribution table: 1920 ..................... 120
7. Age distribution table: 1930 ..................... 121
8. Age distribution table: 1940 ..................... 122
9. Age distribution table: 1950 ..................... 123
10. Age distribution table: 1960 .................... 124
11. Age distribution table: 1970 .................... 125
13. Total migration rate into the Columbus Greek community. .................. 143
14. Comparison of in-migration to immigration. .... 146
15. % immigration from five major areas in Greece. 148
16. Total migration from provinces and major islands in Greece for period 1890-1976 ............... 150
17. Male marital status by decade of birth .......... 151
18. Female marital status by decade of birth ....... 152

ix
19. Age at first marriage for Columbus Greek females ............................................. 154
20. Age at first marriage for Columbus Greek males and differences in means between males and females. .......................................... 155
22. Mating in the Columbus Greek community by decade of female's birth ....................... 160
23. Comparison of ethnic vs. geographical endogamy by decade of female's birth .......... 161
24. Age at menarche of females in the Columbus Greek community .......................................... 163
25. Crude birth rates .................................. 165
26. Fertility rates of women in the Columbus Greek community .......................................... 167
27. Births by age of mother. ......................... 169
28. Number of livebirths/female ....................... 170
29. Rate of miscarriage by year of mother's birth. ......................................................... 172
30. Rate of stillbirth by year of mother's birth ............................................................... 173
31. Mean age at marriage and mean number of years before birth of first child by year of woman's birth ......................................................... 176
32. Methods of birth control ...................... . 180
33. Methods of infant feeding by decade of mother's birth ............................................. 182
34. Crude death rates. .................................. 183
35. Male deaths by age .................................. 185
36. Female deaths by age .............................. 186
37. Mean age at death. .............................. 188
38. % of individuals who fail to survive to reproductive age ........................................ 190
39. Causes of death (when known) for males by year of birth ........................................ 191
40. Causes of death (when known) for females by year of birth ..................................... 192
41. Life table for Columbus Greek males ................................................................. 194
42. Life table for Columbus Greek females ................................................................. 195
43. Selection potential from differential mortality ($I_m$) for Columbus Greek population ........ 217
44. Selection potential from differential fertility ($I_f$) for Columbus Greek population .......... 219
45. Index of Total Selection for the Columbus Greek community ..................................... 220
46. The Index of Total Selection for various human populations ..................................... 222
47. A comparison of Crow's Index of Selection between the Pittsburgh Polish Hill and the Columbus Greek communities ......................................................... 223
48. Coefficients of breeding isolation of various human populations .................................. 228
49. Inbreeding coefficients (f) of various human populations .......................................... 234
LIST OF FIGURES

2. Present geographical distribution of the Columbus Greek community ........ 83
3. Population pyramid for the 1910 Columbus Greek community .................. 128
4. Population pyramid for the 1920 Columbus Greek community .................. 129
5. Population pyramid for the 1930 Columbus Greek community .................. 130
6. Population pyramid for the 1940 Columbus Greek community .................. 131
7. Population pyramid for the 1950 Columbus Greek community .................. 132
8. Population pyramid for the 1960 Columbus Greek community .................. 133
10. Population pyramid for the 1976 Columbus Greek community .................. 135
11. Total migration into Columbus 1900-1979 ........................................ 140
12. Total migration into the Columbus Greek community by sex .................. 142
13. Map of Greece ....................................................... 147
14. Mean ratios of Index of Birthing Years ......................................... 178
CHAPTER I

INTRODUCTION

Goals

This study examines the population dynamics and history of the urban Greek immigrant community of Columbus, Ohio. Broadly subsumed under the topical rubric "demographic (or population) anthropology," this research was conducted for a number of reasons. The major purpose was to examine and describe the potential and operative processes of microevolution in a single urban ethnic population since its formation in the late nineteenth century.

A more general goal of this dissertation is the integration of data and theories from two anthropological subdisciplines (cultural and physical) through a common unit: population structure. In this study, factors determining the population structure (fertility, mortality and migration) will be shown to be the processes involved in the microevolution of any population.
Further, I will examine the effects of cultural beliefs and social organization on the rates of these factors. It will then be possible to relate the influence of cultural factors on the microevolution of a single population, and the broader goal of integrating anthropological subdisciplines will have been initiated.

Sample

The Greek community of Columbus was chosen as the sample population for a number of reasons. First, the population was found to be a suitable unit of study for cultural factors. Although confronted by continuing acculturation pressures and a growing population, the Greek community is attempting to preserve many facets of the traditional way of life. Through numerous organizations, church groups, sports clubs and informal associations, members of this community maintain close communication and interaction among themselves and retain an "ethnic identity." Further, Greek immigrant groups have received scant attention in the anthropological literature dealing with American ethnic groups.

Second, the population was found to be a suitable unit of study for the process of microevolution. It appears that a majority of the population has a deep commitment to the Greek Orthodox Church. The
combination of this commitment, a church doctrine which strongly promotes endogamous marriages, and a high degree of ethnic identity and cohesion within the population result in a high rate of ingroup marriage. Thus, while this population is politically and economically integrated into the larger Columbus community, it is culturally distinct and, in part, reproductively isolated.

Third, for reasons which will be discussed at length later, there is a need for microevolutionary studies of urban endogamous groups. As will be seen, previous such studies have been rare or incomplete. Columbus was chosen as the site of this research for a number of personal reasons, one of which was my commitment to the completion of a second research project.

Purpose

Population structure and vital rates can be useful to physical anthropologists concerned with determining patterns and potentials for microevolution. In addition, cultural factors may significantly influence the rates of vital processes. Numerous individual studies providing the data for these two theoretical formulations have been performed in anthropological populations. The most important of the studies are the following:
I. Determining microevolution through demography
   A. Investigations involving a single micro-evolutionary force
      1. Relating demography and genetic drift: Glass 1956; McKusick 1964; Giles 1966; Roberts 1968b; Cavalli-Sforza 1969.

II. Cultural factors influencing vital rates and population structure
   E. Culture and general population structure: Cross and McKusick 1970.

In summary, the significance of anthropological populations in the study of microevolution has been widely recognized and cultural factors influencing the population structure is also an important area of study. However, the available literature is incomplete in at least two areas.
First, most investigations utilizing demographic parameters to evaluate microevolution have been concerned with only one microevolutionary force (drift, gene flow or natural selection). Few studies have considered demography and multiple microevolutionary factors even though this approach is necessary for a comprehensive understanding of the microevolution of a population. Further, the populations in which such a comprehensive approach has been applied have been limited to Brazilian Indian tribes, the Ramah Navajo, and mixed Mexican communities. No comprehensive microevolutionary study has been performed on an endogamous urban group. The importance of studying the demography of groups living at different cultural levels has recently been stressed in the literature. Zubrow (1976), in particular, has called for more descriptive studies over a wider range of population types than previously known, and has stressed the importance of learning about the demography of subcultural groups in highly industrialized nations.

Second, investigations relating cultural factors to population structure could logically be extended to include an analysis of the effect of this on the biological

---

1. Crawford and Goldstein (1975) studied urban Polish-American migrants; however, they concentrated on only one of the microevolutionary forces, natural selection.
microevolution of the population. To my knowledge, there has not been a systematic presentation of the effects of cultural factors on the operative and potential micro-evolutionary forces in a population.² Because demographic processes are largely determined by social conditions, investigating both the cultural and biological aspects seems to be essential to a more complete understanding of population change.

Thus, there is a need for an investigation of the demography of an urban ethnic population and there is a need for a study which examines the effect of cultural factors on the microevolution of a population. The explicit objectives of the present study are as follows:

1. To describe the population structure of an urban Greek immigrant community.

² Two studies have been performed which mention the relationship between cultural factors and a specific microevolutionary force. Kluckhohn and Griffith (1950) found that the effect of clan exogamy on the Ramah Navajo tended "toward forcing genes from other groups to be spread widely in the population." Salzano, Neel and Maybury-Lewis (1967) noted that the practice of polygyny among the Xavante Indians resulted in the higher fertility and hence greater "genetic fitness" of village chiefs. However, these studies are not exceptions to my generalization concerning the lack of a systematic presentation of the effects of cultural factors on microevolution for two reasons: they were nonquantitative studies which dealt in only general terms with the cultural effects, and they focused on the effect of only one microevolutionary force.
2. To measure the demographic factors of fertility, migration, mortality and marriage patterns in this population and determine changes and trends in these rates.

3. To infer from the demographic processes the potential for microevolutionary forces to have been operative in the population.

4. To elucidate the significance of cultural factors on the population structure of this population.

5. To integrate the subdisciplines of physical and cultural anthropology by exploring the significance of cultural factors on the operative and potential microevolutionary forces in a single community.

6. To develop and test a computer program which can be used by other anthropologists concerned with the microevolution of human populations.

Outline

The general plan of presentation of this research includes, in order:

1. A discussion of the relationship between demography and anthropology, including a rationale for using demographic theory and methods in anthropology and a review of the types of contributions a study of anthropological populations can make to demographic theory.

2. A review of the literature concerned with the two major topical areas: demography and microevolution, and the influence of cultural factors on population structure.

3. A discussion of the nature of this research,
including the three major objectives of this study.

4. A presentation of the general history of Greek immigration to the United States, the history of the development of the Columbus Greek community, and a brief ethnographic description of the Columbus Greek community.

5. A description of the methods and materials used in collecting and analyzing the data, and a discussion of the development of the computer program for demographic research.

6. A verbal and graphic presentation of the results of the research.

7. A discussion of the results as they relate to the potential for microevolution to have occurred in this community, and as they explicate the relationship between cultural influences and population structure. Further, the results will be compared to those of other populations and generational trends within this population will be examined.

3. A summation of the results indicating both the implications of this study and the possibilities for future research.

Summary

In this chapter, I have presented the major substantive aims of this study: to describe the demographic
characteristics of an American urban immigrant community; to determine the potential for microevolution within the population; and to examine, by inference, the ways in which cultural factors influence microevolution. The clear need for this study was demonstrated by showing the ways in which data from this study would fill gaps in the available literature. Finally, the plan of presentation of this dissertation was described.
In this chapter I will discuss two major topical areas: first, the definition of demography and a discussion of the nature of the subject; second, the rationale for using demographic theory and method in anthropology. This involves a discussion of the appropriate aims and fields of study in anthropology, how demography can be applied to the subdisciplines of anthropology, and finally, what anthropology can contribute to demographic theory.

The Nature of Demography

The term "demography" was coined by Guillard in 1855 (Cox 1970). It comes from the Greek words "demos" - the people, and "graphia" - to write. It is, then, a study of "the people" or "the population." Demography has been defined by Bogue (1969:1) as
...the statistical and mathematical study of the size, composition and spatial distribution of human populations and of changes in these aspects through the five processes of fertility, mortality, marriage, migration and social mobility.

The population structure is the age and sex distribution; the composition includes the range of sociodemographic characteristics including marital status, income, race, education, occupation, or religion; distribution refers to the spread and location of a population over a given territory (Goldscheider 1971).

Demography may be conceived in a narrow sense as "demographic analysis," which is seen by Hauser and Duncan (1959) as being confined to the study of components of population variation and change. This formulation is also synonymous with what Petersen (1975) and Kammeyer (1975) call "formal demography," defined as the gathering, collating, statistical analysis and technical presentation of population data. Thus, demography in a narrow sense is concerned with three major tasks: ascertaining the numbers, characteristics and distribution of people in a given area; determining changes in these over time; and explaining the major factors accounting for these changes (the factors being derived from one of the following three variables: fertility, mortality and migration). Here, then, one set of population characteristics are used as independent variables.
to explain variations in another set of population characteristics.

Demography in a broader sense encompasses both "demographic analysis" as described above, and also "population studies or analysis." Population analysis may be seen as the systematic study of population trends and phenomena in relation to their social setting (Petersen 1975). This perspective integrates demographic analysis with material and theories from other disciplines. Thus, depending on the problem to be researched and the background of the investigator, concepts, theories, data and methods of analysis from disciplines such as anthropology, biology, economics, history, sociology, genetics, psychology, etc. can be used in "population studies."

**Rationale for Using Demographic Theory in Anthropology**

As noted by Spuhler (1959), demography has sometimes been defined as a branch of anthropology (as in the 1955 Oxford Universal Dictionary). However, in current American practice, demography is not a branch of anthropology. In fact, until recently, the two sciences have had little connection. Except for a few scattered pieces of research, anthropologists traditionally paid only very
casual attention to population studies. However, in the past decade there has been a surge of interest in the use of demography in anthropology. Indications of the increased interest in demography among anthropologists are twofold: first, an increase in publications concerned with demographic anthropology including books (Salzano and Freire-Maia 1970; Polgar 1971, 1975; Harrison and Boyce 1972; Spooner 1972; Crawford and Workman 1973; Weiss 1973; Freire-Maia 1974; Swedlund 1975; Underwood 1975; Kaplan 1976; Swedlund and Armelagos 1976; and Zubrow 1976), review articles (Baker and Saunders 1973; Weiss 1976) and a multitude of individual reports in journals such as *Current Anthropology, American Journal of Physical Anthropology, Human Biology* and *Social Biology*. The second indication of an increased interest among anthropologists in the field of population studies has been the appointment of anthropologists to national and international councils concerned with population policies.

There are two major reasons why demographic variables should be studied in anthropology: first, to contribute to demographic or, in its broader scope, population theory. Before discussing the first of these, however, I will discuss the nature of the aims, goals and appropriate lines of investigation in anthropology.
After this discussion, it will be easier to explicate possible contributions of a demographic perspective.

Anthropology as a unified discipline is the study of the physical and cultural similarities and differences of human populations and how these conditions evolved from the interaction between biology and culture (behavior). Anthropologists hold that a biocultural orientation is necessary for an adequate understanding of human nature and human evolution. In addition, humans must be studied from a perspective that is comparative across time and space, thus historical and cross-cultural.

As Kluckhohn and Griffith (1950) have noted, the social anthropologist must familiarize himself with genetics and other aspects of human biology because if his reading and research are limited to sociology, economics, politics and the other social sciences, he ceases to be, in the strict sense, an anthropologist. Further, we should attempt to find concepts and methods that can integrate the biological with the cultural aspects of human behavior not only because this is the operational definition of anthropology, but also because human development, genetic and physiological adaptations are set within a social and cultural framework.

To understand both the behavior of humans in a cultural setting and biological variation, the unit of study
must be the population, not the individual. Human popula-
ations are structured; they are patterned with a defi-
nite form, both in the social organization and in the
physical population structure.

In discussing the social structure of a population,
I shall follow Graburn (1971) and look at it as a "map"
that places a society's individuals into categories,
thereby giving them expectations about how they will be
treated and a set of rules to guide them in their beha-
vior toward other people. Societies place people into
categories or positions according to such variables as
kinship, residence, economics, religion, politics, age,
gender and occupation. Social structure includes the
study of all these and the types of ideal and real beha-
vior that occur between these organized groups or between
persons. Social structure does not exist at an individu-
dual level; thus, the proper unit of study of the social
structure is the interacting population.

As Johnston (1966) and others have noted, the pro-
per unit of study for human evolution and variability is
also the population. This is because human evolution
and variation result from changes in gene frequencies
within a population.

The overall aim of anthropological research is to
understand and compare social and physical similarities
and differences in human populations, and how these characteristics evolve. Demography can be of use to anthropology as it contributes to the pursuance of these aims. The specific manner by which this can be accomplished will be revealed as we examine the two ways in which demography can contribute to anthropology: by contributing separately to each of the subdisciplines, and by providing concepts and methods which can be used to integrate the subdisciplines of anthropology.

Demographic Contributions to Anthropological Subdisciplines

Physical anthropologists are beginning to see demographic methods as useful tools. Most physical anthropologists today define both macro- and microevolution in terms of gene frequency changes within populations. The determinant modes of gene frequency change are mutation, natural selection, genetic drift and gene flow. As Spuhler (1959) has noted, physical anthropologists have developed an interest in demography because the forces of demographic variability (fertility, mortality, mating, migration and population size and composition) are how microevolution operates. To study microevolution empirically, these factors must be measured. This relationship will be further explicated in the chapter devoted to the
theoretical framework encompassing demography and micro-evolution.

In archeology, too, demographic information has become increasingly important. As Weiss (1973) has noted, even the most trite archeological data are structured at least in part by demographic factors. The age and sex structure of a population will be reflected, if only indirectly, in the number of points, the volume of pots, or the size of the settlement area. More abstractly, more complex archeological parameters such as length of site occupation or the prevalence of special activity sites are influenced by the demographic characteristics of the population.

Demographic variables have also been viewed as a factor in the causation of major evolutionary transformations. Population growth has been cited as an important factor related to the origins of Near Eastern agriculture. According to the Flannery-Binford Model (Wright 1971), cereal domestication in the Near East arose as a consequence of population growth in "optimal" ecological zones, which produced migrations to adjacent "marginal" zones. In these marginal zones, population pressure called for new kinds of adaptations or innovations in subsistence strategies. This model is partially an outgrowth of the work of Boserup (1965) and her
hypothesis that population pressure is a factor in intensifying means of subsistence.

The development of urbanization and state formation have also been linked to demographic variables. Carneiro (1960) has argued for a relationship between increasing population size and the level of organizational complexity. Clark (1951) has suggested that the permanence of settlement sites and conflicts between settled groups resulted from population increases and the resultant dwindling of land resources.

Linguists may also depend on demographic variables. For example, the "dialectical tribe" is one of the central concepts in Birdsell's explanation of Australian demography.

Cultural anthropologists have employed demographic factors, relating them to the social organization of the anthropological population. Of all the subdisciplines, cultural anthropology has probably had the longest history of interest in demographic factors. For example, in The Division of Labor in Society, Durkheim (1893) related the size of a population to its degree of complexity, and Pitt-Rivers (1922) discussed the relationship between sex ratio and form of marriage. Carr-Saunders (1922), however, was probably the first to compile a comprehensive cross-cultural review of the relationship between
social organization and a demographic parameter (fertility).

In cultural anthropology, demographic studies have usually focused on one of the following topics:

1. A description (sometimes including a "functional analysis") of a specific social custom that influences a demographic parameter. For example, the practices of infanticide, warfare and human sacrifice have been related to mortality; postpartum abstinence, methods of abortion and ritualized celibacy have been related to fertility, etc.

2. The relationship between the demographic parameters (fertility, mortality and migration) and social organization have been studied. For example, Lorimer (1954) concluded that societies emphasizing unilineal descent and having strong corporate kinship groups tend to generate strong cultural motives for high fertility rates.

3. Studies have related specific features of population structure, especially population size, to specific types of cultural configurations, particularly social complexity and stratification, marriage and kinship pattern, and type of political organization.

A more complete development of the relationships between cultural factors and population structure will be seen in the next chapter. However, this cursory outline
shows the various ways demography can contribute to the subdisciplines of anthropology.

**Contributions Demography Can Make to Anthropology as a Unified Discipline**

I have discussed the contribution demographic methods and perspective can make to each subdiscipline of anthropology. However, this is only a part of the potential contribution of demographic anthropology. A broader, possibly more important contribution demography can make is to serve as a vehicle for the integration of the subdisciplines of anthropology.

As previously noted, anthropology is a discipline striving for an understanding through time and space of the evolution of the human condition. It is a holistic science in that it looks at humans from both a biological and a cultural perspective. As we usually find it, however, anthropology is not practiced as a holistic discipline. Far too often, research in a subarea is conducted without regard or acknowledgement of the significance of the research to the other subdisciplines, or to how the research fits into the entire framework of the discipline.

One reason for this fragmentation, besides the technical specialization in the subdisciplines, has been that there were few unifying concepts except evolution
and culture. Further, these concepts are not easily measured, and in fact are not used by the subdisciplines in the same way. Even within the subdiscipline of cultural anthropology, there are many heated arguments on the validity of the concept of cultural evolution, and it has been only recently, as we have begun to discuss the mutually reinforcing feedback system of biocultural evolution, that the subdisciplines of anthropology seem to stand on common ground.

Demography, however, offers a unifying theme: the concept of population and the variables therein. We can examine both biological and social phenomena using a common unit: the statistical population. Furthermore, the concept of population is already prevalent and well accepted in both cultural and physical anthropology. Population structure is discretely measurable, unlike other unifying themes such as evolution and culture. Finally, if we are to understand the process of population adaptation to the environment, we need to assess the interaction between culture and biology. While this can be accomplished through a multidisciplinary study, I propose that it can also be accomplished by an individual anthropologist in a single research study.

Demographic anthropology can have its own clear and distinct place in anthropology. Its goals are to
identify, illustrate and analyze systematically and rigorously the junctures of biological and cultural processes through demographic processes. The demographic approach to anthropology argues that anthropologists cannot fully understand the nature of human society and human biological variation without a clear comprehension of the integral role played by population processes in the dynamics of social and biological life.

Physical anthropology is the study of the fundamental biological processes of human evolution and diversity. This process orientation necessitates building a unified theory relating evolutionary biology to socio-cultural behavior, with the understanding that biologically relevant aspects of human populations are reflected in demographic variables.

Anthropological Contributions to Demographic Theory

A second major reason for studying demographic anthropology is for the contribution it can make to knowledge and theory in the discipline of demography. That demography is in need of an expanded framework is not greatly in doubt. Although demographers' complex mathematical models may not always be appropriately applied to small populations, the inclusion of anthropological information in demographic theory is nevertheless
necessary if demographers are to improve their theories and generalizations.

Demography has used a limited scope and the following problems have resulted from this perspective. First, demographers tend to work with national census figures, and thus have traditionally been limited to Western societies. Most demographic models apply only to the dominant mode in a national population, and do not apply to subcultures such as immigrant groups, religious isolates, ghettos or other isolated or semi-isolated groups. Secondly, demographers tend to stop their analysis short of what other social scientists would consider complete. Demographers tend to look first to a demographic factor when making causal explanations. For example, if the number of births decreases and the number of marriages is also found to have decreased, the latter phenomenon may be taken as the cause of the former. And if the "causal" demographic factor is not found, they turn most readily to an economic explanation. Demographers are accustomed to measurement and are usually content only if measurable relationships can be found (Noonan 1972). However, this suppresses a more complete understanding of the process involved and promotes the idea that quantitative measurement (which is desirable if attainable) is the only tool for understanding human
behavior.

As Freedman (1962) notes, even when demographers look toward more social explanations for demographic factors, they look from a sociological perspective because that is the primary home base of demographers in academia. The resulting categories used to explicate the relationships between social and demographic factors may be inappropriate for anthropologists. For example, if a demographer attempts to relate fertility to social variables, he will likely categorize people on the basis of their education, occupation, urbanization or geographic area. This sociological orientation varies from the anthropological one, in which the unit of analysis is the endogamous population.

As stated, demographers tend to use data from only Western societies when they are theorizing. This is partly because the demographic data is most accurate and complete for Western societies. However, national censuses and vital registration systems, although highly valuable, leave very serious gaps in knowledge about determinants and consequences of population phenomena. As Mag (1975:29) points out,

...the familial and socio-cultural aspects of these phenomena, at all levels of industrial development, may best be understood through coordinated studies of small communities using participant observation, informal interviews, historical research, tests of cognitive and affectual dispositions, etc.
Anthropologists bring a slightly different perspective to population studies. This approach is partially the result of data from circumscribed communities, usually known intimately by the researcher. In this framework, the investigator is often able to recognize influences of fertility and fecundity of which the demographer may be less cognizant. This would be due to the fact that the data commonly used by demographers (national samples or census data) are so divorced from the social situation within which these influences have their reality (Kaplan 1976).

Further, a realistic view of population problems and dynamics requires a view of humankind in its entirety. A population theory purported to have universal application, yet based only on data from Western societies, is obviously ethnocentric and, of course, incomplete. For these reasons, demographic theory has been plagued by overgeneralizations which the introduction of anthropological data can help correct.

An obvious case of oversimplification is the "demographic transition theory," a major cornerstone in demography. This theory contends that as a nation industrializes, its mortality rate declines first, while the birth rate (through the application of the technology of birth and death control) is attenuated later. The lag in
time between the decline in rates accounts for the extraordinar­ily rapid population growth in developing nations. The stages of the demographic transition have been sum­marized by Bogue (1969) as follows:

1. The pretransitional stage: little regulation or control of either death or birth rates, with the consequence of high vital rates but almost zero growth.

2. The transitional stage: death and birth rates are in the process of being reduced; death rates are reduced first, and the population increases.

3. The posttransitional stage: both birth and death rates are low; contraceptive methods keep vital rates in balance with each other; population growth is low or approaching zero.

The idea of demographic transition is still common among demographers. Petersen (1975), for example, characterizes five types of societies ranging on a continuum from the preindustrial type with high fertility, high mortality, and highly fluctuating growth rates, to the modern Western urban economy with controlled fertility, low mortality and usually low growth rates.

Anthropologists have attacked many aspects of this traditional demographic transition theory. First, dem­ographers tend to view preindustrialized societies as "poised on the brink of extinction." But anthropological
studies of hunters and gatherers, and even of early agri-
culturalists, have shown that fertility and mortality
patterns may be quite "moderate" in preindustrial
societies and are not necessarily "high." And, as noted
by Polgar (1971), there are several lines of evidence
indicating that the voluntary regulation of family size
may well have been one of the earliest features of human
culture. Birdsell (1968) has stated that systematic in-
fanticide has been a necessary procedure for spacing
human children, presumably since the beginning of human
entry into the niche of bipedalism and lasting until the
development of advanced agriculture. Further, he esti-
mates that between 15-50% of the total number of births
may have ended in infanticide. Devereux's (1955) study
of 350 preindustrial societies further supports the
anthropological position. He found that in these
societies, abortion is a universal phenomenon and he con-
cluded that it probably has been present from at least
very early in human history.

Therefore, the common postulate of demographers
that cultural forces in preindustrial societies are all
directed to maximize births (to compensate for "very high"
mortality), is open to serious question. In fact, even
the idea of "very high" mortality is questionable based
on studies of hunting/gathering populations such as the
!Kung Bushmen and on Polgar's (1964) evidence that among hunter-gatherers and precontact agriculturalists, the mortality rate was undoubtedly lower than in preindustrialized urban societies because most contagious disease pathogens cannot survive in low density populations.

Numerous ethnographic studies have demonstrated that there is a great variation in both the fertility and the mortality levels of preindustrial societies. The fertility regulating practices of nonindustrialized societies are often ignored by demographers in their analysis of population dynamics.

Thus, modern ethnographic, paleopathological and archeological data tend to show that transition theory does not hold for all populations. In this respect, we must remember that transition theory was originally formulated to explain data from Western Europe. Anthropologists have been useful in demonstrating that these demographic characteristics are neither geographically nor temporally uniform.

Last, demographers have usually held that the human growth curve had a very slow, gradual increase until about the mid-eighteenth century. Both physical and cultural anthropologists have provided evidence that there were at least three other drastic increases in population size, one occurring with the inception of big-game
hunting, the second at the time of the toolmaking revolution, and the other at the time of the agricultural revolution. These other changes in the growth curve are frequently ignored by demographers, as they were unknown before anthropological data was provided.

Thus, anthropologists can be of great assistance to demographers in describing the prehistory and cross-cultural variability of human demography, and, therefore, greatly improving the data base from which demographers derive their theories.

Summary

In this chapter I explored the relationship between demography and anthropology. The aims of this chapter were to explicate the nature of demography, to present a rationale for using demographic theory and methods in anthropology, and to review the types of contributions a study of anthropological populations can make to demographic theory.
The general aims of this study are: (1) to infer from the demographic processes the extent of potential and operative microevolutionary forces in the Columbus Greek population; (2) to examine the influence of cultural factors on demographic variables; (3) to infer the interrelationship between cultural factors and microevolution in a single population. In this chapter, I will present a review of the literature pertinent to the first two general aims of this study.

The Relationship Between Demography and Microevolution

One of the main objectives of physical anthropology is to document and describe patterns of evolution, both on macro and micro levels. There are two major approaches to the study of human microevolution: one is to measure allelic frequency differences between populations; the other is to observe the structure of a
population through time in an attempt to determine which evolutionary mechanisms are operating. When genetics was formally introduced into anthropological methodology, it was initially used by typologists, such as Boyd (1950), who were concerned with the genetic classification of populations. This method, however, yielded little information concerning the reasons populations varied; it was not a process-oriented approach. Gradually, with the development of relatively sophisticated models by geneticists, anthropologists concerned with microevolution shifted their focus from counting and comparing gene frequency differences between populations to attempting to understand the processes and mechanisms responsible for the differences in the observed gene frequencies.

The introduction of the population genetics methods to anthropological studies on human microevolution has been approached from two different perspectives: the theoretical and the observational. The former is based on mathematical models developed by Fisher, Haldane, Wright, Crow and others. As models, they are simplifications of reality which apply perfectly only to "ideal" populations. However, as noted by Freire-Maia (1974), although the genetic theories of the process of evolution were developed for populations with ideal theoretical properties, they may also be used to interpret processes
in real populations (e.g. the Castle-Hardy-Weinberg formula assumes conditions impossible in real populations, but it has still proven to be a valuable tool in the interpretation of some microevolutionary problems).

Because the idealized conditions assumed for the theoretical models are never found in human populations, anthropologists must incorporate the second approach (the observational) in order to obtain factual data on real populations. With this data we can compare actual and expected population measures. Ultimately, this leads to the discarding of some of the simplifying assumptions in order to build more realistic models. As noted by Benoist (1973) there is a dialectical movement between theory and observation. We obtain simplified models from theoretical mathematics; we observe reality to find cases that approximate the models; then, observed data induce us to construct more elaborate theoretical models which must again be modified by reality. It is from the synthesis of the "ideal" population genetic theory and data from observed populations that allows us to understand actual processes at work in the genetic structure of human populations (Lewontin 1972).

As was discussed by Wright (1955), microevolutionary changes result from the interaction of mutation, gene flow, natural selection and genetic drift. In human
populations, the latter three concepts are not themselves easily measurable and we usually only infer their presence and strength by observing other more easily measured variables. It is to the field of demography that we turn for these discernable variables.

As previously noted, demography has been defined by Bogue (1969:1) as

...the statistical and mathematical study of the size, composition, and spatial distribution of human populations and of changes in these aspects through the five processes of fertility, mortality, marriage, migration and social mobility.

These demographic variables are the basic tools for the inference of the mechanisms of evolution. Natural selection is inferred from measures of differential fertility and mortality; gene flow from migration and marriage data; and genetic drift from migration, population size and mating patterns. In fact, evolutionary forces operate through the demographic mechanisms. Therefore, population surveys are the first step to obtain data which can then be manipulated by the theoretical tools of population genetics.

The dynamics of demographic mechanisms reveal the processes of ongoing human evolution.
Population Structure

The structure of a population is described by its age and sex composition and is the result of the interaction of a series of variables: population size, migration, births, deaths, inbreeding, sex ratios, and mating patterns. It is possible to compare populations and find them very similar in structure; however, because these similar structures could be maintained by very different vital rates, we can understand very little about the dynamics maintaining the population structure unless we determine the magnitude of the demographic mechanisms. Further, we need to determine the vital rates of a specific population before we can make inferences about microevolutionary processes operating within that population. Because an understanding of these three major groups of concepts (population structure, demographic vital rates, and microevolutionary forces) is critical to this study, we will discuss these concepts in more detail and trace the history of their use in genetic demography.

The population's composition is related to its biological factors (age and sex composition) and growth characteristics. Of these two variables, age structure is probably the single most important demographic index of population structure (Swedlund and Armelagos 1976).
Age distribution: Petersen (1975) has noted that the most important single figure summarizing a population's age structure is its median age, which divides the population into older and younger halves. Grouping the population into three categories can also be analytically significant. These categories are defined as follows:

1. dependent children: the proportion of the population under 15 years of age.
2. dependent aged: the proportion of the population aged 65 and older.
3. the active population: the proportion of the population between the ages 14 and 65; this is an estimation of the labor potential.

(Petersen 1975)

There is, at first glance, a surprising relationship between the factors influencing the age distribution in a closed population (fertility and mortality). If we closely examine the interrelationships, we find that mortality affects the age distribution in most populations much less than does fertility, and in the opposite direction from what we might originally think. The prolongation of life by the reduction of death rates has the rather surprising effect of making the population somewhat younger. This effect will now be explained: while it is true that as death rates fall, the average age at which people die is increased, the average age of a population is the average of living persons, not their average age age at death. Further, while we easily
realize that as death rates fall, the number of older people in the population increases, it is less apparent that the reduced mortality increases the number of young people as well. In fact, reduced death rates usually make a population younger because the typical improvements in health are aimed at producing the greatest increases in survivorship among the young rather than the old (Coale 1964).

Petersen (1975) has devised a measure to examine the age category most affected by a change in mortality. This is termed the Index of Aging and is equal to

\[
\text{Index of Aging} = \frac{\text{persons 65 years and over}}{\text{children 14 years and younger}} \times 100.
\]

There are other observations which explicate the relationship between demographic variables and the age structure of a population which should be mentioned to facilitate a discussion of the age structure of the Columbus Greek population.

1. Current and recent high fertility produce a younger population than would low fertility, and the converse is also true.

2. Transitory waves of unusually high or low fertility create peaks and valleys that move through the age distribution as the cohorts move through life.

3. A long period of high fertility, or a period of rising fertility, creates a section of the age
distribution that tapers rapidly with age. Conversely, a long period of low fertility or a period of falling fertility creates a relatively flat (or even rising) section of the age distribution.

4. When a cohort of unusual size reaches childbearing age, it sets up an attenuated and flattened out "echo" in the number of births.

5. The rising fraction of the aged in Western countries has not resulted from lowered death rates, but almost wholly from a long history of declining fertility (Coale 1957).

**Sex distribution:** The sex ratio is an indication of the relative numbers of males and females in a population. Three categories of sex ratios can be defined by the age of the group when the ratio is determined. Conventionally, the primary sex ratio exists at the time of fertilization; the secondary sex ratio is that of live births (sometimes including stillbirths); the tertiary sex ratio is that of a cohort at any specific given age after birth. All sex ratios are calculated by the same method:

\[
\text{Sex ratio} = \frac{\text{number of males}}{\text{number of females}} \times 100
\]

(Teitelbaum 1972).

Available evidence indicates that many more males than females are conceived. However, the actual primary
sex ratio in a population is impossible to determine accurately with present methods for obvious reasons.

The secondary sex ratio, on the other hand, lends itself quite well to empirical study. The sex of a live-born child is rarely misclassified. Several factors have been associated with variations in the sex ratio in various populations; these include maternal ABO blood groups (Flank and Buncher 1976), birth order, family size, sex of first infant, maternal age, paternal age, relative ages of parents, and stress conditions. As Teitelbaum (1972) has noted, however, the results of the multitude of studies dealing with maternal and paternal age factors have unfortunately led to little agreement as to which factors are significant. Partially, the problem is that in most studies there is insufficient data to allow the investigator to control for two or more of the suggested factors. Possible relevance of these studies will be discussed after the results from the Greek community have been presented.

Although the basis for variance in the secondary sex ratio is still in question, the fact of the variance in different human populations is not in dispute, and these ratios have been calculated for several populations. For example, Lerner and Libby (1963) report the following secondary sex ratios:
Factors contributing to tertiary sex ratios are generally much more straightforward in their determination. In general, tertiary sex ratios will result from a combination of four factors: the differences in proportion of sexes at birth, the differences in the number of immigrants of each sex, the differences in the number of deaths of the two sexes at various ages, and the number of emigrants of each sex. Obviously, in immigrant populations such as the Columbus Greek community, the tertiary sex ratio may be quite interesting to investigate.

Population pyramid: For easy visualization of the term of population composition, a population pyramid is constructed whereby males and females are divided. These two categories are then further subdivided into age groups, usually at 5 or 10 year cohorts, e.g.:

```
            30+
            70-30
            60-70
            50-60
            40-50
            30-40
            20-30
            10-20
            0-10
```

A population pyramid can be informative, especially when
the cultural patterns of the group are known because it represents the outcome of vital rates operating in previous years. For example, a broad base often designates a growing population, while a narrow base may represent the result of low fertility or high infant and child mortality (Underwood 1975).

**Vital Rates**

A population's age-sex composition is determined by two factors: the population's sex ratio at birth (secondary ratio) and the historical pattern of the vital rates of birth, death and migration.

**Births:** A livebirth is the

...complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of the pregnancy, which, after such separation, breathes or shows any other evidence of life. (Cox 1970:12)

Fetal death is death prior to the complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of the pregnancy; a stillbirth is a fetal death occurring late in the gestation period (after 23 completed weeks of gestation) (Cox 1970).

The most basic measure of the vital rate of birth is the crude birth rate, the ratio of livebirths per calendar year to the average midyear population of the same year expressed in thousands (Sutter 1963). This is only
a very rough measure, however, because the total population is not the population "at risk" for births, because it contains males and females outside the childbearing years.

More specific and informative measures of rates of birth have been developed and are termed rates of fertility.¹ A graph depicting the fertility rate curve generally shows an inverted U shape. It starts low but rises sharply in the teen years, it is highest for women in their twenties, then it declines for women past thirty until it reaches zero at menopause. Fertility rates are dependent on several factors which may be grouped as follows:

1. age of sexual maturation
2. duration of the reproductive period
3. average age at marriage (or mating)
4. length of the interval between marriage and the birth of the first and successive offspring.

Three of these factors (1, 2, and 4) have both biological and cultural components of determination. Factor 3 is essentially a cultural factor. The biological influences on factors 1, 2 and 4 will be presented here. Cultural

¹. We will use the term "fertility" or "natality" to refer to realized reproduction, and another term, "fecundity," to refer to potential reproductive capacity. This clarification is necessary because some disciplines use the terms in the completely opposite sense (Harrison and Boyce 1972b, Polgar 1971).
influences on all of the factors will be discussed in the second major section of this chapter, which deals with cultural influences on the population structure.

