RICE AND TUBER CROPS IN THE EASTERN GHATS (INDIA): AN ETHNOECOLOGICAL PERSPECTIVE

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INTRODUCTION

An ecological approach to the shifting cultivators of the Eastern Ghats provides valuable insights for an understanding of the ongoing processes responsible for the emergence of rice agriculture and tuber crop horticulture in this region. The term Eastern Ghats is used popularly for the ranges of hills which border the peninsular interior on the east and extend from southern Andhra Pradesh (in the south) to Orissa in the north. The region which is specifically considered here consists of the northern extensions of the Eastern Ghats and the country bordering these hills, extending from the Adilabad district in the west to the East Godavari district in the east, in the State of Andhra Pradesh (situated between latitudes 17°5'N and 19°54'N and longitudes 78°E and 84°45'E).

Broadly speaking, the region falls within the drainage system of the lower Godavari valley. The greater part consists of plateaux developed on the Archean gneisses, but faulting has preserved a belt of the Gondwanas along the lower Godavari trough and in the Mahanadi/Brahmani troughs, the latter situated in the State of Orissa. These Gondwana troughs cut across the Eastern Ghats (for details on physiography see Spate et al. 1972).

The bioclimate of the Godavari valley is a rainy variant of the tropical accentuated type: the temperature in the coldest month remains around 20°C, the dry season lasts for seven to eight months and the rainfall ranges from 1000mm in the west to 1600mm in the east (Gaussen et al. 1965). Floristically the lower Godavari valley is covered by deciduous forests of the Terminalia-Tectona series in the west and the Terminalia-Anogeissus-Cleistanthus series in the east (Fig. 1). These forests present different physiognomic types depending upon the stages of their degradation, such as woodland, savannah woodland, scrub woodland, shrub savanna and thorny thicket zones. They are rich in big and small game, avifauna, aquatic fauna and wild plant foods. The shifting cultivators who inhabit these zones depend to a considerable extent on hunting, foraging and seasonal fishing to supplement their dietary requirements.

The most important of these shifting cultivators are the Konda Reddi, Konda Kummari, Koya, Koya Dora, Savara, Gadaba, Khond and Bhagata ethnic groups. The ethnohistories of the Gonds and Kolams of Adilabad district reveal that they were also originally shifting cultivators, who have taken to plough agriculture in recent times. Owing partly to shifting cultivation and more to a host of other agencies, a greater part of the woodland belt of the Eastern Ghats has been transformed into secondary forest. However, there are still

