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THE OCCURRENCE OF CHILI PEPPERS
(CAPSICUM SPP.) IN THE DIETS OF THE OLD WORLD

By

John M. Bohan
A. B., Knox College, 1965

Presented in partial fulfillment of the requirements

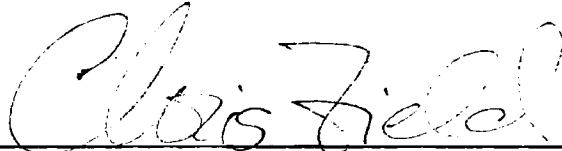
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Master of Arts

University of Montana

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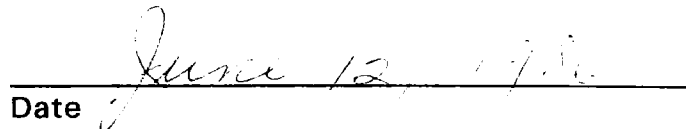
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Bohan, John M., M.A., June, 1986

Geography

The Occurrence of Chili Peppers (*Capsicum* spp.) in the Diets of the Old World (86 pp.)

Director: Chris Field

The occurrence and distribution of dietary *Capsicum* confirms fragmentary reports of a 16th century introduction of the genus by the Portuguese into the lands surrounding the Indian Ocean. A subsequent diffusion into the Islamic world (via Hormuz) and into southwestern China (via Burma) is strongly indicated. An eastward diffusion through the Mediterranean is unlikely. The greatest concentration of chili pepper use on the northern side of the Mediterranean Sea is in the area formerly controlled by the Ottoman Empire.

The distribution of the use of *Capsicum* in the diets of Eurasia, Africa, and Oceania is established by the use of systematic sources of foodways and nutritional information: The Human Relations Area Files (HRAF), the American Geographic Society's monograph series *Studies in Medical Geography*, the journal *Economic Botany*, plus a large selection of cookbooks.

No quantitative analyses of the data are made. Redundant references are assumed to indicate an increasingly characteristic use of chilis. The distribution is mapped by source, individually and cumulatively.

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I would like to thank my parents for their help and encouragement. I would also like to thank the members of my committee--Professors Field, Kang, and Taylor, as well as the faculties of Geography and Anthropology and my graduate colleagues for their advice and toleration. Special thanks to Richard Prittie for the cartographic work.

Chapter 1

INTRODUCTION

The geographical distribution of the dietary usage of the genus *Capsicum* (Chili pepper) has not been adequately studied. The problem is to establish the geographic distribution of the dietary usage of *Capsicum* as a recognizable or characteristic spice, condiment, or food in the traditional diet of any ethnic group or nationality. After a brief introductory remark concerning the American origin of *Capsicum* domestication, the study will be restricted to the Old World.

The working hypothesis is that the chili pepper was introduced into Africa and South Asia as a consequence of Portuguese economic activity in the early years of the 16th century. Following closely after the introduction of this genus and other American food plants into the region, secondary diffusions of these items occurred along old and well established trade routes which led beyond the reach of direct Portuguese influence, i. e.: into the Islamic world, and into southwest China (perhaps via Burma).

Capsicum spp; capsicums; and chili (peppers) are defined in this study as those varieties which are generally referred to as 'pungent' 'piquant', or 'hot'. This pungency is due to the presence in the fruits of the oleoresin *capsaicin*. Fruits of varieties within this genus which are considered to lack a certain (undefined) threshold of this substance ('sweet peppers'), or in which this substance is absent because of selective breeding (paprika) are not included in this study. In gathering

the data for this study, mention of "curry" will be considered as indicating the presence of capsicum (Tannahill 1974:165 [f. n.]), as will "pimento." This latter conotation is made explicit by Braudel (1979:220) and Hendrick (1972:135), and is the usual translation of the French "piment."

The literature concerning the distribution of *Capsicum* as an element of diet is very scattered and fragmentary. Writing concerning the genus is primarily botanical; utilization is not often covered. The usual geographic emphasis in these studies is limited to Middle and South America (Heiser & Smith 1953; Pickersgill 1971). The genus is mentioned in only a cursory manner in many of the standard geographical works dealing with domesticated plants and agriculture (Good 1974; Grigg 1974; Isaac 1970; Sauer 1969 [1952]). The only known geographic work on the chili pepper is a dissertation and a closely related paper by William Davenport (1970, 1971) dealing with the domestication of the genus in the Western Hemisphere.

In the anthropological literature, one of the most comprehensive overviews of the interaction of physiological and cultural factors in the human diet is *Consuming Passions: the anthropology of eating* (Farb and Armelagos 1980). Chili peppers are mentioned briefly.

Historical accounts of the beginnings of a European presence in the study area--i. e.: the 16th century arrival of the Portuguese in the Indian Ocean, give little or no mention of chili even though the economic impact of the introduction of American food plants is discussed in detail (Braudel 1979, Chap. 2; Boxer 1969; Pearson 1976).

A search of the Social Science Index, the Humanities Index, and their antecedents going back to 1950 revealed very few titles containing the words *Capsicum* or chili, e. g.: Pickersgill (1969a), Weil (1976). There are a few popular works concerning chili peppers which generally take a good humored approach to the subject, rely heavily on the existing literature, and are accompanied by recipes and anecdotes. These works do not describe the distribution of capsicum except in general terms--i. e., widespread in tropical areas, etc. (Andrews 1984; Schweid 1980; Tolbert 1972).

The data gathered to establish the distribution of the dietary and medicinal uses of the genus *Capsicum* are presented in the Appendices. These data are derived primarily from the analysis of four systematic sources, and from other occasional references to chilis in the literature. The primary sources are:

1. *The Human Relations Area Files* (HRAF), which developed out of the Yale University Cross Cultural Survey begun in 1937. The Files are explained in greater detail in Chapter 3.
2. The American Geographic Society's monograph series *Studies in Medical Geography*, written by Jacques M. May, M. D., and collaborators (1961-).
3. The journal *Economic Botany*, published by the New York Botanical Garden.
4. A series of cookbooks giving nearly 100% coverage of the study area. This sample is based primarily on the Time-Life series *The Foods of the World*, but is augmented as much as possible by individual ethnically focused cookbooks published in both the United States and overseas.

The distribution compiled from these four principal sources is analyzed for possible correlation with other geographic features, both natural and cultural. The

results are presented cartographically. The study is limited by its dependence on secondary sources, and by the lack of opportunity to conduct systematic fieldwork.

A more complete investigation of the occurrence of capsicum in the Old World could be undertaken if:

1. Culinary and nutritional information could be located concerning those areas which appeared to be underrepresented by the sources available to this study: southern Europe, the Middle East, and Central Asia.
2. The historical data concerning the introduction of American foodplants into the study area could be more fully studied in the Portuguese maritime archives.
3. Detailed botanical studies could be used to establish the geographical distribution and genetic relationships of the species and varieties now established within the study area.

Data of this nature would certainly add to knowledge concerning chilis but might also prove useful in more general studies of diffusion, the acceptance of novelty, nutritional improvement, and the ethnicity of foodways.

Chapter 2

CAPSICUM: NATURE and USE

Family *Solanaceae*.

The family *Solanaceae* (Nightshade) is widely distributed and nearly all of its members are wholly, or in part hallucinogenic, narcotic, or toxic. In addition to the genus *Capsicum*, the family includes the genera: *Atropa* (belladonna); *Datura* (jimsonweed); *Hyoscamos* (henbane); *Lycopersicon* (tomato); *Mandragora* (mandrake); *Nicotiana* (tobacco); *Petunia*; *Physalis* (the husk tomato-- Sp. 'tomatillo'); and *Solanum* (eggplant, nightshade, and potato) (Lewis & Elwin-Lewis 1977). Among the Old World species of *Solanaceae* the only one long held to be edible was *Solanum melongena* (eggplant) of Indian or Southeast Asian origin (Spencer & Thomas 1978:54, Table I.). Various *Solanum* (other than *S. tuberosum*) were formerly considered as food by the Polynesians (Whistler 1984:480). Many of the inedible members of this family have an ancient association with shamanistic and/or vision seeking cults, e. g., witchcraft in medieval Europe (Harris 1974:218-19).

Genus *Capsicum* (Chili Pepper).

The genus *Capsicum* is a small group of closely related and somewhat variable species of perennial shrubs found chiefly in the tropics. It is usually grown as an annual for its fruits, which among the cultivated varieties are many-

seeded berries that vary greatly in size, shape, and pungency. A South American origin for the genus based on literary and linguistic evidence was postulated very early (De Candolle 1898: 288).

The number of species in the genus has been the subject of much discussion, and until recently, little agreement. At present the genus is described as being composed of 20 wild species and five which are considered domestic. There seems to be a consensus that the area of origin is in south central Bolivia (Pickersgill 1971:683; McLeod, Guttman, & Esbaugh 1982:361).

The peppers of greatest commercial and horticultural familiarity, *Capsicum annuum* and *C. frutescens* were the first described, and for many years were considered to be the only members of the genus. *C. annuum* encompasses a very wide range of varieties from the sweet bell peppers, those from which paprika is produced, to the fierce chilis characteristic of Mexican cuisine and the food of much of the rest of the world, e. g., Ethiopia, India, Southeast Asia, and Korea. *C. frutescens* is known in the United States in only one variety--the Tabasco pepper; this species is often mentioned in connection with India (Heiser & Smith 1953:222). Earlier in this century, it was thought to have been of East Indian origin (Hendrick 1972:135).

The division of the genus into these two species was proposed by H. C. Irish in 1898. The work of Irish was very influential on botanists in Europe and Asia (Heiser & Smith 1953:219). The determination of species was formerly based on such variable characteristics as the size, shape, or color of the fruit. "Life style" was also a major consideration in the definition of these species --i. e., the plants

were either considered as cultivated annuals (*annuum*), or as perennial semi-wild types (*frutescens*). This distinction was accepted and discussed in detail by W. H. Burkill in his *Dictionary of the Economic Products of the Malay Peninsula* (1935:444–46). Paul G. Smith and Charles B. Heiser Jr. (1951) have shown that the characteristics of the flower offer a much better basis for taxonomic classification.

Two of the cultivated species (*C. pubescens*, and *C. baccatum* var. *pendulum*) are peculiar to western South America and have not been reported outside that area. *Capsicum chinense*, the most recent of the cultivars to be described (Smith & Heiser 1957), is native to lowland Amazonia, and has a range which extends northwesterly through the Caribbean Islands and Central America. These species were not mentioned by name in any of the literature pertaining to the study area.

In the sources used in this study to establish the distribution of the genus, capsicum was usually referenced in a manner that was non-specific or ambiguous. The two species, *C. annum* and *C. frutescens*, are easily confused by non-botanists. When grown in proximity to each other, the varieties of these species may be very difficult to define because of their tendency to cross pollinate. Commercial growers of chili pepper seed in the United States go to great lengths to maintain spatial, and thereby genetic, isolation of their fields so as to guarantee the desired degree of pungency, size, or shape in their product (Schweid 1980:163).

Physiological Effects.

The pungency characteristic of chili peppers is the result of the presence of the oleoresin capsaicin within the fruits in concentrations of 0.1– 1.0%. This substance is a powerful local stimulant which exerts a strong influence on the sensory nerves (Osol, Farrar, & Pratt 1955:241). This effect is not limited to the organs of taste but can involve the mucous membrane generally or any part of the body sufficiently exposed (Vogl 1982); some of the cookbooks used in this study contained elaborate precautions and warnings concerning the handling of chilis (Foods of the World, Appendix 1.4).

Capsaicin is paradoxically both irritant and anaesthetic. Repeated or increased dosages cause local desensitization from heat. One of the side effects of exposure to capsaicin is a sometimes profuse sweating of the head and face (Lee 1954) which induces a mild condition of hypothermia. Experimentation on laboratory animals has shown that capsaicin "induces an irreversible impairment of thermoregulation against heat stress" (Hori 1984:389).

Capsaicin has been shown to cause the depletion of the neural pain transmitter Substance P from the sensory nerve endings (Hayes & Tyler 1980:561) and is thought to be a valuable tool in the study of pain control (Anon. [Lancet] 1983:1198).

There is a substantial literature concerning capsicum and its active ingredient capsaicin, most of which deals with research on laboratory animals. There is a recent summary in CRC Critical Reviews in Toxicology (Monsereenusorn, Kongsamut, & Pazella 1982). There are also a number of articles dealing with the

medical aspects of use of and exposure to chilis which include not only studies of its effects on the stomach (Ketusingh, Dhorrantintra, & Juenjaroen 1976; Viranuvatti, *et al.* 1972), but also its role as a hazard in the workplace (Uragoda 1983).

Capsicum was listed as an official substance in the United States Pharmacopoeia from 1820 to 1942. "African chillies" were specified, but most were imported from India, although the types produced in Mombasa and Zanzibar were acknowledged as being of the best quality. The species was dropped from the USP Registry by the Revision Committee after a (successful) demand was made to qualify allegedly inferior types of chilis produced in Louisiana (Gathercoal & Wirth 1947:568).

Requirements of Cultivation.

The USDA Agricultural Research Service is involved in an ongoing project concerning the selection of alternative crops. A data base concerning 1,000 species has been created which at present incorporates information concerning their climatic and ecologic requirements. These data are arrayed according to the Holdridge Life Zone system supported by monthly climatic data reports from 2,000 stations worldwide. Manuscript materials concerning *Capsicum* have graciously been made available by Dr. James A. Duke of the USDA Economic Botany Laboratory, Beltsville, Md. 20705.

The habitat range for *C. annuum* and *C. frutescens* encompasses the Holdridge Life Zone classifications: Cool temperate steppe/moist forest (Csw/Cmw) to Tropical desert shrub/thorn woodland (Txw/Ttw), and include the

intermediate Subtropical thorn woodland (St), Warm temperate thorn steppe (Wt), and Temperate/subtropical dry forest (Wd, Sd). The parameters of average annual precipitation and average daily temperature (degrees Celsius) of these zones are as follows--Csw: 6-12C.°, 250-500mm. Cmw: 6-12C.°, 500-1,000mm. Ttw: >24C.°, 250-500mm Ttxw: >24C.°, 500-1,000mm.

The *Capsicum* species listed by Duke were classified by "lifestyle," i. e., as annual or perennial. *C. frutescens* was described as a perennial that is often grown as an annual. The station data for average annual range of precipitation and temperature is 300-4600mm, and 8-29C.° respectively. There was no data available on the means (for comparison, the data on tomatoes (*Lycopersicon esculenta*) is Bmw/Tvm, 300-4600mm, and 6-28C.°).

The two *Capsicum* species are very similar, and often confused. *C. frutescens* needs 4-5 months to mature as compared to 3-4 months for *C. annuum*. *C. frutescens* tolerates more extreme temperatures at both ends of the scale. Both can be grown from sea level to 2,000m in the tropics but require more heat than other vegetables. The optimum average daily temperature is 23.5C.°, but fruit will not set at average daily temperatures above 32C.° or nighttime temperatures that stay above 22C.° The minimum amount of moisture required during the growing season is 60-125cm.¹

¹Sources of gardening information available in the United States state that the cultivation and growth requirements of both tomatoes and "peppers" are roughly the same. Duke cautions against the planting of *Capsicum* where either tomatoes or potatoes have been grown in the previous three years, and that peppers should not be planted in the same location except every other year. Presumably, this advice is intended to avoid nematode or other infections common to the Solanaceae

Human Utilization.

