

## HOUSEHOLD FOOD SUPPLY IN HUNZA VALLEY, PAKISTAN\*

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**ABSTRACT.** Adequate food supply in the Hunza valley of northern Pakistan has been limited by availability of irrigation water. Need to build and manage a large-scale irrigation system fostered an authoritarian political system that in turn gave priority to perpetuating itself rather than to household food production. Traditional structure of Hunza food production is examined in its human attributes and its effects on health, longevity, and nutrition. Contemporary food-production systems are evaluated.

AS formerly remote mountain communities have opened to the larger world, they have undergone rapid, dramatic change. This change has originated both within communities as the political economies have shifted and outside by the integration of peripheral territories, through civil, military, or ecclesiastical mechanisms, into the mainstream of the nation-state. For mountain communities this integration invariably means a loss of autonomy and a dependence on more centralized systems, especially market economies. In the northern Pakistan valley of the Hunza River (Fig. 1), autonomy since the British conquest in 1891 had meant an inadequate reliance on a subsistence food-production system. Now the agrosystem of the valley, which comprises its cultivars, technology, strategies, and social organization, is in the midst of great change. With limited irrigation water available, the valley is making a transition from agriculture to horticulture supplemented with imported grain.

The scholarly discussion about peasant agriculture and horticulture emanates largely from places in which rain-fed conditions prevail, which seriously biases policies and programs designed to further adequate food production. In rain-fed areas, adequacy of land, land tenure, labor, and other factors have frequently constituted the variables limiting household food supply. In the Hunza valley, the limiting variable to household food production is the availability of water for irrigation. Furthermore, as in many less-developed societies, the notion of access to an autonomous household food supply is still being introduced there. Until 1974, the Hunza area was controlled by a local despot who imposed excessive taxes of grain; those taxes, along with other cultural factors, ruled out schemes such as household subsistence vegetable gardens and helped perpetuate chronic malnutrition. With the introduction of representative government and the consequent

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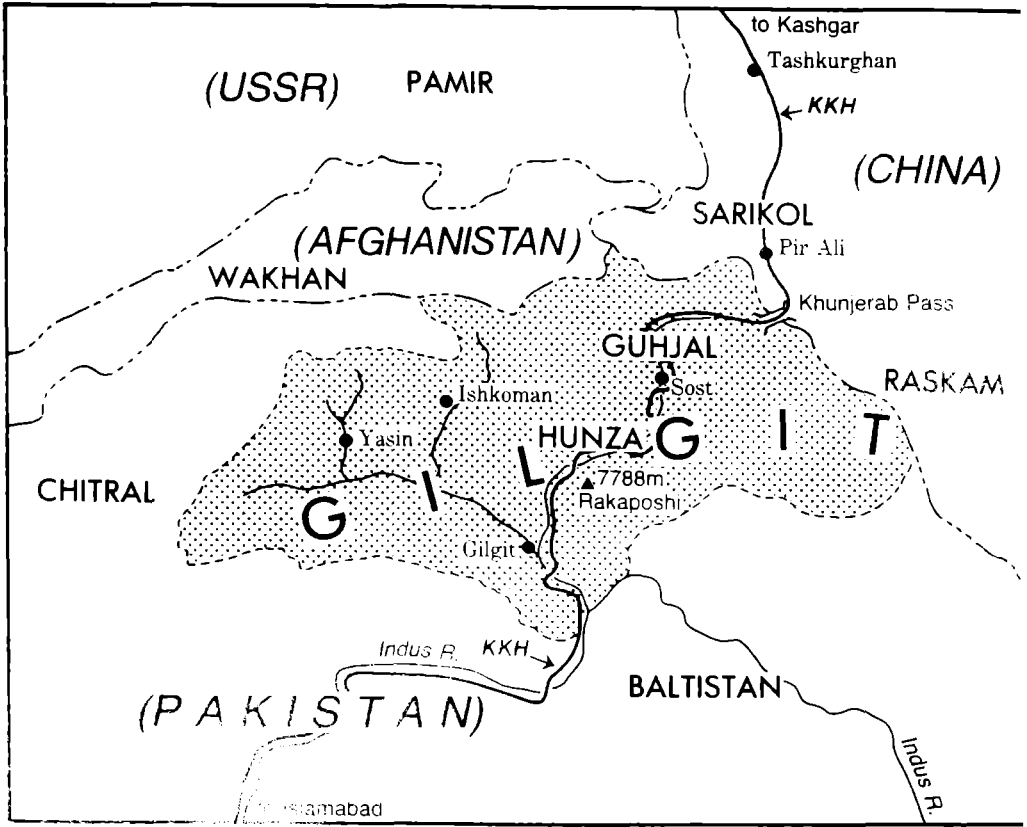


FIG. 1.—Valley of Hunza, Gilgit District, Pakistan.

focus on household food supply, poor people in the Hunza valley are now able to feed themselves. The key issue is not the availability of appropriate cultivars, but the place-specific institutional factors that impede human initiative.