Numerous factors have been associated with variable age of menarche. The trend toward earlier ages of menarche have variously been attributed either to better nutrition or heterosis. The majority of evidence tends to indicate that nutritional factors are of prime significance in the age of the first menstrual period (Tanner 1973). The onset and maintenance of regular menstrual function seems to be dependent on the maintenance of a minimum weight for height; this apparently represents a critical fat storage (Frisch 1975). Other environmental factors such as altitude (Tanner 1973 and Abelson 1976), and light (Wurtman 1964) have also been shown to influence age at menarche.

The biological duration of the female reproductive cycle extends from menarche to menopause. Unless artificially induced, as with oopherectomies or total hysterectomies, the onset of menopause is not as discrete as the onset of menstruation. Women may pass through an extended transitional period of greatly decreased fecundity, usually beginning between ages 40-45. The same factors which delay the onset of menarche have also been found to precipitate the onset of menopause. Thus, for
example, a poorly nourished population would probably have a delayed period of average age of menarche and an early onset of menopause.

While childspacing may be highly culturally influenced (either by abstinence or by contraception and abortion), there is a biological parameter which gives the minimum spacing between offspring. Immediately following a birth (parturition), the mother's menstrual cycle is either absent (amenorrhea) or incomplete (anovulatory cycle) and conception is not possible. The length of this period of infecundity is largely dependent upon two factors: the mother's nutritional status (Frisch 1975) and the length of the period of lactation (the period of time the mother breastfeeds the new infant) (Cox 1970).

Fertility rates of interest in this study are:

1. General fertility rate (the ratio of livebirths in 1 year/1000 women of childbearing age)

2. Fertility ratio (the number of children aged 0-4/1000 women between 22 and 44 years)

3. Age specific fertility rate (the number of births in 1 year/1000 women of a given age cohort)

4. Total fertility rate (an estimate of the number of children a cohort of 1000 women would bear if they all went through their reproductive years exposed to the age-specific fertility rates that were in effect at a particular time; it is computed by summing the age-specific fertility rates for all cohorts and multiplying by the interval into which the ages are grouped)

(DeJong 1972)
Deaths: The crude death rate is perhaps the most commonly used measure of mortality. It is the ratio of the number of deaths in a given population within a specified year to the size of that population at midyear. As with the crude birth rate, the crude death rate is often not a very accurate indicator, in this case because mortality rates are highly affected by the age structure of the population. A young population will have a lower crude death rate than an older population even though the death rates at each age in the two populations are identical. Further, differences between two populations in their sex ratio will also affect the crude death rate because males at all ages usually have death rates somewhat higher than those for females (Heer 1968).

Because the crude death rate is an imprecise tool, age-specific mortality rates have been developed. The ages at which age-specific mortality rates are most likely to be high are indicators of how well a society is adapting to its environment. In general, the age-specific mortality curve has a U shape: high in the first year of life, decreasing rapidly in the second and third years until age 9, remaining low until middle years then increasing at a rapid rate until the older years (Bogue 1969).
Of particular interest to genetic demographers are mortality rates during the pre-reproductive years. The following have been demonstrated to be very useful measures:

1. Infant death rate:
   \[
   \text{deaths prior to 1 year of age} \times \frac{1000}{\text{number of births that year}}
   \]

2. Early childhood death rate:
   \[
   \frac{\text{deaths of ages 1-4}}{\text{number of births - deaths prior to 1 year}} \times 1000
   \]

3. Pre-reproductive death rate:
   \[
   \frac{\text{deaths prior to reproductive age (15)}}{\text{number of births in past 15 years}} \times 1000
   \]

It is life tables, however, that provide the most complete picture of mortality in a given population. Two types of tables can be constructed: (a) a "period life table," which is the most common, summarizes the age-sex-specific mortality conditions occurring in a given year, and (b) an abridged life table, which provides data for persons in age groups, usually of 5 year cohorts.

The former type assumes a cohort of fixed size at birth (usually 100,000) and provides the following data for each year of age:

1. \((qx)\) the probability of death during the year for those persons entering an exact age \(x\)

2. \((dx)\) the number of deaths occurring between exact age \(x\) and exact age \(x + 1\)
3. \((lx)\) the number of survivors to exact age \(x\)

4. \((Lx)\) the number of years of life lived by the cohort between exact age \(x\) and age \(x + 1\)

5. \((Tx)\) the total lifespan of years lived by the cohort from age \(x\) to the end of the human lifespan

6. \((c)\) the mean number of years of life remaining from age \(x\) to the end of the lifespan.

For the abridged life table, the same data are collected, except for \(qx\), \(dx\) and \(Lx\). The number counted are those affected in the designated interval group, not a one year period (Heer 1963).

**Migration:** Lee (1966) has defined migration as a change of residence from one region or place to another. When migration occurs across national boundaries it is called immigration or emigration (depending upon whether individuals are entering or leaving a specified nation); movement within national boundaries but between regions is termed "in-" or "out-migration" (Swedlund and Armelagos 1976).

Of the three basic elements determining population structure, migration varies the most from country to country, both in its importance and in the accuracy with which it is measured.

To measure the crude rate of migration, the number of total migrants during the year is divided by the mid-year population. The rate of out-migration is the number
of out-migrants divided by the midyear population of the place of origin. The rate of in-migration is the number of in-migrants divided by the midyear population of the place of destination. The net migration rate is the ratio of migrants to or from divided by the midyear population (Heer 1968).

Breeding size: We have discussed the calculation of the vital rates which will be important for our genetic analysis. However, we are not interested in calculating the vital rates for a total population living in a given area. Humans do not mate randomly, but within subdivisions or isolates, which are circumscribed by geographical, economic, religious, ethnic or other cultural barriers. Because the term "isolate" has been variously defined, we will elaborate on the development of the concept and specify how it will be considered in this study.

Morris (1971) states that the Swedish scientist Wahlund introduced the term "isolate." In 1928 he considered the case of two closely related panmictic populations which exchanged individuals across their boundaries; he termed these populations isolates.

As Dahlberg (1929) used the term, an "isolate" referred to an abstract breeding unit; it was panmictic and did not take into account differential family size. Further, he devised a method for estimating the size of
the isolate by a formula using the number of first cousin marriages occurring within a certain group:

\[(N - 1) = 2b(b - 1)/c\]

where \(N\) is the size of the isolate
\(b\) is the average number of children reaching adulthood and marrying
\(c\) is the frequency of first cousin marriage.

This formula, however, may not be used for populations in Ohio as all first cousin marriages are prohibited by law.

Roberts (1963) suggested that the term "isolate" be restricted to "...those breeding entities within a culturally homogeneous population which, by their existence, promote genetic heterogeneity among one another and homogeneity within themselves." This definition eliminates not only small isolated populations in which the breeding population is identical to the population as a whole, but also subgroups of large populations either socially or geographically defined (Freire-Maia 1974).

Benoist (1973), however, rejected Roberts' definition, especially for breeding groups in complex societies. The definition of an isolate adopted by Benoist will be utilized in this study: "Those human groups whose main characteristics are their small size and social or geographic isolation."

However, even the isolates present a population contingent much larger than the basic parameter of
interest to the genetic demographer. A more important measure than isolate size is the size of the breeding population (N). This may be calculated by the method of Glass (1952) as the number of parents who have children with ages ranging from 1 day to the mean reproductive age (usually taken to be 30). Therefore, the breeding population excludes infertile couples, celibates, persons under reproductive age and those whose children are all over 30 years. Generally, the breeding population is roughly 35% of the total population (Freire-Maia 1974).

Because of a number of factors (differential fertility, a distorted sex ratio or inbreeding) the estimate of the breeding population may be a rather biased parameter. In humans, corrections may be introduced into the estimate of breeding size to obtain an estimate of the "effective breeding size." Morris (1971) notes that the effective breeding size (N_e) is the breeding size (N) reduced so that the remaining number is equivalent to the number of individuals in the ideal population.\(^2\)

The correction for differential fertility is the one chiefly used for humans because fertility differentials are usually the most important factor in reducing

\(^2\) In the "ideal population's" gene pool, a "random gamete has an equal probability of having come from any parent (all of whom are unrelated) and of mating with any other gamete."
the effective breeding size. Using this correction, the effective size of the breeding population is the number of reproducing adults/generation weighted for their contribution to the next generation. It was initially calculated by Wright (1938) as

$$N_e = \frac{4N - 2}{\sqrt{k + 2}}$$

where $N_e$ is the effective breeding population size,

$N$ is the number of parents in the population,

$\sqrt{k}$ is the variance in number of gametes contributed to the next generation.

Wright (1938) has also determined other correction factors:

1. for unequal number of sexes:

$$N_e = \frac{4NfNm}{Nf + Nm}$$

where $Nf$ is the number of breeding females,

$Nm$ is the number of breeding males,

$Nf + Nm = N$ (the breeding population).

2. for inbred populations:

$$N_e = \frac{N}{1 + F}$$

where $F$ is the inbreeding coefficient (Morris 1971).

However, these latter two corrections need only be made if the inequality in number of sexes or the magnitude of inbreeding is extreme.

Population growth: The biological fitness of an individual or a population is measured by its relative contribution of viable, fertile offspring to the next
generation. The actual achieved reproductivity of a population is a balance between loss by death and infertility and gain by birth. Biological fitness is measured by the rate of increase or decrease in the total size of the population by a quantity \( r \) called the intrinsic rate of increase. This rate \( r \) is calculated from age-specific birth and death rates and was first used to describe population fitness by Fisher (1930) who called it the Malthusian parameter.

The inherent capacity for population growth is referred to as the "biotic potential" and refers to the theoretical maximum rate of growth which a population might achieve if optimum conditions prevail. If a population occupied an ideal environment within which reproductive performance could be maximized, it would be possible to attain the maximum rate of increase \( r_{\text{max}} \). This theoretical maximum is rarely realized, however, and usually is present only for brief periods in the early stages of colonization. The highest intrinsic rate of increase of any human population has been recorded among the Hutterites, where a ratio of 10.4 livebirths was reported for women past reproductive age (Underwood 1975).

Over long periods of time, birth and death rates in a closed population tend to attain a state of equilibrium so that there are only minor fluctuations around a
relatively stable equilibrium level. The equilibrium point (where the growth rate stabilizes at zero) is designated as the carrying capacity of the environment (Underwood 1975).

There are two corollary concepts related to population growth which are fundamental to an understanding of population dynamics. These are the concepts of stationary and stable populations. In the former, there is no growth or decline in population numbers: birth rates equal death rates, and migration rate is zero. In the latter, there is an increase or decrease in population numbers at a constant rate: birth rate does not equal death rate, but their rates remain constant (Cavalli-Sforza and Bodmer 1971).

Lotka (1925) first proposed the idea of a "stable" population. He discovered that in a population closed to migration and with constant age-specific rates of birth and death, the age distribution of a population would approach a final distribution, with the total size growing ultimately at a fixed rate (r).

Among anthropologists, only Roberts (1963) has used the intrinsic rate of increase to measure the biological fitness of a population. He studied the population on Tristan de Cunha and calculated the intrinsic rate of increase from the fertility and mortality history of
cohorts. He found that the fertility of the founder group was the highest of all cohorts.

Cavalli-Sforza and Bodmer (1971) have shown that the intrinsic rate of increase can be obtained as the solution of Lotka's fundamental equation

$$\sum_{x=0}^{m} e^{-rx} l_x b_x = 1$$

where $x$ measures time in units of 1 or more years
- $l_x$ is the probability of survival from birth to age $x$
- $b_x$ is the age-specific birth rate (which is the number of births to individuals in the age group $x$ to $x + 1$.

(See Appendix B)

The calculation of $r$ is usually done in terms of the females:

$$r = \frac{\log_e R_0}{T}$$

where $R_0$ is the net reproductive rate (a measure of the rate of increase of the population per generation)
- $T$ is the length of a generation in years.

**Forces of Microevolution**

**Genetic drift:** Genetic drift results from random fluctuations in gene frequencies between generations as a consequence of sampling error. Meiosis and fertilization are the biological basis of random drift in gene frequencies. The two alleles which occupy each autosomal locus in the fertilized egg are a sample of the four genes at
that locus in the two parents. In small populations, gene frequencies have a high probability of generational fluctuation because of this sampling process. In small populations, the magnitude, but not the direction, of change is determinate. As Wright (1950) noted, genetic drift will only occur as a relevant evolutionary force when a population has a small effective size \((N_e)\). This small \(N_e\) may result from any of the following: (a) at the inception of the group (founder effect), (b) at any given moment from a nonselective disaster (bottleneck effect), (c) at regular intervals along time (in insects as a result of seasonal variations in climate), or (d) constantly.

The anthropological study of genetic drift has involved a number of human populations. Glass (1956) studied the Dunkers in Pennsylvania and attributed genetic variation between a migrant population and their European parental population to the effects of genetic drift. Giles (1966) attributed gene frequency differences between two New Guinea highland populations who had split off from the parental population to genetic drift (particularly founder effect). Roberts (1967) found that both founder effect and inbreeding contributed to variation in the genetic structure of Tristan de Cunha. Cavalli-Sforza (1967) compared small Italian peasant
villages which had experienced no major immigration since the 7th century B.C. and concluded that genetic drift can dramatically affect microevolution in small populations over a short period of time. In larger peasant villages, however, gene flow is great enough that the effects of drift are usually of little consequence (Freire-Maia 1974).

There are two primary methods used to calculate genetic drift. First, according to Wright (1940), random drift in a population may be calculated as

$$\Delta^2 dq = \frac{q(1-q)}{2N_e}$$

where $\Delta^2 dq$ is the variance resulting from drift,
$q$ is the gene frequency,
$N_e$ is the effective population size.

In successive generations, the variance is compounded, so that in generation "g" the variance $(\Delta^2 q)_g$ is

$$q(1-q) 1 - (1 - \frac{1}{2} N_e) g$$

(Wright 1942).

Second, Lasker and Kaplan (1964) devised a measure for estimating the potential occurrence of genetic drift. This measure, the coefficient of breeding isolation, is calculated by multiplying the effective size of the breeding population ($N_e$) by the effective immigration rate. The smaller this index of isolation, the greater the likelihood that random genetic drift has been a
relevant microevolutionary force in that population. According to Roberts (1956), coefficients of isolation higher than 50 correspond to populations where the effects of random drift are slight; coefficients below 5 imply significant microdifferentiation from genetic drift; coefficients lower than 0.5 characterize populations under a very strong action of genetic drift.

Inbreeding: For the population geneticist, consanguinity refers to a relationship between two individuals sharing one or more common biological ancestors. Inbreeding is a genetic consequence of consanguinous matings. Inbreeding is a departure from random mating; its main genetic consequence is to increase the proportion of homozygotes in a population. Thus, through inbreeding, rare recessive genes are phenotypically more apparent.

In 1913 Pearl expressed a need for a coefficient by which the geneticist could quantify the degree of inbreeding (Reid 1973). Two major formulations of an inbreeding coefficient were subsequently proposed.

First, Wright (1921) defined an inbreeding coefficient \( F \) as the genetic correlation between gametes at fertilization. This correlation could be caused by biological kinship of the parents, by various types of assortative mating, or by mating "within local races."
The second inbreeding coefficient \((f)\) was developed by Haldane and Moshinsky (1939) and Malecot (1948) and is based on probabilities rather than correlations. In this case, the inbreeding coefficient is the probability that genes at a given homologous locus in uniting gametes are identical by descent (they were copied from a single gene carried by a common ancestor). This approach, unlike Wright's, limits the problem to parental consanguinity.

The method of ascertainment of inbreeding coefficients for a whole population will depend upon whose definition \((F\) or \(f)\) we wish to use in our measurement. For Wright's correlation, the most common method used is bioassay. This technique has been developed by Morton and Yasuda (1962) and Yasuda (1963) and uses the "method of maximum likelihood" to find the inbreeding coefficient and allele frequencies with the highest probability of producing the observed data. This method of estimation involves the use of derivatives of log functions and an understanding of the procedure requires an understanding of differential calculus (Reid 1973).

There are two primary methods for calculating the inbreeding coefficient for whole populations when using the "\(f\)" model. The first, determined by Malecot (1948) is based on pedigree studies. Here, the individual
inbreeding coefficient \((F)^3\) is calculated for each member of the population. Then the population coefficient of inbreeding \((f)\) is the arithmetic mean of the individual inbreeding coefficients:

\[
f = F = \frac{\Sigma F}{N}
\]

The second method was developed by Crow and Monge (1965) and is called the method of isonymy. This approach estimates total population inbreeding coefficients by measuring the frequency of marriages between persons of identical surnames. This approach assumes that spouses are chosen without regard to surnames. Any increase over the randomly expected frequency of isonymous marriages is viewed to result from consanguinous marriages. The observed value of the proportion of isonymous unions is divided by 4 to give the inbreeding value of the population.

Reid (1973) finds no record of a human population in which the inbreeding coefficient is greater than 0.05, and most human populations have inbreeding coefficients below 0.005. Spuhler (1975) notes that because inbreeding coefficients are sufficiently small in most human populations some workers ignore them completely when dealing with problems of genetic dynamics of human

---

3. This is not the same as Wright's "\(F\)."
populations. Sometimes, however, inbreeding effects become very apparent if deleterious rare recessives exist in the population, or if inbreeding depression can be detected.

**Gene flow:** Gene flow results from migration and interbreeding with the result that there is an exchange of genes between two initially different populations. Gene flow leads to an increase in the genetic variability within populations and a decrease in the genetic variability between populations. Gene flow thus tends to make populations more alike as opposed to drift, which has a diversifying effect. Maruyama (1970) gives the rate of decay of heterozygosity as

\[
\frac{m\pi^2}{2N^2}
\]

where \(m\) is the rate of migration between adjacent isolates

\(N\) is the number of isolates.

Migration with inbreeding also allows mutants arising in one population to be exposed to new genetic combinations in many different environments. In this way, gene flow acts to increase the adaptive potential of the species, just as segregation and recombination provide new opportunities for adaptive combinations of genes within a population.
Several anthropological investigators have studied gene flow. Baker and Saunders (1972) have summarized these studies and conclude the following. Hunting and gathering populations have high rates of gene flow encouraged by social mechanisms stimulating outbreeding (e.g. the incest taboo). Tribal groups in South America also have high rates of gene flow, but the operative social influences are different. With the South American Indians, organized warfare causes gene flow of a different geographical nature than that of the hunters and gatherers. Among peasant groups, new factors such as social class become important in the pattern of gene flow.

There are two methods for the determination of gene flow. The first is a direct method utilizing genealogical records with birthplaces of spouses recorded. Here gene flow into a population is measured by

\[ \frac{\text{number of immigrant spouses}}{\text{number of local born spouses}} \]

The second method utilizes gene frequency differences between populations. Here, migrants from two distinct parental populations \( (P_1 \text{ and } P_2) \) are present in proportions \( m \) and \( 1 - m \). When they establish a hybrid population \( (H) \), then

\[ m = \frac{q_H - q_2}{q_1 - q_2} \]
where $q_H$ is the average gene frequency of all migrants, and when we have a gene "A" whose frequencies in $F_1$ and $F_2$ are $q_1$ and $q_2$ respectively (Workman 1973).

Natural selection: Natural selection is the evolutionary process through which gene frequencies are changed in a population as the result of differences between individuals in Darwinian fitness. It occurs through differential transmission of genes from individuals to the succeeding generation. This variance in transmission may result either from differential fertility or differential mortality.

Historically, the opportunities for natural selection appear to have varied during human evolution. Underwood (1975) holds that during the majority of the preindustrial period of human evolution, differential mortality was the major selective agent; in industrialized nations where prereproductive mortality is very low, differential fertility is the major selective agent. Further, Kirk (1963) has determined that, at least for the United States, the opportunity for natural selection has been decreasing over the past few generations. He concludes that this trend is the result of demographic changes in urban populations such as decreasing birth rate, and a decreasing variance in the number of offspring produced by women.
While it is difficult to measure actual selection, it is possible to estimate the opportunity for it. Crow (1953) devised a measure of the maximum amount of differential fertility and mortality in a population called the Index of Total Selection.

The calculations of Crow's Index requires that all females be counted at a single time (birth), so that both survivors along with those who failed to survive to their reproductive years are included in the sample.

The index of selection potential from mortality is

\[ I_m = \frac{p_d}{p_s} \]

where \( p_d \) is the probability of death prior to reproductive years
\( p_s \) is the probability of surviving from birth to reproductive age.

The component from differential fertility is calculated as

\[ I_f = \frac{S_f^2}{\overline{X_s}^2} \]

where \( S_f^2 \) is the variance of the offspring of the survivors
\( \overline{X_s}^2 \) is the square of the mean.

The Index of Total Selection \( (I) \) then becomes

\[ I = I_m + \left( \frac{1}{p_s} \right) I_f \]

This index is not an accurate measure of actual selection, but provides an estimate of the upper limit of that rate.
of change from natural selection in a population and it indicates which variable (differential fertility or mortality) has probably been the most affected.

The Significance of Cultural Factors to Population Studies

Cultural, as well as biological, factors shape population structure. Each of these forces (fertility, mortality and migration) and some of their social modifiers have been discussed in anthropological literature. However, the degree of attention and the sophistication of analysis certainly has not been equivalent among the three forces. Studies of the influence of cultural factors on the force of fertility have been much more prominent in the anthropological literature than have studies investigating the effect of social forces on mortality or migration. As Nag (1976) has noted, "...their focus is almost entirely on fertility and kinship." In fact, in the most recent anthropological book on the relationship between social organization and population structure (Nag 1976), eleven articles deal with the relationship between cultural factors and fertility, none deal with the relationship between cultural forces and mortality, and only two are concerned with cultural influences on migration. In these two migration studies,
one deals with the influence of migration on fertility and the other totally omits the influence of migration on population structure. This is an example of the fact that the factors of mortality and migration have not been systematically organized, and the framework for analysis of these factors is in a more embryonic stage of development.

In this section on the theoretical foundation of the present study, I will present an analytical framework for cultural influences only as they relate to fertility. The theoretical foundation of the cultural influences on migration and mortality will be discussed primarily in terms of the deficiencies of extant studies for the purpose of this research.

Cultural Factors Influencing Fertility

Sporadic accounts of cultural influences on fertility can be found in nineteenth century ethnographies. Carr-Saunders (1922), however, was the first to attempt a cross-cultural review focusing on the relationship between cultural factors and fertility. After presenting a rather extensive review of anthropological literature on societies at different technological levels in all parts of the world, he concluded that the evolution of human culture brought a universal tendency toward the
maintenance of an "optimum population" appropriate to the resources of each area and the level of economic technology of its occupants. He noted that population growth is limited by practices such as prolonged lactation and prepubertal intercourse. He also found that every "primitive race" uses abstinence, abortion and infanticide either singly or in combination to control population size. Because his data were drawn from the fragmentary and highly ethnocentric studies of the nineteenth century ethnographers, his study is not considered reliable today.

Several years later, Ford (1945, 1952) completed a second cross-cultural study of human reproduction. Using the Human Relations Area Files' data on 200 societies, he concluded that fertility is an acquired motive reinforced by social rewards and punishments. He also found that there is a universal concern with female infertility and that abortion and infanticide are universal in primitive societies.

In an early interdisciplinary study sponsored by UNESCO, an anthropologist (Raymond Firth), a demographer (Frank Notestein) and others investigated the relationship between cultural variables and fertility. Lorimer (1954), who was responsible for compiling the final report, concluded the following:
1. There is a relationship between polygyny and the lactation taboo.

2. Postpartum abstinence is not chiefly an expression of individual preference, but is culturally prescribed.

3. Postpartum abstinence is entirely congruous with a strong cultural emphasis on high fertility.

4. Social disorganization and religious attitudes promote or inhibit high levels of fertility.

5. Corporate kinship groups provide powerful motivation for high fertility and these kinship groups tend to be formed in societies with a strong emphasis on unilineal descent.

6. In societies emphasizing unilineal descent and corporate kinship groups, children are valued because they insure the continuance of the lineage.

The studies discussed above provided generalizations on the influence of cultural factors on fertility. However, none of them provided an analytical tool for the comparative study of fertility. In 1956, Davis and Blake set forth such an analytical framework in an article on social structure and fertility. They first presented a classification of the intermediate variables through which any social factors influencing the level of fertility must operate. They then discussed in broad outline how some types and elements of social organization, acting through these variables, appear to enhance or depress fertility. Their framework is structured by the three necessary steps generally recognized to be
necessary for reproduction:

I. Factors affecting exposure to intercourse ("Intercourse variables")
   A. Variables governing the formation and dissolution of unions in the reproductive period
      1. Age of entry into sexual unions
      2. Extent of permanent celibacy
      3. Amount of reproductive period spent after or between unions
         a. When unions are broken by divorce, separation or desertion
         b. When unions are broken by death of the husband
   B. Variables governing the exposure to intercourse within unions
      4. Voluntary abstinence
      5. Involuntary abstinence (from impotence, illness, unavoidable but temporary separations)
      6. Coital frequency (excluding periods of abstinence)

II. Factors affecting exposure to conception ("Conception variables")
   7. Fecundity or infecundity as affected by involuntary causes
   8. Use or non-use of contraception
      a. By mechanical or chemical means
      b. By other means (rhythm, withdrawal, etc.)
   9. Fecundity or infecundity as affected by voluntary causes (sterilization, sub- incision, medical treatment, etc.)

III. Factors affecting gestation and successful parturition ("Gestation variables")
   10. Fetal mortality from involuntary causes
   11. Fetal mortality from voluntary causes

In this framework, all of the variables are considered to be present in every society, either in a positive, negative or neutral way.
Davis and Blake noted that societies differing in their social organization do not necessarily have different fertility values with respect to all of the variables. Different cultures may exhibit similar values on some variables (for example, some nomadic tribes and settled agrarian villages may have the same age at marriage; and a "primitive" group may practice the same rate of abortion as an industrialized society). However, they concluded that two contrasting societies are not likely to manifest similar values for all the variables (even when their general fertility rates are nearly equal.

In 1962 Nag drew data from a core of 61 societies and concluded the following in terms of Davis and Blake's intermediate variables:

1. **Age of entry into sexual unions:** Late age at first marriage in women causes a reduction in the fertility levels of some Western societies; however, the data did not demonstrate a general significant negative association between the age of women at marriage and the fertility level. (Note: Nag only dealt with the age at marriage of women because the reproductive span of men is longer than that of women and the fertility measures used were based on the reproductivity of women. He did discuss, however, the possibility that a large discrepancy between the ages of the husband and wife could affect the wife's reproductive performance.) The effect of premenarcheal sexual relations on fertility is not clearly known.

2. **Extent of permanent celibacy:** There is very little quantitative data on the celibacy or permanent nonmarriage of women in the selected societies; the extent data indicated that there is generally very little loss of fertility associated with celibacy in the selected societies.
3. **Amount of reproductive period spent after or between unions:** There is a tendency toward a negative association between the frequency of separation or divorce and the fertility level, but this trend was not borne out by a test of significance. There are a few societies (e.g. Jamaica) in which instability of marriage is considered to be a major factor responsible for the reduction of fertility. There is a significant positive association between the frequency of separation and the incidence of sterility. Postwidowhood celibacy does not have a general negative effect on the fertility level of the selected societies.

4. **Voluntary abstinence:** There is a significant negative association between the period of postpartum abstinence and fertility level. Two intervening variables were associated with this factor: that the period of lactation tends to prolong the interval between pregnancies, and the extent of polygyny may affect the length of the postpartum abstinence period. Coitus is avoided with a menstruating woman in almost all societies. However, this does not seem to be of any general significance in explaining variance in fertility because a woman is not fecund during her menstrual period. In some societies, restrictions on coitus may be in connection with special occasions such as ceremonies, economic undertakings, war, etc. While these may significantly affect fertility in some societies, a generalization is not possible from the available data.

5. **Involuntary abstinence:** The temporary absence of married and marriageable men from their homes is a common phenomenon in some nonindustrialized societies. While this may be the most important factor affecting the fertility in some societies (e.g. Purau), there is not enough evidence to comment on its general importance for fertility levels of nonindustrialized societies. (Note: Nag did not consider other factors associated with involuntary abstinence.)

6. **Coital frequency:** Fertility may be affected negatively if this frequency is either too low or too high. However, the data were inadequate for
testing an association between frequency of coitus and fertility.

7. Fecundity or infecundity as affected by involuntary causes: The data for the selected societies were not adequate for evaluating the effects on fertility of age at menarche, the period of adolescent sterility, and age at menopause. There are contradictory results regarding the effect of climate on age at menarche. The effect of diet is more clear: a high protein diet seems to accelerate the onset of menarche.

8. Use or non-use of contraception: Coitus interruptus is the most widely used method of contraception in the societies selected, but it was generally practiced to avoid pregnancy during the postpartum period or to avoid premarital pregnancy.

9. Sterilization: In many societies drugs (herbs) are used to induce at least temporary sterility. This practice does not have a significant association with fertility.

10. Fetal mortality from involuntary causes: The data regarding the frequency of miscarriage and stillbirth available for the societies are not reliable.

11. Fetal mortality from voluntary causes: In at least one society (Yapese), the practice of voluntary abortion seemed to be mainly responsible for the low fertility level. In comparing his data to that of Western societies, Nag indicated that abortion is generally practiced more frequently among industrialized societies. Among Western societies it is practiced mostly as a measure of birth control, while in nonindustrial societies it is practiced primarily to terminate premarital pregnancies.

Nag has continued his interest in the study of cultural influences on fertility. Recently (1975), he investigated the effects of four aspects of marriage and kinship institutions on fertility through their influence on the intermediate variables of Davis and Blake. These
four aspects were the form of marriage, type of union, family type and corporate descent group. Again, Nag focused upon nonindustrialized societies in which modern contraceptives are not widely used. In this study he concluded the following:

1. **Relation of form of marriage to fertility:**
Societies in which polyandry is an ideal or approved form of marriage are rare in the contemporary world. In the two examined, there was no significant difference between the fertility levels of polyandrously married and nonpolyandrously married women.

The results of studies relating polygyny and fertility are often contradictory and inconclusive. However, well designed studies tend to indicate that polygynously married women have lower fertility than monogamously married women.

The mechanism by which polygyny can reduce fertility is not well understood.

2. **Relation of types of unions and fertility:**
Of three types of unions examined in various societies, there is general agreement that the visiting type of union is generally associated with lowest fertility, common law unions are intermediate, and legal unions are generally associated with the highest fertility.

3. **Relationship of family type and fertility:**
Contrary to prominent but generally untested hypotheses, the cumulative fertility of women living in extended families is somewhat lower than that of women living in nuclear families.

4. **Relation of corporate descent groups and fertility:**
There is no statistical evidence that societies emphasizing unilineal corporate descent groups generate stronger cultural motives for high fertility.
Cultural Factors Influencing Migration

Cultural anthropologists have recently experienced a dramatic increase of interest in migration as noted in the review article by Graves and Graves (1974). The majority of these studies have dealt with rural to urban migration. Common areas of investigation are the adaptive strategies used by the migrant, the psychological variables of the migrant, and "push and pull" factors for migration. When migration is considered as a selective process, Graves and Graves note that it has become something of a cliché to find that migrants will be disproportionately drawn from those segments of the population which occupy the least favored structural positions.

For the present study, however, we are interested in migration as it relates to the population structure. In order to determine this, we must know the age and sex composition of the migrants. The cultural factors of importance, then, are those which differentially select for age and sex. Cultural anthropologists have not considered this topic thoroughly. Occasionally, references will be made to differential sexual selection for migration (e.g. Herskovits 1963 for Africa in general; Otterbein 1965 for the Caribbean in general); however, quantitative data is lacking. Further, information concerning age distribution of migrants is also almost
totally lacking.

Turning to sociology does not improve the situation. Petersen (1975) makes the generalization that "...migrants are usually young," and that "...one sex usually predominates." While he noted that the sex which predominates will depend on the social factors, these "social factors" have yet to be systematically examined. Thus, previous studies examining cultural factors influencing age and sex composition of migrants have not been performed.

Cultural Factors Influencing Mortality

There are a vast number of studies in cultural anthropology which discuss mortality. These investigations come from the topical areas of political anthropology (e.g. war), psychological anthropology (e.g. suicide, anorexia nervosa), ecological anthropology (starvation, freezing, infanticide), and especially medical anthropology. However, an analytical framework such as that proposed by Davis and Blake for fertility has not been presented for mortality. A possible analytical framework will be examined in the section on implications for future study. Because the level of mortality in the population discussed in this study is so low, this topic will not be discussed further here.
Summary

Drawing together conceptual tools from the disciplines of anthropology, demography, genetics and biology, I have formulated the theoretical framework used in this study. The theoretical background just reviewed indicates that population structure and vital rates can be useful to physical anthropologists concerned with determining patterns and potentials for microevolution. In addition, I have shown how cultural factors may significantly influence the rates of the vital processes.
CHAPTER IV

THE GREEK COMMUNITY

History of Greek Immigration into the United States

Factors Promoting Emigration

The first settlement of Greeks in the United States dates from 1735 when a Scottish physician, Dr. Andrew Turnbull, founded the Greek Colony of New Snyrna, Florida. The colony did not survive long, even though more than two hundred Greeks had been initially recruited. Most of the settlers died from malaria or in skirmishes with the Indians (Polites 1945).

A second small scale migration dates to the time of the Greek War of Independence (1821-1829) when American missionaries brought over a number of young boys chiefly from the island of Chios. These youths were educated at Amherst, but they did not form a permanent settlement; most returned to Greece after their education was completed (Polites 1945).
Major Greek immigration to the United States was chiefly a product of the late nineteenth and early twentieth centuries. During this period, migration depleted the population of Greece by about one fifth. The most prominent factors accounting for this mass exodus were economic hardship, relative overpopulation, communication, and political oppression.

Economic factors: Nearly all persons who have studied Greek emigration conclude that the primary impetus promoting migration was the search for improved economic conditions. The bulk of early Greek immigrants came from the Peloponnesus, chiefly the rocky, mountainous regions of Arcadia and Laconia. In 1891 and 1899 severe economic crises resulted from the nearly complete failure of the currant crop in that area (Xenides 1922).

In addition, changes in the commercial policies of France and Russia severely disturbed the Greek economy. Because its own crop was destroyed by phylloxera, France had purchased about half the Greek currant crop from 1863 to 1890. In a rising currant market, Greek farmers allowed the silk culture to decline and many destroyed their olive orchards to allow more ground for planting vines. However, when the French developed an insect resistant vine, they no longer needed to import Greek currants. When the French vineyards were replanted and
their yield increased, France enacted a protective tariff that literally legislated Greek currants out of the market. Russia adopted a similar policy. The resultant sharp decline in the demand for Greek currants forced severe economic hardships on the Greek farmers (Fairchild 1922).

Several other factors contributed to the economic problems of the Greek peasant. The government imposed heavy taxation on the populus to support continuous territorial disputes with Turkey. In addition, the Great Powers imposed a trade blockade (1837-1891) on Greece for engaging in hostilities with Turkey (Vlachos 1964). Finally, the necessity of supplying a dowry for the unmarried females in the family prompted fathers and brothers to migrate in order to send back money.

Population pressures: After 400 years of Turkish domination, the Greeks achieved independence in 1830. At this time, however, only a small portion of the Greek territory was freed: the Peloponnesus and the mainland of Greece south of Thessaly. Persons in other areas which remained under Turkish rule existed in a chronic state of political unrest and a series of uprisings among the Greeks drove groups of refugees into the independent areas of Greece, especially from Crete and Macedonia. Thessaly was united with Greece in 1832, and the
emancipation of other adjacent areas from Turkish rule was achieved as a result of the Balkan War (1912-13). The exchange of populations under the Treaty of Lausanne in 1923 introduced more than 1,000,000 refugees from Asia Minor, Eastern Thrace and Southern Bulgaria; this increased the population by 23%. Thus, while the geographical area of Greece increased about threefold, the population increased over sevenfold (Valaoras 1960). Given the nature of the Greek soil (about 30% nonarable land), this influx resulted in an overpopulation of the available farm land.

Political and religious factors: Greeks emigrating from the Ottoman empire often left for political and religious rather than economic reasons. The constant political uprising in areas under Turkish rule resulted in continuous friction between Turkish and Greek peasants. In addition, fear of conscription into the Turkish army was a factor promoting migration. Prior to 1903, Greeks residing in the Ottoman Empire were exempt from military duty. However, the new Turkish constitution of 1903 required Greeks residing within the Turkish empire to render military service to Turkey (Saloutos 1964). Some citizens of Greece also left their homeland to avoid the compulsory two year military service, especially in the period just prior to 1912.
Communication: Vlachos (1964) suggests that another motivating factor for emigration was the extensive advertisement of the United States by the steamship agents who regularly canvassed the rural districts in search of prospective passengers. These men placed posters in the coffeehouses and told exaggerated tales of the ease of acquiring wealth in the United States.

The constant stream of letters sent back to Greece by the first immigrants to the United States furthered this glamorous advertising. In addition, money sent back to Greece by the immigrants in the United States appeared to be great wealth to the poverty stricken peasants in Greece. Each Greek in America became the nucleus of a rapidly increasing group of his own kin or neighbors (Fairchild 1922).

Pattern of Greek Immigration

Even though Greeks came to the United States earlier in the country's history, the records of the Commissioner General of Immigration make no reference to them until 1924, when one is listed. In 1848 another immigrant arrived, and in 1850, two more. After 1830 the pattern changed; more than 100 arrived during 1882. In 1891 more than 1000 arrived for the first time. Immigration was most intense between 1905 and 1915. The peak
year was 1907 when 36,580 Greek immigrants were recorded.

The immigration rate was considerably decreased in 1921 when Congress passed an immigration law limiting the number of immigrants to the United States to 3% of the people from any given country as shown by the census of 1910. In a second law passed in 1924, the quota was reduced from 3% to 2% and the base population was changed from the 1910 to the 1390 census. These acts were deliberately meant to limit immigration from Southern and Eastern Europe. However, the national quota system was finally abandoned in the Immigration Act of 1965 which went into effect in 1963, and there has been an increase in immigration from Greece since that time (Saloutos 1964, Vlachos 1964 and Petersen 1975). Figure 1 depicts yearly Greek immigration to the United States.