The chili pepper is one of a number of ingestible substances favored by human beings for which some degree of enthusiasm must be acquired (e. g.: coffee, tea, alcoholic beverages, and strong tasting foods generally). The mechanisms and motivational factors leading to the acquisition of a taste preference for these substances is not well understood.

In the case of chilis, the explanations range from what University of Pennsylvania psychologists Robert Rozin and Deborah Schiller say resembles the desire to live dangerously (Rozin & Schiller 1982:13) to the allegation of a psychoactive effect (Weil 1976).

Once a taste is acquired, the consumption of chilis has a number of beneficial effects: they are very high in vitamins A and C--more so than citrus fruits. Chilis add variety to otherwise uninspiring and insufficient diets and may actually aid in the digestion of the starchy foods so prevalent in the areas where chilis are a major item in the diet (Farb & Armelagos 1980:207-08); when used in large enough amounts, chilis appear to inhibit the growth of harmful intestinal bacteria (Rivers 1973).

The short-term hypothermic effect caused by sweating and the desensitization to heat shown in the laboratory research has not been investigated with regard to capsicum in human diets. Capsicum may be one of those substances which can permeate the placenta or be contained in mothers' milk. If this is the case, infants born into chili eating cultures might acquire this taste *in utero* or at a very early age. One of the few studies on chili eating by human

subjects was conducted among children in a village in Mexico (Rozin & Schiller 1980:85). They observed an infant as young as nine months of age willingly eat a piquant soup, and another, aged one year, eating tortillas which had been dipped in a hot *salsa*. When interviewed, both adult and juvenile residents of the village gave flavor enhancement as the reason they ate chilis on a daily basis. The conclusion reached in this, and a related study which tested students at the University of Pennsylvania (Rozin, Egbert & Schull 1982) was that a preference for chili can develop from a variety of factors whose interrelationships are not well understood. Exposure (to objects or stimuli of most types) tends to increase positive responses. Taste enhancement, increased salivation and the stimulation of the digestive processes seem to be confirmed effects of chili on humans. However, taste preferences caused by repeated exposure have not been seen to develop in experiments with laboratory animals.

In addition to their primary use as a food or condiment, chili peppers have been used medicinally, and at times, for magical purposes. The reports in the literature relative to the Old World are very scattered concerning these latter uses and concern only aboriginal groups in India and the Polynesians. There were no non-dietary uses found concerning Africa or East Asia. The distribution of the medicinal use of the genus *Capsicum* is not identical with that of its role in diet; the medicinal uses may have developed in Asia as the pharmacological knowledge there was more advanced than was that in Europe when contact occurred in the 16th century. The ability of the fruits to induce sweating when eaten, as well as

cause a burning sensation when applied to the skin, could have led to their consideration as medicines.

Chapter 3

THE DISTRIBUTION EVIDENCE

Establishing the Distribution.

The use of chili as a condiment is generally acknowledged to be widespread throughout the tropical and subtropical areas of the world. Capsicum in the diet is also an outstanding characteristic of many of the foodways in this region (Schweid 1980: 18; Rosengarten 1969:130; Viranavutti *et al.* 1972). In many areas of the world's tropics the use of chili peppers is so basic to the cuisine that the genus is considered indigenous, not as a 16th century introduction from the Americas. The exact limits of the distribution of human utilization of capsicum have not been examined in detail although a large number of fragmentary references to dietary and medicinal uses of the genus exist in the literature of a number of fields.

The probable area of chili use could be mapped based on climatic data indicating the suitability for the growth of these plants under "natural" conditions, i. e., dependent on rainfall. This method would fail to locate instances of regional or national foodways characterized by chili use lying outside of the region, or pockets of its absence within. Historical, cultural, and climatic factors could all be influential in modifying the extent of the distribution.

The sources chosen to establish a more exact description of this distribution on a global scale each focuses on specific and usually exclusive aspects of human

alimentation from which spice and condiment use could be identified. These foci were:

1. Detailed and precisely indexed ethnographic data (*HRAF Files*).
2. Standardized and explicit descriptions of diet from the viewpoint of nutritional adequacy (*AGS Studies in Medical Geography*).
3. The description of the characteristics of national and regional cuisines (Cookbooks).
4. Explicit and specific enumeration and description of human utilization of plant resources (The journal *Economic Botany*).

The initial strategy was to search these sources for any mention of capsicum/chili/peppers/curry throughout the Old World tropics and sub-tropics. Adjacent areas were also examined for reports of capsicum in the diet if there existed present or former (prior to the 17th century) connections of a cultural nature with the tropical/subtropical regions. The cultural linkages considered were:

1. Former colonial possessions in the region (Portugal, Spain, France, the Netherlands, Great Britain).
2. Subjugation by a group which had its cultural roots or base of power within the subtropics (Balkan Europe in the Ottoman period).
3. Those countries acknowledging a strong cultural heritage originating from within this area (the relationship with China shared by Korea and Japan).

No data from Australia was included because of the lack of indigenous horticultural systems and the late date at which European contact occurred.

The following is a brief description of the sources and the manner the pertinent data are presented in the Appendix.²

ANNOTATED SOURCES.

1. HRAF Files. (Appendix 1.1)

The HRAF Files are a comprehensive collection of systematically arranged and cross referenced ethnographic data designed to facilitate cross cultural research. The Files are a development of the Yale University Cross Cultural Survey under the direction of George Peter Murdock. The Survey received considerable support through military contracts in the 1940s. The HRAF Files were incorporated in 1949. The organizational framework of the Files is contained in the *Outline of World Cultures* (OWC) (Murdock *et. al.* 1983 [1938]). The HRAF system is fully explained in: *The Nature and Use of the HRAF Files* (Laglace 1974).

The units used by HRAF are ethnic groups and, occasionally nationalities. Each of these cultural units is assigned an alphanumeric code, the first letter of which is a regional designation. This system is somewhat inconsistent from a geographic point of view, since some of the regions are defined according to natural areas (Asia), some cultural (the Middle East), and others political (Europe, Russia).

The "Middle East" classification appears to conform to the definition of that area as given by Carleton S. Coon (1951, Map 1). Its primary nodal characteristic

²The Appendix is arranged so that sources which have explicit data presented precede those which are only listed in a bibliographic fashion.

is that of the western Islamic culture area. It includes Africa north of an east-west line drawn through the Horn of Africa (approximately Lat. 12° N.) generally following the 300mm isohyet of mean annual precipitation. The eastern boundary of the region is the Pakistan-India border. "Africa" in this (i. e., HRAF) classification is the remaining portion of the continent.

"Asia" is not further subdivided but does include the Philippines. "Oceania" includes all of insular Southeast Asia, New Guinea, Australia, New Zealand, and all of the islands of the western Pacific.

The data in the Files are in the form of paged facsimiles of published work or a compiler's note cards. These pages/cards have a heading indicating the cultural unit identification and bibliographic source codes, file section, author's name, and dates (fieldwork and publication). There is also an indication of the fieldworkers' background and reliability-- e. g.: E-5, a professional ethnographer. Each paragraph, and at times each line of the page/card is tagged with an OWC section number classifying the information it contains.

Each cultural unit file begins with a bibliographic section in which the primary sources are identified, described, and qualified by an identified annotator. Research in the Files was limited to sections 262 (Food) and 263 (Condiments) for all available cultural units included in the study area.

The HRAF Microfiles used for this study were incomplete and had not been updated since at least 1970. The coverage of the study area was about 60% based upon nation states for which there was at least one cultural unit. Ethnic diversity was fairly well represented only in Africa south of the Sahara, and in East Asia.

There was no data available for any European countries other than Yugoslavia or Bulgaria. In the HRAF Middle East region, there was data available only for ethnic groups in Algeria, Mali, Sudan, and Ethiopia. The landlocked nations of southern Africa were not represented in the selection available, nor were Pakistan, Bangladesh, Nepal, Bhutan, or Japan. The ethnic diversity of the study area was not well represented even though there were reports from approximately two thirds of the countries in the study area.

2. Economic Botany. (Appendix 1.2)

Articles in the journal *Economic Botany* which were specifically ethnobotanical and dealt with a cultural unit or nation within or adjacent to the study area were examined for indications of dietary or medicinal use of capsicum. This source produced a greater number of references to medicinal use as compared to diet than did any other source. The majority of the reports concerned aboriginal peoples living within nation states from which other sources had reported dietary use of capsicum. The articles in this journal covered a more limited portion of the study area than did the others but provided the best evidence that the capsicum use area extended into some areas of the Western Pacific.

Because of the small number of references to medicinal use, they were not distinguished from the dietary. The implied assumption is that the small and relatively isolated groups which are surrounded by chili eating agriculturalists also

use these plants similarly. This seems to be especially so in the case of India and is made explicitly so for the Ifugao (Conklin 1967:259).

NON-ANNOTATED SOURCES.

3. AGS Monograph Series *Studies in Medical Geography*. (Appendix 1.3)

The American Geographic Society monograph series concerning the ecology of malnutrition are based on research originally done under contract for the United States Army. Each volume reports the results of an investigation of the agronomic conditions, food production potential, and diet of a number of neighboring or otherwise related third world countries, e. g.: former colonial associations.

This series presented a detailed description of the general and regionalized diets of nearly all the countries in the study area where malnutrition was considered a problem. This source covered the study area more extensively than any other.

The only areas from which there was no data found were Jordan, Nepal, Bhutan, Indonesia, the Philippines, or Oceania. There was also no data on western Mediterranean Europe, the Soviet Union, or Japan--probably because malnutrition was not seen as a problem in these areas.

Throughout this series, the chapters dealing with the individual nations are formatted in a nearly identical manner. Section III. of each is devoted to an explicit description of the typical and usual diet. This information is often subdivided by social class, residence pattern, lifestyle, or regional factors. Staples, luxuries, the sources of the various nutritional requirements (carbohydrates,

proteins, fats, vitamins, etc.) are listed and discussed.

4. Cookbooks. (Appendix 1.4)

A total of 27 ethnic focus cookbooks dealing with nearly 100% of the study area were investigated. Sixteen of these volumes were published as the Time-Life series *The Foods of the World* (Williams 1969-71). Of the twelve other volumes, 8 were published overseas, 7 in the country or region whose food was covered in the volume.

The coverage of the study area available through the cookbooks was somewhat irregular. The only areas for which there was corroboration of the Time-Life series were India, China, Thailand, Malaysia, Indonesia, and the Philippines, and in a special sense, Spain.³ There was no corroborative coverage of Laos, Cambodia, Burma, Pakistan, Bangladesh, Bhutan, or Afghanistan, the Middle East, Africa, or most of Mediterranean Europe.

The volume on the Middle East (Nickles 1969) covered only nine nations (Greece, Turkey, Syria, Iraq, Iran, Lebanon, Israel, Jordan, and Egypt). Coverage of North Africa was limited to the urbanized Mediterranean littoral, and excluded Libya. Africa south of the Sahara was represented only by those nations that are coastal, and excluded Equatorial Guinea, Gabon, the Republic of the Congo, and the Malagasy Republic.

The independently published cookbooks from the United States covered the

³The only independently published cookbook obtainable on Spain was devoted to snacks--tapas (Casas 1985).

Chinese provinces of Sichuan and Hunan, India, and Armenia (Uvezian 1974). The Armenian cookbook made great use of a variety of peppers without indicating that they were of the "hot" type. They were presumably *C. annuum* var. *annuum*--the bell pepper and related varieties. They were usually referred to as 'green peppers'. Even though Armenian cuisine generally resembles the Middle Eastern, Greek, or Anatolian type, the use at of least some degree of the "hot" varieties was strikingly absent. Independent publications were also obtained for Nepalese and Tibetan-style cooking (at least as it is done in Nepal).

The recipes in two other U. S. published cookbooks (Stollard 1976, Rama Rau 1969) appeared to use chilis with a somewhat greater frequency than the Time-Life series; they also omitted the latter's elaborate safety precautions and the recommendations concerning the wearing of rubber gloves.

The overseas cookbooks went even farther in this direction. In the volumes about India, Nepal, and the ASEAN nations (Handy 1979), the frequency of capsicum approached 100% for any type of dish that could be easily classified as non-dessert.

This difference in emphasis is probably the result of editing in the U.S. volumes for a generalized North American type of taste or serving pattern. The in-country cookbooks were probably biased toward the fancy, formal, and traditional meals of the country's urban elite. The use of capsicum in any form (fresh, dry, or powdered) occurred much more frequently in the recipes, and while no exact measurements were made, the use of capsicum per suggested serving seemed much greater.

The examination of the Time-Life series consisted of seeking the indication of *Capsicum* under any alias in the index of each of the 16 volumes dealing with Eurasia, Africa, and Oceania. Those volumes which mentioned capsicum in this manner were then examined more closely--i. e., explanatory material in the relevant chapters was investigated as was the recipe booklet which accompanied each volume of text and illustrations. These recipe booklets each contained about 100 recipes, usually double the number in the main volume. The frequency of chili use in any quantity seemed to be greater in those volumes dealing with the more tropical countries but there did not appear to be any way to verify this assumption. The simple tabulation of the occurrence of capsicum in its various forms, varieties, and species would produce a very suspect indication of "dietary heat." Any conclusions based upon such a tabulation would be ignoring the more important, and as yet unmeasured factors as, e. g.: the average daily relationships between food quantity and capsicum for the general population; field guidelines for establishing the relative pungency of various chili preparations; and the establishment of a measurement of the accuracy of the cookbooks themselves as they portray typical diets.

Twelve of these showed capsicum either in recipe titles or in food lists. Three volumes, *Russian Cooking* (Papashvily & Papashvily 1969), *The Cooking of Provincial France* (Fisher 1968), and the *Cooking of China* (Hahn 1969) did not index capsicum. It was felt that these regions on the periphery of the study area might indicate some use of chili peppers if subjected to closer scrutiny.

This proved to be the case for the Soviet Union and France. In the former

there was a photograph of peppers for sale in the market at Tashkent, Uzbek S. S. R., and there was minor use of red pepper found in the recipes in the accompanying chapter on the Central Asia Republics. The same was the case for the southern regions of France, where the cuisine has a greater number of features common to the cooking of the Mediterranean. This is particularly so for the regions of Languedoc, Foix, and Rousillon (Fisher 1968:14).

The volume on China made no mention of capsicum and attributed the spicy quality of Sichuanese cooking solely to the use of hua jiao, the Sichuan "peppercorn" or fagara, *Zanoxylum piperitum*-- Rutaceae, (citrus family).