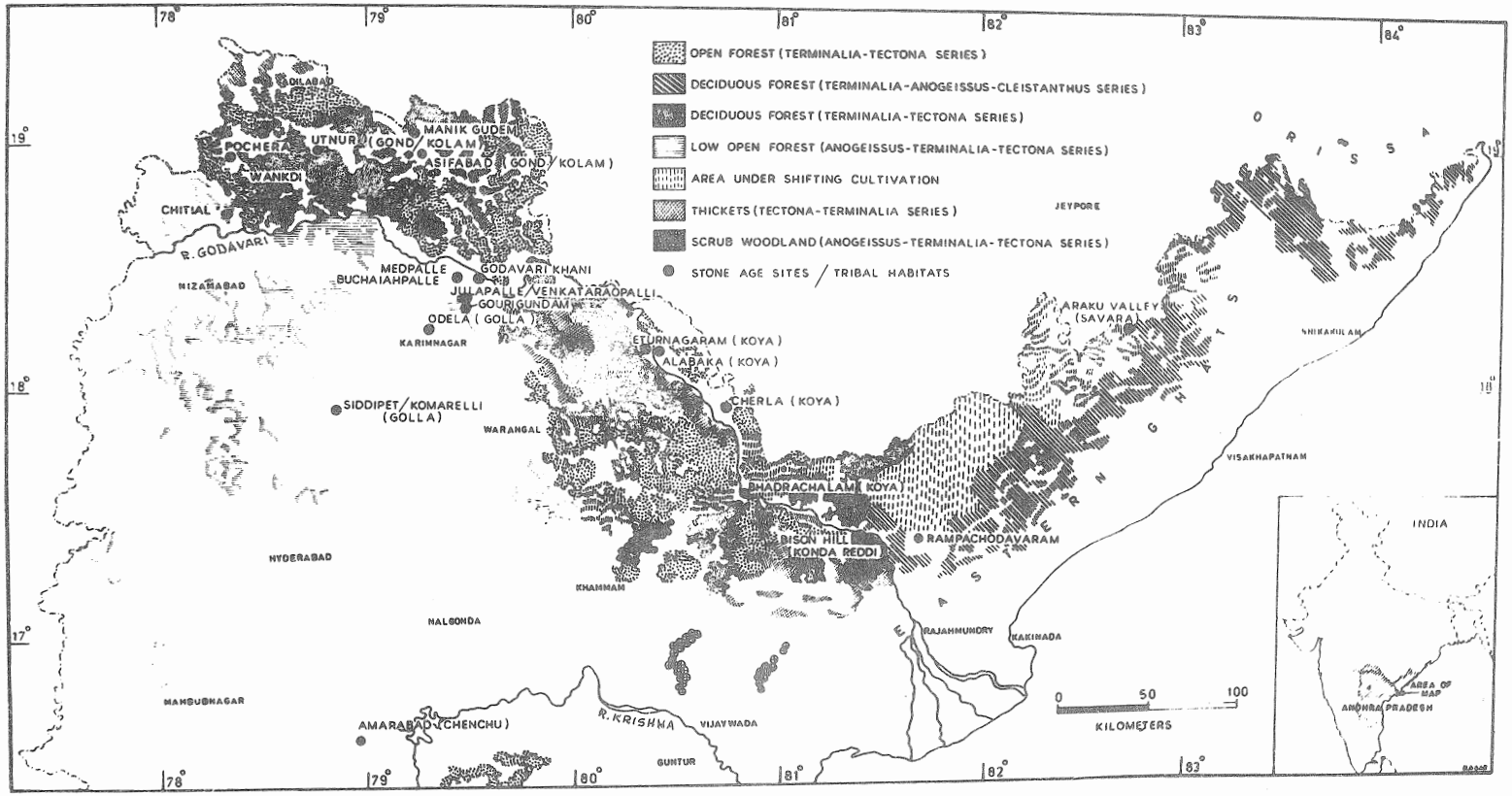

Figure 1. Map showing some important terminal Pleistocene and early post-Pleistocene sites in the traditional shifting cultivator habitats of the Eastern Ghats.

patches of primary forest preserved in high altitude reserves, and elderly informants recall how thick the vegetation was around the shifting cultivator settlements even half a century ago. A few inaccessible zones little affected by modernity still have relatively high resource carrying capacities and low population densities; these provide the best examples of human adaptations in mountainous environments of the Eastern Ghats. Against this ecological and ethnographic background an attempt is made to evaluate the available archaeological record, in order to present a speculative hypothesis for the emergence of rice agriculture and tuber crop horticulture in the Eastern Ghats.

THE ARCHAEOLOGICAL EVIDENCE

As the archaeological potential of this region is yet to be exploited by intensive exploration and excavations, we have to be content with the known distribution pattern of lithic occupation scatters. These belong to two distinctive assemblages that display typo-technological affinities to the Indian Upper Palaeolithic and Mesolithic technocomplexes respectively. These two, considered in a pan-Indian context, can be tentatively given terminal Pleistocene and early post-Pleistocene dates. Barring those sites which yield mixed assemblages, there are a few relatively undisturbed sites in which these two technocomplexes occur singly as discrete horizontal occupation scatters. The areal extents of these sites range from one to six hectares or more, and they are located close to water sources. Sites such as Chitial, Pochera, Manikgudem and Wankdi are of Upper Palaeolithic type; while Godavarikhani, Gouri Gundum, Cherla and Araku valley are considered Mesolithic (Singh 1979; Prasad and Singh 1984; Murty 1981).

In addition, there are several surficial findspots in the forested belt north of the Godavari which have yielded faceted tools and shouldered celts typical of the eastern Indian Neolithic complex. Subrahmanyam and David Raju (1983) have reported ten such findspots, all situated in red soil zones enclosed by hills, with or without perennial streams flowing nearby, and with not even a faint indication of regular settlement. The celts found at these sites occur in association with microliths, perforated stones and potsherds of gritty fabric with red-slipped surfaces. That the occurrence of eastern Indian Neolithic type celts extends south into the Godavari valley is also attested by a findspot at Uppalapadu, right in a settlement of Konda Kummaris who still practice shifting cultivation.

An important feature of the microlithic industries of the Godavari valley is noticeable at Polipaka, a river bank occupation covering about 300 sq.m. Here, bifacial heavy-duty tools on quartzite and dolerite occur with microliths made of quartz, chert, agate and chalcedony. Interestingly enough, such an association of heavy-duty tools and microliths, at times also with polished celts, is well attested in Orissa. Nanda (1983) has brought to light such an instance from the Indravati basin, immediately north of the Godavari valley, as has Ota (1986) from the Phulbani district (central Orissa),

Figure 2. Forest clearance by chopping into and burning tree pith, Pochera

Figure 3. A Konda Reddi with an elongated triangular iron axe hafted in wood (sila katti) used for felling trees.

which consists of the easternmost offshoots of the Eastern Ghats falling within the Mahanadi river system. Several of the thirty open-air primary Mesolithic sites discovered by Ota have yielded heavy-duty implements like horse-hoof cores, choppers, and pointed tools of charnockite and quartzite in association with non-geometric and geometric microliths of quartz, chert and chalcedony. In the Keonjhar district of north Orissa, an extension of the Chotanagpur region, Mohanty (n.d.) has discovered fifty-seven primary occupation scatters, some of which have also yielded heavy duty implements in considerable numbers along with microliths. These heavy duty implements consist of choppers, horse-hoof scrapers, picks, knives, limaces and flakes, all made of dolerite, and some of these sites have also yielded celts which are finished by grinding. Further north, in the Santal Parganas of Bihar, Chakrabarti (1986) has reported a wide dispersal of Upper Palaeolithic and Mesolithic industries in deciduous woodlands, which are again characterized by an amorphous element of medium to heavy modified flakes and worked nuclei.