The pattern of settlement in the United States seems to have been established by the turn of the century. Nearly always, the Greek immigrant settled in an urban area. The most prominent sites of settlement were the Eastern seaboard (New York City, Boston and Lowell) and the cities of the North Central United States (Chicago, Detroit and Cleveland) (Vlachos 1964).
Figure 1. -- Greek immigration to the United States: 1880-1960.  
(Adapted from Vlachos 1964)
Historical and Cultural Characteristics of the Columbus Greek Community

Geographical Distribution

The first Greek settler in Franklin County arrived in 1893; by 1900 he had been followed by at least 13 other Greek immigrants. This number increased over 1000% in the next decade. In the first part of this century, the majority of Greek settlers lived in the area around Front, Neil, Mound, Gay and Gift Streets, or what we might call the center and near-north side of Columbus. Since that time the members of the Greek community have moved away from that central location and they are now geographically dispersed over the entire greater Columbus metropolitan area. Figure 2 depicts the present geographical distribution of the members of the Greek community.

Education

In Greece, higher education has always been highly valued and given status worthy of sacrifice. Lee (1953) noted that education is perhaps the most prized good in Greece. This emphasis on education was brought by Greek immigrants in general (Vlachos 1964) and also can be seen in the Columbus Greek population. The Columbus Greeks
Figure 2 — Present geographical distribution of the Columbus Greek community.

Key:
1 - Worthington
2 - Upper Arlington
3 - Gahanna
4 - Grandview Heights
5 - Reynoldsburg
6 - Whitehall
7 - Bexley
8 - Grove City
9 - Obetz
whom I interviewed strongly supported education for several reasons. First, they prize knowledge as it relates to classical Greek history. More significant socially, they also value education as a means to higher economic status. In reporting which values they wished to give to their children, Greek-American parents ranked highly the one in which the child would value education. Numerous families related family histories in which material sacrifices were made so that all children would have the opportunity to attend college. Even more frequently, parents reported limiting the size of their families to a number that they could adequately care for and educate.

Although the majority of early Greek settlers were of the peasant class and usually illiterate when they arrived, they valued education. In most cases, parents attempted to provide a college education for their children. Tables 1 and 2 depict the highest level of education attained by males and females respectively by decade of birth for the Columbus Greek population. It can be seen that the Greek immigrants were successful in their goal to educate their children. A steadily rising percentage of offspring have attended college or professional school. For males born in the decade 1951-1960, only 6.3% have not at some time attended college. The trend
Table 1 -- Educational trends for males.

<table>
<thead>
<tr>
<th>DECADE OF BIRTH</th>
<th>HIGHEST LEVEL OF EDUCATION ATTAINED*</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1871-1880</td>
<td></td>
<td>84.6</td>
<td>15.4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>1881-1890</td>
<td></td>
<td>73.1</td>
<td>15.4</td>
<td>11.5</td>
<td>3.8</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>26</td>
</tr>
<tr>
<td>1891-1900</td>
<td></td>
<td>83.9</td>
<td>3.2</td>
<td>12.9</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3.2</td>
<td>31</td>
</tr>
<tr>
<td>1901-1910</td>
<td></td>
<td>45.5</td>
<td>13.2</td>
<td>9.1</td>
<td>9.1</td>
<td>18.2</td>
<td>0</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>1911-1920</td>
<td></td>
<td>11.4</td>
<td>11.4</td>
<td>20.0</td>
<td>34.3</td>
<td>11.4</td>
<td>2.9</td>
<td>8.6</td>
<td>35</td>
</tr>
<tr>
<td>1921-1930</td>
<td></td>
<td>0</td>
<td>6.1</td>
<td>16.3</td>
<td>16.3</td>
<td>38.8</td>
<td>0</td>
<td>26.5</td>
<td>49</td>
</tr>
<tr>
<td>1931-1940</td>
<td></td>
<td>8.0</td>
<td>4.0</td>
<td>6.0</td>
<td>10.0</td>
<td>38.0</td>
<td>4.0</td>
<td>30.0</td>
<td>50</td>
</tr>
<tr>
<td>1941-1950</td>
<td></td>
<td>0</td>
<td>12.8</td>
<td>2.3</td>
<td>23.1</td>
<td>30.8</td>
<td>2.3</td>
<td>28.2</td>
<td>39</td>
</tr>
<tr>
<td>1951-1960</td>
<td></td>
<td>0</td>
<td>0</td>
<td>5.1</td>
<td>66.1</td>
<td>25.4</td>
<td>0</td>
<td>3.4</td>
<td></td>
</tr>
<tr>
<td>1961-present</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>Education not completed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>313</td>
</tr>
</tbody>
</table>

*Key: 1 - did not complete grammar school
       2 - did not complete high school
       3 - completed high school
       4 - some college
       5 - B.A. degree
       6 - M.A. degree
       7 - Ph.D. or professional degree
Table 2 -- Educational trends for females.

<table>
<thead>
<tr>
<th>DECADE OF BIRTH</th>
<th>HIGHEST LEVEL OF EDUCATION ATTAINED*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>1871-1880</td>
<td>0%</td>
</tr>
<tr>
<td>1881-1890</td>
<td>0</td>
</tr>
<tr>
<td>1891-1900</td>
<td>75.0</td>
</tr>
<tr>
<td>1901-1910</td>
<td>70.0</td>
</tr>
<tr>
<td>1911-1920</td>
<td>32.1</td>
</tr>
<tr>
<td>1921-1930</td>
<td>5.4</td>
</tr>
<tr>
<td>1931-1940</td>
<td>0</td>
</tr>
<tr>
<td>1941-1950</td>
<td>0</td>
</tr>
<tr>
<td>1951-1960</td>
<td>0</td>
</tr>
<tr>
<td>1961-present</td>
<td>Education not completed</td>
</tr>
<tr>
<td>Total</td>
<td>18.8%</td>
</tr>
</tbody>
</table>

*Key: 1 - did not complete grammar school
       2 - did not complete high school
       3 - completed high school
       4 - some college
       5 - B.A. degree
       6 - M.A. degree
       7 - Ph.D. or professional degree
toward increased higher education is also seen in the table depicting female schooling. Although the number of females entering college and professional school is somewhat lower than for males, it is still high compared to the national average. A striking statistic is that for females born in decades since 1930, over 50% have attended college.

Another indication that education and knowledge are highly valued by the Greek population is the strong community support for Project Paideia, a fund-raising effort for a program in Modern Greek studies at Ohio State University. Because the Greek community pledged to raise $10,000 each year for four years, the university was able to initiate the Modern Greek Studies Program in Fall, 1976. Ohio State University will attempt to cover funding for the program after the initial four year period. The program in Modern Greek Studies presently includes language and literature courses, but it will eventually be a multidisciplinary program including history, culture and political science courses.

In addition to supporting higher education, the Greek-American population of Columbus has supported a Greek community school since 1920. Originally, the Greek school met for two hours most afternoons after public school and was taught by the priest. The primary
function of this school has been to teach Greek language and history. Presently, classes are taught 3-2 hours on Saturday by a lay person hired by the community.

**Occupation**

Most early immigrants came from the rural areas of Greece and, settling in an urban area, had to learn new skills and occupations. In the early years of Greek settlement in Columbus, Greek men chose occupations where their inability to speak English was not a handicap. Most became laborers, employed by the railroad.

Because Columbus does not have heavy industry, as does Cleveland or Canton, factory jobs were not readily available. In addition, Greeks have stated a definite preference for "being their own boss." For these reasons, men would start a flower, fruit or shoeshine stand as soon as possible. The success of these small businesses in the face of a fair amount of discrimination seems to stem from a very great determination to succeed. This determination was evident in nearly every interview with older members of the community as they spoke with pride of the 80 hour Greek work week.

After a man accumulated sufficient capital, he usually became the proprietor of a larger business: a restaurant, confectionary or floral shop. The speed of
their upward mobility is especially remarkable because many men sent the major portion of their earnings back to Greece.

The combined effect of this economic success and the strong value on higher education resulted in a drastic trend upward in the occupations of the Greek males. The highest occupation held, by decade of birth, is listed for males and females in Tables 3 and 4 respectively. It is apparent that the males moved rapidly first into small businesses and then to professional occupations. The percentage of laborers in the community has consistently decreased except for the recent period, which reflects the new wave of immigrants from Greece and the American born younger males who have not yet achieved their highest occupational status.

The statistics on the women of the Greek community show an interesting pattern. Although more than half have attended college, the majority do not work outside the home. This seems to reflect the very strong cultural belief that it is desirable to have the mother present when children are in the home.

Family and Kinship

Early in the century, a typical house unit consisted of four to ten unmarried males living communally.
Table 3 — Highest occupational status: males.

Key:
1 - housewife
2 - college student
3 - child
4 - teacher
5 - lawyer
6 - doctor
7 - engineer
8 - other professional
9 - restaurant owner
10 - other business
11 - restaurant worker
12 - factory worker
13 - other laborer
14 - candy maker
15 - pink collar
16 - disabled
17 - artist
Table 3 -- Highest occupational status: males.

<table>
<thead>
<tr>
<th>DECADE OF BIRTH</th>
<th>OCCUPATIONAL CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>16</td>
</tr>
<tr>
<td>1</td>
<td>0%</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>56.3</td>
</tr>
<tr>
<td>10</td>
<td>12.5</td>
</tr>
<tr>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>13</td>
<td>0</td>
</tr>
<tr>
<td>14</td>
<td>0</td>
</tr>
<tr>
<td>15</td>
<td>0</td>
</tr>
<tr>
<td>16</td>
<td>0</td>
</tr>
<tr>
<td>17</td>
<td>0</td>
</tr>
</tbody>
</table>
Table 4 -- Highest occupational status: females.

Key:  
1 - housewife  
2 - college student  
3 - child  
4 - teacher  
5 - lawyer  
6 - doctor  
7 - engineer  
8 - other professional  
9 - restaurant owner  
10 - other business  
11 - restaurant worker  
12 - factory worker  
13 - other laborer  
14 - candy maker  
15 - pink collar  
16 - disabled  
17 - artist
Table 4 — Highest occupational status: females.

<table>
<thead>
<tr>
<th>OCCUPATIONAL CODE</th>
<th>DECADE OF BIRTH</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>93.1%</td>
<td>83.3%</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>5.6</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>11</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>12</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>13</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>14</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>15</td>
<td>3.4</td>
<td>5.6</td>
</tr>
<tr>
<td>16</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>17</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td><strong>29</strong></td>
<td><strong>18</strong></td>
</tr>
</tbody>
</table>
Today, however, the typical household in the Greek community is composed of the nuclear family. The Greek-American family is intact for longer periods than typical in American society because children (especially females) frequently live with their parents until they are married. In addition to this type of family unit, 5% of the families interviewed consisted of a nuclear family with an in-law residing in the same household, and 3% consisted of a mother and an unmarried adult child living in the same residence. Other compositions were an aunt and adult nephew, a nuclear family and the husband's uncle, and two multi-family units.

In earlier generations, marriages were usually arranged by the family, pending the approval of the child involved. More frequently, spouse selection is left to the child, with the parent's approval. Marriage partners most often meet through mutual acquaintances or at Greek community sponsored functions. In addition, a number of marriages have resulted from relationships developed at college. Females have considerably less freedom to date than do their brothers and it is not uncommon for them to be prohibited from dating until they are seniors or out of high school.

In Greece, brothers would postpone their marriages in order to provide a dowry for their sisters, and
customarily did not marry while the sisters remained unmarried. This practice was followed relatively strictly by the members of the first and second generations, but seems to be a much less common practice at this time.

Parents of most children have stated that they would prefer their children to marry a person of Greek heritage. Some have stated that "we hate to dilute the blood," but more often the reason given is a functional one: marriage is difficult enough, and the more that people have in common, the more likely they will have a successful marriage. In addition, parents have stated that a daughter or son-in-law who is of Greek heritage would understand them better and fewer intergenerational conflicts would occur.

Greeks are restricted by the church from marrying relatives through the degree of second cousin without a special dispensation from the Archbishop. In addition to this restriction, there are marriage restrictions between persons of fictive kinship. Besides consanguinal and affinal ties, persons are also linked by fictive kinship established through ritual sponsorship. This set of relationships is subsumed by the term "koumbaria" and they are reciprocal relationships. A baptismal sponsor ideally, but not always, is the godparent to the couple's first child. One consequence of this practice is that
the children of the godparent become spiritual siblings of the godchild and mating between them or other first degree relatives is considered incestuous and is prohibited. However, the exact interpretation of this relationship differs in various families.

Greek community members are very family-oriented. Mothers are expected to stay home when children are young so that they can properly socialize the children; this is considered the mother's most important life responsibility. Families spend much time together, and parents frequently take the children along to social functions rather than leave them with babysitters. While the child is not the focus of the household, he is usually included in most activities.

The family is usually patriarchally oriented. A male is expected to be the head of the household, although in recent years there has been a trend toward more equality in decision-making. This authority pattern is also seen in child discipline. Mothers will tell a child numerous times to behave in a certain pattern, and the child may or may not comply. When a father instructs a child to change behavior or to perform a task, however, the child seems quick to respond.

Family closeness is also seen as a characteristic to be perpetuated. When asked what values or traditions
parents would like to pass on to their children, 97% spontaneously responded that they would like their children to retain the close family unit.

The pattern of naming an infant is a custom which further ties the child to his Greek heritage. Traditionally, the first born son is given the same name as his paternal grandfather and his middle name is his father's first name; thus alternating generations have the same names. First born daughters are sometimes given the first name of the paternal grandmother, but more often they carry the name of the maternal grandmother. If custom is strictly followed, the infant girl will also receive her middle name from her father's first name.

Family planning, well known even in rural Greece, has been intensively practiced by the immigrant population. Friedl (1962:50-51) found that in a Greek village, "...parents who have more children than they can adequately feed and care for are accused of behaving like animals...and are said to have neither brains nor self-control." I also found a high value placed on having only as many children as could be adequately supported and educated. To this end, families effectively limit the number of children by various forms of birth control.

The primary methods of birth control differ between native born Greeks and this Greek-American population.
Safilios-Rathchild (1969) found that in Greece, abortion rates are quite high and that abortion is socially acceptable, inexpensive, and performed by qualified gynecologists, even though it is illegal and against the official church position. She hypothesized that the high abortion rate in Greece results because control of conception is left primarily to the male (through the use of condom or withdrawal); if conception occurs, the female then limits the family size by abortion.

In the Columbus Greek community, however, the women most often determine the method of contraception. Further, abortion is considered improper by the majority of women even though it is legal. Hence, the patterns in methods of limiting family size have changed.

Religion

During the Turkish occupation, the Greek Orthodox Church was the institution primarily responsible for the preservation of the Greek heritage, including language. Priests became teachers and village leaders and they ultimately sparked the War of Greek Independence (Xenides 1922). In this historical context, the importance of the Greek Orthodox Church can be understood today. In Greece, the Orthodox faith is state supported and is essentially the only religion.
A combination of religion and patriotism pervades the whole Greek attitude toward the Church, and the culture is not separable from the religion. Religion in Greece permeates Greek life. No one would think of initiating an important endeavor without a religious inauguration. Houses, new businesses and even journeys are blessed (Lee 1953).

Religion is not as personalized in Greece, however, as it is among United States Protestants. Interestingly, when members officially leave the Greek Orthodox Church they are many times drawn by fundamentalist Christian religions. In Columbus, the priest now leads an evening prayer meeting in a response to congregational criticism of the "meaninglessness of the ritual." In addition, Sunday schools have been formed in Columbus and in most other American Greek Orthodox Churches, but are almost entirely unknown in Greece.

The church in Columbus is headed by a priest, accountable to the bishop in Chicago and, ultimately, to the Archbishop of North and South America, located in New York.

In the first decade of the Greek community in Columbus, there was no formal church; community members were served by itinerant priests. In 1910 a charter was granted for the establishment of a "Greek Orthodox
Church" and services were held at that time in a building at the corner of Long and High Streets. In March, 1913, members of the Greek community rented the Masonic Temple on South Third Street and in the spring of that year the first permanent priest arrived. Since that time there have been eleven other priests. In 1922, the building of the Annunciation Greek Orthodox Church on Park and Goodale Streets was completed (Greek-American Community 1962). In 1974 the Parish Council and Future Development Committee contracted for 43.7 acres of land at Highway I-270 and Cleveland Avenue. When this is purchased, it will be the site of the relocation of the church and recreation facilities (Kropke 1975).

The Greek Orthodox Church in America differs somewhat from that in Greece in its attitude toward mixed marriages. In Greece, the Church requires that children resulting from mixed marriages be raised in the Orthodox religion; in the United States, it is only considered advisable and not required (Vlachos 1964).

In a study of Greek mixed marriages in the United States, Katsoulis (1969:5) states that

Among Greeks, intermarriage has traditionally been looked upon as something to be avoided at all costs. A Greek son who married outside his group could become an outcast and be stigmatized as an ungrateful errant who was setting a bad example for others. The predicament of a daughter who deviated from the matrimonial form was viewed as
something even more tragic.

In sum, he concluded that marriage to a non-Greek Orthodox was strongly disapproved by the Church, parents, relatives and friends, and only somewhat accepted if the other member agrees to convert or at least be married in the Greek Church. However, the amount of endogamy seems to be decreasing: in 1966, intermarriages constituted 31.9% of all Greek marriages (Katsoulis 1969) while in 1976 this percentage has risen to 46.8% of all Greek marriages (Methodios 1977).

World View

Dimen (1976) has characterized the dominant value profile of persons in Greece as a strong sense of personal dignity, a distrust of others outside the immediate family, a belief in the correctness of male dominance, and a belief in Hellenism.

The sense of personal dignity is portrayed by the characteristic that Greeks call "philotimo." This quality encompasses more than just dignity because it is derived from honor: individual self-esteem, family honor and the honor of Greece. In part, philotimo is felt to be an inherent characteristic of all Greek men by virtue of their being born Greek. However, the quality must be upheld by each member of the family through approved
social behavior and the fulfillment of family and national obligations. The behavior of each individual in a family reflects upon the philotimo of every other member and a disparaging remark about Greece attacks the philotimo of all Greeks.

It is this characteristic of philotimo that promotes Greek Americans to take care of their own who are in financial difficulty. Although many whom I visited were in a low income category, they managed their money carefully and lived in well-kept homes. Only once did I find a person in the Greek community who accepted welfare. For the most part, if a man was unemployed, another community member would assist him in finding work. For a Greek able-bodied man to be deliberately unemployed and accepting welfare would be an affront to the honor of the entire Greek community. Similarly, if a man did not adequately provide for his family, his philotimo would be diminished.

The Greek word "endrope" denotes shame as well as modesty and embarrassment. In Greece, women are characterized by the endrope and men by philotimo; in the Columbus Greek community, the endrope of women is not as apparent. To avoid endrope, however, a Greek may avoid discussing an embarrassment that could reflect poorly on the philotimo of himself, his family and his community.
This is not to say that Greeks are dishonest in their presentation of themselves, only that the truth is sometimes couched in a protective shield.

A strong historical appreciation of the accomplishments of Grecian society provides the basis for a great deal of pride in the Greek heritage, and this is reflected in the maintenance of traditional customs and values. Continued immigration from Greece also helps to perpetuate the ideas from the original Greek homeland. In addition, 53.8% of the families I visited during the structured interviews reported that at least one member of their nuclear family had made at least one trip to Greece (and in some cases, the entire family had visited Greece several times). Finally, the common religious heritage of the members operates to keep the community closely knit and interested in preserving their cultural heritage.

**Summary**

In this chapter I present a brief general history of Greek immigration into the United States, as well as an ethnographic description of a single urban Greek community. The historical and cultural characteristics of the Columbus Greek community showed that while it is geographically, economically and politically well integrated
into the larger Columbus population, the Greek community constitutes a viable ethnic group with distinct aspects of a continuing cultural tradition.
CHAPTER V

METHODOLOGY

Conduct of the Research

The research was conducted in the Greater Columbus Area including the corporate areas of Bexley, Gahanna, Grandview Heights, Grove City, Reynoldsburg, Upper Arlington, Whitehall and Worthington. Initial contact was made with the Greek community through Father Sarris, priest of the Annunciation Greek Orthodox Church, in July 1976. After several discussions with Father Sarris concerning the research project, I began work on the parish records in October 1976. The period of participant observation in the community lasted from September 1976 through May 1977. Structured interviews with members of the Greek community were begun in December 1976 and completed in March 1977. The data from these interviews were coded on IBM cards and analyzed in March and April 1977.
Data Collection

Information used in this study was obtained from three major sources: personal and official documents, structured interviews with members of the Greek community, and participant observation within the Greek community.

Documents

Demographic information for the Columbus Greek population was secured from the following written sources:

1. the parish baptism and death records of the Annunciation Greek Orthodox Church, 1933-1962.

2. the vital statistics column listing births, deaths, baptisms, marriages and new community members which appeared in each issue of the "Charioteer" (the monthly 20 page newsbulletin of the Greek community), 1971-1977.

3. United States decennial census information concerning the number of foreign stock (foreign born and native born of foreign or mixed parentage) in the Columbus Standard Metropolitan Area. This information is located in the Documents Department, State of Ohio Library, Columbus.

4. the Annunciation Greek Orthodox Church membership committee report of 1976.

5. the mailing list of the Annunciation Greek Orthodox Church, October 1976. Official membership in the church is not a prerequisite for appearing on the mailing list.

Historical information concerning the Columbus Greek population was obtained from the following documents:
1. the 50th Anniversary Album of the Greek-American Community of Central Ohio, 1912-1962.


3. the report "Ethnic and Nationality Groups in the Columbus Area" (1975) published by the Transnational Intellectual Cooperation Program.

4. written family histories and biographies.

Structured Interviews

Demographic, social and cultural data were obtained through the administration of an interview schedule. This proforma was modified from Halberstein (1973) and Weiner and Lourie (1969). (See Appendix C for a sample interview schedule). Demographic information was obtained from direct questions, while social and cultural data were obtained from open ended questions and observation of the family interaction patterns and home interior.

Individuals of 102 home units were interviewed. Interviews were usually conducted in the home, but occasionally (6%) in a business office. The structured interviews provided information on 1,286 persons, both living and deceased, who are or were members of the Columbus Greek community.

The sample resulted in information on 416 total family units which I calculated to be 62.1% of the
Columbus Greek community members maintaining contact with the church.¹

This sample size compares favorably with demographic studies of other anthropological populations. Crawford and Goldstein (1975) obtained information on 46% of the individuals of Polish Hill, and Freire-Maia and Kreiger (1963) sampled about 33% of a Jewish isolate in Brazil.

Individuals to be interviewed were generally selected at random from the church membership roster. The exception was the purposeful inclusion of eleven families who had resided in the Columbus area for the longest period of time. Nonparticipation in the study was exceptionally low: 109 families were asked to participate and only 7 declined (1 later withdrew information). This relatively high rate of voluntary participation can be attributed to several factors. My entry into the community was facilitated by an announcement briefly describing the study which was placed in the Sunday Church Bulletin for three consecutive weeks prior to the

¹ Membership in the church was not requisite for appearing on the mailing list of the church. Several individuals who are not church affiliated or who are affiliated with a non-Orthodox Church still receive mailings. Community organizations use the church mailing list to disseminate information to all interested Greek community members.
interviews. It was further assisted by an article presenting my personal history, the purpose of the study and an endorsement by a member of the Greek community which appeared in the "Charioteer" (See Appendix D for a copy of the article). The most important factor influencing the high rate of participation, however, seemed to be the community members' profound interest in the history and trends of their community.

Appointments for the interviews were made by telephone calls. When phoning, I stated my name and that the person being questioned might be familiar with my study either from the Sunday Church Bulletin or the article in the "Charioteer." If the individual did not recognize my name, I indicated that I was a doctoral student at Ohio State University and I gave a name of a member of the Greek community as a reference. I then explained that the purpose of my study was threefold: to determine migration patterns in the Greek community, to study the maintenance of traditional values and customs, and to detect changes in family patterns over the generations. I informed each individual that all information would be confidential and that consenting to an interview did not obligate him to answer any question he felt was too personal.
After amenities were exchanged upon my entering the home, I obtained informed consent (see Appendix E) prior to asking pertinent questions. Although I had taken a Greek language course from the Ohio State Department of Continuing Education, I was not sufficiently fluent in the language to converse with members of the community who spoke only Greek. However, I did interview only Greek speaking individuals by asking relatives or close friends to translate.

Demographic questions were administered in a standard manner to give me a basis for comparison among the families. Information gathered from these questions was transcribed onto 3 x 5 index cards so that individuals would only be counted once and so all information about an individual (sometimes obtained from several sources) would be located on the same card.

To obtain social, cultural and historical data, I conducted in-depth, open-ended interviews. When a person was particularly knowledgeable about a particular topic (e.g. history of the Columbus Greek community, folk remedies, medical beliefs) I extended the interview period and, at times, returned to the home to obtain even more information on that topic. In only 12 cases did the participant keep the interview to the scheduled questions. Interview notes for social, cultural and historical data
were taken in shorthand on interview forms and later transcribed onto note cards for reference to particular subjects according to Murdock's format described in the Outline of Cultural Materials (1961).

A minor methodological problem arose in scheduling the interviews: members of the community are widely dispersed over the greater Columbus area and I was usually unable to schedule consecutive interviews in the same area of the city. This resulted in some difficulty because of the hazardous driving conditions this particular winter in Columbus. In a typical day, I was able to schedule 2-3 interviews averaging three hours each. The longest single interviews were one seven-hour and two six-hour interviews. The shortest interview was forty minutes.

Participant Observation

Because of the urban nature of this community and because the members are widely distributed throughout the city of Columbus, I was not able to perform the type of participant observation possible when living in and studying a small village. However, I was able to obtain cultural information from attending dances, picnics, lunches, dinners, meetings of organizations, Sunday church services, the yearly Greek festival, and memorial
services. In addition, particularly informative periods were the several afternoons and evenings I spent with three members of the Greek community (all from different families) with whom I developed relatively close personal relationships. The information gathered in this phase was also coded according to Murdock's format.

Data Analysis

Sources of Error

Prior to discussing the data analysis, I wish to note some possible sources of error in this study. The problems of validity and reliability of demographic data and the accuracy of reconstructed historical configurations have been well discussed by Drake (1972), Halberstein (1973) and Hollingsworth (1969). They concur that several sources should be consolidated to supplement each other and to serve as a cross check. This was accomplished by comparing the information obtained from the scheduled interviews with vital statistics documents, primarily parish records and the United States decennial census data.

Each of these three sources of information have limitations. The parish records were not complete for all years of the demographic study. In addition, each
birth in the community is not necessarily recorded because only the baptisms performed in Columbus are noted. Hence, children dying prior to baptism are not recorded. Children who were not baptized or were baptized in another church also are not noted; this is an important source of underreporting because some families practice the custom of taking the child to Greece to be baptized, particularly if the parent was an immigrant and his parents remained in Greece. The death records also underreport actual deaths of community members. The death records note only those funerals which were attended by the parish priest. Thus, data may be missing if the individual died and was buried elsewhere.

The United States decennial census is also incomplete. The failure of census takers to correctly enumerate immigrant populations has been noted by Parsons (1975). In addition, the census only counts foreign born and native born of mixed or foreign parentage. This practice excludes from consideration grandchildren of immigrants even if these grandchildren are entirely descended from persons of Greek ancestry. Further, this census only counts persons living in the city every tenth year; children who died prior to the age of ten and persons who have entered and left the city within that period may not be detected.
The major source of reporting error from the scheduled interviews is called age or digit preference. This error, discussed both in demographic and anthropological literature, is the tendency to assign individuals to ages ending in a particular digit (Petersen 1975 and Weiss 1973). The most common digit preference is for years ending in 5 or 0; this is particularly true for individuals whose actual age is unknown and who are placed in the nearest likely category. Because this digit preference was found in my reported data, the correction suggested by Weiss (1973) was performed. He noted that correction for age preference can be made by pooling the data into 5 year classes with only one preferred age in each class. Other sources of reporting error common in other anthropological studies (e.g., investigator's heaping females into fertile age classes) were not significant in this investigation because of the different nature of the population.

Following the method of Cox (1970) I could estimate the quality of the data obtained in the scheduled interviews by comparing the data with the census data. In general, conflicts between the official sources and the interviews were minor. The one exception was that of mortality. My interview data provided considerably less data on the number of deaths in the community than were
reported in the parish records. Because the parish record listed the marriage status of the deceased individual, I could determine that the bias in the interviews resulted from a low enumeration of single males who had died. This discrepancy is dealt with in the following chapter. Other inconsistencies were only of a minor nature and, in general, the data fit well.

Errors in coding were reduced by the keypunchers' practice of double checking the punched cards after they are completed. In addition, I checked the written Fortran sheets with the computer printout. Checks were also made for errors in the original coding by observing for obviously incongruous data (males having miscarriages) and by checking all data falling at extreme ends. These errors were found to be quite uncommon.

Methods of Analysis

Demographic data obtained from the structured interviews were transferred in coded form to computer cards, one per individual. Information was coded on a total of 1,286 individuals in the Columbus Greek community, including deceased persons, immigrants and emigrants. Three computer programs, all in Fortran IV, were utilized in organizing the data:
1. A modified version of the program developed by Keyfitz and Flieger (1971) was used to construct life tables.

2. An aggregation program was developed independently to elicit the following information from the data: age and sex distribution by 1, 5 and 10 year periods; total population figures; male and female births by age of mother, by age of father, and by differences in parental ages; and date of immigrant entry into the population.

3. The Ohio State IBM Sort-and-Merge Program.

The first two programs were tested for validity and are located in Appendix G and H because of their cumbersome nature. The third program is a standard one and had been pretested for validity, hence no such tests were performed on it. All programs were used with an IBM 790 computer.

Most data were analyzed by decades in determining trends. However, fertility measures were combined in 20 year generation periods. Although there is inevitable generation overlap when using these temporal periods, Lasker (1964) holds that this problem is subordinate to the total analytical value of the generational model.

The organized data allowed the reconstruction of migration, fertility, mortality and mate selection patterns which will be presented in the following chapter.
Summary

In this chapter the conduct of the research was presented. The methods of data analysis and the variety of data collecting techniques used in this study (including structured interviews, participant observation and record review) were discussed. Finally, sources of error and confounding variables were identified.
CHAPTER VI

RESULTS

Population Structure and Movement

Age and Sex Distribution

The combined effects of the vital rates of births, deaths and migrations in a population result in a certain age and sex composition, called the population structure. The age and sex composition of the Greek community was determined through analysis of the data obtained in the structured interviews. The numbers of persons of each sex were grouped into age cohorts of five year spans to obtain the age-sex structure of the population for the first year of each decade, beginning in 1910. Tables 5 through 12 present the numbers and corresponding percentages for each age cohort of males and females and for the total population for the first year of each decade and for 1976.

Three major trends are discernible from these tables. First, the population is getting older. This
Table 5 -- Age distribution table: 1910, N = 48.

<table>
<thead>
<tr>
<th>AGE</th>
<th>MALES</th>
<th>FEMALES</th>
<th>MALES %</th>
<th>FEMALES %</th>
<th>% OF TOTAL POPULATION OF COHORT</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4</td>
<td>4</td>
<td>3</td>
<td>8.3</td>
<td>6.6</td>
<td>14.9</td>
</tr>
<tr>
<td>5-9</td>
<td>2</td>
<td>1</td>
<td>4.2</td>
<td>2.1</td>
<td>6.3</td>
</tr>
<tr>
<td>10-14</td>
<td>1</td>
<td>3</td>
<td>2.1</td>
<td>6.6</td>
<td>8.7</td>
</tr>
<tr>
<td>15-19</td>
<td>2</td>
<td>4</td>
<td>4.2</td>
<td>8.3</td>
<td>12.5</td>
</tr>
<tr>
<td>20-24</td>
<td>12</td>
<td>1</td>
<td>25.0</td>
<td>2.1</td>
<td>27.1</td>
</tr>
<tr>
<td>25-29</td>
<td>3</td>
<td>0</td>
<td>6.6</td>
<td>0</td>
<td>6.6</td>
</tr>
<tr>
<td>30-34</td>
<td>9</td>
<td>1</td>
<td>18.75</td>
<td>2.1</td>
<td>20.8</td>
</tr>
<tr>
<td>35-39</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>40-44</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2.1</td>
<td>2.1</td>
</tr>
<tr>
<td>44-49</td>
<td>1</td>
<td>0</td>
<td>2.1</td>
<td>0</td>
<td>2.1</td>
</tr>
<tr>
<td>Total</td>
<td>34</td>
<td>14</td>
<td>70.1%</td>
<td>29.9%</td>
<td></td>
</tr>
</tbody>
</table>
Table 6 -- Age distribution table: 1920, N = 157.

<table>
<thead>
<tr>
<th>AGE</th>
<th>MALES</th>
<th>FEMALES</th>
<th>MALES %</th>
<th>FEMALES %</th>
<th>% OF TOTAL POPULATION OF COHORT</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4</td>
<td>25</td>
<td>19</td>
<td>15.9</td>
<td>12.1</td>
<td>28.0</td>
</tr>
<tr>
<td>5-9</td>
<td>15</td>
<td>8</td>
<td>9.6</td>
<td>5.1</td>
<td>14.7</td>
</tr>
<tr>
<td>10-14</td>
<td>5</td>
<td>4</td>
<td>3.2</td>
<td>2.5</td>
<td>5.7</td>
</tr>
<tr>
<td>15-19</td>
<td>3</td>
<td>5</td>
<td>1.9</td>
<td>3.2</td>
<td>5.1</td>
</tr>
<tr>
<td>20-24</td>
<td>3</td>
<td>12</td>
<td>1.9</td>
<td>7.6</td>
<td>9.5</td>
</tr>
<tr>
<td>25-29</td>
<td>10</td>
<td>6</td>
<td>6.4</td>
<td>3.8</td>
<td>10.2</td>
</tr>
<tr>
<td>30-34</td>
<td>20</td>
<td>6</td>
<td>12.7</td>
<td>3.8</td>
<td>16.5</td>
</tr>
<tr>
<td>35-39</td>
<td>5</td>
<td>0</td>
<td>3.2</td>
<td>0</td>
<td>3.2</td>
</tr>
<tr>
<td>40-44</td>
<td>10</td>
<td>1</td>
<td>6.4</td>
<td>0.6</td>
<td>7.0</td>
</tr>
<tr>
<td>45-49</td>
<td>1</td>
<td>0</td>
<td>0.6</td>
<td>0</td>
<td>0.6</td>
</tr>
<tr>
<td>50-54</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0.6</td>
<td>0.6</td>
</tr>
<tr>
<td>55-59</td>
<td>1</td>
<td>0</td>
<td>0.6</td>
<td>0</td>
<td>0.6</td>
</tr>
<tr>
<td>Total</td>
<td>98</td>
<td>59</td>
<td>62.4%</td>
<td>37.6%</td>
<td></td>
</tr>
</tbody>
</table>
Table 7 -- Age distribution table: 1930, N = 262.

<table>
<thead>
<tr>
<th>AGE</th>
<th>MALES</th>
<th>FEMALES</th>
<th>MALES %</th>
<th>FEMALES %</th>
<th>% OF TOTAL POPULATION OF COHORT</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4</td>
<td>15</td>
<td>19</td>
<td>5.7</td>
<td>7.3</td>
<td>13.0</td>
</tr>
<tr>
<td>5-9</td>
<td>24</td>
<td>18</td>
<td>9.2</td>
<td>6.9</td>
<td>16.1</td>
</tr>
<tr>
<td>10-14</td>
<td>25</td>
<td>20</td>
<td>9.5</td>
<td>7.6</td>
<td>17.1</td>
</tr>
<tr>
<td>15-19</td>
<td>19</td>
<td>8</td>
<td>7.3</td>
<td>3.1</td>
<td>10.4</td>
</tr>
<tr>
<td>20-24</td>
<td>7</td>
<td>8</td>
<td>2.7</td>
<td>3.1</td>
<td>5.8</td>
</tr>
<tr>
<td>25-29</td>
<td>4</td>
<td>9</td>
<td>1.5</td>
<td>3.4</td>
<td>4.9</td>
</tr>
<tr>
<td>30-34</td>
<td>7</td>
<td>13</td>
<td>2.7</td>
<td>5.0</td>
<td>7.7</td>
</tr>
<tr>
<td>35-39</td>
<td>11</td>
<td>8</td>
<td>4.2</td>
<td>3.1</td>
<td>7.3</td>
</tr>
<tr>
<td>40-44</td>
<td>21</td>
<td>7</td>
<td>8.0</td>
<td>2.7</td>
<td>10.7</td>
</tr>
<tr>
<td>45-49</td>
<td>5</td>
<td>0</td>
<td>1.9</td>
<td>0.4</td>
<td>1.9</td>
</tr>
<tr>
<td>50-54</td>
<td>10</td>
<td>1</td>
<td>3.8</td>
<td>0.4</td>
<td>4.2</td>
</tr>
<tr>
<td>55-59</td>
<td>3</td>
<td>0</td>
<td>1.1</td>
<td>0</td>
<td>1.1</td>
</tr>
<tr>
<td>60-64</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>Total</td>
<td>151</td>
<td>111</td>
<td>57.6%</td>
<td>42.4%</td>
<td></td>
</tr>
</tbody>
</table>
Table 8 — Age distribution table: 1940, N = 313.