The absence of mention concerning capsicum is probably attributable to the fact that the volume's publication predates the visit of Richard Nixon to the Peoples' Republic in 1972. Since then the heightened interest in Chinese culture has grown to include an interest in the regional cooking styles in which the use of chilis is nearly indispensable. Chilis may have originally been seen as an inexpensive substitute for salt (Stollard 1976:11; Ling & Ruey 1947).

Comparison of Sources.

The cookbooks provided information on the distribution of dietary capsicum which was much more restricted than that of the monograph series (except for the European countries), but covered a larger area of the world than the available Files. The diets described are undoubtedly idealizations or special occasion meals for the most part, dealing with foodways of urban elites, even in most of the countries of Western Europe. This appears especially true for those volumes dealing with

Africa and Asia published in the United States.

Their description of these diets bears no resemblance to the daily fare mentioned in the Files or the Medical Geography monographs. The variety of ingredients listed is improbable in many instances even for very special events. African diets are repeatedly described as typically consisting of little more than a porridge/gruel of cereals (corn or sorghum) or a paste of tubers (yams or manioc), accompanied by (optimally) a sauce of greens, groundnuts, and chilis; the occasional stew with meat or fish being a luxury (May 1965:58, 1968:24, 1970:22).

The Foods of the World series seemed to be particularly focused on meals that would be typical of chic international restaurants in New York or Washington, D. C. Most volumes in the series had someone connected with such an establishment listed as a consultant. The cookbooks do agree with the AGS monographs and the Files on the spices and condiments typical of the various diets. Their use has probably been toned down or otherwise modified in the cookbooks to favor a particular spice or taste appreciated by the intended audience of the book. An example of this is the moderate use or absence of the odiferous fish sauce (*nuoc mam/nam-pla*) so characteristic of Southeast Asian cooking.⁴

⁴A description of this item was quoted in one HRAF note as being describable (to an Englishman) as resembling the experience of eating a garlic custard over a London sewer (Scott 1910). The author put this description into a cultural context by mentioning the fact that Thais were equally revolted by the idea of Limburger cheese; a fish sauce very similar to *nam-pla* (*liquamen*) was once a necessity in the diet of all classes in the Roman Empire (Tannahill 1973:96-100).

Chapter 4

INTERPRETATION AND EXPLANATION OF THE DISTRIBUTION

The maps in Appendix 2 are designed to provide the following information regarding the Old World distribution of the dietary and medicinal usages of the genus *Capsicum*:

The Environmental Suitability for *Capsicum* (Map 1).

The area of climatic suitability for *Capsicum* as an open field crop is shown (based on the data given by James A. Duke presented in Chapter 2: Requirements of Cultivation). The area shown is not a representation of the Holdridge Life Zone system for the study area. The environmental suitability for *Capsicum* is shown as the area remaining after the eliminating those regions having too little precipitation (annual mean < 300mm) or lacking sufficient heat during the necessary 3-5 month growing season. A region lacking sufficient heat is here interpreted to mean lacking a hot summer according to A. E. Parsons' surface temperature regions. The cartographic representation of these features is based on data in *Goode's World Atlas*, (1983:10-13). The area shown is probably conservative, for Duke has stated that cultivated annuals are generally grown beyond the limits of their optimal life zones. This map shows that the areas unsuitable for the growth of *Capsicum* include not only those that are extremely arid but also those lacking a hot summer.

Source Availability (Map 2).

The data from the sources is not explicitly consistent with regard to subunits of either a geographic or cultural nature. The occurrence of capsicum in the Soviet Union and the Peoples' Republic of China is highly regionalized, being as characteristic of some cuisines as is its absence in others. These two subregions are approximately:

1. Central Asia, including the Soviet Republics known collectively by that term and the desert area of Western China (Xinjiang-Uighur Autonomous Area).
2. The southwest region of the Peoples' Republic--the provinces of Sichuan, Hunan, and Yunan, which are known for their characteristically hot and spicy food.

The former of these is approximately coextensive with the area of Turkic speech in Central Asia. The latter area is simply that of the provinces named in the Peoples' Republic of China. The Indo-European (Persian) speaking Tajik S. S. R. is included within this area but is not indicated. This linguistic boundary also contains within it the majority of the Muslim populations in the Soviet Union and China.

With the exception of these two areas and southern France, the level of information available concerning the possibility of dietary capsicum is shown in units of nation states.

Reports of Dietary Capsicum by Individual Sources (Maps 3-6).

Each map in this group of maps presents the following information: Positive mention of dietary/medicinal capsicum. No mention of capsicum. No data available.

The data points shown on Map 3 (HRAF) are plotted in approximate correspondence with the cultural unit codes as shown on the Mercator projection which serves as a visual index to the Files. A cultural unit identified as a 'nationality' is indicated by a dot centrally located in that nation. The data points indicate either an unambiguous reference to *Capsicum*, or an absence of mention.

Map 4 combines the data obtained from the journal *Economic Botany* and a listing of chili exporting countries found in *The Book of Spices* by Frederick Rosengarten Jr. (1969:82-83). Map 5 shows the information concerning chilis found in the AGS monographs. Map 6 shows the information obtained from the cookbooks. The two maps show the difference in coverage of the study area by the two sources. The study of malnutrition is concentrated (and covers thoroughly) the "Third World" while the information on cooking is predominately concerned with the developed nations.

The Distribution of Dietary Capsicum (Maps 7-9).

Map 7 shows the number of positive reports of dietary capsicum from all sources shown by nation (as excepted). The range is from zero to four or more.

Map 8 combines the data from the previous map and shows the distribution categorized as positive reports of capsicum from two sources, and from three or more sources.

Map 9 shows the distribution at the level of two or more sources compared with the area of environmental suitability (Map 1). Capsicum consuming nations,

or parts of countries reported at this (two or more) level that are outside the area of suitability are indicated by a striping pattern.

Cultural Features.

Map 10 shows the occurrence of dietary capsicum at the level of two or more sources in relation to Portugal's Asian empire at its greatest extent. This map also shows the region where the Muslim population is greater than 10%. In the Soviet Union and China this is shown as the area of Turkic speech. The boundary of the Ottoman Empire at its greatest extent is also shown.

Interpreting the Data.

The reports of dietary capsicum at the level of a single source cover nearly the entire study area. Nations for which there was no indication of capsicum, or for which there was no data available are: All the political units of the Arabian Peninsula, Niger, Equatorial Guinea, Somalia, and Bhutan.

The absence of a report concerning capsicum in the diet is probably not a guarantee that it is not used. Only twice was explicit mention made that chilis were not eaten by a specific group. These concerned the Dutch and their strong attachment to a traditional diet even though they were acquainted with the food of Indonesia because of their colonial experience. Indonesian food is available and occasionally eaten in the Netherlands but is not considered today to be in any way 'Dutch' (Field & Field 1970:38). The other explicit mention of the non-use of chilis

concerned the fact that the national cuisine of the Philippines was considerably less spicy than that of its Southeast Asian neighbors (Handy 1979:15).

Geographic Correlations.

The correlation of the distribution of capsicum at the level of two or more sources and the region of climatic suitability shows that there is very little extension of the dietary use into the region of cool summers. There are quite a number of areas however, where chilis have been integrated in the foodways of groups living where there is too little precipitation for production without irrigation.

In addition to trade, possible explanations for the presence of capsicum outside the zone of suitability are irrigation and highly specialized forms of agriculture--i. e., oases and modern development projects. Trade between agriculturalists and nomadic peoples would also extend the capsicum use area.

The lack of reports at this level within the area of suitability--Spain, southern France and Italy, may be the result of insufficient coverage of the area in the literature consulted. Cultural factors which impede the acceptance of chilis have not yet been identified.

The relative absence of extensions of the capsicum area into the region of insufficient heat (or insufficient length of growing season) would seem to indicate the importance of the required temperature.

Reports of capsicum by a greater number of sources may be somehow indicative of how characteristic the use of chili is in the food of a particular group. An observer might fail to note the elective use of minor amounts. This may be the case for southwestern Europe.

The cultivation and culinary use of the larger, milder varieties of *Capsicum* (sweet peppers and paprika) in the countries along and beyond the northern boundary of the zone of suitability may indicate some ecological aspect relative to the 'heat' (capsaicin content) of peppers.⁵ The relation between capsaicin content and the size of the fruit (the smaller being hotter) (Meising 1957) and the positive association of hotter peppers with more tropical locales (Gathercoal & Wirth 1947: 568) seems to be a plausible hypothesis although no further information concerning research in this area has been located.

Maps 3 through 7 show that capsicum is reported from nearly all countries within the tropics. The level of reporting is lowest in parts of Africa (the Western Sahara and the west coast of the continent south of the Equator). The African countries which reported capsicum from one source only represent a variety of climatic types: the rainy tropics of the Congo basin, the wet-dry tropics on the west coast, and the tropical deserts.

The use of chilis in Africa may be a more characteristic feature of the diet than the available sources indicate. Those groups which actually do not use chili

⁵Rosengarten (1969:82-83) lists the following as paprika producers: Morocco, Spain, Yugoslavia, Bulgaria, Rumania, and Turkey. Sweet peppers, eaten as a vegetable are quite characteristic of the all the diets found around the Mediterranean (Fiebleman 1969, Casas 1985, Fisher 1968, Root 1968, Field & Field 1970, Wechsberg 1968, Nickles 1969, Uvezian 1974)

are probably non-agriculturalists (pastoral nomads or hunters) who are either too isolated or too poor to engage in trade with sedentary peoples who produce chilis as a market crop.

The liberal use of chilis in tropical Asia from India eastward is nearly universal and well documented. The Mexican artist Covarrubias writing of a visit to Bali in the 1930s noted his initial amazement and chagrin when he discovered that his hosts ate "the hottest chili peppers in the world" (Covarrubias 1938).

In light of the physiological properties of capsicum--desensitization to heat stress and stimulation of facial sweating it might appear that there are environmental stimuli involved in the eating of chilis. Two nations on the northern margins of the area of environmental suitability for capsicum, Korea and Bulgaria, have had "extreme" use of chili reported. While there was no data source for Korea other than HRAF, capsicum was reported by every investigator. One writer said that chilis were used "with indiscriminate liberality in nearly every dish" (Hall 1883). The food of Bulgaria was described as "biting" (Sanders 1949).

Chapter 5

HISTORICAL FACTORS

Fifteenth Century Exploration and Portuguese Economic Activity.

The Portuguese led Renaissance Europe in overseas conquest and colonization. They had been encouraged by Papal proclamations (1452–56) to conquer and subdue “all inimical to Christ” and to transfer their property to the Crown. Trade, exclusive of arms, was allowed if expeditious. The region in which this endeavor was to be permitted, and from which all other European kingdoms were explicitly banned, extended from Morocco to “the Indies” (Boxer 1969:20–21).

Following the attractions of West African gold, slaves and ivory, Portuguese caravels established well used shipping routes and colonies in the Atlantic and on the coast of West Africa in the early 1400s (Duncan 1972:7–24). When Vasco da Gama succeeded in reaching India via the Cape of Good Hope (1498), this Portuguese spiritual and economic adventure was expanded beyond that of merely serving as an intermediary in the trading of European manufactured goods, grain and horses into Africa. The establishment of a monopoly over the South Asian and European trade with the Orient was one of the motivations behind the great expenditure of sending ships around the Cape to India.

Prior to the end of the 15th century, trade between Europe and South Asia was funneled through the eastern Mediterranean where the Venetians monopolized

the redistribution of goods received from Byzantium and the Mameluk sultanate (Parry 1969:76).

A major component of this Asian trade was spices. Pepper, the dried seeds of the woody vine *Piper nigrum* from the Malabar Coast of India was the spice in greatest demand by Europeans and was of a very high value (Warnick 1984). Other spices involved in this trade were the true cinnamon (*Cinnamomum zeylanicum*) grown on the Malabar Coast and the island of Ceylon (Sri Lanka); cassia (*Cinnamomum* spp.) from southwest China; members of the the ginger family (*Zingerberaceae*)--ginger, cardamom, and turmeric, widely cultivated in India, Southeast Asia, and Indonesia; and the namesakes of the 'Spice Islands'--cloves (*Caryophyllus aromaticus*) and nutmeg/mace (*Myrsitica fragrans*).

The maritime trading routes the Portuguese encountered in the Indian Ocean were ancient and well established. Trade with Europe from India and kingdoms at the mouth of the Red Sea dates at least from the time of Augustus. Large Chinese fleets had called at Indonesian, Indian, Persian, Arab, and East African ports during the 14th century, and Arabs had visited Canton (Boorstin 1983:180-90).

Calicut on the Malabar Coast (modern Kozhikode in the state of Kerala) was a great emporium when the Portuguese arrived. Numerous well defined trade routes radiated from it--to Malacca and the Banda Islands in Indonesia, to the island of Hormuz at the mouth of the Persian Gulf, Aden on the Red Sea, and to the Islamized Swahili city-states along the coast of East Africa: Malindi, Mombasa, Zanzibar, and Sofala (Pearson 1976:7-10).

Hormuz, an island trading post at the mouth of the Persian Gulf, played a dominant role in the trade between India, Persia, the Gulf kingdoms, Afghanistan, and Inner Asia via the Oxus. Trade goods peculiar to Hormuz were pearls, horses and silk. This site was also located at the beginning of the overland route to Turkey and Europe. Malacca at the tip of the Malay Peninsula was also a major trading site where the goods of India, the Spice Islands, and China had long been exchanged.

Portugal's Asian Monopoly.

During the period AD 1500-15 a succession of Portuguese admirals, culminating with Alfonso de Albuquerque, Viceroy of India, destroyed the seapower of those Muslim merchants (predominately South Arabians and Gujaratis) operating in the Indian Ocean. The Portuguese then established commercial relations with the local sultans of India, the Malay Peninsula, and the Moluccas Islands.

The Portuguese were as interested in trade into eastern Asia as they were in establishing a monopoly in the European pepper trade. When Portugal secured a position at Malacca in 1511, trading activities became possible with East and Southeast Asia. Embassies were sent to the Burmese, the Thais, and the Chinese at Canton (Parry 1969:101). Much of the spices obtained in Indonesia, especially cloves and nutmegs, were resold to Asian traders at Malacca, Goa and Hormuz (Boxer 1969:61-62).

The seizure of the island of Hormuz, by De Albuquerque in 1515, completed the establishment of Portuguese control over all trade from India and Indonesia

into the Persian and Turkish empires. Portuguese control of Hormuz lasted until 1622.

Portugal's monopoly over the spice trade was relatively shortlived. By 1575 she had been ousted by the Dutch from the strategic factory site at Ternate in the eastern Moluccas. From this time until the mid 17th century Portuguese East Asian wealth was derived from their exclusive right to carry silks and silver bullion on the Macao-Nagasaki-Goa run.

The Diffusion of American Food Plants.

It is not clear whether the Portuguese made a concerted effort to introduce American foodplants into India and Africa for economic reasons or if the plants became incorporated into the local diets through persons in some way associated with the Portuguese. Fernand Braudel has suggested that the answer to this question would require a knowledge of the quantities of food shipments into the Portuguese colonies compared to their needs (Braudel 1979:220).