This article investigates the historical and cultural limitations on household food supply in the Hunza region. After a survey of the biophysical environment, I explain how the scarcity of water and the need for intensive irrigation fostered a despotic political system, and how that system, coupled with other factors such as inefficient labor allocation and social customs, militated against household self-sufficiency. I show why the Hunza valley, despite its recurrent famine, developed a worldwide reputation for good health and nutrition and examine the validity of that thesis. I conclude by assessing the current transition in Hunza toward food self-sufficiency.

#### BIOPHYSICAL ENVIRONMENT

The biophysical constraints on the Hunza valley are not sufficient to prevent adequate food production; on the contrary, with irrigation the conditions could be considered ideal for agriculture. Nager, which encompasses the many dispersed settlements across the river from Hunza, has no record

of extensive food scarcity. The climate is not the same on both sides of this east-west valley: Nager, lying on the lower northern slopes of Rakaposhi, which rises to 7,788 meters, receives much less solar radiation than do the south-facing slopes of Hunza. At 37° north latitude, the summer days are long and very little cloud cover is present: the southwest monsoon rains that envelop most of South Asia do not filter over into the trans-Himalaya areas of the Karakorum Mountains (Flohn 1970).

The steep topography induces a mountain-mass effect that reduces the back radiation of the extra heat created by the mountain mass. Precipitation is almost negligible, only 100 to 200 millimeters a year. Within a few kilometers, but at triple the elevation of 2,000 meters, the precipitation is estimated at 2,000 millimeters a year. It is from the precipitation on these mountains and from glaciers on the high mountains, the most extensive glaciated region outside the polar areas, that the Hunzakuts obtain the irrigation water for their fields. Two tree lines thus exist in these valleys: an upper one limited at 3,800 meters by cold, and a lower one limited at 2,700 meters by aridity. Below this lower-limit tree line, the vegetation in the Hunza valley is anthropogenic. The south-facing cliffs and slopes of the valley inhibit the growth of trees and shrubs that might be used as timber and firewood by the local people.

Although some English visitors have characterized the Hunza valley as a harsh or "fearful" environment (Goudie 1981; Miller 1984), it has an equable climate with ample solar radiation due to the abundant sunshine. The quality of this radiation is intense because of the high altitude, the absence of air pollution, and the relatively low water vapor. Exceedingly high yields of C-3 field and orchard crops are found here. It is not unusual to find ranges of 25° C between daytime and nighttime temperatures. In summary, sunshine is the dominant environmental factor in production of food in Hunza. The principal constraint is land that can be irrigated with meltwater conveyed from glaciers and snowfields (Charles 1981).

There are no agroecological zones as such in Hunza, as this mechanistic notion usually assumes interrelationships among climate, soil, and vegetation. Hunza is a desert. Everything green in the valley is the product of human ingenuity, because irrigation water is mandatory for all vegetation growth. Soil is essentially made by the cultivator. If irrigation water can be brought to unconsolidated material, soil can be produced after several years of energetic work (Fig. 2).

#### HUNZA POLITICS AND SOCIAL HIERARCHY

Most theories of agrarian change are based on population increase (Boserup 1965; Geertz 1966; Brookfield 1984, 1986). Another body of theory, some of which has direct application to Hunza food production, addresses the social dimensions of innovation and intensification. It has been theorized that societies dependent on irrigation require a suprahousehold or supravil-



Fig. 2. Irrigated land on very steep debris slopes in the village of Ahmedabad. AKRSP on Hunza notes Aga Khan Rural Support Programme, the sponsor of many successful community-development projects among the largely Ismaili and Imami Shia Muslim villages of the Hunza valley.

lage system of management to ensure a reliable water supply (Wittfogel 1957). This command system of irrigation induces a hierarchical social organization, and with it comes despotic rule. Such a system existed in Hunza until 1974, when the Pakistan central authorities began to introduce representative government.

Valleys in northern Pakistan either had anarchic settlements with hydroagriculture, characterized by short irrigation leats, terraced fields, and tree crops close to the fortified village, or dispersed settlements of hydraulic agriculture with irrigation leats several kilometers in length but with forts for refuge (Kreutzmann 1988). In the anarchic societies, where no real chieftains were present, basic sustenance focused on a form of pastoralism, in which cattle, goats, and sheep were taken to the high pastures in the summer, complemented by grains grown on small, irrigated plots. Since they did not have long irrigation leats that required central management, these valleys retained autarky.