<table>
<thead>
<tr>
<th>AGE</th>
<th>MALES</th>
<th>FEMALES</th>
<th>MALES %</th>
<th>FEMALES %</th>
<th>% OF TOTAL POPULATION OF COHORT</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4</td>
<td>22</td>
<td>17</td>
<td>7.0</td>
<td>5.4</td>
<td>12.4</td>
</tr>
<tr>
<td>5-9</td>
<td>9</td>
<td>10</td>
<td>2.9</td>
<td>3.2</td>
<td>6.1</td>
</tr>
<tr>
<td>10-14</td>
<td>15</td>
<td>19</td>
<td>4.8</td>
<td>6.1</td>
<td>10.9</td>
</tr>
<tr>
<td>15-19</td>
<td>25</td>
<td>21</td>
<td>8.0</td>
<td>6.7</td>
<td>14.7</td>
</tr>
<tr>
<td>20-24</td>
<td>25</td>
<td>22</td>
<td>8.0</td>
<td>7.0</td>
<td>15.0</td>
</tr>
<tr>
<td>25-29</td>
<td>22</td>
<td>8</td>
<td>7.0</td>
<td>2.6</td>
<td>9.6</td>
</tr>
<tr>
<td>30-34</td>
<td>7</td>
<td>13</td>
<td>2.2</td>
<td>4.2</td>
<td>6.4</td>
</tr>
<tr>
<td>35-39</td>
<td>6</td>
<td>7</td>
<td>1.9</td>
<td>2.2</td>
<td>4.1</td>
</tr>
<tr>
<td>40-44</td>
<td>7</td>
<td>14</td>
<td>2.2</td>
<td>4.5</td>
<td>6.7</td>
</tr>
<tr>
<td>45-49</td>
<td>14</td>
<td>8</td>
<td>4.5</td>
<td>2.6</td>
<td>7.1</td>
</tr>
<tr>
<td>50-54</td>
<td>9</td>
<td>6</td>
<td>2.9</td>
<td>1.9</td>
<td>4.8</td>
</tr>
<tr>
<td>55-59</td>
<td>5</td>
<td>0</td>
<td>1.6</td>
<td>0</td>
<td>1.6</td>
</tr>
<tr>
<td>60-64</td>
<td>9</td>
<td>1</td>
<td>2.9</td>
<td>0.3</td>
<td>3.2</td>
</tr>
<tr>
<td>65-69</td>
<td>3</td>
<td>0</td>
<td>1.8</td>
<td>0</td>
<td>1.0</td>
</tr>
<tr>
<td>70-74</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>Total</td>
<td>178</td>
<td>135</td>
<td>56.9%</td>
<td>43.1%</td>
<td></td>
</tr>
</tbody>
</table>
Table 9 — Age distribution table: 1950, N = 454.

<table>
<thead>
<tr>
<th>AGE</th>
<th>MALES</th>
<th>FEMALES</th>
<th>MALES %</th>
<th>FEMALES %</th>
<th>% OF TOTAL POPULATION OF COHORT</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4</td>
<td>25</td>
<td>30</td>
<td>5.5</td>
<td>6.6</td>
<td>12.1</td>
</tr>
<tr>
<td>5-9</td>
<td>22</td>
<td>24</td>
<td>4.8</td>
<td>5.3</td>
<td>10.1</td>
</tr>
<tr>
<td>10-14</td>
<td>23</td>
<td>17</td>
<td>5.1</td>
<td>3.7</td>
<td>8.8</td>
</tr>
<tr>
<td>15-19</td>
<td>10</td>
<td>12</td>
<td>2.2</td>
<td>2.6</td>
<td>4.8</td>
</tr>
<tr>
<td>20-24</td>
<td>24</td>
<td>25</td>
<td>5.3</td>
<td>5.5</td>
<td>10.8</td>
</tr>
<tr>
<td>25-29</td>
<td>38</td>
<td>30</td>
<td>8.4</td>
<td>6.6</td>
<td>15.0</td>
</tr>
<tr>
<td>30-34</td>
<td>25</td>
<td>23</td>
<td>5.5</td>
<td>5.1</td>
<td>10.6</td>
</tr>
<tr>
<td>35-39</td>
<td>26</td>
<td>8</td>
<td>5.7</td>
<td>1.7</td>
<td>7.4</td>
</tr>
<tr>
<td>40-44</td>
<td>7</td>
<td>15</td>
<td>1.5</td>
<td>3.3</td>
<td>4.8</td>
</tr>
<tr>
<td>45-49</td>
<td>7</td>
<td>8</td>
<td>1.5</td>
<td>1.7</td>
<td>3.2</td>
</tr>
<tr>
<td>50-54</td>
<td>7</td>
<td>15</td>
<td>1.5</td>
<td>3.3</td>
<td>4.8</td>
</tr>
<tr>
<td>55-59</td>
<td>15</td>
<td>7</td>
<td>3.3</td>
<td>1.5</td>
<td>4.8</td>
</tr>
<tr>
<td>60-64</td>
<td>18</td>
<td>6</td>
<td>4.0</td>
<td>1.3</td>
<td>5.3</td>
</tr>
<tr>
<td>65-69</td>
<td>3</td>
<td>0</td>
<td>0.7</td>
<td>0</td>
<td>0.7</td>
</tr>
<tr>
<td>70-74</td>
<td>2</td>
<td>2</td>
<td>0.4</td>
<td>0.4</td>
<td>0.8</td>
</tr>
<tr>
<td>75-79</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>80+</td>
<td>1</td>
<td>1</td>
<td>0.2</td>
<td>0.2</td>
<td>0.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>253</strong></td>
<td><strong>201</strong></td>
<td><strong>55.7%</strong></td>
<td><strong>44.3%</strong></td>
<td></td>
</tr>
</tbody>
</table>
Table 10 — Age distribution table: 1960, N = 696.

<table>
<thead>
<tr>
<th>AGE</th>
<th>MALES</th>
<th>FEMALES</th>
<th>MALES %</th>
<th>FEMALES %</th>
<th>% OF TOTAL POPULATION OF COHORT</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4</td>
<td>56</td>
<td>22</td>
<td>8.0</td>
<td>3.2</td>
<td>11.2</td>
</tr>
<tr>
<td>5-9</td>
<td>49</td>
<td>33</td>
<td>7.0</td>
<td>4.7</td>
<td>11.7</td>
</tr>
<tr>
<td>10-14</td>
<td>25</td>
<td>32</td>
<td>3.6</td>
<td>4.6</td>
<td>8.2</td>
</tr>
<tr>
<td>15-19</td>
<td>26</td>
<td>29</td>
<td>3.7</td>
<td>4.2</td>
<td>7.9</td>
</tr>
<tr>
<td>20-24</td>
<td>34</td>
<td>22</td>
<td>4.9</td>
<td>3.2</td>
<td>5.6</td>
</tr>
<tr>
<td>25-29</td>
<td>17</td>
<td>22</td>
<td>2.4</td>
<td>3.2</td>
<td>8.1</td>
</tr>
<tr>
<td>30-34</td>
<td>30</td>
<td>32</td>
<td>4.3</td>
<td>4.6</td>
<td>8.9</td>
</tr>
<tr>
<td>35-39</td>
<td>44</td>
<td>33</td>
<td>6.3</td>
<td>4.7</td>
<td>11.0</td>
</tr>
<tr>
<td>40-44</td>
<td>27</td>
<td>24</td>
<td>3.9</td>
<td>3.4</td>
<td>7.3</td>
</tr>
<tr>
<td>45-49</td>
<td>30</td>
<td>9</td>
<td>4.3</td>
<td>1.3</td>
<td>5.6</td>
</tr>
<tr>
<td>50-54</td>
<td>7</td>
<td>14</td>
<td>1.0</td>
<td>2.0</td>
<td>3.0</td>
</tr>
<tr>
<td>55-59</td>
<td>7</td>
<td>10</td>
<td>1.0</td>
<td>1.4</td>
<td>2.4</td>
</tr>
<tr>
<td>60-64</td>
<td>8</td>
<td>17</td>
<td>1.1</td>
<td>2.4</td>
<td>3.5</td>
</tr>
<tr>
<td>65-69</td>
<td>7</td>
<td>6</td>
<td>1.0</td>
<td>0.9</td>
<td>1.9</td>
</tr>
<tr>
<td>70-74</td>
<td>14</td>
<td>5</td>
<td>2.0</td>
<td>0.7</td>
<td>2.7</td>
</tr>
<tr>
<td>75-79</td>
<td>2</td>
<td>0</td>
<td>0.3</td>
<td>0.0</td>
<td>0.3</td>
</tr>
<tr>
<td>80+</td>
<td>2</td>
<td>1</td>
<td>0.3</td>
<td>0.14</td>
<td>0.44</td>
</tr>
<tr>
<td>Total</td>
<td>385</td>
<td>311</td>
<td>55.3%</td>
<td>44.7%</td>
<td></td>
</tr>
</tbody>
</table>
Table 11 - Age distribution table: 1970, N = 950.

<table>
<thead>
<tr>
<th>AGE</th>
<th>MALES</th>
<th>FEMALES</th>
<th>MALES %</th>
<th>FEMALES %</th>
<th>% OF TOTAL POPULATION OF COHORT</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4</td>
<td>58</td>
<td>15</td>
<td>6.1</td>
<td>1.6</td>
<td>7.7</td>
</tr>
<tr>
<td>5-9</td>
<td>36</td>
<td>26</td>
<td>3.8</td>
<td>2.7</td>
<td>6.5</td>
</tr>
<tr>
<td>10-14</td>
<td>61</td>
<td>23</td>
<td>6.4</td>
<td>2.4</td>
<td>8.8</td>
</tr>
<tr>
<td>15-19</td>
<td>50</td>
<td>41</td>
<td>5.3</td>
<td>4.3</td>
<td>9.6</td>
</tr>
<tr>
<td>20-24</td>
<td>30</td>
<td>51</td>
<td>3.2</td>
<td>5.4</td>
<td>8.6</td>
</tr>
<tr>
<td>25-29</td>
<td>43</td>
<td>34</td>
<td>4.5</td>
<td>4.1</td>
<td>8.6</td>
</tr>
<tr>
<td>30-34</td>
<td>41</td>
<td>28</td>
<td>4.3</td>
<td>2.9</td>
<td>7.2</td>
</tr>
<tr>
<td>35-39</td>
<td>27</td>
<td>33</td>
<td>2.8</td>
<td>3.5</td>
<td>6.3</td>
</tr>
<tr>
<td>40-44</td>
<td>33</td>
<td>34</td>
<td>3.5</td>
<td>3.6</td>
<td>7.1</td>
</tr>
<tr>
<td>45-49</td>
<td>46</td>
<td>34</td>
<td>4.8</td>
<td>3.6</td>
<td>8.4</td>
</tr>
<tr>
<td>50-54</td>
<td>26</td>
<td>27</td>
<td>2.7</td>
<td>2.8</td>
<td>5.5</td>
</tr>
<tr>
<td>55-59</td>
<td>29</td>
<td>11</td>
<td>3.1</td>
<td>1.2</td>
<td>4.5</td>
</tr>
<tr>
<td>60-64</td>
<td>8</td>
<td>15</td>
<td>0.8</td>
<td>1.6</td>
<td>2.4</td>
</tr>
<tr>
<td>65-69</td>
<td>8</td>
<td>10</td>
<td>0.8</td>
<td>1.0</td>
<td>1.8</td>
</tr>
<tr>
<td>70-74</td>
<td>8</td>
<td>16</td>
<td>0.8</td>
<td>1.7</td>
<td>2.5</td>
</tr>
<tr>
<td>75-79</td>
<td>2</td>
<td>5</td>
<td>0.2</td>
<td>0.5</td>
<td>0.7</td>
</tr>
<tr>
<td>80+</td>
<td>8</td>
<td>5</td>
<td>0.8</td>
<td>0.5</td>
<td>1.3</td>
</tr>
</tbody>
</table>

Total 514 436 54.1% 45.9%
Table 12 — Age distribution table: 1976, N = 1072.

<table>
<thead>
<tr>
<th>AGE</th>
<th>MALES</th>
<th>FEMALES</th>
<th>MALES %</th>
<th>FEMALES %</th>
<th>% OF TOTAL POPULATION OF COHORT</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4</td>
<td>61</td>
<td>28</td>
<td>5.7</td>
<td>2.6</td>
<td>8.3</td>
</tr>
<tr>
<td>5-9</td>
<td>68</td>
<td>18</td>
<td>6.3</td>
<td>1.7</td>
<td>8.0</td>
</tr>
<tr>
<td>10-14</td>
<td>40</td>
<td>23</td>
<td>3.7</td>
<td>2.1</td>
<td>5.8</td>
</tr>
<tr>
<td>15-19</td>
<td>59</td>
<td>21</td>
<td>5.5</td>
<td>2.0</td>
<td>7.5</td>
</tr>
<tr>
<td>20-24</td>
<td>52</td>
<td>42</td>
<td>4.9</td>
<td>4.0</td>
<td>8.9</td>
</tr>
<tr>
<td>25-29</td>
<td>44</td>
<td>57</td>
<td>4.1</td>
<td>5.3</td>
<td>9.4</td>
</tr>
<tr>
<td>30-34</td>
<td>38</td>
<td>46</td>
<td>3.5</td>
<td>4.3</td>
<td>7.8</td>
</tr>
<tr>
<td>35-39</td>
<td>49</td>
<td>28</td>
<td>4.6</td>
<td>2.6</td>
<td>7.2</td>
</tr>
<tr>
<td>40-44</td>
<td>33</td>
<td>34</td>
<td>3.1</td>
<td>3.2</td>
<td>6.3</td>
</tr>
<tr>
<td>45-49</td>
<td>29</td>
<td>30</td>
<td>2.7</td>
<td>2.8</td>
<td>5.5</td>
</tr>
<tr>
<td>50-54</td>
<td>48</td>
<td>41</td>
<td>4.5</td>
<td>3.8</td>
<td>8.3</td>
</tr>
<tr>
<td>55-59</td>
<td>28</td>
<td>32</td>
<td>2.6</td>
<td>3.0</td>
<td>5.6</td>
</tr>
<tr>
<td>60-64</td>
<td>26</td>
<td>11</td>
<td>2.4</td>
<td>1.0</td>
<td>3.4</td>
</tr>
<tr>
<td>65-69</td>
<td>12</td>
<td>15</td>
<td>1.1</td>
<td>1.4</td>
<td>2.5</td>
</tr>
<tr>
<td>70-74</td>
<td>8</td>
<td>12</td>
<td>0.7</td>
<td>1.1</td>
<td>1.8</td>
</tr>
<tr>
<td>75-79</td>
<td>6</td>
<td>17</td>
<td>0.6</td>
<td>1.6</td>
<td>2.2</td>
</tr>
<tr>
<td>80+</td>
<td>7</td>
<td>9</td>
<td>0.7</td>
<td>0.8</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Total | 606   | 466     | 56.5%   | 43.5%     |
aging of the population is further revealed by an examination of the median age:

<table>
<thead>
<tr>
<th>year</th>
<th>median age</th>
</tr>
</thead>
<tbody>
<tr>
<td>1920</td>
<td>13</td>
</tr>
<tr>
<td>1930</td>
<td>17</td>
</tr>
<tr>
<td>1940</td>
<td>22</td>
</tr>
<tr>
<td>1950</td>
<td>26</td>
</tr>
<tr>
<td>1960</td>
<td>27</td>
</tr>
<tr>
<td>1970</td>
<td>28</td>
</tr>
<tr>
<td>1976</td>
<td>30</td>
</tr>
</tbody>
</table>

Second, the proportion of males is decreasing, although the overall percentage of males in the population is always over 50%. The total male sex ratio has decreased consistently from a high in 1910 of 70.1% to a low in 1970 of 54.1%. Finally, the population is becoming larger: during each decade the population size has increased.

The basis for these trends would seem to be the particular nature of the migration trends as will be seen in future analysis.

Figures 3 through 10 graphically depict the age-sex population structure of the Columbus Greek community for the first year of each decade and for 1976. The population pyramids are generally the expansive type, characterized by a broad base. The fact that the lower bars are relatively long indicates that the birth rate and migration rate result in a proportion of children sufficient to maintain the population in the long run, if these children remain within the Greek community.
Figure 3 — Population pyramid for the 1910 Columbus Greek community.
Figure 4 -- Population pyramid for the 1920 Columbus Greek community.
Figure 5 -- Population pyramid for the 1930 Columbus Greek community.
Figure 6 — Population pyramid for the 1940 Columbus Greek community.
Figure 7 -- Population pyramid for the 1950 Columbus Greek community.
Figure 8 — Population pyramid for the 1960 Columbus Greek community.
Figure 9 -- Population pyramid for the 1970 Columbus Greek community.
Figure 10 -- Population pyramid for the 1976 Columbus Greek community.
The same trends seen in Tables 5-12 are visually even clearer. Comparing the population pyramids, we can easily recognize that the total population size is increasing and that older age categories are tending to have larger proportions of the population in them. The decreasing proportion of males in the population, however, is more evident from the tables.

The higher proportion of males in the population is partially a result of the migration pattern of the Greeks, as will be seen in the migration analysis. However, it is also partially a result of a high secondary sex ratio. The sex ratio, it will be remembered, is the proportion of males to females X 100 at the time of birth. For the Columbus Greek population, the total births are 447 males to 278 females, which results in a sex ratio of 160.7. This compares to the 1966 United States Caucasian sex ratio of 105.3 and the 1966 Greek sex ratio of 106.3 (Keyfitz and Flieger 1972).

Although the Columbus Greek sex ratio is obviously higher than either the ratio for the Caucasian population of the United States or the population of Greece, it is not possible from simple inspection to determine if this difference is significant. This lack of certainty results from the fact that ratios for the United States and for Greece are determined from very large sample sizes.
Using Visaria's (1967) method, we can test to determine if the Columbus Greek sex ratio is significantly different from the expected. According to Visaria, the 95% confidence limits for sex ratios at birth are a function of the sample size and he calculated them as follows:

<table>
<thead>
<tr>
<th>Number of observed live births</th>
<th>95% confidence limits for sex ratio at birth of:</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>155.0-70.0</td>
</tr>
<tr>
<td>1000</td>
<td>117.8-91.9</td>
</tr>
<tr>
<td>10000</td>
<td>108.2-100.0</td>
</tr>
</tbody>
</table>

Hence, with a high sex ratio of 107 there is a 95% probability that the upper sex ratio limit will be 121.2 if the sample size is 1000 or that the upper limit would be 159.7 if the sample size is 100. Since my sample size (725) falls between 100 and 1000, the upper limit of the Columbus Greek secondary sex ratio should fall between 121.2 and 159.7 if it is to remain within the 95% confidence limits. However, the sex ratio for the Columbus Greek population is 160.7 and thus falls outside the 95% confidence limits. This indicates that even given the relatively small sample size, there is a significant deviation in the secondary sex ratio of the Columbus Greek population.

In addition to the chance of sampling error (which is always a possibility unless the total population is examined), numerous other factors have been postulated
for deviations from expected secondary sex ratios. These other factors were briefly discussed in the theoretical chapter. I tested the most common hypotheses for secondary sex ratio deviations:

1. **Probability of a male child increases with an increase in the difference between ages of parents.** For the total male births in the Columbus Greek population, the mean parental age difference (father's age minus mother's age) was 7.4358. For the total female births, the mean difference was 6.9606. Using student's t test, I calculated that this difference was not significant at a .05 level (t value: 0.9325).

2. **Probability of a male child increases with increasing birth order.** Using a Chi-square Goodness of Fit test, I found no evidence at a .05 level of significance to reject the null hypothesis that male births are independent of birth order ($X^2$ value: 7.14175).

3. **Probability of a male child increases as the age of the father increases.** This hypothesis was not supported at a .05 level of significance when subjected to the student's t test (t value: -0.69727).

4. **Probability that younger females are more likely to have male children.** I determined that the mean age of mothers of male children was less than the mean age of mothers of female children (27.19395 and 28.07388
respectively). Using a student's t test, I determined that this was significant at the .05 level of confidence (t value: -1.8922; the critical region was -∞, -1.64; thus the data fell within the critical region).

In summary, the only hypothesis which was significantly associated with the high male sex ratio was the probability that younger females are more likely to have male children.

**Migration Analysis**

Greek immigration into Columbus began in 1898 when the first Greek individual permanently settled in Franklin County. Migrants into the Columbus community have come both from Greece and from other areas in the United States. In correct demographic terminology, those persons entering Columbus from Greece are called immigrants and those persons entering from other areas of the United States are called in-migrants. These two groups will be considered both separately and in combination for analytical purposes. When I am speaking of the two groups in combination, I shall use the term "migrant."

The total number of migrants into the Columbus Greek community is depicted graphically by decade in Figure 11. From this chart we can see that the total number of migrants increased from the last 19th century
Figure 11 -- Total migration into Columbus 1900-1970.
decade until a time close to 1920 when a downward trend began. This decrease was a result of the strict immigrant quota laws enacted in the second decade of this century. The downward trend ended during the 1930-40 decade because of the increase in immigration after World War II and in-migration from other areas of the United States. Total migration into the Columbus Greek community has increased steadily through the decade 1960-70. Differences by sex of the total number of migrants into the Columbus Greek community are depicted in Figure 12. From this graph we can determine that male/female differences have not been large; however, female peaks generally follow those of the males.

Figures 11 and 12 depict gross data concerning number of migrants entering Columbus. A more refined measure of migration is the migration rate, calculated as

\[
\text{migration rate} = \frac{\text{total migration into Columbus Greek community}}{\text{mid-decade Columbus Greek community population}}
\]

The rates of migration in and out of Columbus and the net migration rate are shown for each decade in Table 13. Here we see that the pattern of migration into the Columbus population is roughly the same as that depicted in Figure 11 until the decade of the 1940's. Although the total number of migrants has increased with each successive decade since 1940, the rate of migration into the
Figure 12 -- Total migration into the Columbus Greek community by sex.
Table 13 — Total migration rate into the Columbus Greek community.

<table>
<thead>
<tr>
<th>DECADE</th>
<th>RATE OF MIGRATION IN</th>
<th>RATE OF MIGRATION OUT</th>
<th>NET MIGRATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1891-1900</td>
<td>100%</td>
<td>0</td>
<td>+100%</td>
</tr>
<tr>
<td>1901-1910</td>
<td>94.3%</td>
<td>0</td>
<td>+ 94.3%</td>
</tr>
<tr>
<td>1911-1920</td>
<td>47.3%</td>
<td>12.3%</td>
<td>+ 45.0%</td>
</tr>
<tr>
<td>1921-1930</td>
<td>13.8%</td>
<td>4.0%</td>
<td>+ 9.8%</td>
</tr>
<tr>
<td>1931-1940</td>
<td>8.2%</td>
<td>3.1%</td>
<td>+ 5.1%</td>
</tr>
<tr>
<td>1941-1950</td>
<td>15.1%</td>
<td>4.0%</td>
<td>+ 11.1%</td>
</tr>
<tr>
<td>1951-1960</td>
<td>14.5%</td>
<td>1.0%</td>
<td>+ 13.5%</td>
</tr>
<tr>
<td>1961-1970</td>
<td>15.5%</td>
<td>1.5%</td>
<td>+ 14.0%</td>
</tr>
</tbody>
</table>
Columbus Greek community has remained close to 15% since then. The reason that the rate has remained relatively constant even though the total number of migrants is increasing is that the total population size has increased proportionately.

The rate of migration away from the Columbus Greek community (also seen in Table 13) has always been substantially lower than migration into the population. However, it should be noted that the rate of out-migration is likely to have been underestimated since there was no method to detect total family units leaving Columbus.

Migrants, on the whole, have tended to be drawn from younger age categories. For the decades 1891-1930, the 5 year age cohort representing the major migrating group was that of the 15-19 year class. Since 1930, however, migrants in the 20-24 year class have predominated. An interesting trend in the past six years has been an increase in the proportion of migrants over 40 years of age. I have interpreted this latter trend to be the result of established Greek families bringing their parents to live with or near them.

Total migration into the Columbus Greek community has been the result of the entry of two categories of migrants: immigrants from Greece and in-migrants of Greek descent born in other parts of the United States. A
comparison of these two groups is shown in Table 14. As seen in this table, the percentage of immigrants from Greece was highest early in this century and it sharply decreased since 1920-30. Since that time, migrants into the Columbus Greek population have been drawn almost equally from Greece and from other areas of the United States. When all years are combined, the total number of immigrants is considerably greater than the number of in-migrants (59.1% and 40.9% respectively).

The two categories also differ considerably in their male/female ratios. In-migrants are represented by nearly equal numbers of males and females, 99 and 94 or 51.3% respectively. Immigrants from Greece, however, are much more heavily weighted by males: 164 males to 105 females, or 61.0% and 39.0% respectively. Thus, in terms of the Columbus data, it seems that within the United States, males and females of Greek ancestry seem nearly equally mobile, while males from Greece are much more likely than females to immigrate.

Immigrants have not come equally from all parts of Greece. Figure 13 is a map of Greece indicating provinces and notable islands. Table 15 depicts the five major areas from which Greek immigrants have originated. It shows that in every decade, the greatest number of immigrants come from the area of the Peloponnesus.
Table 14 -- Comparison of in-migration to immigration.

<table>
<thead>
<tr>
<th>DECADE</th>
<th>IN-MIGRATION (from other U.S.)</th>
<th>IMMIGRATION (from Greece)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># male</td>
<td># female</td>
</tr>
<tr>
<td>1891-1900</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1901-1910</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1911-1920</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1921-1930</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>1931-1940</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>1941-1950</td>
<td>19</td>
<td>14</td>
</tr>
<tr>
<td>1951-1960</td>
<td>23</td>
<td>27</td>
</tr>
<tr>
<td>1961-1970</td>
<td>28</td>
<td>34</td>
</tr>
<tr>
<td>1971-1976</td>
<td>17</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>99</td>
<td>94</td>
</tr>
<tr>
<td>Total % for All years</td>
<td>40.9%</td>
<td></td>
</tr>
</tbody>
</table>
Figure 13 — Map of Greece.
Table 15 — % immigration from 5 major areas in Greece.

<table>
<thead>
<tr>
<th>DECADE</th>
<th>PELOPONNESUS</th>
<th>THESSALY</th>
<th>SMERNA</th>
<th>OTHER</th>
<th>AITOLIA</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>to 1900</td>
<td>67.0%</td>
<td>0</td>
<td>0</td>
<td>33.0%</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>1901-1910</td>
<td>88.6%</td>
<td>0</td>
<td>5.7</td>
<td>3.4</td>
<td>3.4</td>
<td>35</td>
</tr>
<tr>
<td>1911-1920</td>
<td>67.0</td>
<td>4.0</td>
<td>14.0</td>
<td>8.0</td>
<td>8.0</td>
<td>50</td>
</tr>
<tr>
<td>1921-1930</td>
<td>65.0</td>
<td>10.0</td>
<td>20.0</td>
<td>0.5</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>1931-1940</td>
<td>46.6</td>
<td>0</td>
<td>6.7</td>
<td>46.6</td>
<td>13.3</td>
<td>15</td>
</tr>
<tr>
<td>1941-1950</td>
<td>33.3</td>
<td>25.9</td>
<td>7.4</td>
<td>33.0</td>
<td>0</td>
<td>27</td>
</tr>
<tr>
<td>1951-1960</td>
<td>41.9</td>
<td>11.6</td>
<td>7.0</td>
<td>34.8</td>
<td>4.7</td>
<td>43</td>
</tr>
<tr>
<td>1961-1970</td>
<td>41.4</td>
<td>11.4</td>
<td>1.4</td>
<td>45.7</td>
<td>7.1</td>
<td>70</td>
</tr>
<tr>
<td>1971-1976</td>
<td>20.6</td>
<td>0</td>
<td>2.9</td>
<td>64.7</td>
<td>11.8</td>
<td>34</td>
</tr>
</tbody>
</table>
Further, when immigration data from all provinces and major islands are combined, as in Table 16, we see that two provinces in the Peloponnesus account for 45.8% of the total Greek immigration into Columbus. Hence, there has been a definite selection in terms of geographic areas of emigration. As a result, many families in Columbus are related through persons living in Greece.

It is also interesting that the majority of immigrants came from rural areas of Greece. It has only been since 1950 that any appreciable immigration has originated from the urban areas of Athens or Seloniki. This, however, is consistent with the pattern of in-migration within Greece; movement has been very heavy only from the rural to the urban areas.

**Marriage Patterns**

**Marital Status**

The marital status by decade of birth of the individual is depicted in Table 17 for males and Table 18 for females. The statuses are coded either according to the present condition of the individual or the condition at time of death.

Two major patterns emerge from an analysis of this data. First, in considering the data for persons born
Table 16 -- Total migration from provinces and major islands in Greece for period 1890-1976.

<table>
<thead>
<tr>
<th>PROVINCE</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chalkidike</td>
<td>5.7</td>
</tr>
<tr>
<td>Thrace</td>
<td>1.0</td>
</tr>
<tr>
<td>Illyria</td>
<td>0</td>
</tr>
<tr>
<td>Epiros</td>
<td>0.3</td>
</tr>
<tr>
<td>Thessaly</td>
<td>8.1</td>
</tr>
<tr>
<td>W. Lorkis</td>
<td>0.3</td>
</tr>
<tr>
<td>Phokis</td>
<td>0.3</td>
</tr>
<tr>
<td>Aitolia</td>
<td>6.1</td>
</tr>
<tr>
<td>Arkarnania</td>
<td>0</td>
</tr>
<tr>
<td>Biotia</td>
<td>0</td>
</tr>
<tr>
<td>Attica (including Athens)</td>
<td>6.1</td>
</tr>
<tr>
<td>Peloponnnessus</td>
<td></td>
</tr>
<tr>
<td>Elis</td>
<td>1.7</td>
</tr>
<tr>
<td>Achaia</td>
<td>1.7</td>
</tr>
<tr>
<td>Argolis</td>
<td>2.0</td>
</tr>
<tr>
<td>Arcadia</td>
<td>26.3</td>
</tr>
<tr>
<td>Messinia</td>
<td>1.7</td>
</tr>
<tr>
<td>Laconia (Sparta)</td>
<td>19.5</td>
</tr>
<tr>
<td>Smerna</td>
<td>6.3</td>
</tr>
<tr>
<td>Crete</td>
<td>1.3</td>
</tr>
<tr>
<td>Rhodes</td>
<td>0.3</td>
</tr>
<tr>
<td>Samos</td>
<td>0.3</td>
</tr>
<tr>
<td>Chios</td>
<td>4.7</td>
</tr>
<tr>
<td>Corfu</td>
<td>0</td>
</tr>
<tr>
<td>Cephalonia</td>
<td>3.0</td>
</tr>
<tr>
<td>Limnos</td>
<td>1.0</td>
</tr>
<tr>
<td>Sporades</td>
<td>0</td>
</tr>
<tr>
<td>Agean</td>
<td>0.6</td>
</tr>
<tr>
<td>Cyclades</td>
<td>0.6</td>
</tr>
<tr>
<td>Karpathos</td>
<td>0.6</td>
</tr>
<tr>
<td>Ikaria</td>
<td>1.7</td>
</tr>
</tbody>
</table>
Table 17 — Male marital status by decade of birth.

<table>
<thead>
<tr>
<th>DECADE OF BIRTH</th>
<th>SINGLE</th>
<th>MARRIED</th>
<th>SEPARATED</th>
<th>DIVORCED</th>
<th>REMARRIED</th>
<th>WIDOWED</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1871-1880</td>
<td>11.8%</td>
<td>76.5%</td>
<td>0</td>
<td>0</td>
<td>5.9%</td>
<td>5.9%</td>
<td>17</td>
</tr>
<tr>
<td>1881-1890</td>
<td>11.1%</td>
<td>66.7%</td>
<td>0</td>
<td>0</td>
<td>5.6%</td>
<td>10.7%</td>
<td>36</td>
</tr>
<tr>
<td>1891-1900</td>
<td>2.3%</td>
<td>86.4%</td>
<td>0</td>
<td>0</td>
<td>4.6%</td>
<td>6.8%</td>
<td>44</td>
</tr>
<tr>
<td>1901-1910</td>
<td>17.9%</td>
<td>75.0%</td>
<td>0</td>
<td>2.2%</td>
<td>3.6%</td>
<td>3.6%</td>
<td>23</td>
</tr>
<tr>
<td>1911-1920</td>
<td>19.1%</td>
<td>73.5%</td>
<td>0</td>
<td>2.9%</td>
<td>0</td>
<td>4.4%</td>
<td>68</td>
</tr>
<tr>
<td>1921-1930</td>
<td>9.9%</td>
<td>80.2%</td>
<td>0</td>
<td>5.5%</td>
<td>3.3%</td>
<td>1.1%</td>
<td>91</td>
</tr>
<tr>
<td>1931-1940</td>
<td>20.0%</td>
<td>71.3%</td>
<td>1.3%</td>
<td>3.8%</td>
<td>3.8%</td>
<td>0</td>
<td>80</td>
</tr>
<tr>
<td>1941-1950</td>
<td>30.5%</td>
<td>59.8%</td>
<td>0</td>
<td>7.3%</td>
<td>1.2%</td>
<td>1.2%</td>
<td>82</td>
</tr>
<tr>
<td>1951-1960</td>
<td>87.4%</td>
<td>12.6%</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>119</td>
</tr>
<tr>
<td>1961-1970</td>
<td>100.0%</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>1971-1976</td>
<td>100.0%</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>84</td>
</tr>
</tbody>
</table>

Total 548

Composite data on persons at least 37 years old:

<p>| | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>13.7%</td>
<td>75.8%</td>
<td>0.2%</td>
<td>3.0%</td>
<td>3.3%</td>
<td>3.8%</td>
<td>364</td>
<td></td>
</tr>
</tbody>
</table>
Table 18 -- Female marital status by decade of birth.

<table>
<thead>
<tr>
<th>DECADE OF BIRTH</th>
<th>SINGLE</th>
<th>MARRIED</th>
<th>SEPARATED</th>
<th>DIVORCED</th>
<th>REMARRIED</th>
<th>WIDOWED</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1881-1890</td>
<td>0</td>
<td>10.0%</td>
<td>0</td>
<td>0</td>
<td>10.0%</td>
<td>80.0%</td>
<td>10</td>
</tr>
<tr>
<td>1891-1900</td>
<td>0</td>
<td>36.1</td>
<td>0</td>
<td>0</td>
<td>2.8</td>
<td>61.1</td>
<td>36</td>
</tr>
<tr>
<td>1901-1910</td>
<td>2.7</td>
<td>37.8</td>
<td>0</td>
<td>0</td>
<td>5.4</td>
<td>54.1</td>
<td>37</td>
</tr>
<tr>
<td>1911-1920</td>
<td>7.3</td>
<td>65.6</td>
<td>0</td>
<td>1.8</td>
<td>25.5</td>
<td>55</td>
<td></td>
</tr>
<tr>
<td>1921-1930</td>
<td>2.6</td>
<td>77.9</td>
<td>9.1</td>
<td>1.3</td>
<td>9.1</td>
<td>77</td>
<td></td>
</tr>
<tr>
<td>1931-1940</td>
<td>3.2</td>
<td>81.0</td>
<td>1.6</td>
<td>6.3</td>
<td>4.8</td>
<td>3.2</td>
<td>63</td>
</tr>
<tr>
<td>1941-1950</td>
<td>14.6</td>
<td>79.2</td>
<td>6.3</td>
<td>0</td>
<td>1.0</td>
<td>96</td>
<td></td>
</tr>
<tr>
<td>1951-1960</td>
<td>62.2</td>
<td>36.5</td>
<td>1.4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>74</td>
</tr>
<tr>
<td>1961-1970</td>
<td>100.0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>42</td>
</tr>
<tr>
<td>1971-1976</td>
<td>100.0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>30</td>
</tr>
</tbody>
</table>

Composite data on persons at least 37 years old:

3.2%  62.9%  0.4%  3.9%  3.2%  26.5%  278
prior to 1940, we find that many more males than females remain single (13.7% for males; 3.2% for females).

Further, the data concerning the number of single males is an underestimate because the total number of single males in the population is underenumerated as will be shown in the analysis of mortality.

Second, there is a higher percentage of females who are in a divorced, separated or widowed status than there are males in divorced, separated or widower status. The slightly younger age at death of males is only a partial answer to this disparity. More important is the practice for males to remarry and thus reenter the "married" status. Seventeen males have remarried in contrast to only nine remarried females. This disparity is further heightened when we consider that there are many more females who are eligible to remarry.

Age at First Marriage

A summary of the data for the age at first marriage is shown by decade according to the year of birth of the individual in Table 19 for females and Table 20 for males. Males in the Columbus Greek population have, on the average, married later than females in all time periods. Only two women have married younger males, and the difference in their ages was not greater than 18 months.
Table 19 -- Age at first marriage for Columbus Greek females.

<table>
<thead>
<tr>
<th>YEAR OF BIRTH</th>
<th>NUMBER</th>
<th>MEAN</th>
<th>RANGE</th>
<th>MEDIAN (MODE)</th>
<th>$\sigma^2$</th>
<th>$\sigma$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1891-1900</td>
<td>34</td>
<td>21.33</td>
<td>14-34</td>
<td>21 (17)</td>
<td>27.28</td>
<td>5.22</td>
</tr>
<tr>
<td>1901-1910</td>
<td>36</td>
<td>25.22</td>
<td>15-62</td>
<td>23 (25)</td>
<td>131.89</td>
<td>11.48</td>
</tr>
<tr>
<td>1911-1920</td>
<td>50</td>
<td>23.78</td>
<td>14-47</td>
<td>21 (18)</td>
<td>51.03</td>
<td>7.14</td>
</tr>
<tr>
<td>1921-1930</td>
<td>71</td>
<td>23.38</td>
<td>16-40</td>
<td>22 (22)</td>
<td>21.75</td>
<td>4.66</td>
</tr>
<tr>
<td>1931-1940</td>
<td>56</td>
<td>23.41</td>
<td>18-37</td>
<td>21 (20)</td>
<td>19.63</td>
<td>4.43</td>
</tr>
<tr>
<td>1941-1950</td>
<td>81</td>
<td>22.52</td>
<td>15-33</td>
<td>22 (23)</td>
<td>9.88</td>
<td>3.14</td>
</tr>
<tr>
<td>1951-1960</td>
<td>25</td>
<td>19.96</td>
<td>17-24</td>
<td>19 (20)</td>
<td>4.21</td>
<td>2.05</td>
</tr>
<tr>
<td>1961-1970</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1971-1976</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Table 20 — Age at first marriage for Columbus Greek males and differences in means between males and females.