The Portuguese control of Hormuz would have provided ample opportunity for the diffusion of American foods into the Muslim world. Once a food item had gained acceptance in the Muslim world there would have been few obstacles to its attaining a widespread distribution throughout the entire cultural area.

Factors Affecting Diffusion.

While it was the Spanish who first encountered most of the new American food plants, their diffusion into the subtropical Old World is attributable primarily

to the Portuguese. In an appendix to the second edition of *Agricultural Origins and Dispersals*, Carl O. Sauer (1969:151) wrote of some of the problems surrounding the introduction of maize, and American plants generally, into Europe (he listed maize, pumpkins, paprika, and tobacco). His opinion was that there was very little evidence to support the idea that the Spanish had a role in the dispersal of these plants even into the Mediterranean region. American plants, he continues are "more significant" in the eastern Mediterranean and Italy than in Spain.

That American plants were carried directly to Africa and Asia from precolumbian Portuguese landfalls in South America, particularly Bahia, is also unlikely. The Portuguese could have easily reached the American mainland from the Cape Verde Islands anytime after ca. 1455 and may have accidentally done so. No record of any contact with Brazil exists however, prior to that of Cabral (1500); neither is there any hard evidence of American plants in Europe before the return of Columbus. Even for the 16th and 17th centuries there is no evidence to support a direct linkage between Brazil and Portuguese Asian settlements for the introduction of American plants (Haggett 1959). Whether the Portuguese acquired these plants or seeds from the Spanish in southwest Iberia, or the Canary or Cape Verde islands is apparently unknown.

Specific American food plants are known to have reached Asia and Africa very soon after the discovery of the New World. Their introduction by the Portuguese is mentioned explicitly in many cases. Jack R. Harlan (1969:312) lists chilis, tomatoes, and tobacco as present in Ethiopia since the "16th- 17th century," noting that there was a Portuguese embassy there as early as 1520.

Ping-ti Ho (1955) comments that peanuts, sweet potatoes, and maize were mentioned in a history of Hunan Province in southwest China written in 1550. Ho feels that as these plants were then important enough to be taxed this would indicate their introduction ca. 1530. He feels that they could have arrived overland from Burma.

P. Maheshwari and S. L. Tandon (1959:226-228) give an "early 17th century" date for chilis, maize and peanuts in India and specify Portuguese introduction of these species.

Stanley Levy (1957:13-14) states that maize has been grown in Indonesia since the 17th century and that the peanut which is also grown there was acquired indirectly from the Portuguese through Chinese intermediaries. D. M. Grigg (1974:31-33) remarks that maize arrived in West Africa from two sources: the Portuguese, and "from the Turks via Egypt." He adds that maize was known to the Turks since at least 1517. In a discussion of the substances included in the U. S. Dispensary, chilis are said to have been introduced into India by the Portuguese, and into Africa at a somewhat later date. No further historical information is given (Gathercoal & Wirth 1947:569).

It is quite likely that American plants were introduced into this region as groups of species over a very short period of time. Their distribution is somewhat limited by climatic factors, but many seem to appear together in dietary complexes. If this is the case, any historical reference to an American plant in Africa or Asia is probably an indication of the presence of others.

Cultural Factors in the Distribution

The Portuguese in the 16th century were the primary factors in the diffusion of American plants into the Old World tropics. In the case of the chili pepper, even though not mentioned specifically in most of the historical literature, it may be assumed to have been introduced either directly or indirectly by the Portuguese during the period of their colonial empire. The present occurrence of dietary capsicum which lies outside of that region is predominately an area of a considerable Islamic influence.

The distribution of dietary capsicum reported by two or more of the sources is somewhat correlated with those nations either having a former Portuguese influence or a Muslim population greater than ten percent (Map 9). The dissimilarities between the reports of chili use on the northern and southern shores of the Mediterranean bears this out. It does not seem to be the percentage of Muslim population which controls this distribution but whether or not a given region was under Islamic influence at the time of the introduction of American food plants. The only exception to this is Portugal, considered the primary factor in the introduction of chili, which maintained colonies in the tropics longer than any other European power.

The relatively long presence of the Portuguese at Hormuz would have provided sufficient opportunity for the exposure of large numbers of travelers from throughout the entire world of Islam. The lack of internal cultural boundaries in the Islamic world and toleration of a wide range of diversity within the limits of theological acceptability could allow novel items of food, artifacts or technology to

be rapidly disseminated throughout a vast area. The requirement of pilgrimage played an important role in broadening the perceptions and expectations of many. The relatively sophisticated horticultural systems of the Islamic world made possible great extensions in the potential growth areas of many plants.

Capsicum in Oceania

The presence of American plants in Oceania has long been a source of controversy centering on the possibility of precolumbian contacts between Polynesians and South American Indians. One of the main proponents of explanations based upon such early contacts has been Thor Heyerdahl. His *Kon-Tiki* expedition (Heyerdahl 1950) demonstrated that the physical possibility of voyages were within the technical abilities of the period and peoples in question.

Botanical evidence based on genetic analysis of the types of plants given as evidence by Heyerdahl (cotton, sweet potatoes, coconuts, and the bottle gourd) does not support the theories of precolumbian contact (Pickersgill 1969b; Conklin 1963).

The Spanish may not have been responsible for the successful introduction of many American plants in the Pacific. The Medana and Quiros expeditions from Peru planted a variety of species in the early 17th century at Polynesian sites. Yet at the time of Cook's voyages 150 years later, there was no evidence of the plants (Carter 1963:13).

Chilis are currently grown and eaten throughout Polynesia and the Western Pacific (Barrau 1961:59; Barrau 1958:55; Massal & Barrau 1956:37). Their presence

was noted on Easter Island in 1770 by the Gonzalez expedition, the first Spaniards to arrive there (Heyerdahl 1963:31). This may indicate diffusion of these plants eastwards by Malays or Polynesians from areas of Portuguese influence.

The marked absence of chili use in the composite national cuisine of the Philippines (but its presence in the diet of some aborigine groups) and the long standing Spanish presence there is a further indication that the Spanish did not have the primary responsibility for the early introduction of new food plants into Asia.⁶

⁶The maize which the Spanish brought to the Philippines from Mexico was not readily usable as meal because of a lack of familiarity with the methods of preparing it. Corn did not become popular with the Filipinos until Chinese merchants began to grind it in a form that resembled rice! (Spencer 1975:9-10).

APPENDIX 1. SOURCES

The regional divisions used in the Appendices are somewhat different from those used by HRAF, the only source which used a regional breakdown system. The subdivisions used here are more in agreement with geographic use and might better represent the division of the area based on considerations of diet and food preparation styles.

The major differences between the HRAF system as described in Chapter 3. and that used here are listed below:

1. Africa is used to include the entire continental landmass as well as the island of Madagascar.
2. The Middle East is limited to those countries of Western Asia outside of the Soviet Union and exclusive of Pakistan.
3. Central Asia is the area of predominantly Turkic speech inside the Soviet Union, and in the desert area of Western China.
4. Asia is subdivided into South Asia (India, Pakistan, and Sri Lanka), Southeast Asia (the mainland and insular areas south of China exclusive of New Guinea and the Philippines), and East Asia (China, Korea, and Japan).
5. Oceania includes New Guinea, the Philippines, and the island groups of the Western Pacific.

1.1 HRAF FILES.

All HRAF citations pertinent to the study area are included; they are grouped alphabetically by HRAF code in the following categories:

1. Detailed reference to *Capsicum*, chili, (red/green) pepper, etc.
2. Casual reference.
3. No mention.
4. Absence of HRAF data.

The names of larger regions marked with an asterisk indicate a non-HRAF regional classification: e. g., CENTRAL ASIA*, SOUTHEAST ASIA*

The following example illustrates the HRAF citation system:

(Nation/Region)
 Cultural Unit
 OWC Category/Bibliographic number: Author(Date)

EUROPE

1. Detailed mention of capsicum.

EE1 Bulgaria

263/2: Sanders (1949). Peasant food referred to as "biting;" a cook's reply to this was that food without peppers was tasteless.

2. There were no references in this category.

3. No mention of capsicum.

EF1 Yugoslavia, EF6 Serbs, EZ6 Malta.

4. No HRAF data could be obtained for any other European countries.

MIDDLE-EAST

1. Detailed mention of capsicum.

MH1 Iran, MH1 Iraq

263/36: Hooper & Field (1937). Use of capsicum said to be universal throughout the "East."

MA11 Kurd

263/2: Masters (1953). "Strong pepper" (=capsicum?) mentioned as imported from Iraq.

2. There were no references in this category.
3. No mention of capsicum.

ME1 Turkey, ME1 Lebanon, MG1 Jordan, MJ1 Saudi Arabia, MJ4 Bedouin, MD4 Rwala, MM1 Aden, MM2 Hadhramaut

4. Data was obtained on every country in the area.

CENTRAL ASIA*

1. Detailed mention of capsicum.

AE9 Monguor

263:2 Schram (1932). Mention of salt & "pimento" as components of a dipping sauce.

2. There were no references of this type.
3. No mention of capsicum.

AI1 Xinjiang, AJ4 W. Tibet, AH1 Mongolia, RQ2 Kazak

4. There was some data obtained on the entire region but not in any great detail or depth.

AFRICA.

1. Detailed mention of capsicum.

Sierra Leone

FA8 Bambara

263/3: Paques (1954). Mention of "pimentos."

FA16 Dogon

263/2: Palume (1935). Mention of "pimentos."

Ghana

FE11 Tallensi

262/4: Fortes & Fortes (1936). Red pepper said to be the most important spice.

Gabon

FH9 Fang

263/61: Calwick (1950)

"148. The only common flavoring used is chillies (*shatta*), fresh or powdered according to the season." Mint was also mentioned as being a recently introduced spice (? Arabs); also 263/1: Tessma (1913); /61: Calwick (1950).

FO7 Azande

263/68: Evans-Pritchard (1935?). The harvesting of wild chilis said to have been learned from the Arabs.

Zaire

FO32 Mongo

263/1: Maes (1924). Red pepper (*C. minimum*) called *pili-pili*.

FO42 Rundi

263/2: Meyer (1916). Red pepper mentioned as a harvested wild plant.

FQ5 Bemba

262/2: Richards (1939). Chili called "*mpili-pili*."

Madagascar

FY8 Tanala

263/1: Linton (1933). Chilis grow wild.

Ethiopia

MP5 Amhara

263/1: Meesing (1957). Mention of capsicum, its introduction attributed to the Portuguese; pungency said to be inversely proportional to size of fruit; also 263/8: Ray (1935).

Nigeria

MS12 Hausa

262/18: Hill (1972). *C. frutescens* called *barkono*. Trade with Tauregs mentioned; also /2: Smith (1954), /10: Hassan & Shuaiba (1952).

2. Casual mention of capsicum.

Upper Volta

FA28 Mossi

263/1: Dolobson (1933).

Sierra Leone

FA8 Bambara

263/2: Montell (1924),/7: Dieterlen & Calame-Griale (1960).

Mali

FC7 Mende

262/2: Little (1945)

Nigeria

FF38 Kata

263/1: Meek (1931).

FF57 Tiv

263/1: East (1939),/11: Malhere (1931),/19: Bohannon & Bohannon (1953).

FF62 Yoruba

262/1: Forde (1951); 263/5: Bascom (1951).

Algeria

MS25 Taureg

263:7 Nicolaison (1963).

3. No mention of capsicum.

Nigeria--FF52 Nupe; Sudan--FJ22 Nuer, FJ23 Shilluk,
FO7 Azande.

Uganda--FK7 Ganda, FL11 Luo.

Kenya--FL6 Dorobo, Tanzania, FN4 Chagga.

Zambia--FN17 Ngonde (Nyakusa), FQ6 Ila, FR5 Ngoni,

Angola--FB13 Mbundi.

Mozambique--FT6 Thonga, FT7 Yao.

Namibia--FX10 Bushman, FX13 Hotttentot.

South Africa--FX14 (Transvaal).

4. No data: There was no HRAF data available on 18 African countries. These included 11 of those nations with Muslim majorities (excluding Algeria and the Sudan), three nations of the Sahel region (Niger, Chad, C. A. R.), (formerly Portuguese) Sao Tome/Principe, the Republic of the Congo in equatorial Africa, and Botswana, Zimbabwe in southern Africa.

SOUTH ASIA *

1. Detailed mention of capsicum.

AW1 India

263/13: Univ. Cal. (1955). Capsicum use said to be "extensive."

AW60 Toda

262/1: Rivers (1906). Chilis mentioned as tabu to a certain type of individual--"patol" (?=shaman).

2. Casual mention of capsicum.

AR7 Khasi

262/20: Hunter (1897)

AV4 Kashmiris

263/2: Gervis (1954)

3. No mention of capsicum.

AV1 Kashmir, AU1 Afghanistan, AW6 Punjab, AX5 Vedda

4. There was no data obtained for Pakistan, Nepal, Bangladesh, Bhutan, or Sri Lanka. Data available on the ethnic groups was focused on aboriginal tribes.

EAST ASIA*

1. Detailed mention of capsicum.

AA1 Korea

262/44: Hall “---chilis are the principal condiment---used w/ indiscriminate liberality in nearly every dish”

263/1: Hubert (1906). Red peppers grown “everywhere”

AE3 Sino-Tibetan Border

263/1: Fitzgerald (1934). The food of the “Min Chia” is said to be less “hot” than that of Sichuan, “but still uses more ‘pepper’ than suits the European taste.”

AF17 S. China

262/3: Chen (1940). Chilis introduced by Chinese from the *nan yang*, the area of Chinese influence in Southeast Asia, and the South China Sea.

2. Casual mention of capsicum.

AA1 Korea

262/10: Saunderson (1894), /2: Grifis (1882), /4: Moose (1911), /49: Dallet (1874), /55: Knez (1960).

AF12 China

263/15: Tao (1928)

3. No mention of capsicum.

AD1 Formosa, AF13 N.W. China, AF14 Cent. China, AE15 East China, AF12 China

4. There was no HRAF data obtained for Japan, nor dealing with the ethnic diversity within the area.

SOUTHEAST ASIA*

1. Detailed mention of capsicum.

AE5 Miao (Hmong)

262/4: Mickey (1947). Chilis (red and green) eaten with cooked vegetables.

263/2: Ling & Ruey (1947). The liking of pungent foods attributed to the difficulties in obtaining salt in earlier times (see AF17 China re: Han salt monopoly).

263/12: Wu & Chen (1942). Mention of chili peppers and the high price of salt.

AM4 Cambodia

263/ 114: Maurel (1887). "Their cookery is so strongly spiced it is repulsive to Europeans."

AM8 Laotians

263/149: Reinach (1901). "Pimentos---a much sought after condiment, ---indispensable to the people of Laos." A dried and smoked form of chili referred to as *mak phik*.

AM11 Vietnamese

262/2: Garrou (1945). *C. annuum* mentioned as synonymous with 'pimento.'