In contrast, the northern valleys, like Hunza, had hydraulic agriculture, in which intensification of food production could come about only through a revision in the command social organization of production, all of which was focused on the limiting variable, water (Fig. 3). This led to a principality form of social organization in Hunza, where a local despot, the mir, com-

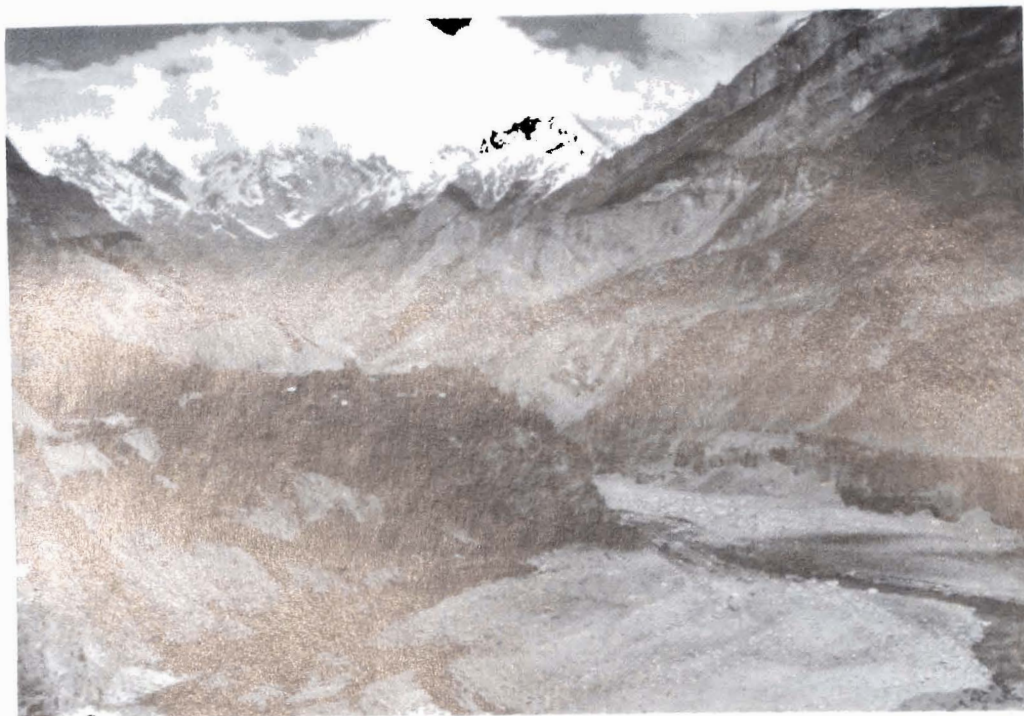


FIG. 3—Locations of Hunza villages and irrigated fields are determined by access to glacial and snowfield meltwater.

manded local forces and coerced the population into various hydraulic agriculture projects, the principal one being the construction of irrigation leats. The Hunza people could not make the transition to a more intensive system of food production, such as kitchen gardens, because the despotic ruler collected taxes in grain; he would then further his legitimacy by redistributing some of that grain to Hunza residents during feasts and in times of acute famine.

Hunza lacks close high mountain pastures; therefore its people had to travel five to ten days to other communities or had to coerce other inhabitants in Guhjal to supply them with dairy products and grain (Frembgen 1984). The fetish for dairy products is widespread to this day in Hunza. Before 1891, when the British brought the valley under their rule from imperial India, the Hunza area sustained itself by raiding caravans in the east, from Yarkand in Chinese Turkestan, now Xinjiang Province, coming up the Yarkand River valley, up to the Braldu River and glacier, over the Karakorum crest into Baltistan, and then into the Vale of Kashmir or to Leh in Ladakh.

It has been hypothesized that increased glaciation and the advance of glacial snouts rendered the Braldu caravan route impassable in the nineteenth century and thereby forced the caravans to cross over the Karakorum Pass far to the east and beyond the reach of the Hunzakuts (Schomberg 1936). The British conquest of Hunza in 1891 terminated the common practice of slave owning and trading by the Hunza ruler (Knight 1892). With the loss

of the lucrative looting and pillaging of the caravans and the end of the slave trade, the Hunza economy declined and the meager resource base was insufficient to support the populace. Efforts by the mir to cultivate far-flung valleys such as Raskam in Chinese Turkestan proved futile, and British rule and pacification gradually became a factor in the persistence of chronic starvation in Hunza during the first half of this century. Irrigation construction increased after this period (Kreutzmann 1988).

Hunza society, like those in adjacent arid valleys westward into Afghanistan and eastward into the Himalaya, was divided hierarchically. The elite group in Hunza was the Akabirs, who ate high-status, locally grown foods like wheat and barley. The second group, the Shader, ate wheat and barley, when available, but occasionally were forced to eat foxtail millet and sweet and bitter buckwheat. These varieties of buckwheat provided sustenance for the Barbardar, the lowest group, whose status was only slightly above that of slaves. An even lower-class group included the musicians and blacksmiths to the mir. The social rehabilitation of these people is under way, because of the beneficent paternalism of Ismaili Muslim leadership, and lately their village has been renamed from Domashi to Mominabad in a public attempt to eradicate their former low status. In times of water scarcity, the Barbardar starved first in the spring.

#### ALLOCATION OF LABOR

The allocation of labor within the South Asian household is governed by the social institution of *purdah*, the seclusion of women. By placing limits on the kinds of tasks that women can accomplish and, more importantly, on where these tasks may be performed, that is, in the immediate vicinity of the steading, *purdah* helped curtail the effectiveness of food production in Hunza households.