<table>
<thead>
<tr>
<th>YEAR OF BIRTH</th>
<th>NUMBER</th>
<th>MEAN</th>
<th>RANGE</th>
<th>MEDIAN (MODE)</th>
<th>t²</th>
<th>t</th>
<th>DIFFERENCE IN MEANS (♂ - ♀)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1871-1880</td>
<td>13</td>
<td>34.77</td>
<td>17-42</td>
<td>35 (35)</td>
<td>37.86</td>
<td>6.15</td>
<td>----</td>
</tr>
<tr>
<td>1881-1890</td>
<td>33</td>
<td>33.18</td>
<td>19-53</td>
<td>31 (31)</td>
<td>63.72</td>
<td>7.98</td>
<td>----</td>
</tr>
<tr>
<td>1891-1900</td>
<td>41</td>
<td>33.07</td>
<td>21-68</td>
<td>32 (33)</td>
<td>23.07</td>
<td>4.80</td>
<td>11.63</td>
</tr>
<tr>
<td>1901-1910</td>
<td>21</td>
<td>31.90</td>
<td>22-48</td>
<td>30 (40)</td>
<td>54.19</td>
<td>7.36</td>
<td>6.68</td>
</tr>
<tr>
<td>1911-1920</td>
<td>55</td>
<td>30.13</td>
<td>21-47</td>
<td>29 (30)</td>
<td>35.89</td>
<td>5.99</td>
<td>6.35</td>
</tr>
<tr>
<td>1921-1930</td>
<td>81</td>
<td>28.09</td>
<td>19-40</td>
<td>26 (25)</td>
<td>236.80</td>
<td>15.39</td>
<td>4.71</td>
</tr>
<tr>
<td>1931-1940</td>
<td>60</td>
<td>28.17</td>
<td>20-39</td>
<td>28 (29)</td>
<td>18.21</td>
<td>4.27</td>
<td>4.76</td>
</tr>
<tr>
<td>1941-1950</td>
<td>47</td>
<td>25.09</td>
<td>19-31</td>
<td>23 (24)</td>
<td>16.25</td>
<td>4.32</td>
<td>2.57</td>
</tr>
<tr>
<td>1951-1960</td>
<td>13</td>
<td>21.54</td>
<td>19-25</td>
<td>20 (21)</td>
<td>25.6</td>
<td>5.06</td>
<td>1.58</td>
</tr>
<tr>
<td>1961-1970</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
The difference in the mean age at marriage between males and females has decreased from the decade beginning 1901 to the decade beginning 1931 (a mean age difference from 11.63 to 4.76). Persons born after 1940 were not considered in this calculation because they would obviously bias the result; they would have an earlier mean age at marriage as many of them are still single).

The decreasing difference in mean age can be attributed to a significant trend among the males toward earlier ages at marriage. The mean age at first marriage for males was highest in the decade beginning 1871 and steadily decreased through the decade ending in 1940 (mean ages were 34.77 and 28.17 respectively). By using the analysis of variance test, I determined that the downward trend in age at first marriage was significant for males at a .05 level (F statistic: 2.938). There was no significant trend discernable for the female population (F statistic: 1.458).

**Congruence in Spouses' Place of Origin**

Data were available for a total of 371 persons in which the birthplace of both spouses was known. Table 21 compares the birthplaces of marriage partners by the decade of birth of the female partner.
Table 21 -- Place of birth: female and spouse by decade of female birth.

<table>
<thead>
<tr>
<th>PERCENTAGES</th>
<th>FEMALE BIRTHPLACE</th>
<th>1</th>
<th>1</th>
<th>1</th>
<th>2</th>
<th>2</th>
<th>2</th>
<th>3</th>
<th>3</th>
<th>3</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>MALE BIRTHPLACE</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>#</td>
<td></td>
</tr>
<tr>
<td>1881-1890</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>11.0</td>
<td>89.0</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>1891-1900</td>
<td>0</td>
<td>0</td>
<td>18.3</td>
<td>0</td>
<td>0</td>
<td>2.8</td>
<td>0</td>
<td>11.0</td>
<td>86.2</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>1901-1910</td>
<td>17.6</td>
<td>12.0</td>
<td>17.6</td>
<td>2.0</td>
<td>9.8</td>
<td>9.8</td>
<td>0</td>
<td>0</td>
<td>31.4</td>
<td>51</td>
<td></td>
</tr>
<tr>
<td>1911-1920</td>
<td>32.4</td>
<td>14.1</td>
<td>2.8</td>
<td>18.3</td>
<td>8.5</td>
<td>7.0</td>
<td>1.4</td>
<td>1.4</td>
<td>14.1</td>
<td>71</td>
<td></td>
</tr>
<tr>
<td>1921-1930</td>
<td>20.0</td>
<td>16.7</td>
<td>3.3</td>
<td>10.0</td>
<td>16.7</td>
<td>18.3</td>
<td>3.3</td>
<td>3.3</td>
<td>8.3</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>1931-1940</td>
<td>25.6</td>
<td>15.9</td>
<td>8.5</td>
<td>6.1</td>
<td>3.7</td>
<td>7.3</td>
<td>4.9</td>
<td>2.4</td>
<td>25.6</td>
<td>82</td>
<td></td>
</tr>
<tr>
<td>1941-1950</td>
<td>38.5</td>
<td>3.8</td>
<td>11.5</td>
<td>7.7</td>
<td>7.7</td>
<td>0</td>
<td>15.4</td>
<td>0</td>
<td>15.4</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>1951-1960</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1961-1976</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>371</td>
<td></td>
</tr>
</tbody>
</table>

N = 75 40 30 27 26 31 12 6 124 = 371

Total % 20.2 10.8 8.1 7.3 7.0 8.4 3.2 1.6 33.4 = 100%
In all time periods, the most frequent pairing for marriage partners' birthplaces was "both from Greece" (33.4%). This pairing was highest (89%) in the first decade for which we have data (1881-1890) and decreases to a low (8.3%) in the decade beginning in 1931. With increased immigration, pairing has risen but has never again exceeded other ratios in a given decade.

The second most frequent pairing (20.2%) when all data are totalled is the one in which both spouses are born in Columbus. Because there was no female birth in Columbus prior to the decade beginning in 1911, there obviously are no data prior to that date. This pairing has fluctuated from a low of 17.6% in the first possible decade to a high of 38.5% in the decade beginning in 1951, the one for which we have the latest data.

A total of 39.4% of pairings occur between partners who do not have the same place of origin. These pairings are comprised of a total of 6 possible categories. Thus, there seems to be geographical endogamy in that persons born in Greece tend to marry mates from Greece, and persons born in Columbus tend to marry mates from Columbus.

An interesting characteristic that was noted is that females from Greece less often (4.8%) married non-Greeks than did males (16.5%). This will be reintroduced in the discussion.
Greek Ancestry Endogamy

Table 22 depicts matings of persons characterized as Pull, Mixed or Non-Greek by the decade of birth of the female spouse. Of the 376 marriages for which the ancestry of both spouses was known, a total of 278 or 73.9% have been between persons both having Pull Greek ancestry. This pairing reached a peak in the decade ending in 1910 and has steadily decreased since then to a low of 48.1% in the decade of wife's birth ending in 1960.

Among those members of the community of Pull or Mixed ancestry who married Non-Greek spouses, the majority were male. Thus, males more often tended to marry out of the community than did females. This may suggest a lower submission of the males to the endogamous rule of the community; it may also reflect a lower proportion of eligible Pull or Mixed Greek females.

Table 23 compares the data concerning congruence in spouse's place of birth with congruence in proportion Greek. Again, marriages are arranged by decade according to the wife's birthyear. From Table 23 it is clear that the percentage of marriages of persons born in the same geographical area is less than the proportion of marriages in which both spouses have Pull Greek ancestry. Thus, we may infer that cultural endogamy is a more important factor in selecting a mate than is geographical
<table>
<thead>
<tr>
<th>FEMALE'S BIRTH DECADE</th>
<th>FULL GREEK X FULL GREEK</th>
<th>FULL GREEK X MIXED GREEK</th>
<th>FULL GREEK X NON GREEK</th>
<th>MIXED GREEK X MIXED GREEK</th>
<th>MIXED GREEK X NON GREEK</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1891-1900</td>
<td>88.6%</td>
<td>11.4%</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>1901-1910</td>
<td>97.2</td>
<td>2.7</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>35</td>
</tr>
<tr>
<td>1911-1920</td>
<td>84.3</td>
<td>0</td>
<td>13.7</td>
<td>0</td>
<td>2.0</td>
<td>36</td>
</tr>
<tr>
<td>1921-1930</td>
<td>71.6</td>
<td>9.5</td>
<td>16.2</td>
<td>0</td>
<td>2.7</td>
<td>74</td>
</tr>
<tr>
<td>1931-1940</td>
<td>70.5</td>
<td>11.5</td>
<td>16.4</td>
<td>1.6</td>
<td>0</td>
<td>61</td>
</tr>
<tr>
<td>1941-1950</td>
<td>61.0</td>
<td>13.4</td>
<td>24.4</td>
<td>1.2</td>
<td>0</td>
<td>82</td>
</tr>
<tr>
<td>1951-1960</td>
<td>48.1</td>
<td>3.7</td>
<td>14.8</td>
<td>18.5</td>
<td>0</td>
<td>27</td>
</tr>
<tr>
<td>1961-1976</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Table 23 — Comparison of ethnic vs. geographical endogamy by decade of female’s birth.

<table>
<thead>
<tr>
<th>FEMALE'S BIRTH DECADE</th>
<th>% MARRIAGES WITH CONGRUENCE IN PLACE OF ORIGIN</th>
<th>% MARRIAGES IN WHICH BOTH ARE FULL GREEK</th>
</tr>
</thead>
<tbody>
<tr>
<td>1881-1890</td>
<td>89.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>1901-1910</td>
<td>81.0%</td>
<td>97.0</td>
</tr>
<tr>
<td>1911-1920</td>
<td>58.8%</td>
<td>84.0</td>
</tr>
<tr>
<td>1921-1930</td>
<td>55.0%</td>
<td>71.6</td>
</tr>
<tr>
<td>1931-1940</td>
<td>44.7%</td>
<td>70.5</td>
</tr>
<tr>
<td>1941-1950</td>
<td>54.9%</td>
<td>61.0</td>
</tr>
</tbody>
</table>
Age of Menarche

Patterns of fertility are in part dependent upon the fecundity of the females of the population, which in turn is partly determined by the age of menarche. Table 24 summarizes the menarcheal data for 142 females for whom information was known. The mean ages at menarche were calculated according to the woman's year of birth and grouped by 20 year cohorts. Three females, one each from the first three cohorts, never began menstrual periods. These females were excluded from calculation.

On the average, the age of menarche has occurred at increasingly earlier ages. Using analysis of variance, I found that the decrease in the mean age of menarche was significant at the .05 level of confidence (F statistic: 17.593). Only the first four cohorts were used in calculating the mean age at menarche because many females in the fifth cohort have not yet reached the critical age period.

Tanner (1973) has described this same trend for females in general throughout the United States as a part of his secular growth trend. He attributes this decrease
Table 24 — Age at menarche of females in the Columbus Greek community.

<table>
<thead>
<tr>
<th>FEMALE'S BIRTH DECADE</th>
<th>N</th>
<th>MEAN AGE AT MENARCHE</th>
<th>MEDIAN (MODE)</th>
<th>RANGE</th>
<th>$\tau^2$</th>
<th>$\Upsilon$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1881-1900</td>
<td>9</td>
<td>14.78</td>
<td>14+ (15)</td>
<td>13-16</td>
<td>.94</td>
<td>.97</td>
</tr>
<tr>
<td>1901-1920</td>
<td>20</td>
<td>13.75</td>
<td>13 (13)</td>
<td>12-17</td>
<td>2.62</td>
<td>1.62</td>
</tr>
<tr>
<td>1921-1940</td>
<td>50</td>
<td>12.4</td>
<td>12- (12)</td>
<td>10-16</td>
<td>1.63</td>
<td>1.28</td>
</tr>
<tr>
<td>1941-1960</td>
<td>56</td>
<td>11.98</td>
<td>12- (12)</td>
<td>10-16</td>
<td>1.69</td>
<td>1.3</td>
</tr>
</tbody>
</table>
in mean age of menarche to better nutrition and social conditions. Heterosis has also been postulated as a factor decreasing the age of menarche. Neither of these hypotheses were testable from my data, however.

Rates of Fertility

Table 25 compares the crude birth rate of women in the Columbus Greek community with that of all women in Columbus and all women in Ohio. The data are arranged by decade according to the date of birth of the child. The Columbus (total) and Ohio data were obtained from the Division of Vital Statistics, Ohio Department of Health. Because the health department listed the birth rate for each year, I had to combine data for the decade and obtain a mean for the ten year period. For the Greek population, the total number of births in a ten year period was divided by the mid-decade population; the rate was then calculated/1000 population for consistency in comparison with the Columbus (total) and Ohio data.

The much higher crude birth rates of the Columbus Greek population (sometimes 2-4 times that of the total Columbus and Ohio populations) during the first three decades is primarily a reflection of the age distribution of the population. It will be remembered that the early Greek community was a very young community. Hence, most
Table 25 -- Crude birth rates.

<table>
<thead>
<tr>
<th>YEAR OF BIRTH</th>
<th>COLUMBUS GREEK POPULATION</th>
<th>ALL COLUMBUS</th>
<th>ALL OHIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1901-1910</td>
<td>30.0</td>
<td>17.5</td>
<td>21.8</td>
</tr>
<tr>
<td>1911-1920</td>
<td>64.4</td>
<td>18.1</td>
<td>20.6</td>
</tr>
<tr>
<td>1921-1930</td>
<td>35.3</td>
<td>19.6</td>
<td>19.6</td>
</tr>
<tr>
<td>1931-1940</td>
<td>19.7</td>
<td>16.2</td>
<td>14.9</td>
</tr>
<tr>
<td>1941-1950</td>
<td>25.3</td>
<td>21.5</td>
<td>21.7</td>
</tr>
<tr>
<td>1951-1960</td>
<td>26.2</td>
<td>27.0</td>
<td>25.2</td>
</tr>
<tr>
<td>1961-1970</td>
<td>16.3</td>
<td>19.7</td>
<td>17.5</td>
</tr>
<tr>
<td>1971-1976</td>
<td>18.4</td>
<td>18.0</td>
<td>15.7</td>
</tr>
</tbody>
</table>
members of the community were either in fertile years or were children. All three categories of populations demonstrated a significant decrease during the decade beginning in 1930, and this reflects the general trend in the United States during the period of the depression. Since that time, the Columbus Greek population's birth rate has been lower than or nearly equal to that of the total Columbus population. This is a reflection both of an increasingly older population as well as a decrease in actual fertility/women in the Columbus Greek community, as will be shown shortly.

Table 26 gives the fertility ratio (number of children aged 0-4/number of females over age 14) of the Columbus Greek population by decade according to the year of birth of the child. The drastic fluctuation from a high ratio of 1428.6/1000 women for the decade beginning in 1901 to a low ratio of 226/1000 women for the decade ending in 1970 is a reflection of the pattern of migration. In the first part of the century, the majority of women in the Columbus Greek community were of childbearing age. A drastic decrease in this ratio occurred from the decade beginning 1901 through the decade ending in 1940. Since that time, there has been a much more gradual decrease in the fertility ratio.
Table 26 — Fertility rates of women in the Columbus Greek community.

<table>
<thead>
<tr>
<th>Decade</th>
<th>Rate/1000 women</th>
</tr>
</thead>
<tbody>
<tr>
<td>1900-1910</td>
<td>1428.6</td>
</tr>
<tr>
<td>1911-1920</td>
<td>1230.4</td>
</tr>
<tr>
<td>1921-1930</td>
<td>956.7</td>
</tr>
<tr>
<td>1931-1940</td>
<td>325.5</td>
</tr>
<tr>
<td>1941-1950</td>
<td>366.5</td>
</tr>
<tr>
<td>1951-1960</td>
<td>398.2</td>
</tr>
<tr>
<td>1961-1970</td>
<td>226.0</td>
</tr>
<tr>
<td>1971-1976</td>
<td>228.3</td>
</tr>
</tbody>
</table>
Age-specific birth rates are shown in Table 27. The data are organized by the decade of birth of the child to show the births by age of mother. From inspection of the table we see the trend toward an increase in the age of the mother. However, as these are only gross data and not standardized for differing numbers of women in each age cohort, this table will not be examined further. We will now consider more accurate indicators of the fertility pattern.

Table 28 depicts the number of livebirths of 505 women for whom complete reproductive histories were known. These data were organized according to 20 year cohorts by the date of the female's birth. By inspection we see a consistent trend of decreasing number of livebirths/female in each successive 20 year cohort. The mean number of livebirths decreased from a high of 3.98/female in the cohort beginning in 1881 to a low of 2.27/female in the cohort ending in 1940. In relation to this, the range has also decreased from 12 in the first cohort to 6 in the third cohort. Using analysis of variance, I found that this decrease in number of livebirths was significant at the .05 level of confidence (F statistic: 19.325). Only the first three cohorts were used in the calculations because the fourth cohort has not completed their reproductive years.
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>85+</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>80-84</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>75-79</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>70-74</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>65-69</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>60-64</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>55-59</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>50-54</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>45-49</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>40-44</td>
<td>6</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>35-39</td>
<td>16</td>
<td>13</td>
<td>9</td>
<td>19</td>
<td>12</td>
<td>11</td>
<td>8</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>30-34</td>
<td>50</td>
<td>34</td>
<td>32</td>
<td>45</td>
<td>33</td>
<td>31</td>
<td>27</td>
<td>20</td>
<td>18</td>
<td>17</td>
<td>16</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>25-29</td>
<td>23</td>
<td>27</td>
<td>31</td>
<td>28</td>
<td>27</td>
<td>25</td>
<td>21</td>
<td>18</td>
<td>16</td>
<td>15</td>
<td>14</td>
<td>13</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>20-24</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>15-19</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10-14</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5-9</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4-8</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 27 -- Births by age of mother.
Table 28 — Number of livebirths/female.

<table>
<thead>
<tr>
<th>YEAR OF MOTHER'S BIRTH</th>
<th>N</th>
<th>MEAN</th>
<th>MEDIAN (MODE)</th>
<th>RANGE</th>
<th>$\sigma^2$</th>
<th>$\bar{\sigma}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1881-1900</td>
<td>53</td>
<td>3.98</td>
<td>3.5 (4)</td>
<td>0-12</td>
<td>6.25</td>
<td>2.5</td>
</tr>
<tr>
<td>1901-1920</td>
<td>90</td>
<td>2.53</td>
<td>2 (2)</td>
<td>0-7</td>
<td>2.79</td>
<td>1.67</td>
</tr>
<tr>
<td>1921-1940</td>
<td>135</td>
<td>2.27</td>
<td>2 (2)</td>
<td>0-6</td>
<td>1.79</td>
<td>1.34</td>
</tr>
<tr>
<td>1941-1960</td>
<td>164</td>
<td>.994</td>
<td>.5 (0)</td>
<td>0-4</td>
<td>1.25</td>
<td>1.12</td>
</tr>
<tr>
<td>1961-1976</td>
<td>63</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>
The percentage of married women never having children, a rough indicator of sterility in the population, has remained relatively stable throughout the history of the population. In the first cohort, 5 of 46 married women (10.9%) had no children; in the second cohort, 11 of 87 married women (12.6%) had no children; and in the third cohort, 15 of 59 married women (11%) had no children.

In no case did an unmarried woman give birth and raise the child within the Columbus Greek community. Although very occasionally an unwed woman would leave Columbus "for a certain time," in no case did the woman return with a child. Hence, the rate of illegitimacy, while impossible to measure accurately, appears to be exceptionally low.

**Reproductive Wastage**

Data concerning reproductive wastage were obtained during the structured interviews. Information concerning the number of miscarriages of 226 women is presented in Table 29; information concerning the number of stillbirths for 310 women is presented in Table 30. In both tables, the data is organized into four 20 year cohorts by the date of the woman's birth. The difference in the sample sizes of the women for miscarriages and
Table 29 -- Rate of miscarriage by year of mother's birth.

<table>
<thead>
<tr>
<th>DECADE OF MOTHER'S BIRTH</th>
<th>N</th>
<th>MEAN</th>
<th>MEDIAN (MODE)</th>
<th>RANGE</th>
<th>( \chi^2 )</th>
<th>( \chi )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1881-1900</td>
<td>26</td>
<td>.808</td>
<td>0 (0)</td>
<td>0-3</td>
<td>1.0415</td>
<td>1.021</td>
</tr>
<tr>
<td>1901-1920</td>
<td>43</td>
<td>.6977</td>
<td>0 (0)</td>
<td>0-6</td>
<td>1.42</td>
<td>1.19</td>
</tr>
<tr>
<td>1921-1940</td>
<td>66</td>
<td>.3485</td>
<td>0 (0)</td>
<td>0-3</td>
<td>.415</td>
<td>.644</td>
</tr>
<tr>
<td>1941-1960</td>
<td>91</td>
<td>.132</td>
<td>0 (0)</td>
<td>0-3</td>
<td>.282</td>
<td>.531</td>
</tr>
</tbody>
</table>
Table 30 -- Rate of stillbirth by year of mother's birth.

<table>
<thead>
<tr>
<th>DECADE OF MOTHER'S BIRTH</th>
<th>N</th>
<th>MEAN</th>
<th>MEDIAN (MODE)</th>
<th>RANGE</th>
<th>$\hat{\tau}^2$</th>
<th>$\hat{\tau}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1881-1900</td>
<td>34</td>
<td>.412</td>
<td>0 (0)</td>
<td>0-2</td>
<td>.371</td>
<td>.61</td>
</tr>
<tr>
<td>1901-1920</td>
<td>59</td>
<td>.153</td>
<td>0 (0)</td>
<td>0-2</td>
<td>.2005</td>
<td>.448</td>
</tr>
<tr>
<td>1921-1940</td>
<td>85</td>
<td>.071</td>
<td>0 (0)</td>
<td>0-1</td>
<td>.0664</td>
<td>.258</td>
</tr>
<tr>
<td>1941-1960</td>
<td>132</td>
<td>.0227</td>
<td>0 (0)</td>
<td>0-1</td>
<td>.0224</td>
<td>.15</td>
</tr>
</tbody>
</table>
stillbirths is the result of children being able to report the number of their mother's stillbirths, although they usually did not know if their mother had suffered spontaneous abortions. Data on miscarriages categorized as "unknown" were not used in calculations.

Both miscarriage and stillbirth rates have consistently decreased in the Columbus Greek population since the community was founded. In the first cohort (women born 1881-1900), 11 of a possible 26 (42.3%) women suffered at least one miscarriage and 12 of a possible 34 (35.3%) had at least one pregnancy that ended in stillbirth. This is in great contrast to the third cohort in which only 7 of 91 women (7.6%) had miscarriages and 3 of 132 (2.3%) had stillbirths.

An inspection of the mean rates of miscarriage and stillbirth also confirms this trend. Miscarriages have decreased from a mean in the first cohort of .81 to that of .13 in the third cohort. Stillbirths have likewise decreased from .41 to .0227. Using analysis of variance, I found that the decrease in both stillbirths and miscarriages was significant at a .05 level of confidence (F statistics: 13.645 and 7.9156 respectively).

There were no induced abortions reported for the first cohort; in the second cohort one woman was reported to have obtained at least one abortion (2.3% of
In the third cohort, 4 women from a possible 61 (6.6%) had obtained at least one abortion, and 1 of 61 (1.6%) had obtained more than one; in the fourth cohort, whose reproductive history is not yet complete, 3 of 83 women (3.6%) have obtained at least one abortion and 2 of 83 (2.4%) have had more than one. Because of limited data, no trends are discernible.

**Childspacing**

There are several methods available to observe childspacing. One important measure is the time between marriage and the birth of the first child. Table 31 presents data concerning this measure according to the decade of birth of the female spouse. In addition to noting the number of years of marriage prior to the birth of the first child, this table also gives the mean age of females at the birth of their first child. As presented in this table, the data show no discernible pattern which relates to the mother's decade of birth.

This table does, however, demonstrate two notable features of the Columbus Greek population. First, the time lag between marriage and birth of the first child is relatively long (2.25 years was the minimum mean and 4.37 years was the maximum mean). Second, the mean age of the woman at the birth of her first child is far
Table 31 -- Mean age at marriage and mean number of years before birth of first child by year of woman's birth.

<table>
<thead>
<tr>
<th>DECADE OF WOMAN'S BIRTH</th>
<th>MEAN AGE AT MARRIAGE</th>
<th>MEAN # YEARS AFTER MARRIAGE BEFORE BIRTH OF FIRST CHILD</th>
<th>MEAN AGE OF MOTHER AT BIRTH OF FIRST CHILD</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1881-1890</td>
<td>24.37</td>
<td>+ 2.25</td>
<td>= 26.62</td>
<td>8</td>
</tr>
<tr>
<td>1891-1900</td>
<td>21.17</td>
<td>+ 2.67</td>
<td>= 23.84</td>
<td>30</td>
</tr>
<tr>
<td>1901-1910</td>
<td>23.0</td>
<td>+ 4.37</td>
<td>= 27.37</td>
<td>27</td>
</tr>
<tr>
<td>1911-1920</td>
<td>22.4</td>
<td>+ 2.6</td>
<td>= 25.0</td>
<td>37</td>
</tr>
<tr>
<td>1921-1930</td>
<td>23.3</td>
<td>+ 2.6</td>
<td>= 25.9</td>
<td>60</td>
</tr>
<tr>
<td>1931-1940</td>
<td>22.8</td>
<td>+ 3.4</td>
<td>= 26.2</td>
<td>46</td>
</tr>
<tr>
<td>1941-1950</td>
<td>21.6</td>
<td>+ 3.1</td>
<td>= 24.7</td>
<td>58</td>
</tr>
</tbody>
</table>
beyond the mean age of menarche. Thus, the decrease in age of menarche will not significantly influence the fertility of the women in this population.

I devised a second measure of childspacing which I call the Index of Birthing Years. It is calculated as

\[
\text{Index} = \frac{\text{number of children} - 1}{\text{age of oldest child} - \text{age of youngest child}}
\]

for each woman. This index gives a measure of the relative compactness of years of actual childbearing for a female. The numerator is so devised to exclude women having only one child. If the total number of children remains constant, but the time span between oldest and youngest child increases, the ratio will decrease. If the time span between oldest and youngest child remains constant and the number of children increases, the ratio will increase. When the number of children for women of different cohorts is known, this can be an interesting and informative index.

The mean index was calculated for fertile females in the Columbus Greek population according to the decade of their births and is presented in Figure 14. Because we know that the mean number of children born to women in the Columbus Greek community has decreased, we would initially anticipate that the index may have also decreased for each cohort. However, by inspection we see
Figure 14 — Mean ratios of Index of Birthing Years.

YEAR OF MOTHER'S BIRTH


.199 (.3535) (.3605) (.3855) (.421) (.4603) (.46) (.4999)
that the index has, in fact, increased. There has been a consistently rising trend within this population. The conclusion, then, is that the total years in which females have children has been considerably shortened since the first cohort, and that this decrease in childbearing years has become increasingly shorter since that time.

Patterns of Birth Control

Table 32 depicts methods of birth control used by women in the Columbus Greek community, grouped according to the 20 year cohort of their birth. A number of interesting features concerning the community are shown here. The percentage of women in each cohort not using any measures of birth control has consistently decreased for each 20 year cohort, and for the women born 1941-1960, only 10.3% of the married women are not using any measures of birth control.

The preferred method of birth control has changed through the years according to what is technologically available and community pattern. In Greece, the decision to use a birth control method is primarily the responsibility of the male (by use of condom or withdrawal). This pattern was the one most prevalent for the first three cohorts (if birth control was used) but it has decreased for the fourth cohort and birth control pills
Table 32—Methods of birth control.

<table>
<thead>
<tr>
<th>DECADE OF MOTHER'S BIRTH</th>
<th>UNKNOWN</th>
<th>STERILIZATION (MALE)</th>
<th>STERILIZATION (FEMALE)</th>
<th>DIAPHRAGM</th>
<th>CONDOMS/withdrawal</th>
<th>RHYTHM</th>
<th>IUD</th>
<th>BIRTH CONTROL</th>
<th>PILLS</th>
<th>NONE</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1941-1940</td>
<td>34%</td>
<td></td>
<td></td>
<td>2.9%</td>
<td>5.9%</td>
<td>5.9%</td>
<td>5.9%</td>
<td>5.9%</td>
<td>5.9%</td>
<td>5.9%</td>
<td>5.9%</td>
</tr>
<tr>
<td>1951-1960</td>
<td>34%</td>
<td></td>
<td></td>
<td>2.9%</td>
<td>5.9%</td>
<td>5.9%</td>
<td>5.9%</td>
<td>5.9%</td>
<td>5.9%</td>
<td>5.9%</td>
<td>5.9%</td>
</tr>
<tr>
<td>1961-1970</td>
<td>34%</td>
<td></td>
<td></td>
<td>2.9%</td>
<td>5.9%</td>
<td>5.9%</td>
<td>5.9%</td>
<td>5.9%</td>
<td>5.9%</td>
<td>5.9%</td>
<td>5.9%</td>
</tr>
<tr>
<td>1971-1980</td>
<td>34%</td>
<td></td>
<td></td>
<td>2.9%</td>
<td>5.9%</td>
<td>5.9%</td>
<td>5.9%</td>
<td>5.9%</td>
<td>5.9%</td>
<td>5.9%</td>
<td>5.9%</td>
</tr>
</tbody>
</table>

*Note: During some decades, not all techniques of birth control had yet been developed.*
have become the method of choice.

An interesting characteristic was found when making this table: 20.6% of the second cohort, 27.8% of the third cohort, and 7.7% of the fourth cohort reported that they did not use birth control methods because they were either sterile or subfecund (indicated by the fact that they had at least one child, but had tried without success to have more).

Table 33 presents patterns in the method of infant feeding used by women in the Columbus Greek community, according to the mother's decade of birth. Although post partum lactation was not reported by any female as a method of birth control, it is so used in many cultures and will be considered here for that reason. In this population, breast feeding has been the major method of infant feeding for women in each of the 20 year cohorts. In addition, relatively few women who desired to breast feed were unable to do so (7.4% of the entire 80 year group).

**Mortality Patterns**

**Mortality Rates**

Table 34 presents the crude death rate for the Columbus Greek population by decades since the founding
Table 33 — Methods of infant feeding by decade of mother's birth.

<table>
<thead>
<tr>
<th>DECADE OF MOTHER'S BIRTH</th>
<th>N</th>
<th>% BREAST</th>
<th>% BOTTLE</th>
<th>% COMBINATION</th>
<th>% WANTED BUT UNABLE TO BREAST FEED</th>
<th>% STARTED WITH BREAST FEEDING, DIDN'T LIKE IT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1881-1900</td>
<td>28</td>
<td>92.9</td>
<td>3.6</td>
<td>3.6</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1901-1920</td>
<td>50</td>
<td>84.0</td>
<td>2.0</td>
<td>8.0</td>
<td>6.0</td>
<td>0</td>
</tr>
<tr>
<td>1921-1940</td>
<td>51</td>
<td>41.2</td>
<td>19.6</td>
<td>19.6</td>
<td>13.7</td>
<td>5.9</td>
</tr>
<tr>
<td>1941-1960</td>
<td>34</td>
<td>52.9</td>
<td>20.6</td>
<td>11.8</td>
<td>5.9</td>
<td>8.8</td>
</tr>
<tr>
<td>1961-1976</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>163</td>
<td>65.6</td>
<td>11.7</td>
<td>11.7</td>
<td>7.4</td>
<td>3.7</td>
</tr>
<tr>
<td>YEAR OF DEATH</td>
<td>GREEKS</td>
<td>COLUMBUS</td>
<td>OHIO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------</td>
<td>--------</td>
<td>----------</td>
<td>------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1901-1910</td>
<td>0</td>
<td>14.4</td>
<td>13.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1911-1920</td>
<td>3.8</td>
<td>15.1</td>
<td>13.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1921-1930</td>
<td>2.7</td>
<td>13.9</td>
<td>11.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1931-1940</td>
<td>3.4</td>
<td>13.6</td>
<td>10.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1941-1950</td>
<td>4.6</td>
<td>12.6</td>
<td>10.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1951-1960</td>
<td>4.0</td>
<td>9.9</td>
<td>9.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1961-1970</td>
<td>3.5</td>
<td>9.0</td>
<td>9.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1971-1976</td>
<td>3.6</td>
<td>8.9</td>
<td>9.4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
of the community. It also compares these rates with those of Columbus (total) and Ohio. In general, these rates are exceptionally low. In part, the low rate results from the population being relatively young during most time periods. However, there is a source of error which contributes to this low rate. This error is the result of the underenumeration of single males in the Columbus Greek population. I was able to determine this source of error by comparing my data on mortality with the church death records for selected years. For the decade in which the parish data seemed most complete (1951-1960), I found a total mortality rate of 4.9 deaths/1000 population. Because the marital status of the deceased individual was listed in the parish records, I was able to determine that this error of underestimation is drawn almost entirely from the presence and death of undetected single males in the population. Because the parish records for all years were not available, I was not able to determine if this was a good estimate of error for all decades considered. However, I have no reason to believe that it is not.

Data concerning age-specific deaths are presented according to sex in Tables 35 and 36. These particular data are not very illuminating because of the nature of the migrant population: in the early years, there were
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><img src="image" alt="" /></td>
<td><img src="image" alt="" /></td>
<td><img src="image" alt="" /></td>
<td><img src="image" alt="" /></td>
<td><img src="image" alt="" /></td>
<td><img src="image" alt="" /></td>
<td><img src="image" alt="" /></td>
<td><img src="image" alt="" /></td>
<td><img src="image" alt="" /></td>
<td><img src="image" alt="" /></td>
<td><img src="image" alt="" /></td>
<td><img src="image" alt="" /></td>
</tr>
</tbody>
</table>
Table 36 -- Female deaths by age.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1-4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5-9</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10-14</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>15-19</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>20-24</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>25-29</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>30-34</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>35-39</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>40-44</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>45-49</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>50-54</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>55-59</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>60-64</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>65-69</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>70-74</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>75-79</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>80-84</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>85+</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>
no persons in the older age categories which were then available as a possible death. The mean age at death is presented in Table 37. From this we see that the mean age has consistently increased for each decade. Interpretation of this table is also difficult, however. The increase in the mean age at death is probably a reflection of several of the following factors: an increasingly older population (ultimately giving us deaths in older age categories), a decrease in infant mortality, increased longevity from lower mortality during middlecence. One notable feature of these tables, however, is that there is a greater proportion of male than female child deaths, even when the sex ratio difference is taken into consideration.

Another source of error must be considered when dealing with the mortality data. It is probable that children who died soon after birth, or perhaps within the first year of life, were remembered as stillbirths (this especially seemed to be true if a sibling rather than the mother of the deceased infant was the person interviewed). The degree of error arising from this source, however, was impossible to accurately calculate.

The mortality information of prime importance to physical anthropologists usually concerns mortality which occurs prior to the reproductive years. This measure is
Table 37 — Mean age at death.

<table>
<thead>
<tr>
<th>DECADE OF DEATH</th>
<th>MEAN AGE AT DEATH MALES</th>
<th>N</th>
<th>MEAN AGE AT DEATH FEMALES</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1911-1920</td>
<td>12.3</td>
<td>3</td>
<td>2.0</td>
<td>1</td>
</tr>
<tr>
<td>1921-1930</td>
<td>19.5</td>
<td>4</td>
<td>7.0</td>
<td>1</td>
</tr>
<tr>
<td>1931-1940</td>
<td>34.1</td>
<td>7</td>
<td>38.0</td>
<td>3</td>
</tr>
<tr>
<td>1941-1950</td>
<td>53.8</td>
<td>20</td>
<td>51.0</td>
<td>1</td>
</tr>
<tr>
<td>1951-1960</td>
<td>57.3</td>
<td>18</td>
<td>57.5</td>
<td>6</td>
</tr>
<tr>
<td>1961-1970</td>
<td>64.2</td>
<td>22</td>
<td>66.2</td>
<td>5</td>
</tr>
</tbody>
</table>

Note: Stillbirths not counted.
used in the calculation of Crow's Index of Total Selection. Table 38 presents data concerning this index according to the birthdate of the individual, grouped into 20 year cohorts (males and females being considered together and stillbirths being included). From an inspection of the table, we see that the percentage of each cohort not reaching reproductive age (here calculated at 15) has decreased for each successive cohort.

Causes of Death

Because the parish records did not give cause of death, the only source for this information was the scheduled interviews. Tables 39 and 40 depict causes of death by decade of birth for males and females respectively. For both males and females, the leading causes of death, in decreasing order of frequency, were as follows:

1. heart attack
2. cancer
3. accident
4. stroke
5. pneumonia
6. liver disease
7. diabetes
8. asthma
9. other

These data seem to be fairly reliable indicators of adult causes of death. However, during the interviews, I found that childhood causes of death were often unknown
Table 38 -- % of individuals who fail to survive to reproductive age.

<table>
<thead>
<tr>
<th>GENERATION</th>
<th>BIRTHDATE</th>
<th>BIRTHS</th>
<th>SAMPLE SIZE BIRTHS &amp; MIGRANTS (0-15 YEARS)</th>
<th>SAMPLE SIZE BIRTHS &amp; MIGRANTS</th>
<th>% COHORT NOT REACHING AGE 15</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>1881-1900</td>
<td>Insufficient Data</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>1901-1920</td>
<td>90</td>
<td>113</td>
<td>15.0% 15.0%</td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>1921-1940</td>
<td>146</td>
<td>194</td>
<td>7.7</td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>1941-1960</td>
<td>261</td>
<td>334</td>
<td>2.7</td>
<td></td>
</tr>
<tr>
<td>V*</td>
<td>1960-1976</td>
<td>245</td>
<td>318</td>
<td>2.5</td>
<td></td>
</tr>
</tbody>
</table>

*not a 20 year cohort

Note: Stillbirths are included.
Table 39 -- Causes of death (when known) for males by year of birth.