AN1 Malay

263/28: William-Hunt (1952). "Coarse salt ground with chilis is a popular addition to the aboriginal [=Semang] diet."

/32: Grist (1936). "Capsicum" and chilis mentioned. This is possibly the East Indian useage of the word--as referring to a bell pepper (*C. annuum* var. *annuum*). Some local production was done by the Chinese, but most chili was imported from India. The author felt that the Malays could grow more if they made the effort, noting that the climate, while too wet for optimal production was still suitable. He noted that the growing season required was 4-6 mos.

AN5 Malays

263/5: Firth (1943), /19: Wunsedt (1925),/142: Cuisiner (1936). All mention capsicum with special reference to pickles.

AN7 Semang

262/1: Schebesta (1954). Mentions chilis several times, referring to it as Spanish pepper, and giving a local name: *ladah*.

263/30: Evans (1937). "The Negrito uses salt and cap-sicum as condiments---[they are] obtained in trade with the Chinese and the Malays."

AO1 Thailand

262/20: Young (1898). "A highly spiced diet is the custom of the Thais, European food is considered [by them] to be insipid."

263/2: Thompson (1941). "Spanish peppers or chillies are planted in every garden [and] together with betel nut are an indispensable condiment."

OA5 Apayoa (Isneg) [Northern Luzon]

263/44: Vohoverbath (1941). "*Capsicum frutescens* (*tor-an*)--leaves used as a vegetable, (*pat-o*), fruit as a condiment (*bisi*); *C. annuum* green pepper (*xappo*). Also 262/46 Wilson (1947).

OF7 Bali

262/2: Covarrubias (1938). Diet described [92] as "cold white rice---a side dish of vegetables chopped together with a dozen or so of spices, aromatics, grated coconut, and the hottest chili peppers in the world."

2. Casual mention of capsicum.

AE5 Miao (Hmong)

263/39: Bernatzik (1947).

AO1 Thailand

262/1: Anuman Rachathon (1955); /18: Siwasariyanon (1954), /22: Graham (1924); 262/35: De Young (1955).

AN1 Malay

263/7: Dennys (1894).

AP1 Burma, AP4 Burmese

262/22: Christian (1942), 263/1: Khaing (1946).

OA5 Apayoa

262/46: Wilson (1947).

OB1 Indonesia (OC1 Borneo, OD5 Batak, OE5 Java,
OF15 Savi, OH1 Moluccas)

262/: Wilken, C. A. (1883), 263/3: Low (1848), /14: Roth (1941)

3. No mention of capsicum.

AM1 Indochina, OA1 Philippines, OG6 Makassar (Celebes)

4. There was some data on the entire region, at least at the level of nation states. Ethnic diversity was not well represented. Food or diet was not covered in detail, especially the interaction of the South Asian, East Asian, and aboriginal foodways which all meet in this area.

OCEANIA

With the exception of OJ27 Orokaiva (New Guinea), there was no mention of capsicum found for any site in Oceania. The Orokaiva entry is: 262/15: Hogbin (1970), and mentions only curry, which is possibly an introduction from Indonesia.

Australia and New Zealand were not included in the study area. The other Oceania sites are as follows: OJ23 Orokaiva, OM1 New Ireland, OQ6 Lau, OT11 Tikopia, OV6 Samoa, OX6 Marquesas, OY2 Easter Island.

There are two references to members of the family Solanaceae on Easter Island: 261/1: Metraux (1940) which mentions a wild plant eaten only during famine (*Solanum foresteri* (poporo); and /10: Cook (1899) stating that tomatoes were grown in gardens.

1.2. References to the distribution of capsicum usage in the journal *Economic Botany* (New York: The Society for Economic Botany, The New York Botanical Garden, v. 1, 1947-) are in chronological order and by region.

AFRICA.

1969 (23:309-14) Harlan, Jack R.
Ethiopia, a center of diversity.

Mention of a Portuguese embassy by as early as 1520; he states that the probable date of the introduction of American food plants is "16th--17th century." Capsicum, tomatoes and tobacco mentioned specifically.

--- (23:352-72) Williams, Llewelyn.
Forest and agricultural resources of Dahomey, West Africa.

Capsicum listed as a minor industrial crop.

1976 (30:375-81) Johnson, E. J., and T. J. Johnson.
Economic plants in a rural Nigerian market.

Capsicum frutescens included in a list of plants, local pidgin name given as *ehie* (?aji) (p.376, Table I). During the period of study (12 months), 29% of the plants observed in the markets were of American origin.

1979 (33:29-35) Wilson, R. T., and Woldo Gebre Mariam.
Medicine and magic in central Tigre.

No mention of capsicum.

1983 (37:384-95) Bedigan, Deborah, and Jack R. Harlan.
Nuba agriculture and ethnobotany with particular emphasis on sesame and sorghum.

No mention of capsicum.

1983 (37:28–57) Secoy, D. M., and A. E. Smith.

Use of plants in the control of agricultural and domestic pests.

C. frutescens is used in India and Africa to protect stored food (cereals?) from weevils; it is also used as a charm for crops (p. 52).

1984 (38:464–89) Okoli, 'Bosa E.

Wild and cultivated cucurbits in Nigeria.

Capsicum mentioned in a discussion of food preparation (ingredient of sauce, relish) (p. 353).

SOUTH ASIA.

1959 (13:205–42) Maheshwari, P., and S. L. Tandon.

Agriculture and economic development in India.

Mention of Portuguese introduction of chilis. 1959 harvest 354,000 tons (? fresh), 6820 tons (dry) exported.

1963 (17:127–32) Newcomb, Robert M.

Botanical source-areas for some Oriental spices.

1970 (24:241–78) Jain, S. K., and C. R. Tarafder.

Medicinal plants of the Santals: a revival of the work of P. O. Bodding.

"74. *Capsicum frutescens* L. [used to treat] Headache, night-blindness, pain, adenitis, sores, scald head, dysuria, bronchitis, colds or chill, poison of crocodile." (p. 248). (The work was originally published as: Studies in Santal medicine. *Mem. Asiat. Soc. of Bengal*, 10(1):1–32, 1925.)

1971 (25:414–22) Shah, N. C., and M. C. Joshi.

An ethnobotanical study of the Kumaon region of India.

Mention of medicinal and magical use only. It is not specified which parts of the plant are so used nor how they are acquired.

1978 (32:278–84) Bedi, S. J.

Ethnobotany of the Ratan Mahal Hills of Gujarat State, India.

No mention of capsicum.

1979 (33:52–56) Jain, S. K., and Namita Dam (Nee Goon).

Some ethnobotanical notes from N. E. India.

No mention of capsicum.

1980 (34:264–72) Jain, S. K., and S. K. Borthakur.

Ethnobotany of the Mikirs of India.

No mention of capsicum.

1981 (35:4–9) Rao, R. R.

Ethnobotany of the Meghalaya: medicinal plants used by the Khasi and Garo tribes.

No mention of capsicum.

1982 (36:176–81) Rao, R. R., and N. S. Jamir.

Ethnobotanical studies in Nagaland: I. Medicinal plants.

No mention of capsicum.

1983 (37:384–95) Onge, I., and N. Bhargarva

Ethnobotanical studies of the tribes of the Andaman and Nicobar Islands, India.

No mention of capsicum.

--- (37:299–305) Lal, S. D., and B. K. Yadav.

Folk medicines of the Kurukshetra District (Haryana), India.

Lalmirch (*Capsicum* spp. listed as an ingredient in a concoction used in the

treatment of piles; *lalmirch* is also listed as being prohibited during treatment for digestive disorders. (pp. 300-02).

1984 (38:194-209) Francis, Peter, Jr.
Plants as human adornment in India.

"Nagas wear fruit in their ears (1911), and hair (1926)" (p.199). The dates in parentheses refer to the author's sources.

SOUTHEAST ASIA.

1957 (11:3-39) Levy, Stanley
Agriculture and economic development in Indonesia.

No mention of capsicum, corn (*Zea mays*) said to have been introduced in the 17th century.

1971 (25:136-59) Dentan R. K.
Some Senoi-Semang planting techniques.

"*Capsicum annum/frutescens* harvested by pulling the entire plant from the ground after it has gone to seed. (p. 146).

1986 (40:38-53) Anderson, Edward F.
Ethnobotany of the hill tribes of northern Thailand: I.
Medicinal plants of Akha.

No mention of capsicum.

OCEANIA.

1963 (16-22) Stopp, Klaus.
Medicinal plants of the Mt. Hagen people (Mbowamb) in New Guinea.

No mention of capsicum.

1967 (21:243-72) Conklin, Harold C.

Ifugao ethnobotany, 1905-1965: the 1911 Beyer-Merrill report in perspective.

Capsicum frutescens (*paktiu*) is used in both food and drink (=beer?), its use is thought to clear the head of an intoxicated person(?); other American species mentioned are *Zea mays*, *Phaseolus aureus*, *Ipomoea batatas*, *Amaranthus spinosus*, there is no indication of cultivation. The Ifugao are an aboriginal group on northern Luzon, P. I. (p.259).

1971 (24:245-54) Nagata, Kenneth M.

Hawaiian medicinal plants.

Capsicum mentioned, no indication of dietary use or history; it is used in the treatment of skin diseases, asthma, and "bad blood."

--- (25:423-50) Weiner, Michael A.

Ethnomedicine in Tonga.

"*C. frutescens*" used in the treatment of skin diseases, "leaves chewed for tuberculosis," the juice (hopefully of the leaves!) is used in the treatment of conjunctivitis, the fruits are eaten for jaundice, no mention of diet or history. (p.445). The author lists *C. frutescens*, *Physalis angulata*, *P. peruviana*, and *Solanum uporo* as: "Solanaceae (Tomato [sic] family," This is possibly due to the fact that three of the four are called *poro*, and they may be classified in Tongan on the basis of e. g., leaf shape or color. *Capsicum* is referred to as "pantropical" and said to grow in house yards (=weedy?).

1974 (28:1-30) Uhe, George

Medicinal plants of Samoa.

Capsicum is used in the treatment of: "boils, *mumu* (an inflammation of the limbs--'probably the beginning stages of elephantiasis)--the leaves are used externally; cuts/wounds-- leaves applied topically; the fruits are used as a stomachic, also externally for backache; leaves and fruits used for chest troubles, coughs; the [entire?] plant is used in the treatment of gonorrhoea." (p. 27).

1975 (29:268-77) Adell, Johannes.

Medicinal plants of the Nekematigi of the eastern highlands of New Guinea.

No mention of *Capsicum*.

1984 (38:464–89) Whistler, W. Arthur.
Annotated list of Samoan plant names.

Polo can indicate members of both *Solanum* and *Capsicum*; in previous times the name referred to the former only, until the species of that genus became locally extinct. The word now refers only to chilis. Else where in Polynesia the term refers to both genera (p. 480).

1.3 The American Geographical Society, Studies in Medical Geography. New York and London: Hafner Publishing Co.

Mays, Jacques M., and Irma S. Jarcho

1961 (vol. 3) The ecology of malnutrition in the Far and Near East.

Mays, Jacques M.

1963 (vol. 4) The ecology of malnutrition in five countries of Eastern and Central Europe.

1965 (vol. 5) The ecology of malnutrition in Middle Africa.

1966 (vol. 6) The ecology of malnutrition in Central and Southeastern Europe.

1967 (vol. 7) The ecology of malnutrition in Northern Africa.

Mays, Jacques M., and Donna L. McLellan

1968 (vol. 8) The ecology of malnutrition in the French speaking countries of West Africa and Madagascar.

1970 (vol. 9) The ecology of malnutrition in Eastern Africa and four countries of Western Africa.

1971 (vol. 10) The ecology of malnutrition in seven countries of Southern Africa and in Portuguese Africa.

1.4 COOKBOOKS

The Foods of the World (27 vol.), Richard L. Williams, series editor.
(New York:Time-Life, Inc., 1968-70)

Bailey, Adrian.

1969 The cooking of the British Isles.

Feibleman, Peter S.

1969 The cooking of Spain and Portugal.

Field, Frances, and Michael Field

1970 A quintet of cuisines.

Fisher, M. F. K.

1968 The cooking of provincial France.

Hahn, Emily

1968 The cooking of China.

Nickles, Harry G.

1969 Middle Eastern cooking.

Papashvily, George, and Helen Papashvily

1969 Russian cooking.

Rama Rau, Santh

1969 The cooking of India.

Root, Waverly

1968 The cooking of Italy.

Steinberg, Rafael

1969 The cooking of Japan.

1970 Pacific and Southeast Asian cooking.

Van der Post, Laurens

1970 African cooking.

Wechsberg, Joseph.

1968 The cooking of Vienna's Empire.

Independently published ethnic focus cookbooks.

Anon.

1973 Hawkins pressure cookery and instruction book.
Bombay: Pressure Cookers & Appliances, Ltd.

Casas, Penelope

1985 Tapas: the little dishes of Spain. New York:
Alfred A. Knopf.

Ching, Lee Sook

1980 Cook Malaysian. Singapore: Times Books Intl.

Handy, Elice

1979 *Female* Cookbook--1980 (*Female*, Cathay-Pacific, ASEAN
Food Festival) Singapore: MPH Magazine.

Huang, Su Hei

1974 Chinese cuisine. Taipei: Wei-chuan Publishing Company.

Kon, Mrs. P. C.

1980 The Malaysian cookbook. Singapore: Vista Productions, Ltd.
1962 Joys of Nepalese cooking. Gwalior, India: Smt. S. Devi.

Indra Majupuria, and Diki Lobsang

1981 Tibetan cooking. Gwalior, India: S. Devi.

Mehta, Shahnz, and Joan Korenblit

1981 Good cooking from India. Emmaus (Pa.): Rodale Press.

Singh, Mrs. Balbir

1961 Indian cookery. London: Mills & Boon, Ltd.

Stollard, Louise

1976 The Szechuan and Hunan cookbook. New York:
Sterling Publishing Co.

Uvezian, Sonia

1985 The cuisine of Armenia. New York: Colophon Books
(Harper & Row).

APPENDIX 2. CUMULATIVE CITATION INDEX

This index lists each country for which information on diet could be obtained from the sources listed above (Appendix 1.), as well as occasional sources listed in column 5. The data is coded as follows: Capsicum indicated (+); No mention of capsicum (-); No data (0). Parenthetic numerals are a positive indication of dietary/medicinal capsicum and refer to the notes at the end of this section. The countries are grouped by number of sources, and by geographic region.

Source key:

Column 1. HRAF 2. Medical Geography. 3. Economic Botany.

4. Cookbooks. 5. Other Sources.

Capsicum Use Reported by
Four or More Sources.

	1	2	3	4	5
Middle East					
Turkey	+	+	0	+	(2)
Africa					
Benin (Dahomey)	+	+	+	(4)	
Ethiopia	+	+	+	(3)	(2)
Nigeria	+	+	+	(4)	(2)
Sudan	+	+	+	0	(2)
South Asia					
India	+	+	+	+	(2)

Capsicum Use Reported by
Four or More Sources

-----	1	2	3	4	5	
East Asia						
China	+	+	0	+	(2)	
Thailand	+	+	+	+	(2)	
Malaysia	+	+	+	+	(2)	

Capsicum Use Reported by
Three Sources.