Landholdings in Hunza are extremely fragmented, owing to the ever-increasing amount of land brought under cultivation by the extension of irrigation leats, and one consequence is the inefficiency of the spatial allocation of household labor. Women cannot travel far beyond the immediate confines of the steading to work in the tiny parcels of land farther from home. The net effect is low labor productivity, not only for women but also for children who perform minor tasks. It should be pointed out that in Hunza, under the strictures of Ismaili Muslims, women have much more freedom than they do elsewhere in South Asia, but the social constraint on movement nevertheless remains.

Women's labor in food production is absolutely essential to household subsistence. From associated fieldwork in the cis-Hindukush 2,000-meter community of Kalam, in the northern end of the Swat valley, it has been observed that the time contribution of women's labor is 62 percent of all labor performed in plots around the household (Allan 1987). That figure agrees with observations elsewhere in the South Asian mountain rimland

(Acharya and Bennett 1981). Men may undertake field tasks that entail a higher level of energy expenditure, for example, plowing and digging potato ridges, but weeding, harvesting, and winnowing by women consume much more time than does men's labor. Despite the greater intensity of men's infrequent labor, it is still well below what might be termed intensive; it is always submaximal. Contemporary studies of energy expenditure in high-land societies indicate that this is a common pattern (Thomas 1988).

In view of the relatively low food-energy production of indigenous farming in Hunza, it is appropriate to ask why the mir enforced grain production at the expense of other food crops such as potatoes, which, as British accounts indicate, were present in Hunza in 1891 (Mason 1931). Because money was virtually unknown in Hunza, all taxes were paid in grain to the mir. Grain could be easily stored during the winter and transported. Furthermore, there were strict rules about the allocation of irrigation water to certain crops, and vegetables had lowest priority. Consequently the cultivation of garden crops such as vegetables and especially potatoes was suppressed by the taxing system. Fruit trees, which were untaxed, supplied up to 50 percent of the human food-energy intake.

#### HUNZA AGROSYSTEM

Any examination of household food systems in Hunza is fraught with problems common to all subsistence societies: absence of a cadastral survey, food taboos, indigenous systems of weights and measures, language barriers, illiteracy, and idiosyncratic social practices. The household food production system in the Karakorum, given the labor, land, and water, has low productivity. Each household has about 0.75 hectare of cultivated land, of which one-fifth is in orchard crops. Some 95 percent of households could be classified as owner-occupied, and of the land owned, 88 percent of the households report that their landholdings are fragmented. With slightly more than seven members in each household, why could the Hunzakuts not produce enough food for themselves? The individual landholdings and the amount of water and labor were certainly sufficient to provide an adequate food supply for each household; furthermore, excellent growing conditions existed.

Double-cropping prevails throughout most of the Hunza area. Only in the highest villages around Baltit, now Karimabad, the seat of the former mir's palace, and farther north in Guhjal, the area contiguous with the Chinese border, does single-cropping prevail. As has been demonstrated, double-cropping is possible with appropriate crops in all the villages in Hunza (Whiteman 1988). The failure to achieve food self-sufficiency from gardens and fields lies in a combination of political, social, and agronomic traditions.

In the days of the mir, whose office and permanence after 1891 were supported by the British officers and Indian troops billeted in Gilgit Agency (now District), taxes amounting in some instances to almost one-half of

household grain production had to be paid. The grain was used by the mir as currency to embellish his palace, to supply feasts on auspicious occasions, or to trade with neighboring Chinese Turkestan to the north and with the Vale of Kashmir to the south. The excess also provided investment capital to pay Hunzakuts in the winter to construct irrigation leats that would water more land and consequently enhance the tax revenue of the mir. Related to this second point is a matter associated with the kin groups of the engineers and beneficiaries of new irrigation leats. Riparian rights were complicated, but a principal feature of priority water distribution was that the elite obtained newly available irrigation water first and founded new dispersed settlements along the newly constructed leats. On the other hand, the socially depressed groups were confined to single, discrete villages. A measure of this social exclusion was the negligible amount of land fragmentation among low-status villagers.

Mechanization has entered Hunza through a variety of technological innovations. Perhaps the most prominent has occurred through the introduction of tractors and small threshers. Tractors are driven over jeep tracks and are leased for eight dollars an hour. One hour's tilling by tractor and tine harrow easily cultivates one householder's land. Threshers are hauled over the jeep tracks that connect all but one village cluster in Gilgit District. Although this greatly improved technology eliminates the requirement for keeping many cattle for plowing and threshing, women's work is still labor intensive and is not ameliorated by technical innovations such as tractors and threshers. Fields still must be weeded and crops cut. In addition to the more extensive activities associated with grain cultivation, women are responsible for the collection of fruit, planting and care of vegetable gardens, much of the collection of fodder, and keeping of livestock such as poultry and ungulates around the house. A primary social constriction to food production, then, is the preference for certain foodstuffs; others are the lack of flexibility in labor allocation and the social prohibition placed on women and their participation in everyday activities of household food production (Fig. 4).