<table>
<thead>
<tr>
<th>YEAR OF BIRTH</th>
<th>N</th>
<th>HEART ATTACK</th>
<th>CANCER</th>
<th>ACCIDENT</th>
<th>STROKE</th>
<th>PNEUMONIA</th>
<th>LIVER DISEASE</th>
<th>DIABETES</th>
<th>ASTHMA</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1871-1880</td>
<td>11</td>
<td>72.7%</td>
<td>9.1%</td>
<td>9.1%</td>
<td>0</td>
<td>9.1%</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1881-1890</td>
<td>21</td>
<td>4.8</td>
<td>23.8</td>
<td>0</td>
<td>9.5</td>
<td>9.5</td>
<td>0</td>
<td>4.8</td>
<td>0</td>
<td>4.8</td>
</tr>
<tr>
<td>1891-1900</td>
<td>27</td>
<td>40.7</td>
<td>14.8</td>
<td>11.1</td>
<td>18.5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3.7</td>
<td>7.4</td>
</tr>
<tr>
<td>1901-1910</td>
<td>8</td>
<td>25.0</td>
<td>25.0</td>
<td>12.5</td>
<td>12.5</td>
<td>0</td>
<td>12.5</td>
<td>0</td>
<td>0</td>
<td>12.5</td>
</tr>
<tr>
<td>1911-1920</td>
<td>8</td>
<td>25.0</td>
<td>0</td>
<td>37.5</td>
<td>0</td>
<td>37.5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1921-1930</td>
<td>4</td>
<td>25.0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>75.0</td>
<td>0</td>
</tr>
<tr>
<td>1931-1940</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>100.0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1941-1950</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>50.0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>50.0</td>
<td>0</td>
</tr>
<tr>
<td>1951-1960</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1961-1970</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1971-1976</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>83</td>
<td>41.0%</td>
<td>14.5%</td>
<td>10.8%</td>
<td>9.6%</td>
<td>9.6%</td>
<td>1.2%</td>
<td>1.2%</td>
<td>1.2%</td>
<td>10.8%</td>
</tr>
</tbody>
</table>
Table 40 -- Causes of death (when known) for females by year of birth.

<table>
<thead>
<tr>
<th>YEAR OF BIRTH</th>
<th>N</th>
<th>HEART ATTACK</th>
<th>CANCER</th>
<th>ACCIDENT</th>
<th>STROKE</th>
<th>PNEUMONIA</th>
<th>LIVER DISEASE</th>
<th>DIABETES</th>
<th>ASTHMA</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1881-1890</td>
<td>5</td>
<td>60.0%</td>
<td>0</td>
<td>0</td>
<td>20.0%</td>
<td>0</td>
<td>20.0%</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1891-1900</td>
<td>7</td>
<td>43.0</td>
<td>0</td>
<td>14.3</td>
<td>14.3</td>
<td>0</td>
<td>0</td>
<td>14.3</td>
<td>14.3</td>
<td>0</td>
</tr>
<tr>
<td>1901-1910</td>
<td>4</td>
<td>75.0</td>
<td>25.0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1911-1920</td>
<td>3</td>
<td>33.3</td>
<td>0</td>
<td>33.3</td>
<td>0</td>
<td>33.3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1921-1930</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>33.3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1931-1940</td>
<td>1</td>
<td>100.0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1941-1950</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1951-1960</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1961-1970</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1971-1976</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>50.0%</td>
<td>10.0%</td>
<td>10.0%</td>
<td>10.0%</td>
<td>5.0%</td>
<td>5.0%</td>
<td>5.0%</td>
<td>5.0%</td>
<td>0</td>
</tr>
</tbody>
</table>
This error is compounded by the error previously discussed of categorizing early childhood deaths as stillbirths. Hence, this table is probably only useful when considering adult deaths.

**Life Table**

Using a modified version of the life table model (LIFE) of Keyfitz and Flieger (1971), I constructed an abridged, synthetic cohort life table for each sex and these are presented for the decade 1961-1970 in Tables 41 and 42. Briefly, each column in the table is described as follows:

- **PP**: the total population falling within the specified age category.
- **DD**: the total number of deaths occurring within the specified age category.
- **Q(X)**: the probability of dying for an individual of exact age x before reaching age x + n (n is 1 for the first age group, 4 for the second, and 5 for all remaining age categories up to age 80; the last age category includes all persons over the age of 85).
- **L(X)**: the number surviving to exact age x, out of 100,000 born. This is also the probability that a child just born will survive at least to exact age x, multiplied by 100,000 to remove the decimal.
- **D(X)**: the number of individuals dying between ages x and x + n out of 100,000 born. This is also the probability that the child will die between the exact ages of x and x + n.
Table 41 — Life table for Columbus Greek males.

<table>
<thead>
<tr>
<th>AGE</th>
<th>PP</th>
<th>DD</th>
<th>Q(X)</th>
<th>L(X)</th>
<th>D(X)</th>
<th>LL(X)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>99</td>
<td>1</td>
<td>0.010009</td>
<td>100000</td>
<td>1001</td>
<td>99086</td>
</tr>
<tr>
<td>1</td>
<td>399</td>
<td>1</td>
<td>0.009963</td>
<td>98999</td>
<td>986</td>
<td>393531</td>
</tr>
<tr>
<td>5</td>
<td>544</td>
<td>1</td>
<td>0.009149</td>
<td>98013</td>
<td>897</td>
<td>487822</td>
</tr>
<tr>
<td>10</td>
<td>539</td>
<td>1</td>
<td>0.009243</td>
<td>97116</td>
<td>898</td>
<td>483384</td>
</tr>
<tr>
<td>15</td>
<td>425</td>
<td>1</td>
<td>0.011714</td>
<td>96219</td>
<td>1127</td>
<td>478318</td>
</tr>
<tr>
<td>20</td>
<td>427</td>
<td>1</td>
<td>0.011641</td>
<td>95091</td>
<td>1107</td>
<td>472677</td>
</tr>
<tr>
<td>25</td>
<td>438</td>
<td>1</td>
<td>0.011357</td>
<td>93913</td>
<td>1067</td>
<td>267923</td>
</tr>
<tr>
<td>30</td>
<td>357</td>
<td>1</td>
<td>0.013960</td>
<td>92917</td>
<td>1127</td>
<td>461620</td>
</tr>
<tr>
<td>35</td>
<td>377</td>
<td>2</td>
<td>0.026188</td>
<td>91620</td>
<td>2399</td>
<td>452253</td>
</tr>
<tr>
<td>40</td>
<td>435</td>
<td>2</td>
<td>0.027215</td>
<td>89221</td>
<td>2027</td>
<td>440786</td>
</tr>
<tr>
<td>45</td>
<td>363</td>
<td>1</td>
<td>0.013724</td>
<td>87194</td>
<td>1197</td>
<td>433250</td>
</tr>
<tr>
<td>50</td>
<td>255</td>
<td>2</td>
<td>0.038732</td>
<td>85997</td>
<td>3331</td>
<td>421927</td>
</tr>
<tr>
<td>55</td>
<td>164</td>
<td>1</td>
<td>0.029982</td>
<td>82667</td>
<td>2479</td>
<td>407147</td>
</tr>
<tr>
<td>60</td>
<td>117</td>
<td>1</td>
<td>0.042167</td>
<td>80188</td>
<td>3381</td>
<td>393221</td>
</tr>
<tr>
<td>65</td>
<td>124</td>
<td>2</td>
<td>0.078153</td>
<td>76807</td>
<td>6003</td>
<td>372187</td>
</tr>
<tr>
<td>70</td>
<td>100</td>
<td>6</td>
<td>0.262016</td>
<td>70804</td>
<td>18552</td>
<td>309195</td>
</tr>
<tr>
<td>75</td>
<td>85</td>
<td>5</td>
<td>0.257870</td>
<td>52252</td>
<td>13474</td>
<td>228756</td>
</tr>
<tr>
<td>80</td>
<td>28</td>
<td>5</td>
<td>0.624726</td>
<td>38778</td>
<td>24225</td>
<td>131922</td>
</tr>
<tr>
<td>85</td>
<td>8</td>
<td>1</td>
<td>1.000000</td>
<td>14552</td>
<td>14552</td>
<td>116418</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AGE</th>
<th>E(X)</th>
<th>A(X)</th>
<th>TT(X)</th>
<th>R(X)</th>
<th>E(X)</th>
<th>MM(X)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.010101</td>
<td>0.087</td>
<td>7050787</td>
<td>0.0000</td>
<td>70.508</td>
<td>0.010101</td>
</tr>
<tr>
<td>1</td>
<td>0.002506</td>
<td>1.500</td>
<td>6951701</td>
<td>0.0000</td>
<td>70.220</td>
<td>0.002506</td>
</tr>
<tr>
<td>5</td>
<td>0.001838</td>
<td>2.500</td>
<td>6558171</td>
<td>0.0000</td>
<td>66.911</td>
<td>0.001838</td>
</tr>
<tr>
<td>10</td>
<td>0.001857</td>
<td>2.553</td>
<td>6070349</td>
<td>0.0161</td>
<td>62.506</td>
<td>0.001855</td>
</tr>
<tr>
<td>15</td>
<td>0.002356</td>
<td>2.539</td>
<td>5586965</td>
<td>0.0254</td>
<td>58.065</td>
<td>0.002353</td>
</tr>
<tr>
<td>20</td>
<td>0.002342</td>
<td>2.489</td>
<td>5108647</td>
<td>0.0000</td>
<td>53.724</td>
<td>0.002342</td>
</tr>
<tr>
<td>25</td>
<td>0.002284</td>
<td>2.537</td>
<td>4635970</td>
<td>0.0117</td>
<td>49.327</td>
<td>0.002283</td>
</tr>
<tr>
<td>30</td>
<td>0.002810</td>
<td>2.714</td>
<td>4168677</td>
<td>0.0149</td>
<td>44.864</td>
<td>0.002801</td>
</tr>
<tr>
<td>35</td>
<td>0.005305</td>
<td>2.563</td>
<td>3707058</td>
<td>0.0000</td>
<td>40.461</td>
<td>0.005305</td>
</tr>
<tr>
<td>40</td>
<td>0.004598</td>
<td>2.376</td>
<td>3254805</td>
<td>0.0000</td>
<td>35.480</td>
<td>0.004598</td>
</tr>
<tr>
<td>45</td>
<td>0.002762</td>
<td>2.727</td>
<td>2814020</td>
<td>0.0393</td>
<td>32.273</td>
<td>0.002755</td>
</tr>
<tr>
<td>50</td>
<td>0.007894</td>
<td>2.580</td>
<td>2380771</td>
<td>0.0400</td>
<td>27.684</td>
<td>0.007843</td>
</tr>
<tr>
<td>55</td>
<td>0.006087</td>
<td>2.504</td>
<td>1958845</td>
<td>0.0400</td>
<td>23.696</td>
<td>0.006098</td>
</tr>
<tr>
<td>60</td>
<td>0.008599</td>
<td>2.717</td>
<td>1551699</td>
<td>0.0288</td>
<td>19.351</td>
<td>0.008547</td>
</tr>
<tr>
<td>65</td>
<td>0.016129</td>
<td>3.026</td>
<td>1158478</td>
<td>0.0000</td>
<td>15.083</td>
<td>0.016129</td>
</tr>
<tr>
<td>70</td>
<td>0.060000</td>
<td>2.584</td>
<td>786292</td>
<td>0.0000</td>
<td>11.050</td>
<td>0.060000</td>
</tr>
<tr>
<td>75</td>
<td>0.058902</td>
<td>2.588</td>
<td>477097</td>
<td>0.0351</td>
<td>9.131</td>
<td>0.058824</td>
</tr>
<tr>
<td>80</td>
<td>0.183635</td>
<td>2.442</td>
<td>248341</td>
<td>0.0400</td>
<td>6.404</td>
<td>0.178571</td>
</tr>
<tr>
<td>85</td>
<td>0.057897</td>
<td>8.000</td>
<td>116418</td>
<td>0.0000</td>
<td>8.000</td>
<td>0.125000</td>
</tr>
</tbody>
</table>
### Table 42 — Life table for Columbus Greek females.

<table>
<thead>
<tr>
<th>AGE</th>
<th>FF</th>
<th>DD</th>
<th>Q(X)</th>
<th>L(X)</th>
<th>D(X)</th>
<th>LL(X)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>42</td>
<td>1</td>
<td>0.023316</td>
<td>100000</td>
<td>2332</td>
<td>97926</td>
</tr>
<tr>
<td>1</td>
<td>176</td>
<td>1</td>
<td>0.022409</td>
<td>97668</td>
<td>2189</td>
<td>365202</td>
</tr>
<tr>
<td>5</td>
<td>293</td>
<td>1</td>
<td>0.016920</td>
<td>95480</td>
<td>1616</td>
<td>473360</td>
</tr>
<tr>
<td>10</td>
<td>509</td>
<td>1</td>
<td>0.011452</td>
<td>93864</td>
<td>1075</td>
<td>466486</td>
</tr>
<tr>
<td>15</td>
<td>432</td>
<td>1</td>
<td>0.009776</td>
<td>92789</td>
<td>907</td>
<td>461676</td>
</tr>
<tr>
<td>20</td>
<td>337</td>
<td>1</td>
<td>0.013280</td>
<td>83049</td>
<td>1169</td>
<td>437257</td>
</tr>
<tr>
<td>25</td>
<td>310</td>
<td>1</td>
<td>0.015999</td>
<td>84375</td>
<td>1386</td>
<td>408352</td>
</tr>
<tr>
<td>30</td>
<td>374</td>
<td>1</td>
<td>0.013876</td>
<td>86880</td>
<td>1119</td>
<td>365753</td>
</tr>
<tr>
<td>35</td>
<td>386</td>
<td>1</td>
<td>0.0077618</td>
<td>80330</td>
<td>6259</td>
<td>335645</td>
</tr>
<tr>
<td>40</td>
<td>308</td>
<td>1</td>
<td>0.016164</td>
<td>85761</td>
<td>1386</td>
<td>425470</td>
</tr>
<tr>
<td>45</td>
<td>301</td>
<td>1</td>
<td>0.009776</td>
<td>84375</td>
<td>1386</td>
<td>425470</td>
</tr>
<tr>
<td>50</td>
<td>241</td>
<td>1</td>
<td>0.029405</td>
<td>74071</td>
<td>2178</td>
<td>355753</td>
</tr>
<tr>
<td>55</td>
<td>179</td>
<td>1</td>
<td>0.104304</td>
<td>71893</td>
<td>10310</td>
<td>335645</td>
</tr>
<tr>
<td>60</td>
<td>185</td>
<td>3</td>
<td>0.197744</td>
<td>61853</td>
<td>11562</td>
<td>281093</td>
</tr>
<tr>
<td>65</td>
<td>168</td>
<td>1</td>
<td>0.077618</td>
<td>80330</td>
<td>6259</td>
<td>335645</td>
</tr>
<tr>
<td>70</td>
<td>99</td>
<td>3</td>
<td>0.023809</td>
<td>71626</td>
<td>0.0000</td>
<td>71.626</td>
</tr>
<tr>
<td>75</td>
<td>49</td>
<td>2</td>
<td>0.005682</td>
<td>7064696</td>
<td>0.0000</td>
<td>72.333</td>
</tr>
<tr>
<td>80</td>
<td>10</td>
<td>1</td>
<td>0.003413</td>
<td>6679494</td>
<td>0.0000</td>
<td>69.957</td>
</tr>
<tr>
<td>85</td>
<td>8</td>
<td>1</td>
<td>0.001965</td>
<td>6206134</td>
<td>0.0000</td>
<td>66.118</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.023212</td>
<td>2.585</td>
<td>0.0000</td>
<td>61.857</td>
</tr>
<tr>
<td>90</td>
<td>0.002304</td>
<td>2.363</td>
<td>6206134</td>
<td>0.0000</td>
<td>66.118</td>
<td>0.002304</td>
</tr>
<tr>
<td>100</td>
<td>0.001965</td>
<td>2.496</td>
<td>5739648</td>
<td>0.0000</td>
<td>61.857</td>
<td>0.001965</td>
</tr>
<tr>
<td>150</td>
<td>0.002321</td>
<td>2.585</td>
<td>5277973</td>
<td>0.0000</td>
<td>57.443</td>
<td>0.002315</td>
</tr>
<tr>
<td>200</td>
<td>0.002975</td>
<td>2.558</td>
<td>4821123</td>
<td>0.0380</td>
<td>53.083</td>
<td>0.002967</td>
</tr>
<tr>
<td>250</td>
<td>0.003226</td>
<td>2.475</td>
<td>4370289</td>
<td>0.0000</td>
<td>48.841</td>
<td>0.003226</td>
</tr>
<tr>
<td>300</td>
<td>0.002674</td>
<td>2.444</td>
<td>3926501</td>
<td>0.0000</td>
<td>44.594</td>
<td>0.002674</td>
</tr>
<tr>
<td>350</td>
<td>0.002592</td>
<td>2.540</td>
<td>3489244</td>
<td>0.0000</td>
<td>40.162</td>
<td>0.002591</td>
</tr>
<tr>
<td>400</td>
<td>0.003258</td>
<td>2.593</td>
<td>3057597</td>
<td>0.0000</td>
<td>35.652</td>
<td>0.003247</td>
</tr>
<tr>
<td>450</td>
<td>0.004167</td>
<td>2.610</td>
<td>2632127</td>
<td>0.0000</td>
<td>31.196</td>
<td>0.004149</td>
</tr>
<tr>
<td>500</td>
<td>0.005643</td>
<td>2.908</td>
<td>2214413</td>
<td>0.0283</td>
<td>26.798</td>
<td>0.005587</td>
</tr>
<tr>
<td>550</td>
<td>0.016217</td>
<td>2.496</td>
<td>1306061</td>
<td>0.0000</td>
<td>22.483</td>
<td>0.016216</td>
</tr>
<tr>
<td>600</td>
<td>0.005955</td>
<td>2.887</td>
<td>1420085</td>
<td>0.0000</td>
<td>19.172</td>
<td>0.005952</td>
</tr>
<tr>
<td>650</td>
<td>0.030716</td>
<td>2.690</td>
<td>1054332</td>
<td>0.0400</td>
<td>14.665</td>
<td>0.030303</td>
</tr>
<tr>
<td>700</td>
<td>0.041332</td>
<td>2.680</td>
<td>718687</td>
<td>0.0400</td>
<td>11.670</td>
<td>0.040816</td>
</tr>
<tr>
<td>750</td>
<td>0.101592</td>
<td>2.524</td>
<td>437594</td>
<td>0.0000</td>
<td>8.748</td>
<td>0.100000</td>
</tr>
<tr>
<td>800</td>
<td>0.058428</td>
<td>5.000</td>
<td>237756</td>
<td>0.0000</td>
<td>8.000</td>
<td>0.125000</td>
</tr>
</tbody>
</table>
\( LL(X) \) : the total years lived between ages \( x \) and \( x + n/100,000 \) born.

\( M(X) \) : the age specific death rate for the interval \( x \) to \( x + n \).

\( A(X) \) : the mean years lived in an interval by those dying during it.

\( TT(X) \) : the total years lived beyond age \( x/100,000 \) born.

\( R(X) \) : the increase from an annual cohort to the next as estimated from the observed age distribution by \( r = 0.1 \).

Note: Where the quantity is negative, the program substitutes zero, and zero is also used in the first three age groups. Higher values indicate higher birth rates of that cohort.

\( E(X) \) : the expectation of life at age \( x \). This is the average number of years lived subsequently to age \( x \) by those reaching age \( x \).

\( MM(X) \) : the observed age specific death rate for the interval \( x \) to \( x + n \).

Keyfitz and Fleiger's LIFE program was developed for use in populations in which all age cohorts had a death rate greater than zero. As previously discussed, the Greek population had a low reported death rate and, as a result, some age cohorts did not have a death rate greater than zero. Thus, Keyfitz and Fleiger's program could not be used without modification.

Several modifications were tested: combining male and female data, setting \( M(X) \) equal to 0.01 if the death rate was zero; setting \( M(X) \) equal to 0.001 if the death rate was zero; and setting the value for \( MM(X) \) at 0.02.
The modified program which was finally used seems to be the most satisfactory because it has the closest fit to the actual data. It instructs the computer to consider a decade as one year, and if no deaths occur in an age category to fabricate one death. The result of this modification is only a slight underestimation of life expectancy. Because there were more age categories in the female life table that had no deaths, the female life expectancy data are slightly more underestimated than that for the males. The computer program for this modified life table is presented in Appendix F. These life tables compare favorably with ones for Greece and the United States found in Appendix I.

We can see by inspection, however, that the life expectancy values of the Columbus Greek population are more similar to the population of Greece than that of the United States in two respects: first, the difference between males and females is small in both the Columbus Greek population (1.1 years) and the population in Greece (3.85 years) as compared to the United States (7.24 years). Second, male life expectancy values are higher both in the populations from Greece and the Greek Columbus community (70.65 and 70.5) than in the United States population (66.98).
Summary

The findings reported in this chapter describe the demographic characteristics of the Columbus Greek population. This information is important not only because it is new demographic data, but also because it will be used in the next chapter to examine the potential for microevolution within the Columbus Greek community.
CHAPTER VII

DISCUSSION

One of the three major aims of this study was methodological: the development of a computer program for the determination of demographic characteristics in a specific population. This program is located in Appendix G. The other two aims were substantive: to determine the population dynamics and history of the Greek urban immigrant community of Columbus, Ohio, and secondly, to examine cultural influences on demographic vital rates and to elucidate how these rates govern the potential and operative microevolution in one community. By inference, it should then be possible to understand the cultural influences on the microevolution of a specific population.

Effects of Social and Cultural Factors on the Population Structure

Social and cultural factors influence population structure through their effect on the demographic vital
rates of migration, mortality and fertility. Each of
these rates and the cultural factors patterning them will
be considered separately below.

**Effect on Migration Patterns**

For demographic purposes in anthropology, migration
rate is an important parameter because it determines
maximum gene flow. However, the age and sex composition
of the migrant group are more significant than the gross
rate in determining the population structure. In this
respect, cultural characteristics of major interest are
not only those which promote migration, but those which
promote differential migration in terms of age and sex.

Nearly all early Greek immigrants to Columbus came
seeking a higher standard of living than existed in
Greece. A sustained economic crisis in the late 19th
and early 20th centuries prompted this emigration. In
the early years, the high male/female sex ratio and the
immigrants' age distribution were the result of the defi­
nite migratory selection preference for young males. For
several reasons, listed below, it was young males who
first migrated.

The pattern of inheritance in Greece has long been
the equal distribution of the parents' property to all
the children (Friedl 1962, 1963; Levy 1963). While
daughters received their portion in the form of material goods at the time of their marriage through the dowry system, sons were legally entitled to equal portions of farm and grazing lands. However, equal partition of the family's farm resulted in land holdings too small to support a family. One solution to this problem was to send "surplus sons" to other areas of the world, particularly the United States. As Levy (1963:121) described, "The system of equal inheritance of property and villagers' values associated with a preference for ... city life led to a movement of young men out of the rural community." Friedl (1962, 1963) found that among villagers the potential for satisfaction and prestige was greater in the cities than in the villages. She noted that urban life is preferred over village not because of an anticipated increase in the standard of living, but because urban life was perceived as more exciting and prestigious. Thus, when sons left the village it was not banishment, but an adventure.

The eldest son usually stayed in the village to become the executor of the land when his father "retired," and the youngest son was given the responsibility of caring for his parents in their old age (Peristiany 1966). Consequently, the middle sons usually emigrated to the United States. These young men were frequently sponsored
by a relative (often an uncle) from the same village. In this way, persons from the same geographical area in Greece were reunited in the United States. This pattern of sponsorship, known as the "padrone system," is found in various forms in other Mediterranean and Southeastern European countries. However, the exploitation of young Greek males did not seem to be as great as in other immigrant groups having this system of sponsorship, and the sponsor did not achieve the political or social dominance seen in the Italians and other such immigrant groups.

Because the Greek economy was depressed for several decades, many young men also migrated to the United States to better the economic condition of their families. Large numbers of young Greek men sent the greater portion of their earnings back to their families in Greece, not only for the support of their families, but to contribute to their sisters' dowries. In Greece, males traditionally do not marry until all of their sisters have done so, and an appropriate dowry was essential for a woman's marriage. Thus, for males wishing to marry, it was in their self-interest to contribute to their sisters' dowries. In addition, the philotimo of the family and, hence, of every member, was enhanced if the sister "married well."
In some cases, the desire of young males to escape military service in the Turkish army was a factor promoting migration. Less often, males emigrated to avoid conscription in the Greek army.

The shift from a highly male dominated migration flow toward one with increasing numbers of females reflected the lag period in which males became established in the United States. Only after they were financially secure did males bring their wives to the United States. Women, in general, did not emigrate from Greece unaccompanied by males; they arrived after their fathers or for an arranged marriage. When a single Greek woman entered the Columbus community, she lived with a Greek family until her marriage.

This pattern of female isolation is typical in the villages of Greece (Campbell 1964). In order to protect the family's philotimo, male members guarded the chastity of the women. Females did not intermingle with males outside the family largely because of the endrope which would result from the loss of their virginity.

In addition, Greek women did not migrate to the United States in search of jobs to supplement the family income as did some immigrant women, such as the Irish. It is the duty of Greek males to provide for the women, and it is considered improper for women to work in
occupations outside the home. This emphasis on the woman's staying within the home results not only from the desire to protect the family from shame, but just as importantly from the woman's realizing herself in marriage and motherhood. Campbell (1964) found that the highest and most enobling vocation to which a Greek woman can aspire is motherhood.

Migration into the urban area of Columbus was part of the general trend of Greek immigrants to settle in urban centers of the United States. This urban settlement pattern was the result of several factors, including the high value placed on urban living, the desire to be with other members of the Greek community, the need for sending funds back to Greece, and the lack of available farmland in the United States by the time of Greek immigration.

The decreased migrations from Greece, as well as from other parts of southeastern Europe, after 1920, reflect the social climate of the United States. Noting the influx of too many "undesirable" foreign elements, former immigrants feared for jobs and safety. More established Americans pressured Congress to pass strict immigrant quota laws. The drastic drop in the rate of immigration into Columbus after 1920 reflects these laws. The increased migration in later years reflects the more
liberal refugee policy and the repeal of the national quota acts.

**Effects on Patterns of Mortality**

Cultural influences on the mortality pattern were less discernable than were the influences on migration. In part, this is because the mortality data gathered were incomplete. The data reported were not sufficient to allow conclusions to be drawn concerning differential mortality for sex and age categories. However, some population patterns are detectable.

The age pattern of migration determined that the population would be "young" and continued immigration of a "young" population has contributed to a low death rate compared to the United States population in general. Although immigrant populations usually have higher than United States average mortality rates (Bullough and Bullough 1972), the Greek population did not. Compared to the Polish Hill community of Pittsburgh, another urban immigrant population spanning approximately the same time period, the Greek community had only about one fourth to one half the deaths for any generational group (Crawford and Goldstein 1975).

This lower mortality rate may be attributed to several factors. Members of the Columbus Greek
population reported that the community had a history of seeking good medical care. Early in the century, a Greek immigrant graduated from the Ohio State College of Medicine. Greek immigrants who were unable to speak English were able to go to this physician and seek formal medical care. Prior to the arrival of this physician, the community utilized the services of an Albanian doctor fluent in Greek. Thus, the population did not experience the significant language problems of many immigrant groups seeking health care in a new country.

In addition, education and professional status are highly valued among the Greek people. As a result, the fear of the professional was not as great as among other immigrant groups (Clark 1970). Finally, the rapid upward mobility of the members of the community allowed them to afford formal medical care.

Patterns concerning causes of death are difficult to determine because of the dearth of usable data. One interesting feature was discovered, however, for the Columbus Greek population, the four leading causes of death are, in descending order:

1. heart disease
2. cancer
3. accident
4. cerebrovascular disease.

Smith and Zopf (1976) list the leading causes of death
for the entire population of the United States as follows:

1. heart disease
2. cancer
3. cerebrovascular disease.

For the population of Greece, Smith and Zopf (1976) found the leading causes to be:

1. cancer
2. cerebrovascular disease
3. miscellaneous conditions.

The fact that heart disease is the most frequent cause of death for both the Columbus Greek population and the United States general population, and that it is not listed as any of the three leading causes of death for the population of Greece imply that life patterns and environment are important for the epidemiology of the Columbus Greek community. While the data are too limited to allow conclusive statements, it is probable that the shift from a rural to an urban environment, and from intensive farm life to more sedentary but tension intensive business occupations, contributed to the increase in coronary disease.

Effects on Fertility Patterns

Social and cultural factors have had many direct and indirect influences on fertility patterns of the Columbus Greek community. The discussion of these factors will be facilitated by the use of the analytical
framework of Davis and Blake (1956) discussed at length in Chapter III.

The mean fertility rates for women of each twenty year cohort were smaller at all ages than were the mean rates for United States women in general (Petersen 1975). Because European immigrant populations have historically tended to have higher fertility rates than resident United States groups (Hutchinson 1956), the lower fertility rates found among women of the Columbus Greek community are especially notable.

Davis and Blake (1956) categorized factors influencing fertility as intercourse, conception or gestation variables. For the Columbus Greek community, the most significant factors contributing to the decreased fertility rate seem to be those which affect conception. This differs from the patterns in Greece, where the most significant factors are associated with gestation.

In both the European and Columbus Greek populations, the limitation of family size receives heavy emphasis. Friedl (1958), Valisios (1960) and Blum and Blum (1965) have all noted the trend in Greece for smaller families which has been present since at least the turn of the century. In large part, this lower fertility has been viewed as the result of the desire of parents to provide adequately for their children and to have them educated
so they would achieve professional status (Friedl 1962, 1963). Tsoukalis (1976) has pointed out that the propensity toward higher education in Greece can be considered as established fact. To support this position, he notes the readiness of poor peasant families to undergo great economic sacrifices to insure their children's higher education.

As discussed in Chapter IV, limitation of family size has long been important to Greek peasants. Safilios-Rothchild (1969) found that in Greece, control of conception is primarily left to the male; if conception occurs, the female limits family size through abortion. Supporting evidence comes from Blum and Blum (1965) who studied village women in Greece. They found that while birth control is an important concern among village women, knowledge of modern contraceptives is not evident, and induced abortion is the only method of birth control used by most village women.

While the desire to limit family size in order to adequately care for and educate the children is also seen in the Columbus Greek community, the method of limiting fertility has changed from control of gestation variables to control of conception variables. For the Columbus population born after the turn of the century, the majority of women have practiced birth control. For the
groups born after 1941, the method of choice has been birth control pills.

Thus, while the primary aim of limiting family size to properly care for and educate the children has remained the same for both the Columbus and European Greek populations, the means used to achieve this aim have changed. This trend may be seen as the result of increased knowledge and availability of contraceptive methods for Columbus women. In addition, the increased independence and self-determination among Columbus Greek women also means that wives more often have the opportunity to determine when pregnancy will occur.

Because of the emphasis on family planning within the Greek community, variables which otherwise might have served to limit the number of offspring probably have had little effect on the total fertility rates. For example, late marriage is a prominent factor in limiting family size in many populations where little or no birth control measures are used, such as the Amish (Cross and McKusick 1970) or the Alpine Swiss (Friedl and Ellis 1976).

Periods of imposed celibacy are also unlikely influences on fertility rates. Priests, but not bishops and higher church officials, are allowed to marry and have children. However, because there is only one priest
and no bishop in the community, this pattern has not affected the fertility rate. In addition, ritual times of abstinence such as the forty day post-partum period, and religious fasting days are relatively few, so that within the period of a year, these would not importantly affect the number of a woman's fertile days.

In many societies, the significant lowering of the age of menarche found in the Columbus Greek community might have increased the fertility rate of the population. However, because the age of the mother when the first child was born is considerably greater than the age of menarche, this biological trend had no discernable effect on fertility patterns of the Greek community.

One factor which may have influenced the low fertility rate was the customary pattern of celibacy for those persons (particularly women) who had not married. Because of the loss of philotimo which would occur for the family if an unmarried woman became pregnant, daughters were carefully chaperoned until they were wed. The higher than average number of unmarried males (compared to the United States average), resulting from the lack of a suitable partner, may also have contributed to the lower number of children within the community.

In summary, it is most likely that the conscious parental desire to limit family size contributed most
significantly to the lowered fertility rate.

**Effect on Mate Selection**

The proportion of single males in the Columbus Greek community was higher than the proportion for females in every decade by date of birth. This follows the general historical trend in Greece. For example, Hajnal (1965) found that for Greece in 1965, 9% of the males, but only 4% of the females, in the age group 45-49 had never married. Two reasons for this pattern in Greece are the higher male sex ratio, which can account for 1% difference, but more importantly, the much stronger social pressure on females to marry.

In the Columbus Greek population, the proportion of males born in the decade beginning in 1921 who remained single (20.1%) was higher than the United States average (15.4%). In contrast to this, a lower proportion of Greek females (7.3%) than United States females in general (13.4%) remained single (Smith and Zopf 1976). This pattern has been consistent for all age groups. Thus, the number of males of Greek heritage remaining single has always been higher than the national average, while the number of females remaining single has been lower than the national average.
Several social factors are implicated in this pattern. First, it is necessary for a male to defer marriage until he is able to establish an independent livelihood adequate to support a family. In addition, for immigrant males with unwed sisters in Greece, their need to provide their sisters' dowries further deferred their age of marriage. Another important factor cited by nearly all eligible single males that were interviewed was the lack of a suitable spouse. These men usually desired a wife of Orthodox religion and Greek heritage. While there have always been fewer Greek females in Columbus than males, this differential was highest in the early decades of the Columbus Greek community.

Although these factors cannot be wholly separated, there is a distinction between the desire for a spouse of the Greek Orthodox faith and a spouse of Greek heritage. For the first generation of immigrants, the latter seemed to be the most important factor in selecting a marriage partner, but members of more recent generations seem more willing to accept a non-Greek than a non-Orthodox spouse. In general, however, the belief in the common cultural heritage, strengthened by common tradition, language and religion, has constituted a barrier to exogamy.
For females, a trend was not discernable for age at first marriage; for males, however, there was a significant decrease in the mean age at first marriage. While this pattern parallels the general trend in the United States, it is exaggerated for males. For example, the United States median age at marriage for males has dropped from 26.1 to 20.3 during the period 1890-1950 (Smith and Zopf 1976), while in that same time period, the median age at marriage for Columbus Greek males has dropped from 31 to 23.

In addition to factors operating in the general United States population, social changes in the Columbus Greek community have contributed to the lower male age at marriage. The upwardly mobile occupational trend within the Columbus Greek community has allowed males to obtain well-paying jobs at earlier ages than in previous generations. In addition, males have fewer financial obligations to their family of orientation because the dowry system is almost extinct and parents are financially more secure in their retirement years.

A high proportion of the marriages in all decades were endogamous both for place of birth and for proportion of Greek ancestry. However, the data indicated that endogamy for ethnic heritage was a more important factor in selecting a mate than was geographical propinquity of
birth. An additional finding is that males tended more often to marry persons from a different geographical region than did females (16.5% and 4.3% respectively). In part, this reflects the higher proportion of Greek males present in this country, but it is also consistent with the circum-Mediterranean value system which allows males greater social freedom.

**Microevolutionary Implications of the Changing Population Structure**

The microevolutionary forces of natural selection, genetic drift, gene flow and mutation determine the genetic composition of a population. The first three of these microevolutionary forces are discernible from demographic data. In this section vital rates, as determined in Chapter VI, will be utilized to infer the pattern and extent of microevolutionary forces operating in the Columbus Greek community. These forces will be noted primarily for the extant population, although historical trends will be discerned where possible.

**Natural Selection**

Natural selection is the evolutionary process through which gene frequencies are changed as the result of differences between individuals in Darwinian fitness.
It occurs through the differential transmission of genes to the succeeding generation. This variance in transmission may result either from differential fertility or differential mortality.

Crow (1958) devised an index which examines the maximum amount of selection which can occur through differential mortality and fertility. This Index of Total Selection is a measure of the maximum amount of evolution by selection that could occur in a population each generation. It also indicates whether differential fertility or mortality is the more important variable in the determination of the selection potential.

The index of selection potential from differential mortality ($I_m$) is given as

$$I_m = \frac{p_d}{p_s}$$

where $p_d$ is the probability of death prior to reproductive age

$p_s$ is the probability of surviving from birth to reproductive age.

$I_m$ for the Columbus Greek generations is shown in Table 43.

The component from differential fertility is calculated as

$$I_f = \frac{s_f^2}{\bar{x}_s^2}$$

where $s_f^2$ is the variance in the offspring of the survivors.
Table 43 -- Selection potential from differential mortality ($I_m$) for Columbus Greek population.

<table>
<thead>
<tr>
<th>GENERATION</th>
<th>BIRTHDATE</th>
<th>$P_d$</th>
<th>$P_s$</th>
<th>$I_m$</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>1881-1900</td>
<td></td>
<td></td>
<td>Insufficient data</td>
</tr>
<tr>
<td>II</td>
<td>1901-1920</td>
<td>.189</td>
<td>.811</td>
<td>.233</td>
</tr>
<tr>
<td>III</td>
<td>1921-1940</td>
<td>.103</td>
<td>.897</td>
<td>.115</td>
</tr>
<tr>
<td>IV</td>
<td>1941-1960</td>
<td>.034</td>
<td>.966</td>
<td>.035</td>
</tr>
<tr>
<td>V*</td>
<td>1961-1976</td>
<td>.033</td>
<td>.967</td>
<td>.034</td>
</tr>
</tbody>
</table>

*not a 20 year cohort
\( \bar{X}_s^2 \) is the square of the mean.

\( I_f \) for the Columbus Greek generations is shown in Table 44.

The Index of Total Selection (I) is given as

\[
I = I_m + \left( \frac{1}{p_s} \right) (I_f).
\]

The Index of Total Selection for the Columbus Greek generations are given in Table 45.

For the Columbus Greek population, only two generations (II and III) have complete data for both the calculation of fertility and prereproductive mortality.

Crow's Index for Total Selection decreased from .771 for the generation born 1901-1920 to .503 for the generation born 1921-1940. This results from three factors: a decrease in the birth rate, a reduction in the variance in the number of children born to each woman, and a decrease in the probability of death prior to reproductive age. This pattern is consistent with Kirk's (1968) finding that opportunity for selection has decreased in the United States as a whole.