Europe						
Yugoslavia	-	+	0	+	(2)	
Hungary	0	+	0	+	(2)	
Middle East						
Algeria	+	+	0	+		
Egypt	0	+	+	+		
Africa						
Gabon	+	+	0	(4)		
Gambia	+	+	0	(4)		
Ghana	+	+	0	(4)		
Liberia	?	+	0	(4)		
Tanzania	0	+	0	(4)	(2)	
Togo	+	+	0	(4)		
Uganda	+	0	0	(3)	(2)	
Sierra Leone	+	+	0	(4)		
Southeast Asia						
Burma	+	+	+	0		
Indonesia	+	0	-	+	(2)	

Capsicum Use Reported by
Two Sources

-----	1	2	3	4	5
Europe					
Bulgaria	+	-	0	(5)	
Greece	0	-	0	+	(2)
Portugal	0	0	0	+	(2)
Romania	0	+	0	(6)	
Yugoslavia	0	+	0	+	
Middle East					
Egypt	0	+	+	+	
Israel	0	+	0	+	
Iran	+	-	0	+	
Iraq	+	-	0	+	
Tunisia	0	+	0	+	
Africa					
Angola	0	+	0	+	
Cameroon	-	+	0	(4)	
Gambia	+	+	0	(4)	
Guinea	-	+	0	(4)	
Guinea-Bissau	-	+	0	(4)	
Ivory Coast	-	+	0	(4)	
Kenya	-	-	0	(4)	(2)
Madagascar	+	+	0	0	
Mozambique	-	+	0	+	
Senegal	0	+	0	(4)	
Upper Volta	+	+	0	0	
Zaire	+	+	0	0	
Southeast and East Asia and Oceania					
Cambodia	+	-	0	0	
Japan	0	0	0	+	(2)
Oceania	-	0	+	-	(9)
Philippines	+	0	+	-	
Vietnam	+	-	0	+	

Capsicum Use Reported by
One Source.

-----	1	2	3	4	5
Europe					
France	0	0	0	0	(1)
Great Britain	0	0	0	+	
Italy	0	0	0	0	(1)
Spain	0	0	0	+	
U. S. S. R.	0	0	0	0	(8)
Middle East					
Jordan	-	-	0	+	
Lebanon	-	-	0	+	
Libya	0	+	0	0	
Morocco	0	-	0	(5)	
Syria	-	-	0	+	
Africa					
Botswana	0	-	0	0	(6)
Burundi	0	+	0	0	
Cent. Afr. Rep.	0	+	0	0	
Chad	0	+	0	0	
Congo	0	+	0	0	
Djibouti	0	+	0	0	
Malawi	0	+	0	0	
Mali	+	-	0	0	
Niger	-	+	0	0	
Sao Tome & Principe	0	+	0	0	
South Africa	-	-	0	+	
Swaziland	0	+	0	0	
Rwanda	0	+	0	0	
Zambia	+	0	0	0	
Zimbabwe	0	-	0	+	
South Asia and East Asia					
Nepal	0	0	0	+	
Pakistan	0	+	0	0	
Sri Lanka	0	+	0	0	
Laos	-	+	0	0	
Korea	+	0	0	0	

Countries Which Did Not Report the Use of Capsicum.

-----	1	2	3	4	5
Albania	0	0	0	0	
Afghanistan	-	-	0	0	
Arabian Peninsula	-	0	0	0	
Benelux Countries	0	0	0	-	
Equatorial Guinea	0	-	0	0	
Lesotho	0	-	0	0	
Mauretania	-	-	0	0	
Namibia	0	-	0	0	
Spanish Sahara & Ifni	0	-	0	0	

Notes.

- (1). Ground red pepper(Capsicum) is substituted for Piper as a table and kitchen spice, and is the characteristic spice of the western Mediterranean--personal communication, Prof. Thomas Foor, Dept. of Anthropology, University of Montana, 1986.
- (2). Commercial spice producing country (Rosengarten, 1969: 82-83).
- (3). Included in the subregion "East Africa" (Van der Post 1969).
- (4). Included in the subregion "West Africa" (ibid).
- (5). Included in the volume "Quintet of Cuisines (Field & Field 1970).
- (6). Chili eating by the Bushmen mentioned by Grivetti (1978:1208).
- (7). Photograph of chilis for sale in the market at Taskent, Uzbek S. S. R. Chilis also found in recipes in the chapter on the Central Asian Republics (Papashvily & Papashvily 1969).
- (8). The capsicum references concerning the Philippines

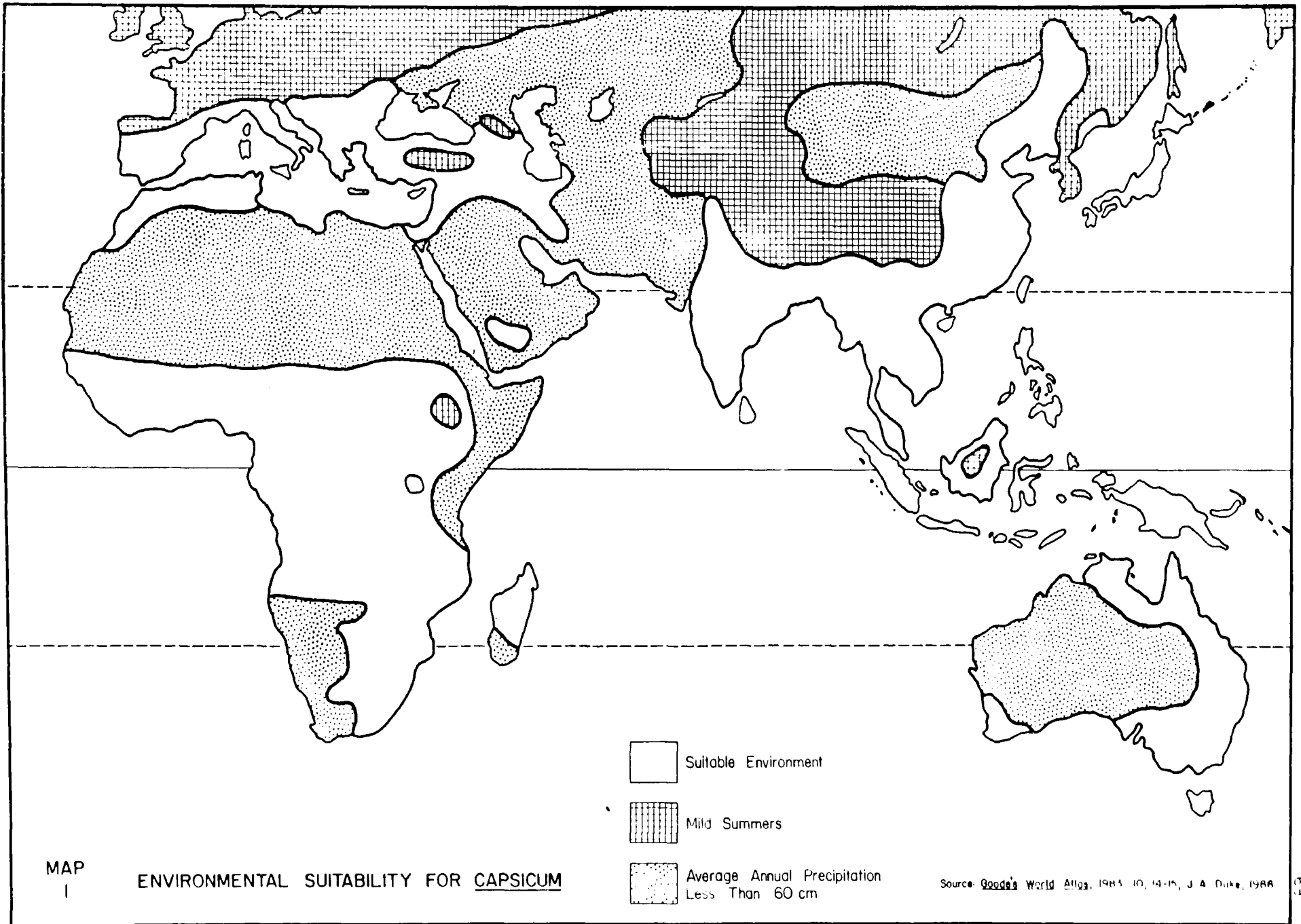
concerned aboriginal tribes. Cookbook descriptions of Philippine food indicated an absence of chili use. This was emphasized in the ASEAN region cookbook which took an almost apologetical tone when urging the reader to give the relatively bland food of the Philippines a try (Handy 1979:15).

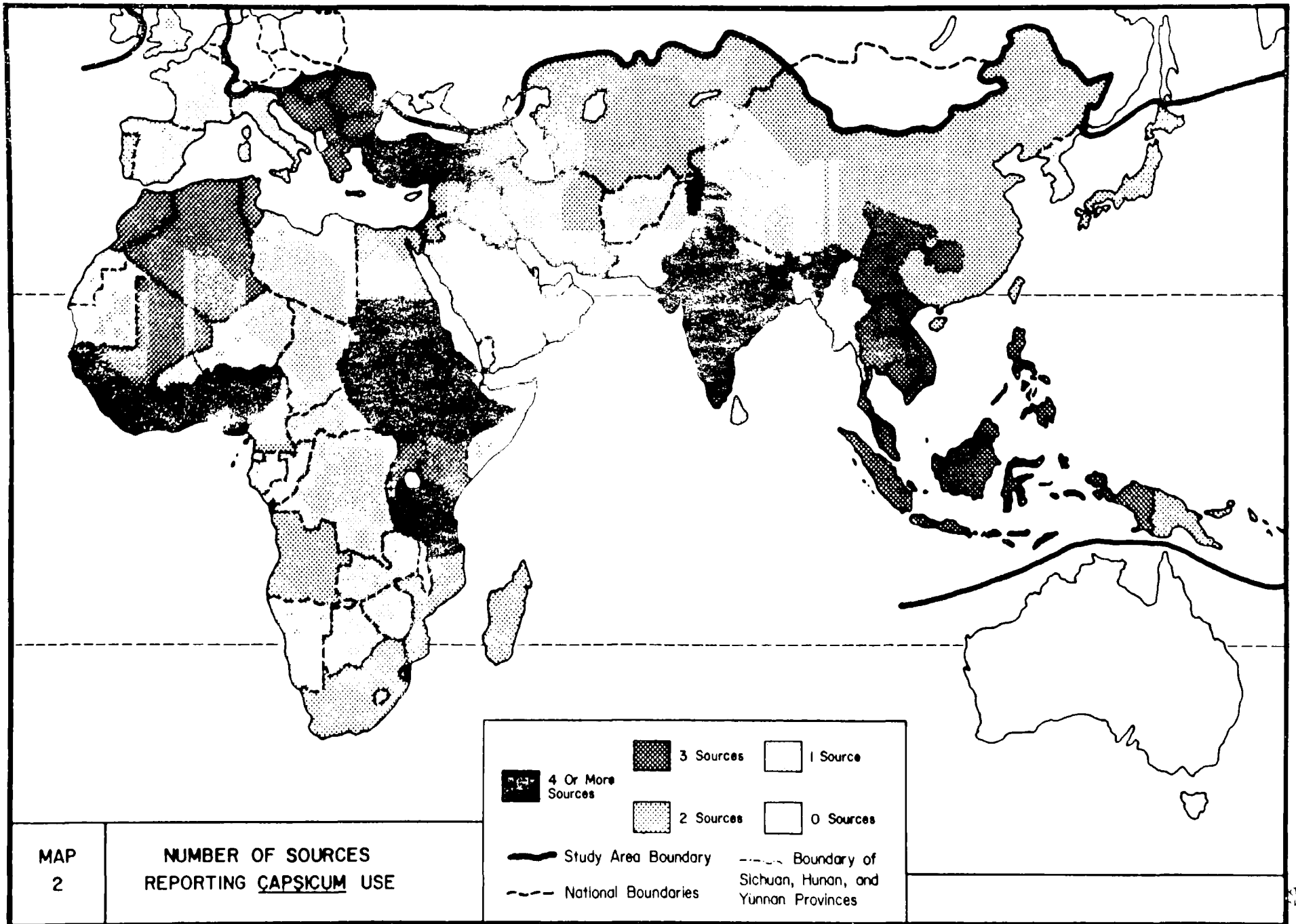
- (9). Capsicum use in Oceania is reported very sparsely. Reports in the journal *Economic Botany* dealt exclusively with medicinal use. Chilis were casually mentioned in lists of garden crops in Melanesia, Micronesia, and Polynesia (Barrau 1961, 1958; Massal & Barrau 1956)

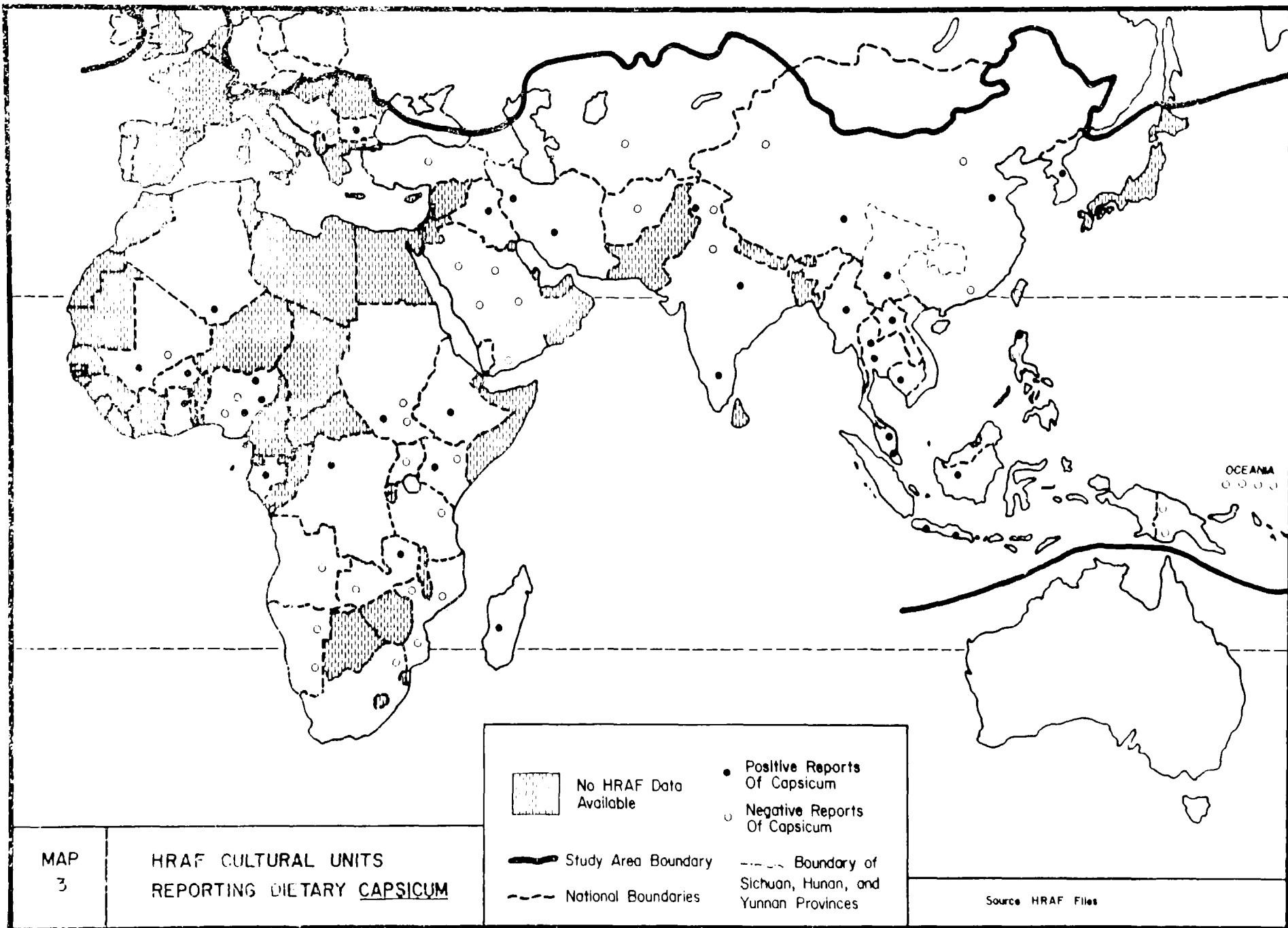
APPENDIX 3. CARTOGRAPHY

Map Number

1. Environmental Suitability for *Capsicum*.
2. Number of Sources Reporting *Capsicum* Use.
3. HRAF Cultural Units Reporting *Capsicum*.
4. Economic and Ethnobotanical Data.
5. Reports of *Capsicum* in AGS Monographs.
6. Cookbooks Reporting *Capsicum*.
7. Positive Reports of *Capsicum*.
8. Distribution of Dietary/Medicinal *Capsicum*.
9. Environmental Suitability and Reports of *Capsicum*.
10. Historical and Cultural Features in the Distribution
of *Capsicum*.