Throughout the mountains of the Hunza area, and, for that matter, the entire chain of mountains from the Alps to the Himalaya, social customs exist regarding gender roles in livestock husbandry. A persistent theme in the petroglyphs etched into the rock varnish of the Karakorum boulders is the portrayal of ibex. Goats, not only the wild variety but also, importantly, the domestic variety, are vital to Hunza culture. Every household keeps goats, but only males can milk them: such is the cultural bond between procreation of goats and masculinity (Jettmar 1960). These goats curb Hunza food production. They contribute little to the dietary intake of the Hunzakuts. They are permitted free range during the entire late autumn, winter, and early spring, which inhibits cultivation of any crop that might be available for fodder or that would contribute substantially to food production. Garden



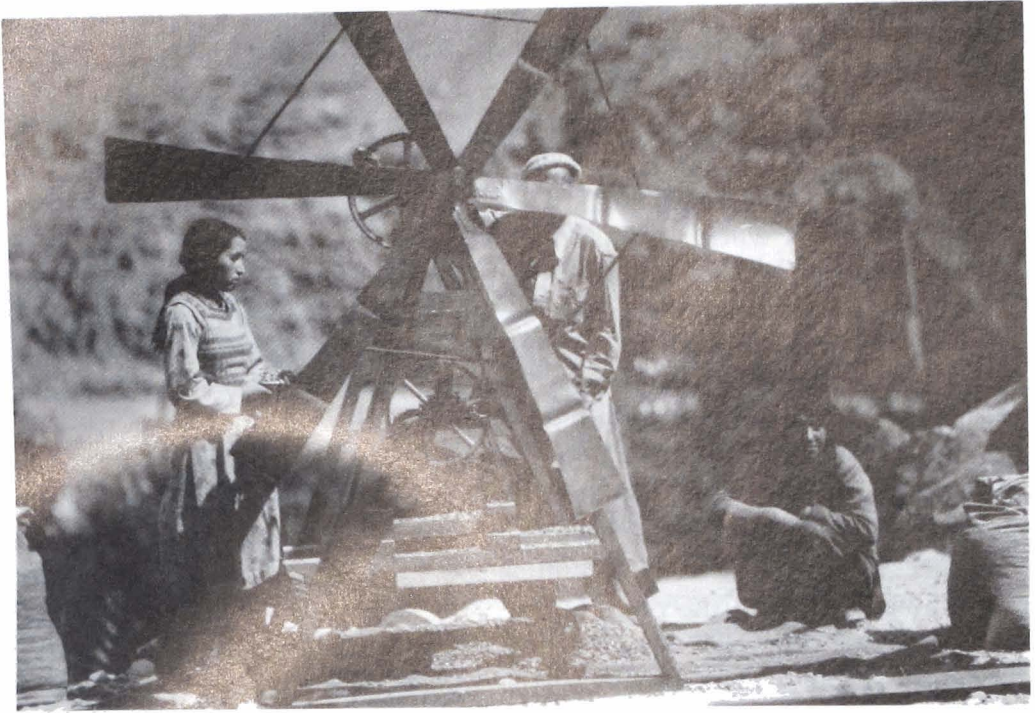


FIG. 4—An intermediate-technology, wind-powered, hand-cranked device to crack apricot stones. The kernels formerly provided oil for lighting lamps.

crops such as beets, turnips, and cabbage are virtually unknown because the animals eat the seedlings. If the animals were tethered during the period they are around the household, many fruit trees could be espaliered along the terrace walls. Now that the costs of transporting chemical fertilizers are subsidized by the central government, goats are no longer relevant as a source of dung. Yet the fetish about goat keeping remains.

Without irrigation water, no food crop can be grown in Hunza. Rights to irrigation water in Hunza are extremely complicated. Traditional customs in allocating water to certain villages and to specific clans of people inhibit greater agricultural productivity (Allan 1986). There is, for example, a priority for watering winter-sown wheat in the spring. Irrigation water is not let into the fields on a regular time-scheduled basis but rather on the volume of available water from slowly melting glaciers and snowfields. Later, barley and vegetables are irrigated. Because of the length of the first watering cycle, vegetables cannot be grown until late in it. Orchards and fodder plots fare even worse, as irrigation water for them is not available until midsummer.

The priority of wheat is a relic from the days of the hereditary rulers who demanded taxes in grain. A flat wheat bread, *chapatti*, is also an important dietary preference. In fact, if a meal in Hunza does not include a chapatti, it is regarded only as a snack. Although productivity is mediocre, wheat continues to be the preferred basic foodstuff. Wheat varieties are of the local

type, because the straw is better than that from new high-yielding varieties; furthermore, the new varieties show no increase in yield compared with indigenous strains (Husain 1987).