Spuhler (1962) postulated the existence of correlations between Index of Total Selection and the technological and economic levels of human populations. He found trends for increased selection through differential fertility and decreased selection through prereproductive
Table 44 — Selection potential from differential fertility ($I_f$) for Columbus Greek population.

<table>
<thead>
<tr>
<th>GENERATION</th>
<th>BIRTHDATE</th>
<th>$S_f^2$</th>
<th>$\bar{X}_s^2$</th>
<th>$I_f$</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>1881-1900</td>
<td>6.25</td>
<td>15.84</td>
<td>.395</td>
</tr>
<tr>
<td>II</td>
<td>1901-1920</td>
<td>2.79</td>
<td>6.40</td>
<td>.436</td>
</tr>
<tr>
<td>III</td>
<td>1921-1940</td>
<td>1.79</td>
<td>5.15</td>
<td>.348</td>
</tr>
<tr>
<td>IV*</td>
<td>1941-1960</td>
<td>1.25</td>
<td>0.988</td>
<td>1.265</td>
</tr>
<tr>
<td>V**</td>
<td>1961-1976</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

* total reproductive history not yet complete

** insufficient data because of young age; also not a 20 year cohort
Table 45 — Index of Total Selection for the Columbus Greek community.

<table>
<thead>
<tr>
<th>GENERATION</th>
<th>BIRTHDATE</th>
<th>$I_m$</th>
<th>$I_f$</th>
<th>$\left(\frac{1}{P_s}\right)I_f$</th>
<th>$I$</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>1881-1900</td>
<td>*</td>
<td>.395</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>II</td>
<td>1901-1920</td>
<td>.233</td>
<td>.436</td>
<td>.536</td>
<td>.771</td>
</tr>
<tr>
<td>III</td>
<td>1921-1940</td>
<td>.115</td>
<td>.348</td>
<td>.388</td>
<td>.503</td>
</tr>
<tr>
<td>IV</td>
<td>1941-1960</td>
<td>.034</td>
<td>1.265</td>
<td>1.31</td>
<td>1.344</td>
</tr>
<tr>
<td>V</td>
<td>1961-1976</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

* insufficient data
mortality in populations having increasing levels of technology. The Columbus Greek data is consistent with Spuhler's hypothesis. In addition, the selection potential from differential mortality was lower for all generations than was the selection potential from differential fertility.

In samples from 64 populations, Spuhler (1973) found empirical values of \( I \) ranging from a minimum value of 0.23 to a maximum of 3.69. Table 46 compares Crow's Index for the Columbus Greek population with Indices calculated for other populations.

Comparing the Index for Total Selection for the Columbus Greek population and that of Polish Hill (Crawford and Goldstein 1975) demonstrates the necessity for more population studies before generalizations can be made. Both populations are urban immigrant populations which span approximately the same time period. However, the selection potential is considerably different for corresponding generations in the two populations, as can be seen in Table 47.

Both populations demonstrate the pattern of decreasing \( I_m \), \( I_f \), and, consequently, total selection. However, the potential for selection in the Polish Hill community is greater at all times than in the Columbus Greek community. This greater selection potential among
Table 46 — The Index of Total Selection for various human populations.

<table>
<thead>
<tr>
<th>POPULATION</th>
<th>PERIOD</th>
<th>I_m</th>
<th>I_f</th>
<th>I_T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Columbus Greeks</td>
<td>1976</td>
<td>.115</td>
<td>.348</td>
<td>.503</td>
</tr>
<tr>
<td>Hutterites (Spuhler 1976)</td>
<td>1950</td>
<td>.053</td>
<td>.167</td>
<td>.229</td>
</tr>
<tr>
<td>Xavante (Spuhler 1976)</td>
<td>1964</td>
<td>.493</td>
<td>.168</td>
<td>.743</td>
</tr>
<tr>
<td>Polish Hill (Crawford and Goldstein 1975)</td>
<td>1969</td>
<td>.14</td>
<td>.78</td>
<td>1.03</td>
</tr>
<tr>
<td>Tlaxcala (Halberstein and Crawford 1972)</td>
<td>1970</td>
<td>.59</td>
<td>.35</td>
<td>1.14</td>
</tr>
<tr>
<td>U.S. Nonwhite (Spuhler 1976)</td>
<td>1964</td>
<td>.050</td>
<td>1.410</td>
<td>1.460</td>
</tr>
<tr>
<td>Cuanalan, Mexico (Halberstein 1973)</td>
<td>1972</td>
<td>1.47</td>
<td>.28</td>
<td>2.16</td>
</tr>
</tbody>
</table>
Table 47 -- A comparison of Crow's Index of Selection between the Pittsburgh Polish Hill and the Columbus Greek communities.

<table>
<thead>
<tr>
<th>GENERATION</th>
<th>POLISH HILL</th>
<th>COLUMBUS GREEK</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1906-1925</td>
<td>1926-1945</td>
</tr>
<tr>
<td>I_m</td>
<td>1.33</td>
<td>0.14</td>
</tr>
<tr>
<td>I_f</td>
<td>0.89</td>
<td>0.78</td>
</tr>
<tr>
<td>I_T</td>
<td>3.39</td>
<td>1.03</td>
</tr>
</tbody>
</table>
the Polish Hill immigrants is the result of their greater prereproductive mortality as well as their greater mean and variance in number of offspring.

In summary, the demographic characteristics of the Columbus Greek community suggest that natural selection could have operated at only a moderately low level compared with other human populations. In addition, the necessity of learning more about the microevolutionary processes operating in ostensibly similar populations has been demonstrated.

Genetic Drift

Genetic drift results from random fluctuations in gene frequencies between generations as a consequence of sampling error. Meiosis and fertilization are the biological bases of random drift in gene frequencies. The two alleles occupying each autosomal locus in the fertilized egg are a sample of the four genes at that locus in the two parents. In small populations, gene frequencies have a high probability of fluctuating from generation to generation because of this sampling process (Spuhler 1973).

In small populations, the magnitude, but not the direction, of genetic drift is determinate. Lasker and Kaplan (1960) devised a measure for estimating the
potential for drift to occur in a population. This measure, the coefficient of breeding isolation, is calculated by multiplying the effective size of the breeding population \(N_e\) by the effective immigration rate. The smaller this index of isolation, the greater the likelihood that random genetic drift has been a relevant micro-evolutionary force in that population.

**Effective size of the breeding population:** To calculate the effective size of the breeding population for the Columbus Greek community, it was first necessary to calculate the total breeding population \(N\). Following Lasker and Kaplan (1964), \(N\) was determined for the Columbus Greek population by counting all the persons within reproductive years (taken to be 19-44). Freire-Maia (1974) estimated that \(N\) would represent roughly 35% of the total population. For the Columbus population, \(N\) was calculated as \(423/1072\) or 39.5% of the population, a figure slightly higher than Freire-Maia's estimate.

Because a number of factors may bias the effectiveness of this estimate, corrections of the breeding size may be made to find the effective breeding size \(N_e\). For the Columbus Greek community, two corrections were necessary: one for differential fertility and the other for unequal numbers of sexes.
The correction for differential fertility is calculated as
\[ N_e = \frac{4N - 2}{\sqrt{\frac{k^2}{2} + 2}} \]
where \( N_e \) is the number of parents in the population,
\( k^2 \) is the variance in the number of gametes contributed to the next generation (Wright 1938).

The correction for unequal number of sexes was also determined by Wright (1938) and is given as
\[ N_e = \frac{4N_f N_m}{N_f + N_m} \]
where \( N_f \) is the number of breeding females,
\( N_m \) is the number of breeding males.

When these corrections were made for the Columbus Greek population, the effective breeding size of the population was 304/1072 or 28.4% of the population. Lasker estimates that the effective breeding size of a population is about 29% of the total population size. Thus, the Columbus data is quite close to Lasker's estimate.

**Calculation of genetic drift:** After calculating the effective breeding size, it is possible to determine the potential for the magnitude of genetic drift by calculating the coefficient of breeding isolation by the method of Lasker and Kaplan (1960):
\[ D_p = (I)(N_e) \]
where \( D_p \) is the potential for genetic drift, given as the coefficient of breeding isolation,
\( I \) is the effective immigration rate.
$N_e$ is the effective size of the breeding population.

For the Columbus Greek population, the effective size of the breeding population was calculated above as 304; the effective immigration rate taken from Table 13 is 14.2%. The product of these two variables is the coefficient of breeding isolation, a measure of the potential for genetic drift in the population. For the Columbus Greek population, this coefficient equals 43.2.

Lasker and Kaplan (1964) postulate that genetic drift might be expected to have a considerable effect on the genetic microdifferentiation of a population with a coefficient of 5 or less, but it would have little effect in a population with a coefficient greater than 50. The Columbus Greek coefficient of 43.2 indicates that genetic drift may have a slight to moderate potential for differentiating the population, but the effect was probably small.

For comparison with the Greek population of Columbus, the coefficients of breeding isolation for several other populations are given in Table 48. From this table, the special importance of small population size in determining the potential for drift may be seen.
Table 48 -- Coefficients of breeding isolation of various human populations.

<table>
<thead>
<tr>
<th>POPULATION</th>
<th>POPULATION SIZE</th>
<th>N_e</th>
<th>I</th>
<th>COEFFICIENT OF BREEDING ISOLATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Columbus Greek</td>
<td>1072</td>
<td>304</td>
<td>14.2%</td>
<td>43.2</td>
</tr>
<tr>
<td>Kippel, Switzerland (Friedl and Ellis 1973)</td>
<td>450</td>
<td>70</td>
<td>4.5%</td>
<td>5.84</td>
</tr>
<tr>
<td>Dunkers, Pennsylvania (Lasker 1960)</td>
<td>350</td>
<td>117</td>
<td>22.0%</td>
<td>25.7</td>
</tr>
<tr>
<td>Cunalan, Mexico (Halberstein 1974)</td>
<td>2040</td>
<td>735</td>
<td>16.3%</td>
<td>119.8</td>
</tr>
<tr>
<td>Dinka tribe (Roberts 1956)</td>
<td>13,400</td>
<td>3909</td>
<td>11.0%</td>
<td>430.0</td>
</tr>
<tr>
<td>Tlaxcala, Mexico (Halberstein and Crawford 1972)</td>
<td>15,000</td>
<td>4350</td>
<td>18.8%</td>
<td>815.63</td>
</tr>
</tbody>
</table>
Gene Flow

Gene flow refers to recurrent introduction of genes into a population by outbreeding (Spuhler 1959). As Lasker (1960) aptly suggests, genetic drift and gene flow are two sides of the same coin because they reflect the converse but linked concepts of isolation and migration. Lasker demonstrated that drift cannot be studied in isolation because gene flow will stabilize the stochastic processes; that is, it will offset the effects of genetic drift. Gene flow leads to an increase in the genetic variability within populations and a decrease in the genetic variability between populations; thus, gene flow tends to make populations more alike, as opposed to genetic drift, which tends to make populations more heterogenous.

Lamb (1975) has shown that gene flow may be measured by the degree of admixture occurring in a population, which is calculated as follows:

\[
\frac{\text{number of immigrant spouses}}{\text{number of local born spouses}}
\]

in each generation.

As we would anticipate in a migrant population with a continuous inflow of immigrants, the rate of admixture (and consequently gene flow) is high. In the first generation of the Columbus Greek community, the rate of gene flow was 100% because there were no available Columbus
born spouses of Greek heritage living in the Greek community. After the community became established, and the offspring forming the second adult generation came of marriageable age, the rate of admixture dropped rapidly. Most recently, the rate of admixture for Columbus born adults within the Greek community has decreased to approximately 50%. However, this figure underestimates the potential gene flow for the next generation because it does not count breeding couples who were married in Greece. In the past 25 years, approximately 20% of the marriages in the Columbus Greek community have occurred between persons both born in Greece. Thus, in a migrant population, not only the admixture rate, but the total marriage pattern must be considered because the children of the marriage partners both born in Greece will contribute to the gene pool in the next generation.

**Inbreeding**

A final concept to be discussed is not a mechanism of microevolution, but it is important in population genetics. This concept, inbreeding, is linked to the two previously discussed concepts of genetic drift and gene flow because it also reflects the extent of isolation, migration and admixture.
Consanguinity refers to a relationship between two individuals sharing one or more common biological ancestors. Inbreeding is a genetic consequence of the mating of consanguinous individuals, and, as such, is a departure from random mating. Inbreeding is important to the population anthropologist not because it induces changes in the gene frequencies, but because it tends to increase the proportion of homozygotes. Thus, it allows rare recessive genes to become phenotypically more apparent.

In general, the isolation of a small population increases inbreeding levels, while the effect of gene flow is to decrease inbreeding levels. In other words, inbreeding is likely to occur most often in the same populations in which the probability for genetic drift is high and the amount of gene flow is low.

Two major methods are available for calculating the level of inbreeding. The first is through the use of isonymy (concordance of marital surnames), a method developed by Crow and Monge (1965). This approach estimates total population inbreeding coefficients by measuring the frequency of marriages between persons of identical surnames. Any increase over the randomly expected frequency of isonymous matings is viewed to result from consanguinous marriages. The observed value of the proportion of isonymous matings is divided by 4 to give
the inbreeding value for the population.

For the Columbus Greek population, there were four isonymous marriages. However, I determined from interview data that none of the isonymous marriages occurred between consanguinous individuals. Thus, the use of isonymy to determine a coefficient of inbreeding in migrant populations seems of doubtful value at best, and could be highly misleading.

A more accurate indicator of the level of inbreeding within a migrant population comes from the analysis of consanguinity between marriage partners for whom pedigree data is available. Malecot (1948) devised a measure of population inbreeding using pedigrees. With this method, the individual inbreeding coefficient ($F$) is calculated for each member of the population; then the population coefficient of inbreeding ($f$) is calculated as the arithmetic mean of the individual inbreeding coefficients:

$$f = \bar{F} = \frac{\sum F}{N}.$$ 

Each individual $F$ is calculated on the basis of the following:

<table>
<thead>
<tr>
<th>Relationship</th>
<th>$F$ Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>first cousin</td>
<td>$1/8$ or 0.0625</td>
</tr>
<tr>
<td>second cousin</td>
<td>$1/64$ or 0.015625</td>
</tr>
<tr>
<td>second and $\frac{1}{2}$ cousin</td>
<td>$1/128$ or 0.00781</td>
</tr>
<tr>
<td>third cousin</td>
<td>$1/256$ or 0.00391</td>
</tr>
<tr>
<td>fourth cousin</td>
<td>$1/1024$ or 0.00098</td>
</tr>
</tbody>
</table>
For the Columbus Greek population, the following consan­
guinous marriages were reported from a total of 364
marriages:

<table>
<thead>
<tr>
<th>Relationship</th>
<th>Number of Marriages</th>
</tr>
</thead>
<tbody>
<tr>
<td>first cousin</td>
<td>0</td>
</tr>
<tr>
<td>second cousin</td>
<td>1</td>
</tr>
<tr>
<td>second and ½ cousin</td>
<td>1</td>
</tr>
<tr>
<td>third cousin</td>
<td>3</td>
</tr>
<tr>
<td>fourth cousin</td>
<td>2</td>
</tr>
</tbody>
</table>

The sum of the individual F values divided by the number
of marriages examined was \( \frac{.03814}{364} = .000102 \).

Reid (1973) found no record of a human population
in which the inbreeding coefficient is greater than 0.05,
and he found that most human populations have inbreeding
coefficients below 0.005. Table 49 compares the coeffi­
cient of inbreeding of the Columbus Greek population with
those of other selected populations.

The Columbus Greek population falls within the same
range as the general Catholic population within the
United States; both groups have religious proscriptions
against marriages closer than third degree (second cou­
sin) (Freire-Maia 1969). For the Columbus Catholic popu­
lation, however, Freire-Maia found the coefficient of
inbreeding to be zero among 1237 marriages. Hence, while
the Columbus Greek population has a coefficient of in­
breeding within the range of that of the general popula­
tion of United States Catholics, the Greek population has
Table 49 — Inbreeding coefficients (f) of various human populations.

<table>
<thead>
<tr>
<th>Populations with f between 0.00001 and 0.0001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Netherlands (Reid 1973)</td>
</tr>
<tr>
<td>Panama (Friere-Maia 1968)</td>
</tr>
<tr>
<td>Roman Catholic, Columbus Ohio (Friere-Maia 1968)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Populations with f between 0.0001 and 0.001</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Roman Catholic (Friere-Maia 1968)</td>
</tr>
<tr>
<td>Greek Orthodox, Columbus Ohio (this study)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Populations with f between 0.001 and 0.01</th>
</tr>
</thead>
<tbody>
<tr>
<td>French Canadians (Freire-Maia 1968)</td>
</tr>
<tr>
<td>Roman Catholic, Cuba (Freire-Maia 1968)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Populations with f between 0.01 and 0.05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hutterites, United States (Mange 1964)</td>
</tr>
<tr>
<td>Dunkers, Pennsylvania (Glass 1952)</td>
</tr>
</tbody>
</table>
a greater coefficient of inbreeding than among Columbus Catholics. However, this level of inbreeding is far less than that for other religious isolates in the United States such as Dunkers, Hutterites and Mormons.

It is also possible that the coefficient of inbreeding was slightly underestimated for the Columbus Greek population because many individuals had ancestors from the same geographical region of Greece. Usually, pedigree information for these ancestors was not available. However, the degree of relationship between marriage partners would probably not be closer than 4th cousin, and the F value for that level of consanguinity is very low. Hence, this additional inbreeding would have little effect on the total \( f \) value of the population.

Summary

In this chapter I examined the effects of social and cultural factors on the vital rates and found them to be important. In addition, I discussed microevolutionary implications of the historical changes in the population structure of the Columbus Greek community.
CHAPTER VIII

SUMMARY AND CONCLUSIONS

Findings of the Study

The three substantive aims of this study were to describe the demographic characteristics of a specific urban Greek immigrant community, to determine the potential for microevolution, and to examine by inference the ways in which cultural factors influence microevolution. The findings of this study relevant to each of these three aims will be summarized separately below.

Demographic Characteristics of the Columbus Greek Community Population Structure

1. The population is getting older: the median age has increased from 18 in 1920 to 30 in 1976.
2. The proportion of males in the population is greater than 50% in all time periods, but this proportion has consistently decreased through time.
3. The population is becoming larger and there has been an increase in population size during each decade; this
increase is attributed both to births and continuous in-
migration.

4. The proportion of children is sufficiently large to maintain the population if these children remain within the Greek community.

**Fertility Patterns:**

1. Birth rates have decreased significantly and are now low compared with national standards.
2. The rate of stillbirth and miscarriage has decreased significantly; the abortion rate has remained low.
3. The rate of sterility has remained relatively constant and is moderate (about 11% of marriages).
4. Family planning has been important since the beginning of the century; the most frequently used methods of birth control have changed with technological advances in the field of planned parenthood. Presently, a majority of women use birth control pills.
5. There is a significantly high secondary sex ratio, the cause of which remained unknown.
6. The age of menarche has decreased significantly.

**Mortality Patterns:**

1. Death rates were low compared to the general United States population, even accounting for incomplete data.
2. The mean age at death has consistently decreased for each 10 year cohort.
3. Prereproductive age mortality has decreased for each successive cohort.
4. Life expectancy values of the Columbus Greek population are more similar to the population of Greece than that of the United States in two respects: first, the difference between life expectancy of males and females is small in both the Columbus Greek population and the population in Greece as compared to the United States in general. Second, male life expectancy values are higher both in the populations from Greece and the Columbus Greek community than in the United States general population.
5. The three leading causes of death in descending order are heart attack, cancer and accident.

Migration:
1. Greek immigration into Columbus began in 1898 and the rate increased until the early 1920's. The downward trend ended during the decade of the 1930's as a result of increased immigration to Columbus from the rest of the country, and also increased immigration as a result of relaxed immigration laws.
2. Migrants are drawn from the younger age categories. For the decades 1891-1930, the 5 year cohort representing the major migrating group was that of the 15-19 year class; since 1930, migrants in the 20-24 year class have predominated.

3. In-migrants are represented by nearly equal numbers of males and females. However, there have been 50% more male than female immigrants from Greece.

4. The majority of immigrants into Columbus came from the Peloponnesus, primarily from the provinces of Laconia and Arcadia.

**Marriage Patterns:**

1. In considering data for persons born prior to 1940, we find that many more males (13.7%) than females (3.2%) remain single.

2. On the whole, males have married later than females in all time periods. There has been a significant decrease in the mean age at marriage for males; there was no significant discernable trend for females.

3. Cultural endogamy had a higher correlation with mate selection than did geographical propinquity of birth.

4. Males tend to remarry more often than females.
Potential for Microevolution Within the Columbus Greek Community

The potential for microevolution to have occurred in this population can be best examined by noting the potential for genetic change due to each of the forces of microevolution.

Natural selection: The demographic characteristics of the Columbus Greek community suggest that natural selection could have operated at only a moderately low level compared with other human populations. Low mortality and fertility rates and a low variance in the number of offspring all contribute to the low potential for natural selection. Following the general pattern for industrialized populations, however, the Columbus Greek population did exhibit a trend in which the potential for selection from differential fertility was more significant than that due to mortality.

Gene flow: As we anticipated in an immigrant population with a continuous flow of immigrants, the admixture rate was high, averaging over 50% in all generations. The homogenizing effect of gene flow that might be expected if the immigrants were randomly selected is not as high because the immigrants came from a single country.
However, as the immigrants came from a number of villages in Greece, we anticipate the homogenizing effect of gene flow to be less than that derived from a random universe of immigrants, but more than if the immigrants all came from the same community.

**Genetic drift:** In calculating the potential for genetic drift in the Columbus Greek population, we first calculated the effective breeding size of the population. This was estimated to be within 1% of Lasker's estimate of the effective breeding size of a population.

Calculation of the coefficient of breeding isolation allowed us to see that in the Columbus Greek population, genetic drift had a slight to moderate potential for differentiating the population. Although the effective breeding size was sufficiently low to allow for a large degree of drift, the immigration rate was great enough that only low to moderate microdifferentiation from drift was likely to result.

**Inbreeding levels:** Inbreeding does not affect the gene frequencies of a population, but only the phenotypic expression of the genes by allowing the more frequent appearance of rare recessives. Hence, it is not actually a force of microevolution, but it is of interest to
population anthropologists. The inbreeding level of the Columbus Greek population was greater than that for the Columbus Catholic population, but much lower than that for other religious isolates in the United States such as the Dunkers, Hutterites and Mormons. The inbreeding rate in the Columbus Greek population was relatively low compared with other national rates.

Inference of Cultural Influences on Forces of Micro-evolution

Several cultural factors both directly and indirectly influenced the potential for microevolution in the Columbus Greek population. These factors were discussed in Chapter VII in terms of their influence on the population structure and demographic vital rates. Cultural influences on the forces of microevolution can now be inferred.

1. The desire to provide material goods and education for their children was a primary factor in the population's low birth rate. In addition, later age at marriage and strict premarital celibacy contributed to the low birth rates. The mortality rate was also low because, for a variety of reasons, the population traditionally sought good medical care. The combination of low birth and mortality rates resulted in a moderately low
potential for natural selection.

2. Religious proscription directly retarded the level of inbreeding.

3. While there is a strong cultural preference for mates to be of Greek heritage and of the Orthodox faith, the influx of immigrants has allowed a wider choice of Greek mates than just those born in the Columbus area. The pattern of preferred mate selection based on cultural endogamy rather than geographic propinquity (for place of birth) contributed to a high rate of gene flow.

4. The continuous inflow of immigrants retarded the extent to which genetic drift could have operated.

Summary

The Greek community is politically, geographically and economically well integrated within the larger Columbus population. However, it constitutes a viable ethnic group with distinct aspects of a continuing cultural tradition. While the Greek Orthodox Church has been the most consolidating influence, traditional values, family relationships, language and forms of recreation have contributed to the reproductive isolation of the population. This pattern is likely to be maintained because the older urban Greek immigrants are making conscious efforts to preserve their traditional heritage, there is a
continuing influx of migrants from Greece, and the existence of a very strong religious organization are all factors contributing to the continuation of the distinct community.

The demographic history of the Columbus Greek population, however, is not of a closed population. The historical and present demographic dynamics of the community have provided the parameters for the operation of several microevolutionary processes. Natural selection and genetic drift potentially have occurred only to a low to moderate degree; gene flow has occurred at relatively high rates. Thus, the major microevolutionary force operative in the Columbus Greek community has probably been gene flow. As gene flow usually acts to stabilize gene frequencies in populations, I conclude that there has probably not been extensive microdifferentiation within this urban immigrant population.

Implications for Future Research

This study does not pretend to explain everything about the relationship between biology and culture in reference to the community's population structure or to its microevolution. However, it is a beginning in the formulation of generalizations concerning industrialized populations. The following are suggestions for future
research based on the findings of this study:

1. This study could be greatly enhanced by a follow-up study of the same population in which quantitative physiological data are used to examine allelic frequencies and to test if the calculated microevolution of the population is substantiated. This follow-up could ideally be performed concommitantly with the thalassemia screening program.

2. The implications of the study of the microevolution of an immigrant community suggest that there also may be general microevolutionary patterns found in communities of emigration. A promising line of investigation would be to examine the effect of large scale migration on the villages of origin.

3. Another topic which has been neglected in the literature is the examination of the reciprocal relationships between culture and microevolution. The present study examined the influence of cultural factors on the microevolution of a population; a project investigating the converse would further integrate the subdisciplines of cultural and physical anthropology. The proposed research would investigate the extent to which population structure influences cultural practices (e.g. how does the biased sex ratio favor assimilation of an immigrant population into the larger population).
4. Because the potential for microdifferentiation varied considerably with the scant comparable data on urban industrialized groups, I strongly suggest that other studies of such populations be performed. Until such studies are completed, generalizations concerning microevolution in urban industrialized populations are not possible.
APPENDIX A

At times it is difficult to state whether differences in sex ratios between populations are meaningful. One factor, the sample size, becomes especially important in this determination. If we know, for example, that one population has a sex ratio of 101 and another the ratio of 104, we can only determine through calculation if there is a meaningful difference between these ratios.

One method used to determine "meaningful differences" is to calculate whether the ratios fall within a confidence interval determined by a given degree of confidence (e.g. 0.95). This method is as follows:

\[ p = \frac{\text{males}}{\text{males} + \text{females}}. \]

The standard error of \( p \) is a description of the distribution of \( p \); it is an estimate of the standard deviation and is calculated as

\[ \text{SE}_p = \sqrt{\frac{p(1-p)}{\text{males} + \text{females}}}. \]

The confidence interval for \( p \) (at 95%) is calculated as
\[ p \pm 1.96(\text{SE}_p) \]

which is

\[ p \pm 1.96 \sqrt{\frac{p(1-p)}{\text{males + females}}} \]

From these calculations, it is obvious that as the sample size (males + females) increases, the standard error decreases.
APPENDIX B

In more theoretical works, the same equation is usually seen in the notation of integral calculus:

$$\int l_x m_x e^{-rx} dx = 1.$$ 

This says the same thing as the summation equation given in the body of this paper ($\sum_{x=0}^{\infty} l_x m_x e^{-rx} = 1$) only more precisely. Instead of taking the intervals of time ($x$) in large units (days or years) the intervals are made infinitesimally small (i.e. $dx$). Hence, the value of $r$ obtained will be very precise. In practice, however, the summation equation is ordinarily used because the data can only be retrieved in the larger units of time (Wilson and Bossert 1971).
Although it is confronted by continuing acculturation pressures and is economically and politically well integrated into the larger urban society, the Greek Community of Columbus is attempting to preserve many facets of the traditional Greek way of life.

In order to determine the way in which these traditional values are being maintained, you will be asked the following questions:

1. Who resides in your house?

2. Why settle in Columbus?
   - did you have friends or relatives here previously?
   - occupational history

3. Previous family address
   - reasons for moving

4. Previous family name

5. Do you know other members of the Greek community in your neighborhood?
   - amount of interaction with them

6. Participation in religious activities (church attendance, special services, church organizations)

7. Language retention (bilingual; children attend Greek language school)

8. Major social activities (what and with whom)

9. Communication with friends and relatives in Greece (frequency, method)
   - return visits
10. Maintaining traditional customs (marriages, festivals, christenings, etc.)

11. Feelings of marrying within the church (do you want your children to?)
   - do children retain your values and traditions?

12. What folklore is told to children?

13. Do you know of any Greek beliefs or superstitions?

14. Frequency of preparation of traditional Greek foods

15. Use of traditional medicine (home remedies, etc.)

16. Values

17. Any problems encountered as a result of following any of these traditional customs?
<table>
<thead>
<tr>
<th>ID #</th>
<th>NAME</th>
<th>DATE</th>
<th>PLACE</th>
<th>RESIDENCE</th>
<th>NAT</th>
<th>OCCUP</th>
<th>ED</th>
<th>INC</th>
<th>AGE</th>
<th>SPOUSE</th>
<th>ORIGIN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BIRTH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MARRIAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REPRODUCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DEATH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AOM</th>
<th>LB</th>
<th>IF DEAD</th>
<th>RW</th>
<th>1st</th>
<th>DN</th>
<th>BC</th>
<th>AGE</th>
<th>PLACE</th>
<th>CAUSE</th>
<th>ILLNESS</th>
<th>ADD MED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**DATA RECORDING SHEET**
APPENDIX D

ANNOUNCEMENT OF RESEARCH

From THE CHARIOTEER, Volume 7:16 (1977)

ANTHROPOLOGY STUDY CONDUCTED

by Diana Synadinos

Having to slush through snow every day to keep appointments would discourage most of us, but Toni Reimer finds it invigorating. Having grown up in Iowa where winters are much heavier, she was delighted with Ohio's recent snowfall.

Who is Toni Reimer and why are some of us getting phone calls from her asking if she might interview us? The explanation is interesting.

Born in 1946 in Perry, Iowa, she grew up in that small community. Her mother was the school nurse and everybody knew everyone else. After high school, she got into an Army program to study nursing. She completed the program with a B.S. and served in this country for 3 years. She then re-entered college to pursue a Master's degree in nursing.

She married Steve Reimer in 1968. Steve was also from her home town of Perry. His father was the history teacher in the high school there and there were many similarities in both backgrounds of Steve and Toni. Steve is now a professor of economics and accounting at OSU and that is what originally brought them to Columbus in July of 1972.

Toni enrolled in graduate school at OSU in the Department of Anthropology. Why the departure from nursing to anthropology? Well, it's not exactly a departure. Toni's nursing experience brought some interesting observations to light, one of them being that "ethnic" patients in a hospital staffed by middle class white Americans are often misunderstood. This led her to look into the possibilities of studying an ethnic minority group in depth so that she could take what she has learned and instruct a nursing staff in methods that will better open understanding between patient and nurse.

Anthropology seemed the most likely avenue and the main theme of her doctoral dissertation will be the Greek community of Columbus, Ohio. To date, there have been no anthropological studies done on urban Greek groups, so the field is untapped. She chose the Greek community because she felt it is a body of people that is still somewhat intact and still holding onto Old World customs and religious practices.

The nature of the questions she asks generally deals with just how Greek we remain after migrating to this country, and moreover, how much we have succeeded in handing it over to our American born children, etc. It is a most interesting study and her results and data should be a very valuable collection for our church library.

She has found everyone to be very cooperative and open, but to any who might be wary of her questions, we assure you she is legitimate! No names are used in her reports and information is kept to herself.

She spends nearly all of her time on this project reading back issues of the "Orthodox Observer", histories, stories, articles and anything that will help her to better understand what it means to be Greek. Some interviews run late at night, but she is very fortunate in having a supportive husband who is quite willing to warm up his own supper and not bring pressure on her during this busy period in her life.

No matter how involved in work, she and Steve play volleyball twice a week. She loves to cook and also plays flute to relax. Her musical tastes run to classical and easy listening. They both love plants. She concerns herself more with indoor plants while he does the vegetable and flower gardening around their Grandview home. Both are also avid readers.

She hopes to have over 100 samples from which to compile her data and if she calls you, please give her your time graciously. She is a lovely and personable gal who is winning our hearts!
APPENDIX E

THE OHIO STATE UNIVERSITY

Population Study of an Urban Greek Community:
Informant's Consent Form

I, ____________________________, consent to be interviewed by Toni Reimer with regard to information for the study of the population history of the Greek community of Columbus, Ohio. I am aware that the information I provide will remain anonymous. I recognize that I will be asked questions regarding my life history and that of other members of my family. I understand that some of these questions will be of a personal nature (for example, methods of birth control). I also recognize that I may refuse at any time to give out information and may decline to answer any or all questions. No guarantee has been given me concerning the results of this study or any benefits I might receive from it.

I understand and consent to these above conditions.