MAP
3

HRAF CULTURAL UNITS
REPORTING DIETARY CAPSICUM



No HRAF Data Available

● Positive Reports Of Capsicum

○ Negative Reports Of Capsicum



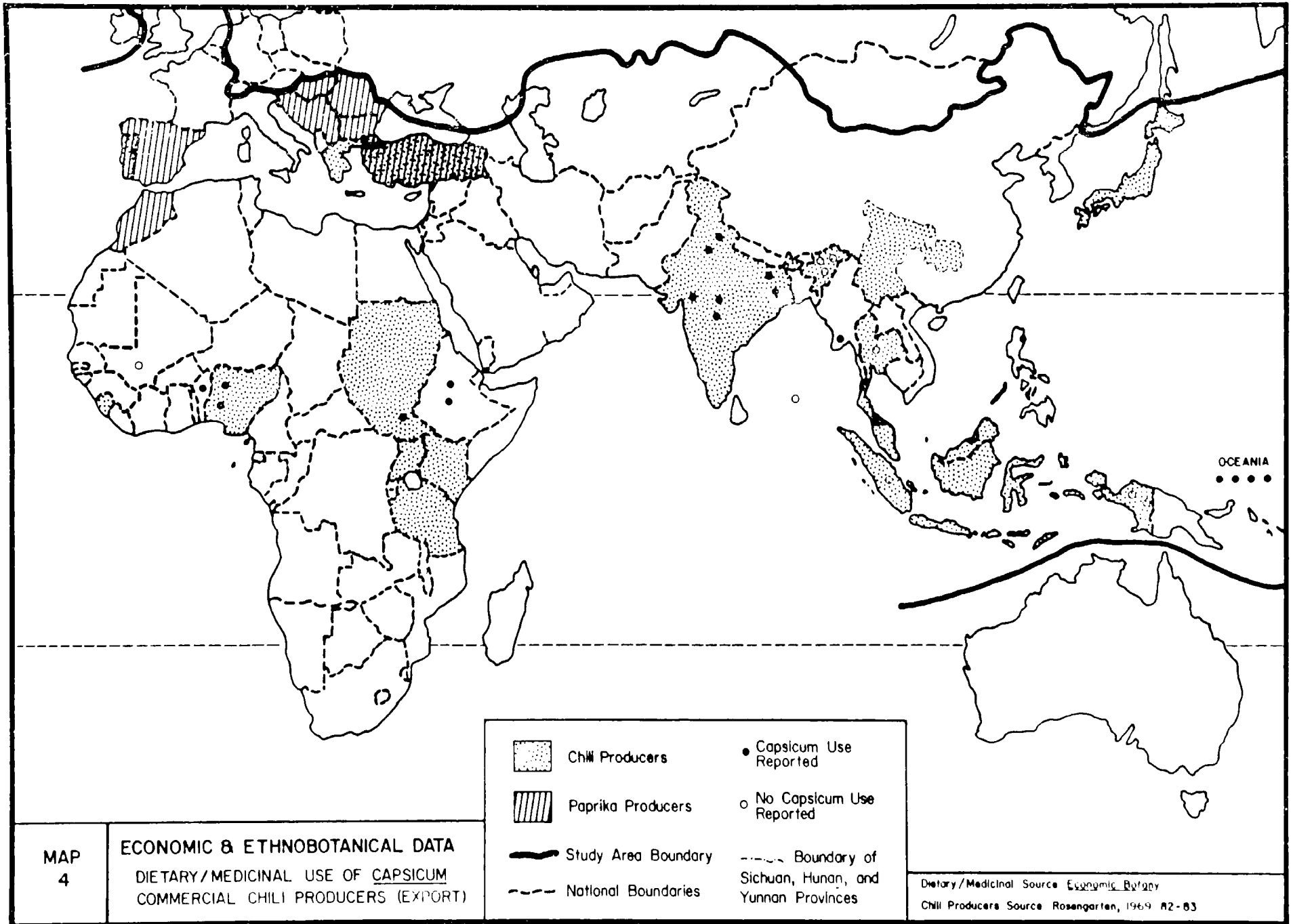
Study Area Boundary

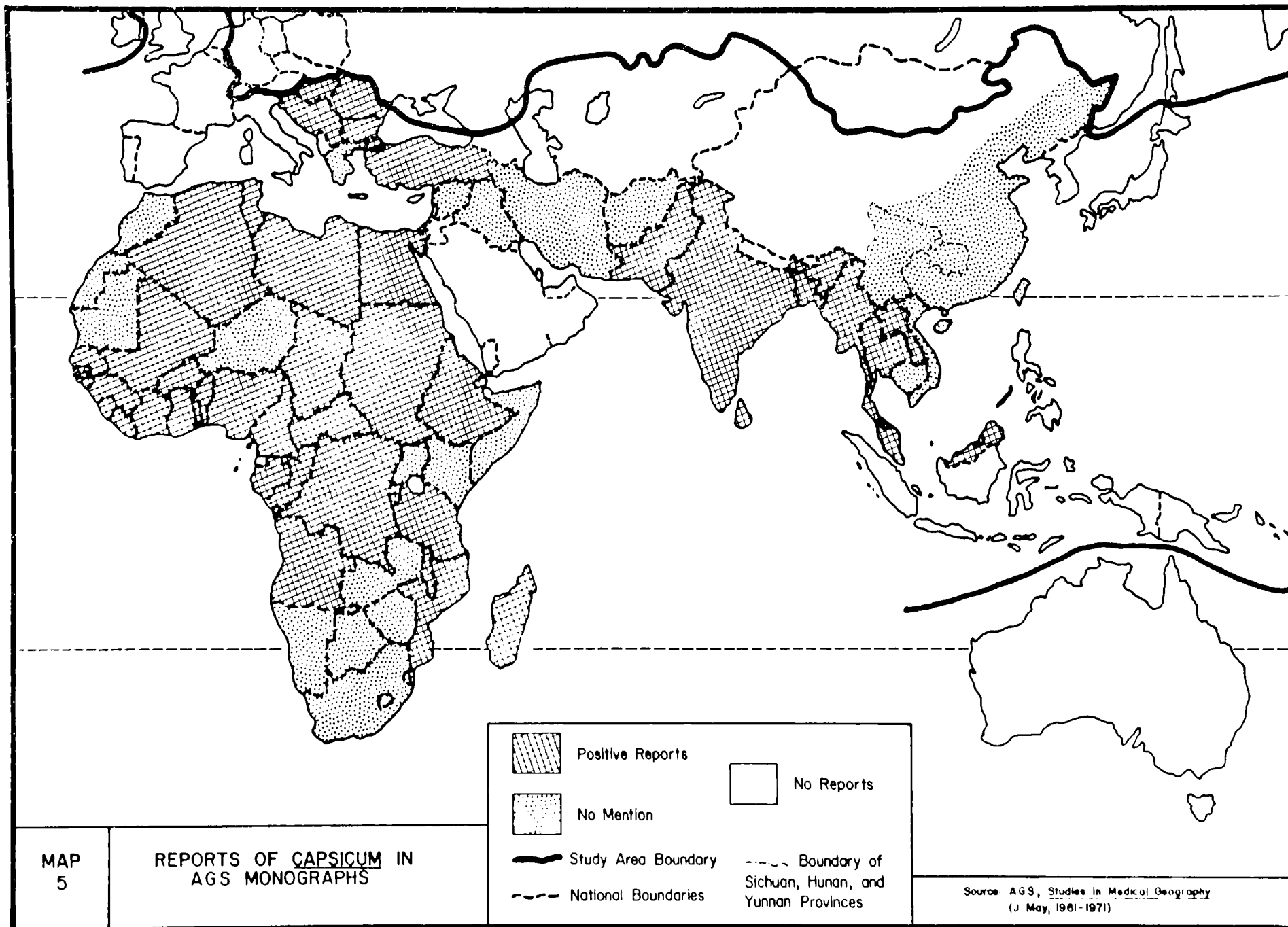


National Boundaries

--- Boundary of Sichuan, Hunan, and Yunnan Provinces







Source HRAF Files



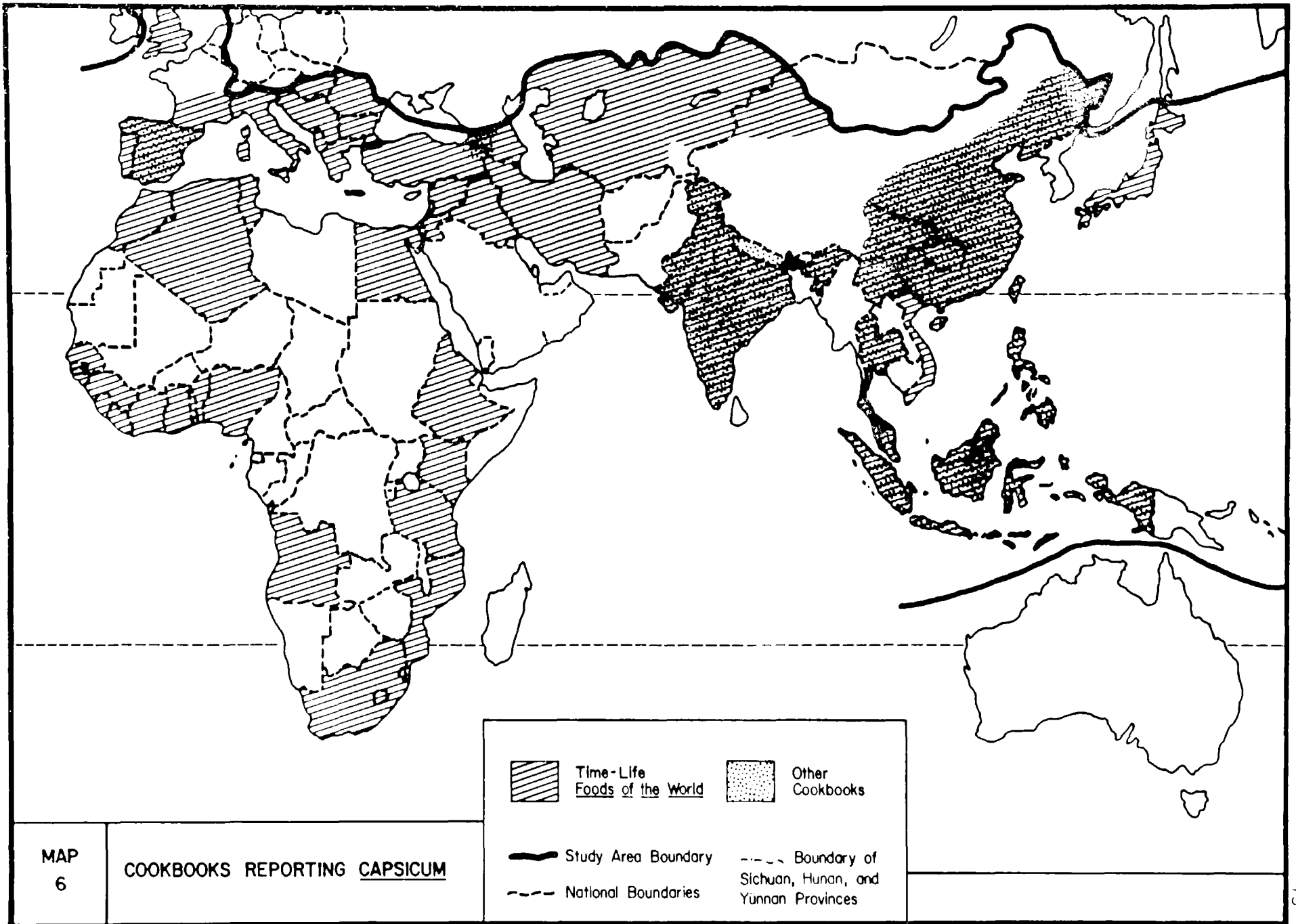


MAP
5

REPORTS OF CAPSICUM IN
AGS MONOGRAPHS

- | | | | |
|--|---------------------|---|--|
|  | Positive Reports |  | No Reports |
|  | No Mention | | |
|  | Study Area Boundary |  | Boundary of
Sichuan, Hunan, and
Yunnan Provinces |
|  | National Boundaries | | |

Source: AGS, *Studies in Medical Geography*
(J May, 1961-1971)