#### MYTH OF HUNZA HEALTH AND LONGEVITY

Despite the recurrent problem of food scarcity in spring, Hunza residents are, paradoxically, world famous for being a well-fed and healthy people. Popular histories and geographies of the area all stress their good health (Rodale 1949; Banik 1960; Taylor 1964), but very little has been done to survey the population at large. Until completion and opening of the Karakorum Highway through the Hunza valley in 1978, only a few government-vetted foreigners were permitted to enter the valley, and the mir, until he was deposed in 1974, was able to influence the opinions that the handful of visitors from the West took away with them. Since 1986, however, foreigners have been permitted to travel the entire length of the Karakorum Highway; with this easier access to Hunza, much more information is being elicited about the area than in the past.

Notwithstanding legends about Hunza health, visitors now learn early that considerable hunger existed in the valley until recently. Personal recollections from many residents reveal a pattern of early deaths, even in the face of excellent local potato yields, now using European Cardinal seed, which ranged from fifty tonnes a hectare in Hunza itself to ninety-one tonnes a hectare in an adjacent valley of Yasin (Whiteman 1988). With the tremendous productivity of this kitchen garden vegetable, how could there be such a record of chronic springtime famine and subsequent death? The stunted growth and very small stature of the Hunzakuts clearly indicate chronic malnutrition (Schomberg 1936; Lorimer 1938). Field interviews in twenty Gilgit District village clusters in the summers of 1985, 1986, and 1987 indicated that by springtime food stocks were low and that in Hunza, especially among the lower classes, starvation existed. As all cultivated land required irrigation water that came from melting snowfields or glaciers, it was early summer before food became available. In the popular imagination, Hunza was Shangri-la; in reality, the oral record from all segments of Hunza society comprises a litany of accounts of severe food shortages and recurrent mortality almost every spring.

Leaf's discussion of dietary factors that might contribute to longevity has received considerable attention (Leaf 1971, 1973, 1975). Other factors certainly contribute to extreme old age in populations; these would include continual vigorous manual labor throughout a person's life and living in a community that granted long-lived persons status in everyday affairs. Nevertheless, the fetish with longevity focuses on diet. From an examination of recipes recounted by very old women in Hunza, it has been possible to establish the principal dietary components, especially those grown by the household.

The Hunza diet today bears no relation to that of a quarter century ago, when primary orchard foodstuffs such as apricots, apples, plums, cherries, and mulberry were supplemented with grains from field crops of wheat, barley, foxtail millet, sweet and bitter buckwheat, and maize. Some informants recalled amaranth, but there is no evidence of it today. Vegetables, if available, included the occasional potato, turnip, carrot, and several wild plants like mugwort and dandelion. As has previously been noted, a great emphasis was put on different types of flat, unleavened bread, or chapatti, eaten with certain fruits (Ali 1966). Seven kinds of bread were eaten, and different varieties of grains were customarily mixed and eaten in conjunction with fruits or vegetables. If a certain grain was not available for a specific dish, then a substitute could not be used. For example, if wheat was not available for the breakfast dish *bataring-i-daodo*, a soup of wheat noodles and softened dried apricots, that meal was forgone. Having all the ingredients for a dish was essential for adequate traditional dietary habits.

Hunzakuts also emphasize various liquids in their diet: *lassi*, homemade wine, and glacier milk. *Lassi* is a diluted yogurt, made from the small amounts of milk obtained from goats, sheep, and cattle, after the clarified butter, or *ghee*, is extracted. Not much was ever available in Hunza, because the residents did not have access to many high pastures for their grazing animals. Most of what was available was obtained from nearby Wakhi and Kirghiz pastoral groups to the north. The higher-status groups in Hunza, like the Hunzakuts today, preferred to eat substantial amounts of *ghee*, used in cooking, and the yogurt drink. To obtain these products, they had to trade grain for milk products with the pastoralists who, being mobile, needed a high-value, easily transportable food product like grain. Meat for the Hunzakuts came from goats and sheep traded from the pastoralists.

Strangely, there is no record of making raisins, even though the practice was widespread in neighboring areas. In Hunza, grapes were either consumed fresh or made into wine, which was then stored in clay containers in the winter. In addition to drying fruits, especially apricots, winemaking was a method of preserving food energy for the winter. Wine was also made from mulberry fruits and a spirit distilled from apricots. Although the consumption of intoxicants is prohibited by Islam, it should be remembered that Hunzakuts are Ismailis, a Sevenser sect whose imam is the Aga Khan. As is true of mountain societies, the Hunzakuts display less fidelity to prevailing religious orthodoxy than may be characteristic of lowland adherents. Ismailis also do not observe Ramadan, the month-long fasting period. Drinking wine thus enabled the Hunzakuts to preserve and store food energy during winter scarcity.

Everyone interviewed in Hunza mentioned that it is essential that glacial milk be drunk. This liquid is obtained from the meltwater streams coming down the gullies from the melting glaciers. Several champions of Hunza

"health," as well as respected nutritionists like Sir Robert McCarrison (1936), have extolled the virtues of drinking this opaque liquid, which contains substantial amounts of suspended rock flour, usually three-quarters biotite mica and nearly one-quarter plagioclase feldspar by weight (Keller and Feder 1979). The glacial milk does not necessarily have significant properties that would contribute to longevity (Keller and Feder 1979; Nagahori 1982). In fact, the composition of Hunza drinking water is similar to stream waters in gneiss and schist regions in the American states of Georgia, Colorado, and Maine.