Name ______________________________
Date ______________________________
APPENDIX F

FORTRAN CODING

Code sheet: IBM Fortran Coding Form

<table>
<thead>
<tr>
<th>Columns</th>
<th>Coded for:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-4</td>
<td>individual's code number</td>
</tr>
<tr>
<td>5-8</td>
<td>individual's father's code number</td>
</tr>
<tr>
<td>9-12</td>
<td>individual's mother's code number</td>
</tr>
<tr>
<td>13</td>
<td>gender</td>
</tr>
<tr>
<td>14-15</td>
<td>month of birth</td>
</tr>
<tr>
<td>16-19</td>
<td>year of birth</td>
</tr>
<tr>
<td>20-23</td>
<td>year of mother's birth</td>
</tr>
<tr>
<td>24-25</td>
<td>place of birth</td>
</tr>
<tr>
<td>26</td>
<td>present residence</td>
</tr>
<tr>
<td>27-30</td>
<td>year of migration</td>
</tr>
<tr>
<td>31</td>
<td>education</td>
</tr>
<tr>
<td>32-33</td>
<td>occupation</td>
</tr>
<tr>
<td>34-35</td>
<td>age at marriage</td>
</tr>
<tr>
<td>36</td>
<td>marital status</td>
</tr>
<tr>
<td>37-38</td>
<td>years between marriages</td>
</tr>
<tr>
<td>39-42</td>
<td>spouse's identification number</td>
</tr>
<tr>
<td>43-44</td>
<td>spouse's place of birth</td>
</tr>
<tr>
<td>45</td>
<td>% Greek</td>
</tr>
<tr>
<td>46</td>
<td>spouse's % Greek</td>
</tr>
<tr>
<td>47-48</td>
<td>woman's age at menarche</td>
</tr>
<tr>
<td>49-50</td>
<td>woman's number of livebirths</td>
</tr>
<tr>
<td>51-52</td>
<td>woman's number of deceased children</td>
</tr>
<tr>
<td>53-54</td>
<td>woman's number of stillbirths</td>
</tr>
<tr>
<td>55-56</td>
<td>woman's number of miscarriages</td>
</tr>
<tr>
<td>57</td>
<td>woman's number of abortions</td>
</tr>
<tr>
<td>58</td>
<td>woman's method of infant feeding</td>
</tr>
<tr>
<td>59</td>
<td>woman's method of birth control</td>
</tr>
<tr>
<td>60-62</td>
<td>age at death</td>
</tr>
<tr>
<td>63</td>
<td>place of death</td>
</tr>
<tr>
<td>64-65</td>
<td>cause of death</td>
</tr>
<tr>
<td>78-79</td>
<td>age of father at birth</td>
</tr>
</tbody>
</table>
FORTRAN IV 1.0

DIMENSION NAME(1), NOTE(10), PPM(20), IDT(20), BB(20), ODM(20), DDF(20)

READ 50, NAME
50 FORMAT (1,4X,A4,4)

READ 54, NAME
54 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

READ 6, DATE
6 DATE = 77142 11/16/77

FORMAT (1,1X,A4,4)

READ 56, IDATE, TTP, TDD, TBB, TBBF, YEARS
56 FORMAT (1,5X,4,9,5F6.0)

READ 50, IDP, IDDF
50 FORMAT ([1],[1])

READ 59, IDT, DDF, DDF
59 FORMAT ([1],[1])

READ 60, DDF
60 FORMAT ([1])

DO 62 6=11
62 PRINT 6

FORMAT ([1],1X,A4,4)

IF (NAME) 50
50 FORMAT ([1],1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)

IF (NAME) 50
50 FORMAT (1,1X,A4,4)
APPENDIX G

COLUMBUS GREEK AGGREGATE DATA PROGRAM

FERTRAN IV G1 RELEASE 2.0

MAIN

DATE = 77131 13/4/9/16

COO1

DIMENSION PCP(1001,1001,1001),ISB(1001,1001,1001),ISAGE(1001,1001,1001,1001),ISAGE(1001,1001,1001,1001),YEARS(1001,1001,1001,1001)

CCG2

CCG3

CCG4

CCG5

CCG6

CCG7

CCG8

CCG9

CCG10

CCG11

CCG12

CCG13

CCG14

CCG15

CCG16

CCG17

CCG18

CCG19

CCG20

402 CONTINUE

CCG21

403 CONTINUE

CCG22

404 CONTINUE

CCG23

405 CONTINUE

CCG24

406 CONTINUE

CCG25

407 CONTINUE

CCG26

408 CONTINUE

CCG27

409 CONTINUE

CCG28

410 CONTINUE

CCG29

411 CONTINUE

CCG30

412 CONTINUE

CCG31

413 CONTINUE

CCG32

414 CONTINUE

CCG33

415 CONTINUE

CCG34

416 CONTINUE

CCG35

417 CONTINUE

CCG36

418 CONTINUE

CCG37

419 CONTINUE

CCG38

420 CONTINUE

CCG39

421 CONTINUE

CCG40

422 CONTINUE

CCG41

423 CONTINUE

CCG42

424 CONTINUE

CCG43

425 CONTINUE

CCG44

426 CONTINUE

CCG45

427 CONTINUE

CCG46

428 CONTINUE

CCG47

429 CONTINUE

CCG48

430 CONTINUE

CCG49

431 CONTINUE

CCG50

432 CONTINUE

CCG51

433 CONTINUE

CCG52

434 CONTINUE

CCG53

435 CONTINUE

258
```fortran
MAIN

<table>
<thead>
<tr>
<th>Line</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>0111</td>
<td>IF IAMU-34 .LE. 0 GO TO 117</td>
</tr>
<tr>
<td>0112</td>
<td>IF IAMU-39 .LE. 0 GO TO 118</td>
</tr>
<tr>
<td>0113</td>
<td>IF IAMU-44 .LE. 0 GO TO 119</td>
</tr>
<tr>
<td>0114</td>
<td>IF IAMU-49 .LE. 0 GO TO 120</td>
</tr>
<tr>
<td>0115</td>
<td>IF IAMU-54 .LE. 0 GO TO 121</td>
</tr>
<tr>
<td>0116</td>
<td>IF IAMU-59 .LE. 0 GO TO 122</td>
</tr>
<tr>
<td>0117</td>
<td>IF IAMU-64 .LE. 0 GO TO 123</td>
</tr>
<tr>
<td>0118</td>
<td>IF IAMU-69 .LE. 0 GO TO 124</td>
</tr>
<tr>
<td>0119</td>
<td>IF IAMU-74 .LE. 0 GO TO 125</td>
</tr>
<tr>
<td>0120</td>
<td>IF IAMU-79 .LE. 0 GO TO 126</td>
</tr>
<tr>
<td>0121</td>
<td>IF IAMU-84 .LE. 0 GO TO 127</td>
</tr>
<tr>
<td>0122</td>
<td>IF IAMU-89 .LE. 0 GO TO 128</td>
</tr>
<tr>
<td>0123</td>
<td>IF IAMU-94 .LE. 0 GO TO 129</td>
</tr>
<tr>
<td>0124</td>
<td>IF IAMU-99 .LE. 0 GO TO 130</td>
</tr>
<tr>
<td>0125</td>
<td>IF IAMU-104 .LE. 0 GO TO 131</td>
</tr>
<tr>
<td>0126</td>
<td>IF IAMU-109 .LE. 0 GO TO 132</td>
</tr>
<tr>
<td>0127</td>
<td>IF IAMU-114 .LE. 0 GO TO 133</td>
</tr>
<tr>
<td>0128</td>
<td>IF IAMU-119 .LE. 0 GO TO 134</td>
</tr>
</tbody>
</table>
```

**FORTRAN IV G1 RELEASE 2.0**

DATE: 77131

13/49/16

PAGE: 203
<table>
<thead>
<tr>
<th>Line</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>G165</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G166</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G167</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G168</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G169</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G170</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G171</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G172</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G173</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G174</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G175</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G176</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G177</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G178</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G179</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G180</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G181</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G182</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G183</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G184</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G185</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G186</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G187</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G188</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G189</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G190</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G191</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G192</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G193</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G194</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G195</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G196</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G197</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G198</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G199</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G200</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G201</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G202</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G203</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G204</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G205</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G206</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G207</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G208</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G209</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G210</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G211</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G212</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G213</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G214</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G215</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G216</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G217</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G218</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G219</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G220</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G221</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G222</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G223</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G224</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G225</td>
<td>GO TO 150</td>
<td></td>
</tr>
<tr>
<td>G226</td>
<td>GO TO 150</td>
<td></td>
</tr>
</tbody>
</table>
FORTRAN IV G 1 RELEASE 2.0

0459

0461

0462

0463

0464

0465

0466

0467

0468

0469

0470

0471

0472

0473

0474

0475

0476

0477

0478

0479

0480

0481

0482

0483

0484

0485

0486

0487

0488

0489

0490

0491

0492

0493

0494

0495

0496

0497

0498

0499

0500

0501

0502

0503

0504

0505

0506

0507

0508

0509

0510

0511

0512

0513

0514

0515

0516

0517

0518

0519

0520

0521

0522

0523

0524

0525

0526

0527

0528

0529
0513 CONTINUE
0514 WRITE (6,205) ICATE,(ISAGE(I,J,2),J=1,19)
0515 CONTINUE
0516 WRITE (6,206) IDATE,(181FA(I,J,1),J=1,19)
0517 CONTINUE
0518 WRITE (6,207) ICATE,(ISBIFO(I,J,1),J=1,19)
0519 CONTINUE
0520 WRITE (6,208) ICATE,(ISBIFO(I,J,2),J=1,19)
0521 CONTINUE
0522 WRITE (6,209) ICATE,(ISBIFO(I,J,1)+ISBIFO(I,J,2),J=1,19)
0523 CONTINUE
0524 WRITE (6,210) ICATE,(ISBIFO(I,J,1)*ISBIFO(I,J,2),J=1,19)
0525 CONTINUE
0526 WRITE (6,211) ICATE,(ISBIFO(I,J,1),J=1,19)
0527 CONTINUE
0528 WRITE (6,212) ICATE,(ISBIFO(I,J,2),J=1,19)
0529 CONTINUE
0530 WRITE (6,213) ICATE,(ISBIFO(I,J,1)+ISBIFO(I,J,2),J=1,19)
0531 CONTINUE
0532 WRITE (6,214) ICATE,(ISBIFO(I,J,1)*ISBIFO(I,J,2),J=1,19)
0533 CONTINUE
0534 WRITE (6,215) ICATE,(ISBIFO(I,J,1),J=1,19)
0535 CONTINUE
0536 WRITE (6,216) ICATE,(ISBIFO(I,J,2),J=1,19)
0537 CONTINUE
0538 WRITE (6,217) ICATE,(ISBIFO(I,J,1)+ISBIFO(I,J,2),J=1,19)
0539 CONTINUE
0540 WRITE (6,218) ICATE,(ISBIFO(I,J,1)*ISBIFO(I,J,2),J=1,19)
0541 CONTINUE
0542 WRITE (6,219) ICATE,(ISBIFO(I,J,1),J=1,19)
0543 CONTINUE
0544 WRITE (6,220) ICATE,(ISBIFO(I,J,2),J=1,19)
0545 CONTINUE
0546 WRITE (6,221) ICATE,(ISBIFO(I,J,1)+ISBIFO(I,J,2),J=1,19)
0547 CONTINUE
0548 WRITE (6,222) ICATE,(ISBIFO(I,J,1)*ISBIFO(I,J,2),J=1,19)
0549 CONTINUE
0550 WRITE (6,223) ICATE,(ISBIFO(I,J,1),J=1,19)
0551 CONTINUE
0552 WRITE (6,224) ICATE,(ISBIFO(I,J,2),J=1,19)
0553 CONTINUE
0554 WRITE (6,225) ICATE,(ISBIFO(I,J,1)+ISBIFO(I,J,2),J=1,19)
0555 CONTINUE
0556 WRITE (6,226) ICATE,(ISBIFO(I,J,1)*ISBIFO(I,J,2),J=1,19)
0557 CONTINUE
0558 WRITE (6,227) ICATE,(ISBIFO(I,J,1),J=1,19)
0559 CONTINUE
0560 WRITE (6,228) ICATE,(ISBIFO(I,J,2),J=1,19)
0561 CONTINUE
0562 WRITE (6,229) ICATE,(ISBIFO(I,J,1)+ISBIFO(I,J,2),J=1,19)
0563 CONTINUE
0564 WRITE (6,230) ICATE,(ISBIFO(I,J,1)*ISBIFO(I,J,2),J=1,19)
0565 CONTINUE
0566 WRITE (6,231) ICATE,(ISBIFO(I,J,1),J=1,19)
0567 CONTINUE
0568 WRITE (6,232) ICATE,(ISBIFO(I,J,2),J=1,19)
0569 CONTINUE
0570 WRITE (6,233) ICATE,(ISBIFO(I,J,1)+ISBIFO(I,J,2),J=1,19)
0571 CONTINUE
0572 WRITE (6,234) ICATE,(ISBIFO(I,J,1)*ISBIFO(I,J,2),J=1,19)
WRITE (6,217) DATE, (ISDFA(I,J,1), J=1, 3)
WRITE (6,218) DATE, (STFAM(I,J,1), J=1, 3)
WRITE (6,219) DATE, (ISDEF(I,J,3), J=1, 19)
WRITE (6,220) DATE, (STFAM(I,J,3), J=1, 19)
WRITE (6,221) DATE, (STFAM(I,J,1), J=1, 19)
WRITE (6,222) DATE, (STFAM(I,J,3), J=1, 19)
WRITE (6,223) DATE, (STFAM(I,J,3), J=1, 19)
WRITE (6,224) DATE, (STFAM(I,J,1), J=1, 19)
WRITE (6,225) DATE, (STFAM(I,J,3), J=1, 19)
WRITE (6,226) DATE, (STFAM(I,J,3), J=1, 19)
WRITE (6,227) DATE, (STFAM(I,J,1), J=1, 19)
WRITE (6,228) DATE, (STFAM(I,J,3), J=1, 19)
WRITE (6,229) DATE, (STFAM(I,J,3), J=1, 19)
WRITE (6,230) DATE, (STFAM(I,J,1), J=1, 19)
WRITE (6,231) DATE, (STFAM(I,J,3), J=1, 19)
WRITE (6,232) DATE, (STFAM(I,J,3), J=1, 19)
WRITE (6,233) DATE, (STFAM(I,J,1), J=1, 19)
WRITE (6,234) DATE, (STFAM(I,J,3), J=1, 19)
WRITE (6,235) DATE, (STFAM(I,J,3), J=1, 19)
WRITE (6,236) DATE, (STFAM(I,J,1), J=1, 19)
WRITE (6,237) DATE, (STFAM(I,J,3), J=1, 19)
WRITE (6,238) DATE, (STFAM(I,J,3), J=1, 19)
WRITE (6,239) DATE, (STFAM(I,J,1), J=1, 19)
WRITE (6,240) DATE, (STFAM(I,J,3), J=1, 19)
WRITE (6,241) DATE, (STFAM(I,J,3), J=1, 19)
WRITE (6,242) DATE, (STFAM(I,J,1), J=1, 19)
WRITE (6,243) DATE, (STFAM(I,J,3), J=1, 19)
WRITE (6,244) DATE, (STFAM(I,J,3), J=1, 19)
WRITE (6,245) DATE, (STFAM(I,J,1), J=1, 19)
WRITE (6,246) DATE, (STFAM(I,J,3), J=1, 19)
WRITE (6,247) DATE, (STFAM(I,J,3), J=1, 19)
WRITE (6,248) DATE, (STFAM(I,J,1), J=1, 19)
WRITE (6,249) DATE, (STFAM(I,J,3), J=1, 19)
WRITE (6,250) DATE, (STFAM(I,J,3), J=1, 19)
WRITE (6,251) DATE, (STFAM(I,J,1), J=1, 19)
WRITE (6,252) DATE, (STFAM(I,J,3), J=1, 19)
WRITE (6,253) DATE, (STFAM(I,J,3), J=1, 19)
WRITE (6,254) DATE, (STFAM(I,J,1), J=1, 19)
WRITE (6,255) DATE, (STFAM(I,J,3), J=1, 19)
WRITE (6,256) DATE, (STFAM(I,J,3), J=1, 19)
WRITE (6,257) DATE, (STFAM(I,J,1), J=1, 19)
WRITE (6,258) DATE, (STFAM(I,J,3), J=1, 19)
WRITE (6,259) DATE, (STFAM(I,J,3), J=1, 19)
WRITE (6,260) DATE, (STFAM(I,J,1), J=1, 19)
FORTRAN IV G1 RELEASE 2.0

PROCEDURE

WRITE ( 6,204 )
READ ( 6,205 )
WRITE ( 6,208 )
READ ( 6,209 )
WRITE ( 6,210 )
READ ( 6,211 )
WRITE ( 6,212 )
READ ( 6,213 )
WRITE ( 6,214 )
READ ( 6,215 )
WRITE ( 6,216 )
READ ( 6,217 )
WRITE ( 6,218 )
READ ( 6,219 )
WRITE ( 6,220 )
READ ( 6,221 )
WRITE ( 6,222 )
READ ( 6,223 )
WRITE ( 6,224 )
READ ( 6,225 )
WRITE ( 6,226 )
READ ( 6,227 )
WRITE ( 6,228 )
READ ( 6,229 )
WRITE ( 6,230 )
READ ( 6,231 )
WRITE ( 6,232 )
READ ( 6,233 )
WRITE ( 6,234 )
READ ( 6,235 )
WRITE ( 6,236 )
READ ( 6,237 )
WRITE ( 6,238 )
READ ( 6,239 )
WRITE ( 6,240 )
READ ( 6,241 )
WRITE ( 6,242 )
READ ( 6,243 )
WRITE ( 6,244 )
READ ( 6,245 )
WRITE ( 6,246 )
READ ( 6,247 )
WRITE ( 6,248 )
READ ( 6,249 )
WRITE ( 6,250 )
READ ( 6,251 )
WRITE ( 6,252 )
READ ( 6,253 )
WRITE ( 6,254 )
READ ( 6,255 )
WRITE ( 6,256 )
READ ( 6,257 )
WRITE ( 6,258 )
READ ( 6,259 )
WRITE ( 6,260 )
READ ( 6,261 )
WRITE ( 6,262 )
READ ( 6,263 )
WRITE ( 6,264 )
READ ( 6,265 )
WRITE ( 6,266 )
READ ( 6,267 )
WRITE ( 6,268 )
READ ( 6,269 )
WRITE ( 6,270 )
READ ( 6,271 )
WRITE ( 6,272 )
READ ( 6,273 )
WRITE ( 6,274 )
READ ( 6,275 )
WRITE ( 6,276 )
READ ( 6,277 )
WRITE ( 6,278 )
READ ( 6,279 )
WRITE ( 6,280 )
READ ( 6,281 )
WRITE ( 6,282 )
READ ( 6,283 )
WRITE ( 6,284 )
READ ( 6,285 )
APPENDIX H

O.S.U. IBM SORT AND MERGE PROGRAM

// (5000.1500), CLASS=A
// EXEC SORT3, TIME=(0,10)
// S.SORTIN DD *
// S.SORTOUT UNIT=SYSDA, SPACE=(CYL,(1,1)), DISP=(NEW, PASS),
// DC8=(REDFM=FB, LRECL=80, BLKSIZE=500), DSN=&&SORT1
// S.SYSIN DD *
SORT FIELDS=(20,4,CH,A,9,4,CH,A,16,4,CH,A)
// // EXEC FORTRAN, TIME.GO=(.30)
// CMP.SYSIN DD *

INTEGER 1(EC)
REAL 1
WRITE(6,6)
10045 FORMAT(11-1,31HSOFT BY SEX AND YEAR OF BIRTH )
10051 FORMAT(5011)
10082 FORMAT(1H,411,1X,411,1X,411,1X,411,1X,211,1X,411,1X,
*1X,411,1X,211,1X,211,1X,211,1X,211,1X,211,1X,211,1X,211,1X,211,1X,211,1X,
*211,1X,11,1X,211,1X,211,1X,211,1X,211,1X,211,1X,211,1X,211,1X,211,1X,
*211,1X,11,1X,211,1X,211,1X,211,1X,211,1X,211,1X,211,1X,211,1X,211,1X,211,1X)
3010  GC  TC 3
3017  GC  TE
3011  END
APPENDIX I

UNITED STATES 1967 LIFE TABLES
(from Keyfitz and Pleiger 1971)

**Table 2** LIFE TABLE FOR MALES

<table>
<thead>
<tr>
<th>Age</th>
<th>n0</th>
<th>1</th>
<th>1*</th>
<th>μx</th>
<th>lx</th>
<th>ex</th>
<th>mx</th>
<th>1000ex</th>
<th>Sx</th>
<th>Sx1000ex</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.02469</td>
<td>100000</td>
<td>2469</td>
<td>98094</td>
<td>0.02517</td>
<td>6698012</td>
<td>0.00</td>
<td>66.98</td>
<td>0.02517</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>0.00382</td>
<td>97531</td>
<td>373</td>
<td>390030</td>
<td>0.00096</td>
<td>65994910</td>
<td>0.00</td>
<td>67.67</td>
<td>0.00096</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0.00244</td>
<td>97158</td>
<td>206</td>
<td>485199</td>
<td>0.00049</td>
<td>62180860</td>
<td>0.00</td>
<td>63.93</td>
<td>0.00049</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>0.00025</td>
<td>96921</td>
<td>96</td>
<td>5241599</td>
<td>0.00056</td>
<td>57268618</td>
<td>17.78</td>
<td>99.08</td>
<td>0.00056</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>0.00073</td>
<td>96672</td>
<td>111</td>
<td>481730</td>
<td>0.00148</td>
<td>5241599</td>
<td>34.69</td>
<td>54.22</td>
<td>0.00146</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>0.01001</td>
<td>95961</td>
<td>96</td>
<td>477443</td>
<td>0.00201</td>
<td>47586986</td>
<td>39.76</td>
<td>49.60</td>
<td>0.00201</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>0.00951</td>
<td>95060</td>
<td>96</td>
<td>477443</td>
<td>0.00201</td>
<td>47586986</td>
<td>39.76</td>
<td>49.60</td>
<td>0.00201</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>0.00382</td>
<td>97089</td>
<td>373</td>
<td>485199</td>
<td>0.00096</td>
<td>65994910</td>
<td>0.00</td>
<td>67.67</td>
<td>0.00096</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>0.00244</td>
<td>97158</td>
<td>206</td>
<td>485199</td>
<td>0.00049</td>
<td>62180860</td>
<td>0.00</td>
<td>63.93</td>
<td>0.00049</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>0.00025</td>
<td>96921</td>
<td>96</td>
<td>5241599</td>
<td>0.00056</td>
<td>57268618</td>
<td>17.78</td>
<td>99.08</td>
<td>0.00056</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>0.00073</td>
<td>96672</td>
<td>111</td>
<td>481730</td>
<td>0.00148</td>
<td>5241599</td>
<td>34.69</td>
<td>54.22</td>
<td>0.00146</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>0.01001</td>
<td>95961</td>
<td>96</td>
<td>477443</td>
<td>0.00201</td>
<td>47586986</td>
<td>39.76</td>
<td>49.60</td>
<td>0.00201</td>
<td></td>
</tr>
</tbody>
</table>

**Table 3** LIFE TABLE FOR FEMALES

<table>
<thead>
<tr>
<th>Age</th>
<th>n0</th>
<th>1</th>
<th>1*</th>
<th>μx</th>
<th>lx</th>
<th>ex</th>
<th>mx</th>
<th>1000ex</th>
<th>Sx</th>
<th>Sx1000ex</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.01910</td>
<td>100000</td>
<td>1910</td>
<td>98533</td>
<td>0.01939</td>
<td>7422270</td>
<td>0.00</td>
<td>74.22</td>
<td>0.01939</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>0.00305</td>
<td>98090</td>
<td>299</td>
<td>391488</td>
<td>0.00076</td>
<td>7323737</td>
<td>0.00</td>
<td>74.66</td>
<td>0.00076</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0.00176</td>
<td>97719</td>
<td>172</td>
<td>485199</td>
<td>0.00045</td>
<td>65994910</td>
<td>0.00</td>
<td>67.67</td>
<td>0.00045</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>0.00149</td>
<td>97638</td>
<td>146</td>
<td>487752</td>
<td>0.00040</td>
<td>64432676</td>
<td>15.23</td>
<td>66.01</td>
<td>0.00040</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>0.00292</td>
<td>97473</td>
<td>285</td>
<td>486694</td>
<td>0.00049</td>
<td>59559759</td>
<td>25.64</td>
<td>61.10</td>
<td>0.00049</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>0.00399</td>
<td>97188</td>
<td>349</td>
<td>485093</td>
<td>0.00072</td>
<td>54698261</td>
<td>36.03</td>
<td>56.28</td>
<td>0.00072</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>0.00423</td>
<td>96839</td>
<td>410</td>
<td>483219</td>
<td>0.00085</td>
<td>49846888</td>
<td>26.83</td>
<td>51.47</td>
<td>0.00085</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>0.00606</td>
<td>96429</td>
<td>585</td>
<td>480782</td>
<td>0.00122</td>
<td>45009699</td>
<td>1.84</td>
<td>46.68</td>
<td>0.00122</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>0.00921</td>
<td>95844</td>
<td>883</td>
<td>477163</td>
<td>0.00185</td>
<td>42018166</td>
<td>0.00</td>
<td>41.94</td>
<td>0.00185</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>0.01363</td>
<td>94961</td>
<td>1294</td>
<td>471763</td>
<td>0.00274</td>
<td>35430264</td>
<td>0.00</td>
<td>37.31</td>
<td>0.00274</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>0.02073</td>
<td>93667</td>
<td>1942</td>
<td>463796</td>
<td>0.00419</td>
<td>30712316</td>
<td>8.93</td>
<td>32.79</td>
<td>0.00419</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>0.03042</td>
<td>92126</td>
<td>2790</td>
<td>452074</td>
<td>0.00617</td>
<td>26074377</td>
<td>14.47</td>
<td>28.43</td>
<td>0.00617</td>
<td></td>
</tr>
<tr>
<td>55</td>
<td>0.04658</td>
<td>88935</td>
<td>3964</td>
<td>435335</td>
<td>0.00911</td>
<td>21593636</td>
<td>17.50</td>
<td>24.24</td>
<td>0.00910</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>0.06553</td>
<td>84971</td>
<td>5526</td>
<td>419322</td>
<td>0.01341</td>
<td>17720280</td>
<td>24.24</td>
<td>20.24</td>
<td>0.01335</td>
<td></td>
</tr>
<tr>
<td>65</td>
<td>0.10384</td>
<td>79445</td>
<td>8240</td>
<td>377794</td>
<td>0.02184</td>
<td>13808967</td>
<td>24.24</td>
<td>16.47</td>
<td>0.02173</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>0.15801</td>
<td>71196</td>
<td>11250</td>
<td>329111</td>
<td>0.03410</td>
<td>93030320</td>
<td>24.24</td>
<td>13.07</td>
<td>0.03403</td>
<td></td>
</tr>
<tr>
<td>75</td>
<td>0.23828</td>
<td>59946</td>
<td>14204</td>
<td>265171</td>
<td>0.05387</td>
<td>60191219</td>
<td>24.24</td>
<td>10.03</td>
<td>0.05361</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>0.36743</td>
<td>45652</td>
<td>16778</td>
<td>186422</td>
<td>0.09000</td>
<td>33601887</td>
<td>24.24</td>
<td>7.36</td>
<td>0.09061</td>
<td></td>
</tr>
</tbody>
</table>

272
GREECE LIFE TABLES, 1966-68  
(from Keyfitz and Pleiger 1971)

### Table 2 Life Table for Males

<table>
<thead>
<tr>
<th>Age, i</th>
<th>l_i</th>
<th>n_i</th>
<th>x_i</th>
<th>d_i</th>
<th>m_i</th>
<th>m_x</th>
<th>T_x</th>
<th>1000r_x</th>
<th>i_x</th>
<th>M_x</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.03442</td>
<td>100000</td>
<td>3492</td>
<td>97254</td>
<td>0.03591</td>
<td>706436</td>
<td>8.11</td>
<td>70.65</td>
<td>0.03614</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>0.00477</td>
<td>98508</td>
<td>460</td>
<td>384687</td>
<td>0.020120</td>
<td>6976782</td>
<td>8.11</td>
<td>72.19</td>
<td>0.020121</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>0.00263</td>
<td>96046</td>
<td>252</td>
<td>479038</td>
<td>0.00053</td>
<td>6582595</td>
<td>3.21</td>
<td>69.53</td>
<td>0.00055</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>0.00238</td>
<td>95795</td>
<td>228</td>
<td>478630</td>
<td>0.00049</td>
<td>6102486</td>
<td>3.86</td>
<td>63.71</td>
<td>0.00049</td>
<td>10</td>
</tr>
<tr>
<td>15</td>
<td>0.00378</td>
<td>95560</td>
<td>361</td>
<td>476999</td>
<td>0.00076</td>
<td>5626558</td>
<td>8.22</td>
<td>56.85</td>
<td>0.00075</td>
<td>15</td>
</tr>
<tr>
<td>20</td>
<td>0.00557</td>
<td>95207</td>
<td>533</td>
<td>474747</td>
<td>0.01112</td>
<td>5167556</td>
<td>16.75</td>
<td>54.07</td>
<td>0.01111</td>
<td>20</td>
</tr>
<tr>
<td>25</td>
<td>0.00569</td>
<td>94677</td>
<td>539</td>
<td>472553</td>
<td>0.01114</td>
<td>4676212</td>
<td>8.62</td>
<td>49.35</td>
<td>0.01114</td>
<td>25</td>
</tr>
<tr>
<td>30</td>
<td>0.00634</td>
<td>94139</td>
<td>597</td>
<td>469237</td>
<td>0.01227</td>
<td>4200759</td>
<td>0.00</td>
<td>44.62</td>
<td>0.01227</td>
<td>30</td>
</tr>
<tr>
<td>35</td>
<td>0.00760</td>
<td>93542</td>
<td>711</td>
<td>466039</td>
<td>0.01535</td>
<td>3731522</td>
<td>0.39</td>
<td>39.69</td>
<td>0.01535</td>
<td>35</td>
</tr>
<tr>
<td>40</td>
<td>0.01211</td>
<td>92530</td>
<td>1124</td>
<td>461548</td>
<td>0.02244</td>
<td>3265483</td>
<td>38.52</td>
<td>35.18</td>
<td>0.02243</td>
<td>40</td>
</tr>
</tbody>
</table>

### Table 3 Life Table for Females

<table>
<thead>
<tr>
<th>Age, i</th>
<th>l_i</th>
<th>n_i</th>
<th>x_i</th>
<th>d_i</th>
<th>m_i</th>
<th>m_x</th>
<th>T_x</th>
<th>1000r_x</th>
<th>i_x</th>
<th>M_x</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.03095</td>
<td>100000</td>
<td>3095</td>
<td>97578</td>
<td>0.03172</td>
<td>7449622</td>
<td>7.35</td>
<td>74.50</td>
<td>0.03191</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>0.00435</td>
<td>96905</td>
<td>422</td>
<td>386887</td>
<td>0.02109</td>
<td>7352244</td>
<td>7.35</td>
<td>75.87</td>
<td>0.02111</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>0.00184</td>
<td>95483</td>
<td>178</td>
<td>401970</td>
<td>0.00397</td>
<td>6956568</td>
<td>2.70</td>
<td>72.20</td>
<td>0.00397</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>0.00140</td>
<td>95305</td>
<td>135</td>
<td>403108</td>
<td>0.00030</td>
<td>6683698</td>
<td>3.29</td>
<td>67.32</td>
<td>0.00029</td>
<td>10</td>
</tr>
<tr>
<td>15</td>
<td>0.00188</td>
<td>96170</td>
<td>101</td>
<td>400418</td>
<td>0.00038</td>
<td>6002438</td>
<td>5.11</td>
<td>62.02</td>
<td>0.00038</td>
<td>15</td>
</tr>
<tr>
<td>20</td>
<td>0.00240</td>
<td>95899</td>
<td>230</td>
<td>479389</td>
<td>0.00408</td>
<td>5522068</td>
<td>6.80</td>
<td>57.59</td>
<td>0.00404</td>
<td>20</td>
</tr>
<tr>
<td>25</td>
<td>0.00331</td>
<td>95759</td>
<td>317</td>
<td>478629</td>
<td>0.00566</td>
<td>5042082</td>
<td>0.00</td>
<td>52.66</td>
<td>0.00565</td>
<td>25</td>
</tr>
<tr>
<td>30</td>
<td>0.00387</td>
<td>95441</td>
<td>364</td>
<td>476327</td>
<td>0.00777</td>
<td>4546553</td>
<td>0.00</td>
<td>47.83</td>
<td>0.00777</td>
<td>30</td>
</tr>
<tr>
<td>35</td>
<td>0.00543</td>
<td>95073</td>
<td>516</td>
<td>474148</td>
<td>0.01099</td>
<td>4086326</td>
<td>18.02</td>
<td>33.00</td>
<td>0.01099</td>
<td>35</td>
</tr>
<tr>
<td>40</td>
<td>0.00775</td>
<td>94556</td>
<td>733</td>
<td>471086</td>
<td>0.01560</td>
<td>3614179</td>
<td>39.50</td>
<td>38.22</td>
<td>0.01554</td>
<td>40</td>
</tr>
<tr>
<td>45</td>
<td>0.01252</td>
<td>93823</td>
<td>1175</td>
<td>466330</td>
<td>0.02252</td>
<td>3142322</td>
<td>14.77</td>
<td>33.50</td>
<td>0.02251</td>
<td>45</td>
</tr>
<tr>
<td>50</td>
<td>0.01875</td>
<td>92649</td>
<td>1737</td>
<td>459237</td>
<td>0.03378</td>
<td>2576702</td>
<td>0.00</td>
<td>28.99</td>
<td>0.03378</td>
<td>50</td>
</tr>
<tr>
<td>55</td>
<td>0.03067</td>
<td>90911</td>
<td>2788</td>
<td>448151</td>
<td>0.06222</td>
<td>2217455</td>
<td>13.35</td>
<td>24.39</td>
<td>0.06220</td>
<td>55</td>
</tr>
<tr>
<td>60</td>
<td>0.00406</td>
<td>88123</td>
<td>4446</td>
<td>430531</td>
<td>0.01033</td>
<td>1759314</td>
<td>26.04</td>
<td>20.26</td>
<td>0.01025</td>
<td>60</td>
</tr>
<tr>
<td>65</td>
<td>0.00242</td>
<td>83877</td>
<td>7733</td>
<td>400557</td>
<td>0.01931</td>
<td>1338783</td>
<td>26.84</td>
<td>16.00</td>
<td>0.01918</td>
<td>65</td>
</tr>
<tr>
<td>70</td>
<td>0.15369</td>
<td>75944</td>
<td>11672</td>
<td>352432</td>
<td>0.03312</td>
<td>938226</td>
<td>26.84</td>
<td>12.35</td>
<td>0.03291</td>
<td>70</td>
</tr>
<tr>
<td>75</td>
<td>0.28175</td>
<td>64272</td>
<td>16823</td>
<td>281012</td>
<td>0.05987</td>
<td>565794</td>
<td>26.84</td>
<td>9.11</td>
<td>0.05951</td>
<td>75</td>
</tr>
<tr>
<td>80</td>
<td>0.41915</td>
<td>47449</td>
<td>39638</td>
<td>187961</td>
<td>0.10481</td>
<td>354782</td>
<td>26.84</td>
<td>6.42</td>
<td>0.10398</td>
<td>80</td>
</tr>
<tr>
<td>85+</td>
<td>0.00000</td>
<td>27561</td>
<td>27561</td>
<td>115022</td>
<td>0.23961</td>
<td>115022</td>
<td>26.84</td>
<td>4.17</td>
<td>0.23696</td>
<td>85+</td>
</tr>
</tbody>
</table>
BIBLIOGRAPHY

Ableson, A.

Abbott, G.

Adams, J. and A. Kasakoff

Allen, P.

Ammerman, A., L. Cavalli-Sforza, and D. Wagner

Angel, A.

Angel, J.

Angel, L.  

Aschenbrenner, S.  

Banks, J.  

Baker, P. and W. Sanders  

Balikci, A.  

Ballonoff, P.  

Barnett, C., J. Jackson and H. Cann  

Behrman, S., L. Corsa and R. Freedman  

Beiles, A.  

Bender, D.  
Benedict, B.

Benjamin, B.

Benoist, J.

Bialor, P.

Binford, L. and W. Chasko, Jr.

Birdsell, J.


Blum, R. and E. Blum

Blumberg, B.

Bodmer, W.
Bodmer, W. and J. Lederberg

Bond, J.

Bonne, B.

Borrie, W.

Bose, A.

Boserup, E.

Bottomly, G.

Bowers, N.

Boyce, A., C. Kuchemann and G. Harrison

Boyd, W.

Boyden, S.

Brass, W.

Bronson, B.

Brown, F. and J. Roucek

Brozek, J., et.al.

Burch, T. and M. Gendell

Buzzati-Traverso, A.

Campbell, J.

Candilis, W.


<table>
<thead>
<tr>
<th>Name</th>
<th>Year</th>
<th>Title and Details</th>
</tr>
</thead>
</table>
DeOlivera, A. and F. Salzano  

Dimen, M. and E. Friedl  

Dorn, H.  

Drake, M.  

Dumond, D.  

Duncan, O.  

Dunn, S.  


Durkheim, E.  

Easterlin, R.  

Eaton, J. and A. Mayer  
Elahi, K.  

Fairchild, H.  

Farley, R. and K. Taeuber  

Fisher, R.  

Ford, C.  

Freedman, R.  

Freire-Maia, N.  

Friedl, E.  
Friedl, E.  


Friedl, J. and W. Ellis  

Frisancho, A., J. Klayman and J. Matos  

Frisch, R.  

Giblett, E.  

Giles, E.  

Glass, B.  

Glass, D. and D. Eversley  

Glass, D. and R. Revelle  

Goldscheider, C.  
Goldschmidt, E.
1963 The Genetics of Migrant and Isolate Populations. Williams and Wilkins.

Greek American Community of Central Ohio
1962 The Greek Orthodox Church: Golden Anniversary Album. 1912-1962.

Griffith, J.

Gustafson, E.

Hackenberg, R.

Hajnal, J.

Halberstein, R.

Halberstein, R. and M. Crawford

Haldane, J.

Haldane, J. and S. Jayakar
Hall, R.  
1972  The Demographic Transition: Stage Four.  

Harrison, G.  

Harrison, G. and A. Boyce  


Hassan, F.  

Hauser, P.  

Hauser, P. and O. Duncan  


Heer, D.  

Herskovits, M.

Hesser, J., B. Blumberg and J. Drew

Hinshaw, R., P. Pyeatt, and J. Habicht

Hollingsworth, T.

Howells, N.

Hulme, H.
1951 Semistarvation and Human Semen. Fertility and Sterility 2:318-331.

Hussels, I.

Hutchinson, E.

Hyrenius, H., et.al.

Johnston, F. and K. Kensinger
Johnston, P., et al.

Juberg, R., et al.

Kallman, F. and J. Rainer

Kammeyer, K.


Kaplan, B.

Katsoulis, N.

Katz, S.

Kayfitz, N. and W. Flieger

Kirk, D.

Kiser, C.
1965 Types of Demographic Data of Possible Relevance to Population Geneticists. Eugenics Quarterly 12:72-84.
Kitto, H.

Kluckhohn, C. and C. Griffith
1950 Population Genetics and Social Anthropology.
Cold Spring Harbor Symposia on Quantitative Biology 15:401-408.

Koumoulides, J.

Kroeber, A.
1909 Classificatory Systems of Relationship. Man 39:77-84.

Kropke, R.
1975 Ethnic and Nationality Groups in the Columbus Area. Columbus: Transnational Intellectual Program.

Kunitz, S. and J. Slocumb

Kunstadter, P.


Lamb, N.

Langaney, A. and J. Gomila
Lasker, G.


Lasker, G. and B. Kaplan

Lasker, G., et al.

Lee, E.

Lerner, I. and W. Libby

Levy, H.

Lewontin, R.

Liberty, M., D. Hughey and R. Scaglion
Livingstone, F.

Livson, N. and D. McNeill

Longacre, W.

Lorimer, F.


Lotka, A.

MacFarlane, A.

Malinowski, B.

Mangalam, J. and H. Schwarzweiler
Markides, K.  

Masnick, G. and S. Katz  

Mather, K.  

Mayer, K.  

McAlpine, P. and N. Simpson  

McKusick, V., et.al.  

McNall, S.  


McNeil, W.  

Mead, M.  

Meggitt, M.  
Melina, R. and J. Himes

Methodios, A.
1977 Yearbook: Greek Orthodox Archdiocese of North and South America. New York.

Milicer, H.

Morgan, E.

Morris, L.

Morton, N.

Moskos, C.

Motulsky, A.

Murdock, G., et.al.

Nag, M.

Nag, M.

Neel, J.

Neel, J. and K. Weiss

Noonan, J.

Oberg, J.

Olusanya, P.

Orent, A.
Otterbein, K.

Parsons, C.

Peristiany, J.

Petersen, W.

Pethe, V.

Phillips, D.

Pitt-Rivers, G.

Pitt-Rivers, J.

Polgar, S.
Polgar, S.

Polites, N.

Pollitzer, W. and W. Brown

Potter, R.

Reed, E.

Reid, R.

Rex-Kiss, B., L. Szabo and E. Hartmann

Reyna, S.
Roberts, D.

Roberts, D. and J. Bea

Roberts, G.

Robinson, H. and A. Masi

Rohlf, F. and G. Schull

Rosen, B.

Ryder, N.
Ryder, N.

Safilios-Rothchild, C.


Saloutos, T.

Salzano, F.

Salzano, F. and R. deOlivera

Salzano, F. and N. Freire-Maia

Saucier, J.

Schull, W. and J. Neel

Schwartz, D.
Scott, J.

Scrimshaw, S.

Shapiro, H.

Smith, C.

Spengler, J.

Spengler, J. and O. Duncan

Spooner, B.

Spuhler, J.


Spuhler, J. and P. Clark
Spuhler, J. and C. Kluckhohn

Strandskov, H.

Sutter, J.

Suttles, W.

Sved, J., E. Reed and W. Bodmer
1967 The Number of Balanced Polymorphisms that can be Maintained in a Natural Population. *Genetics* 55:469-481.

Swedlund, A.

Swedlund, A. and G. Armelagos

Szathmary, E. and T. Reed

Tarver, J. and C. Lee

Teitelbaum, M.
Thieme, P.


Thomas, B.

Uhlenburg, P.

Underwood, J.

Valacras, V.


Visaria, P.

Vlachos, E.

Vlavianos, B.

Wagley, C. and M. Harris

Washburn, S.
Watts, Elizabeth, F. Johnston and G. Lasker

Weiner, J. and J. Lourie

Weiss, K.

Weiss, K. and P. Ballonoff

White, B.

Wienker, C.

Will, F.
1967 From a Year in Greece. Austin: University of Texas Press.

Wisenfeld, S.
Wolanski, N.

Wolf, A.

Woodhead, A.

Woolf, C. and F. Dukepoo

Workman, P.

Workman, P., E. Blumberg and A. Cooper

Workman, P., J. Mielke and H. Linna

Wright, S.
Wright, S.

Xenides, J.

Yasuda, N.

Yasuda, N. and N. Morton

Yengoyan, A.

Zotos, S.

Zubrow, E.