MAP
6

COOKBOOKS REPORTING CAPSICUM



Time-Life
Foods of the World



Other
Cookbooks



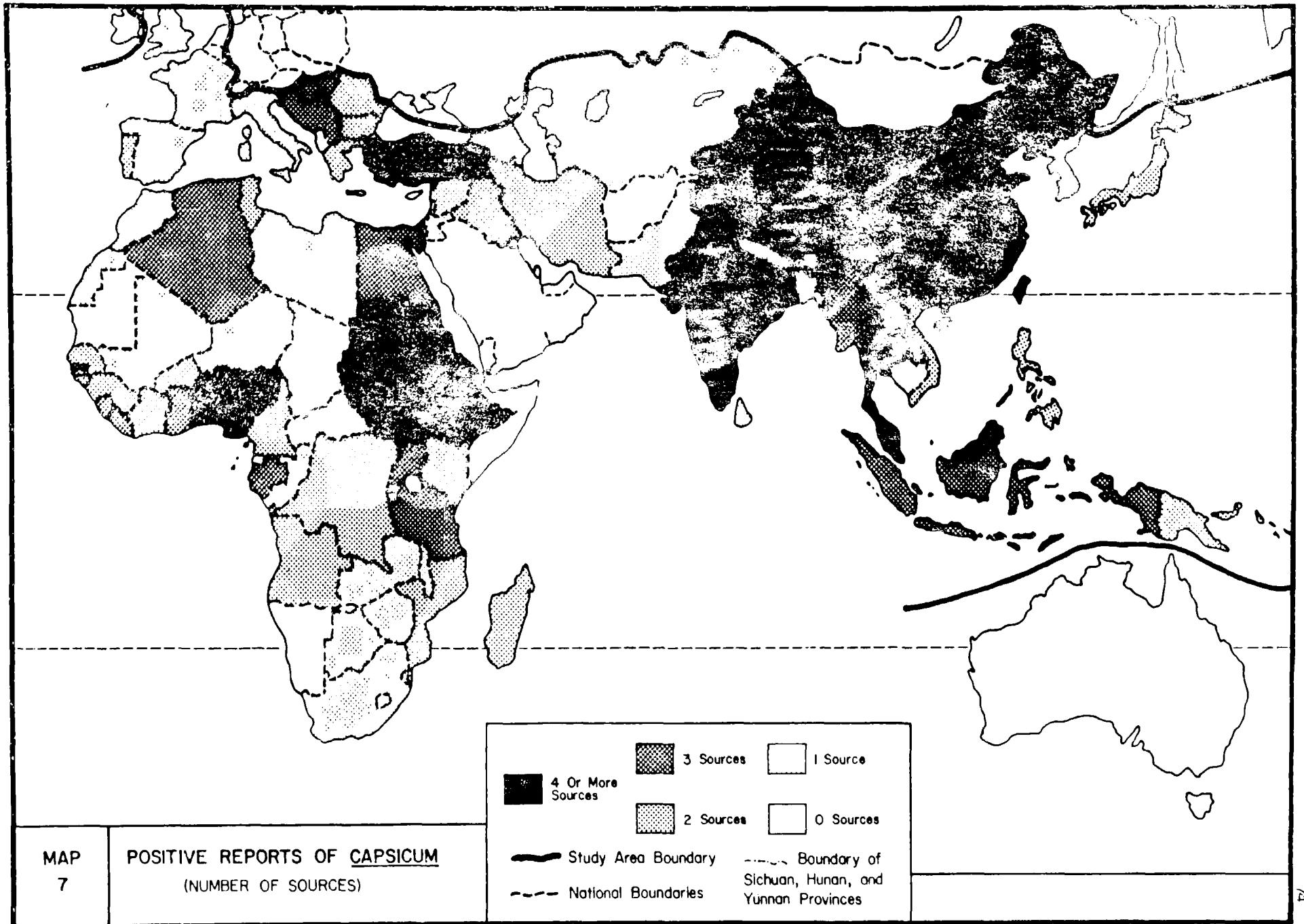
Study Area Boundary



Boundary of
Sichuan, Hunan, and
Yunnan Provinces

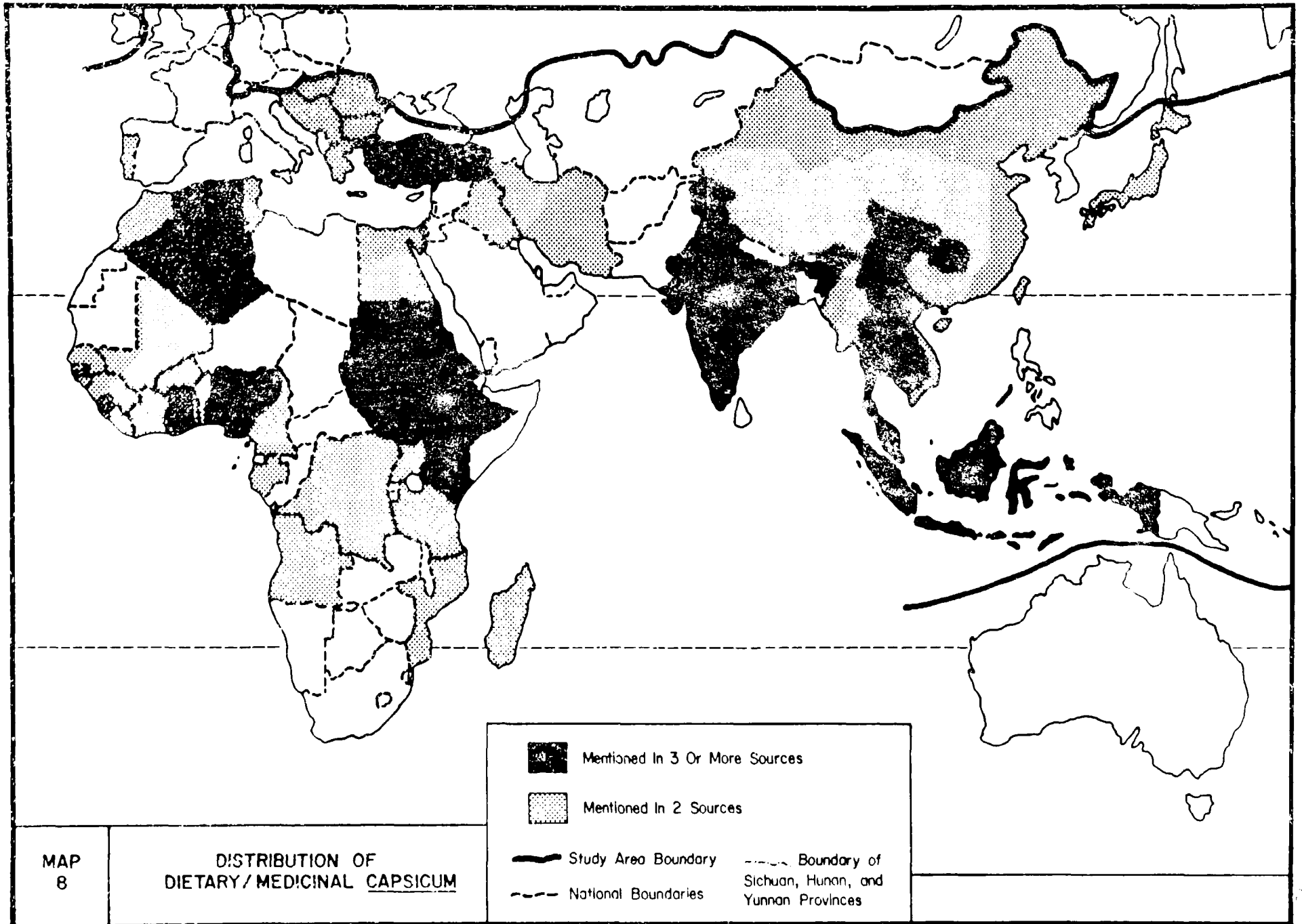


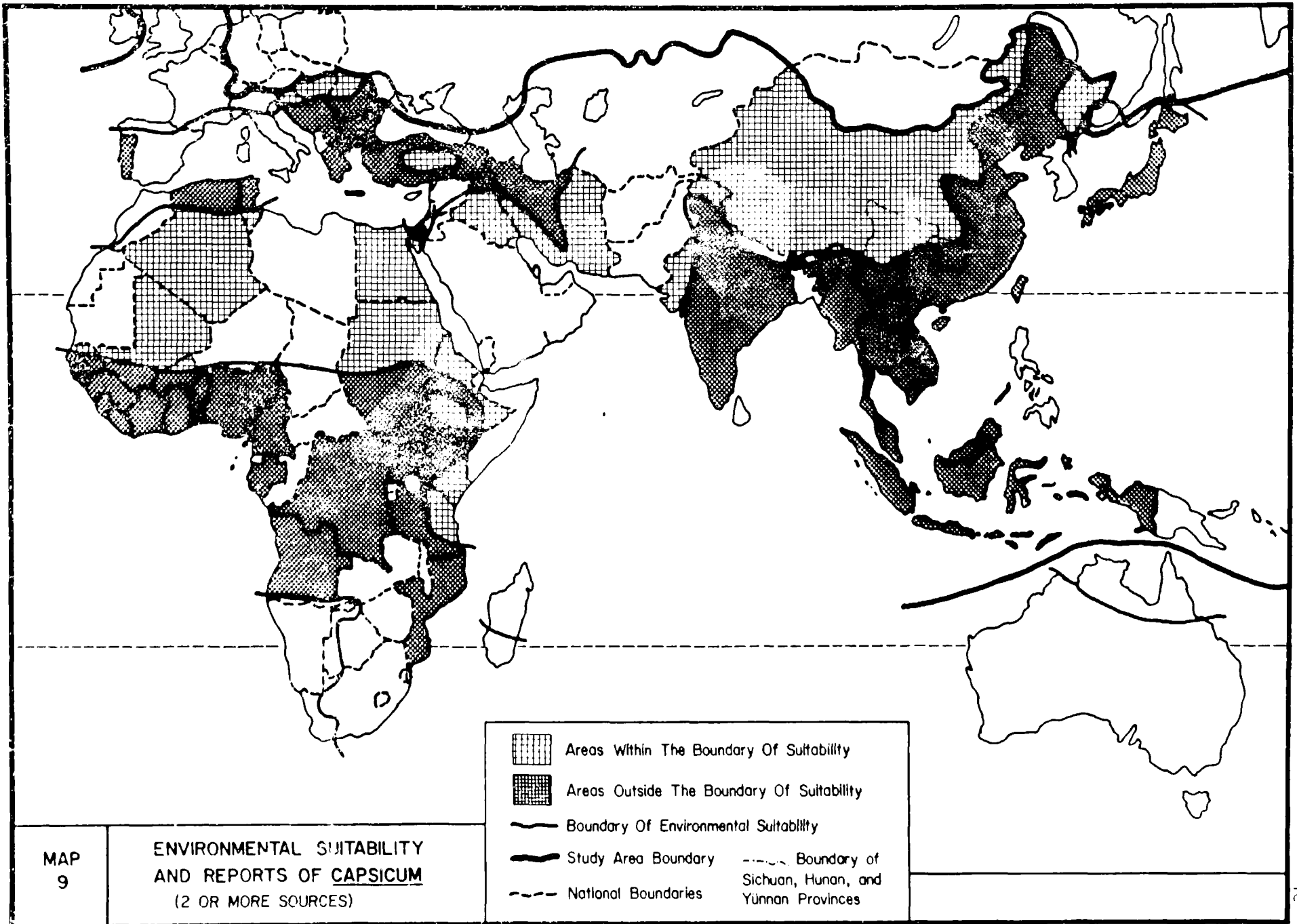
National Boundaries

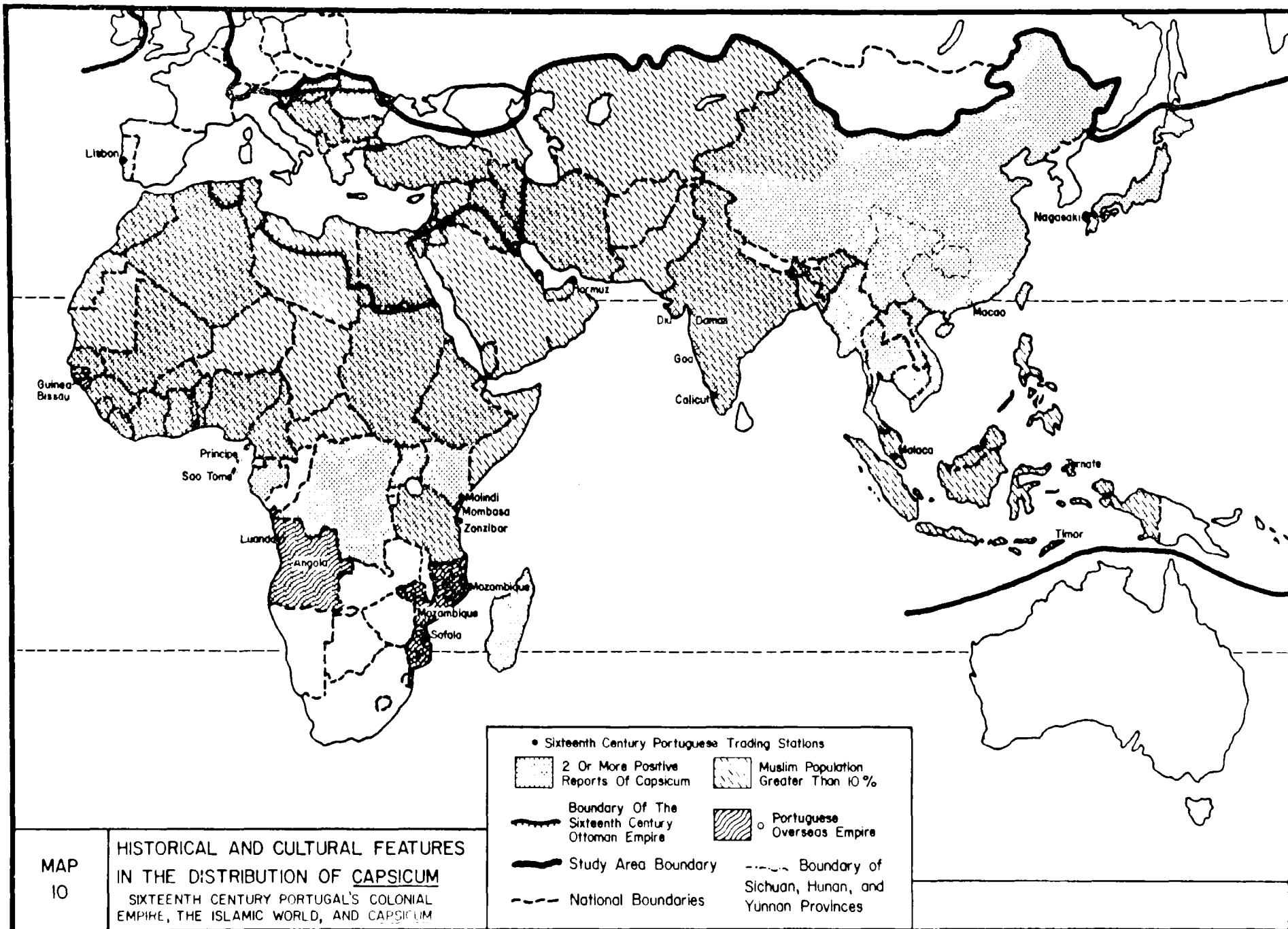


MAP
7

POSITIVE REPORTS OF CAPSICUM
(NUMBER OF SOURCES)







LITERATURE CITED

Andrews, Jane

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