The health of Hunzakuts has been the principal focus of physicians who have examined a few members of the population. This concern, however, has skewed the results that were obtained. By concentrating on reputed centenarians (Leaf 1982; Nagahori 1982; Murray and Murray 1984), the general health characteristics of the population are overlooked. A remote area like Hunza is almost the last place in Pakistan in which a physician might choose to practice; the large number of local folk with misshapen arms and legs from fractures not set by professionals speaks of the poor quality of local medical care. As one would expect in so isolated a place, there is substantial incidence of cretinism and goiters, as well as rampant gastrointestinal disorders and tuberculosis. Epidemics of the latter disease are said to have killed off substantial numbers of people, but because the mir's regime did not keep census records, these reports cannot be substantiated.

In the few studies of Hunzakut longevity, the putative centenarians often mention that many children and wives have died. The large number of infant deaths can be traced to inadequate nutrition and diarrhea. In a society in which most of the diet was vegetarian, high-quality protein was unavailable for infants and young children. Another probable cause of early death was contaminated water supplies. All drinking water is from a *kul*, which is a combination of irrigation leat, sewer, and potable-water supply. The fact that people attribute their longevity to drinking glacial milk obtained from the *kul* may be the reason that gastrointestinal disorders are so prevalent. Furthermore, the fondness for lassi, made by reconstituting yogurt with *kul* water, is also a contributory factor. Although the houses of the Hunza people are clean and neat, this fastidiousness does not extend to personal hygiene.

Notwithstanding the widespread poor personal hygiene and dietary habits, there are several positive aspects about Hunza health and diet (Shah and others 1966). Owing to vigorous exercise, there is a low incidence of symptoms associated with cardiovascular disease and a low incidence of hypertension (Murray and Murray 1984). A general feature of the diet noted by all investigators is the low daily food-energy intake, approximately six megajoules a day for elderly adult males. Perhaps the reason for the reputed health and longevity of the Hunzakuts lies not in any specific dietary item or in the social environment, but in a larger-than-normal proportion of elderly persons in a population that has experienced chronic malnutrition. Experi-

ments with laboratory animals have consistently shown that those fed a low-energy diet live longer than others (Leaf 1982).

As for the authenticity of claims for Hunza longevity, no investigator has ever found a shred of evidence that substantiates the claims made over the years by the former chieftain, by any elderly person reputed to be a centenarian, or by any member of the community. The local language, Burchaski, famous in linguistics for being the only language in the world not related to any other, has had no written form. Hence no records of births, deaths, or marriages, or any other documentary evidence, exist. Despite local claims to the contrary (Haider and Ahmad 1966), Hunza health and longevity remain apocryphal.

#### CONTEMPORARY SITUATION

In light of the persistent starvation in Hunza, its ever-increasing population, and the precarious nature of its water supply from retreating and advancing glaciers (Hewitt 1969; Haserodt 1984) during a cloudy spring that inhibits the melting of snowfields, it comes as no surprise that the Pakistan central government intervened. In 1974 it removed the mir from power and since then has attempted to solve the problem of Hunza food scarcity by providing subsidized wheat to the populace. Although, as a result of this policy, no one starves in Hunza as in former years, the government's action has tended to reinforce consumption of wheat instead of encouraging a shift in food production from grain to intensive cultivation of vegetables and increased orchard output. Household cash is now diverted into useless, non-food luxuries such as tea, and into large quantities of the three scourges of the South Asian diet: salt, sugar, and fats. Subsidized wheat, grown relatively cheaply on the Indus plains, also creates a dependency by the local folk on the central government. From the viewpoint of the government, shipping food into an area historically prone to famine gives it some leverage in the everyday affairs of mountain folk only recently brought under central state control.

With the completion of the Karakorum Highway, Hunza life has been profoundly altered (Allan 1989). The first changes occurred when Chinese engineers and laborers came as construction workers to Hunza. In the typical Chinese manner, they grew many vegetables adjacent to their camps; new vegetables were thus introduced. After road-construction crews came the Pakistani and foreign developmental agencies, bent on improving the local food supply. Despite thirty years of Pakistan governmental efforts in agriculture and the expenditure of a considerable amount of money, not until the early 1980s was real progress made. The Food and Agriculture Organization, under a contract from the United Nations Development Program, initiated a project for rural development throughout Gilgit District. The agronomist on the project almost singlehandedly changed the lives of 250,000 people by starting a commercial seed-potato program that for the first time

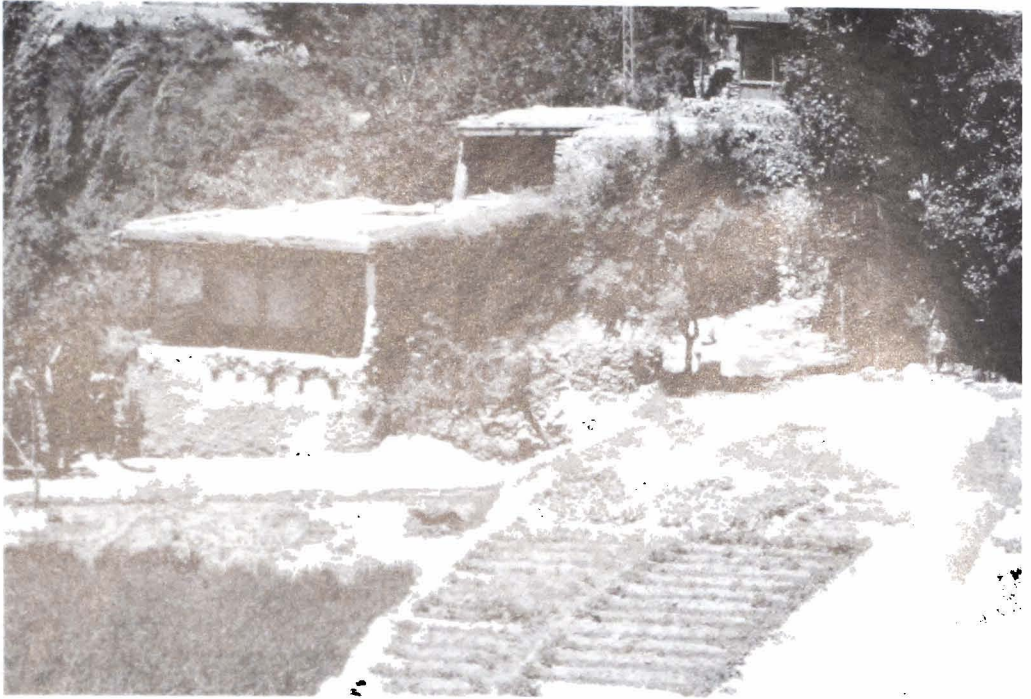


FIG. 5—New vegetable gardens with potatoes, cabbage, cucurbits, and horsebeans planted around a house in Hunza.

has brought cash income to many people in the district. Much of this new agricultural activity is focused along the route of the highway in *Guhjal tehsil*, the administrative unit immediately north of Hunza, which once fell under the rule of the mir of Hunza. Part of the reason for the success of the potato program is that the area was less amenable to the autocratic whims of the mir. In addition to the potato program, vegetables and orchard crops ideally suited to the conditions of Hunza were promoted for household production (Fig. 5).

The end of despotic rule caused a power vacuum in the Hunza political economy. Into this void stepped the Aga Khan Rural Support Programme, a nongovernmental organization to promote community development. This program has successfully galvanized local efforts by distributing substantial amounts of cash for self-help projects such as irrigation leats, jeep tracks, and land reclamation. The success of this project is due largely to the close monitoring and high visibility that the program enjoys from abundant transportation on jeep tracks linked with the Karakorum Highway, which the Pakistani and Chinese governments finally completed in 1978.

The highway is the second major innovation to alter radically the Hunza valley. Like other main transmontane highways in the South Asian mountain rimland (Allan 1988), the road has transformed traditional circulation patterns. Seed potatoes now can be moved to the plains in twenty-four hours,

thereby providing the mountain residents of Guhjal with access to substantial sums of cash income. Tourists flock to northern Pakistan and travel through the Sarikol *pamir* in Xinjiang Province and from there to Kashgar on the ancient Silk Route.

### CONCLUSION

Too often, developmental strategies focus on preconceived notions that have worked in some areas but that have little relevance in others. The theoretical implications of agrarian change are well argued at the general level, but they must contain theory rooted in comparative experience. There is little evidence to suggest that changes in the food-production system in Hunza arose internally. On the contrary, the system came under strong social control, which suggests a social theory of agrarian change. This revelation argues forcefully against adherence to ecological principles derived from nonhuman systems like botany.

In the Hunza example, it has been demonstrated that two main innovations induced externally—the removal of the despotic mir and the completion of the highway—provided the impetus for agrarian change. The chronic starvation of the Hunza population under the old agrosystem clearly reveals the social impediments to intensification in the food-producing system. Mountain populations, long a bastion of conservatism, are now being goaded by the actions of central governments to intensify food output. In Hunza, with its microscopic landholdings but excellent biophysical growing conditions, the local folk are making the transition to food self-sufficiency by actively planting kitchen gardens for domestic consumption and by exporting temperate plant produce from the valley.

The Hunza experience in the development of horticulture emphasizes the key role of place. Too often, the emphasis is on compositional forces in food-producing systems: chemical fertilizers, cultigens, technology, and a host of biophysical attributes. Mechanistic notions like agroecological zones are meaningless. In the case of Hunza, contextual factors inhibited the existence of an adequate food supply. The political system was rooted in control and manipulation of irrigation water, which had far-reaching consequences for household food production. In the literature, it is generally assumed that the household garden has an unrestricted supply of moisture, but where this is a limiting variable on plant growth, the provision of this key ingredient is mediated through an authoritarian political mechanism that may curtail the ability of households to be self-sufficient.

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