The present environs in which these artefactual scatters occur in the Godavari valley, and for that matter up to Santal Parganas, are degraded woodlands, woodland savannahs and shrub savannahs. Such a dispersal leads to an assumption that the opening up of woodlands for human settlements was occurring from at least terminal Pleistocene times onwards. The occurrence of heavy duty implements in certain microlithic situations would suggest that such artifacts may have played a functional role in felling trees. To support such a suggestion, we can examine the forest clearance practices of the present shifting cultivators.

For clearance, trees are felled by chopping a hole into the trunk about 30cm to 40cm above the ground, and then a fire is lit in the hole. The fire burns into the trunk, so that the tree falls under its own weight or via a push (Fig. 2). Trees with a girth of 15cm fall in a day or two, while those of half a meter or more take about a week. Iron shaft-hole axes procured from the weekly market are now becoming common, but iron triangular axes (sila goddali) hafted in wood, which recall the lithic prototypes of the Neolithic, are also widely used by some Konda Reddi and Koya Dora groups (Fig. 3). The undergrowth is cleared with a bush knife known as a tuppa katti, the stumps of the felled trees are covered with tuppa (cut undergrowth), and the whole plot is then burned. Thus fire is a most important tool for the shifting cultivators, although hunting with the aid of fire, which was widely in vogue a few decades ago, is now undertaken only for ritual hunting. Presumably, the terminal Pleistocene and early post-Pleistocene occupations in the woodland environments could not have come into existence without some forest clearance, and if the ethnographic practices are any guide one might expect that fire was as effective a tool in the past as it is today.

ETHNOFIRE ECOLOGY

Proceeding on the premise that fire was used as a forest clearing tool during terminal Pleistocene and early post-Pleistocene times, it is necessary to ask what might have been the resultant effects on the floristic pattern. That is, did the clearance of stretches of closed forest facilitate the invasion of pyrophilous plant species, thus giving rise to new exploitable plant food sources for the human inhabitants?

Lewis (1972:195-222), reviewing the archaeological evidence and ecological factors concerning the role of fire in the domestication of plants and animals in Southwest Asia, has argued several propositions. These are that the establishment of fire-climax ecosystems would result in overall changes of environment without specific climatological changes; that the changes would be characterized not by dessication and resource depletion but by increased plant and animal productivity; that disequilibrium accompanies such increased productivity; and that such disequilibrium could be of sufficient magnitude to provide the stimulus which has been sought by archaeologists to explain the beginnings of agriculture. Regarding the appearance of domesticated wheat, barley and oats in the oak-pistachio woodland belt of Southwest Asia, Lewis presents a case that heat (generated by fire) was the causal factor in the mutations which ultimately led to the appearance of these domesticated forms.

In so far as the environments of the Eastern Ghats are concerned it should be emphasized that they are in no way comparable to those of Southwest Asia. As a matter of fact, the cultural traditions of the Eastern Ghats display several parallels with Southeast Asia (the latter outlined by Hutterer 1976), these being stone tool assemblages characterized by generalized lithic tool kits comprising an amorphous flake element; ethnographic traditions geared to broad spectrum exploitation; extensive uses of wood and bamboo for making hafted tools, dwellings, and a variety of specialized traps; and the keeping of domesticated pigs and fowls. Notwithstanding the fact that the environments of the Eastern Ghats and Southwest Asia are dissimilar, it should be emphasized that the two causal factors --(1) the use of fire and (2) the opening up of woodlands--may be crucial in both regions for understanding the origins and dispersal of seed agriculture.

SHIFTING CULTIVATION IN THE EASTERN GHATS

The shifting cultivators of this region, as already mentioned, extensively make use of fire to make _podu_ fields, and practice what Boserup (1965) termed bush fallow and short fallow agriculture. The general pattern is one of both monocrop and polycrop agriculture in two cycles annually: (1) _punasa panta_ (June to August) and (2) _pedda panta_ (January to June). For _punasa panta_ the major crop is rice, a variety called _budama dhanyamu_, the seeds of which are usually stored, although sometimes they are also obtained from the Odiya who migrated into the Godavari valley from Orissa. Incidentally, _budama dhanyamu_

also grows without cultivation along hillslopes and stream banks, where it is also harvested. Two other crops, namely, samalu and sollu (Panicum miliare and Eleusine coracana), are also grown for punasa panta, but the yields are small.

For pedda panta, which is also called konda panta (hill crop), mixed cropping in the podu fields is the prevalent pattern: a variety of crops in different combinations are raised by broadcasting and covering with the ashes of burnt trees, shrubs and undergrowth. These crops are millets such as samalu, sollu, gantelu, korralu (Setaria italica), camalu (Echinochloa frumentacea), and two varieties (red and white) of jonna (Sorghum bicolor); mokka jonna (Zea mays); grams like kandulu (Cajanas cajan), bobbarlu (Vigna catjang), minumulu (Phaseolus mungo), pesalu (Vigna radiatus), ulavalu (Macrotyloma uniflorum) and sanagalu (Cicer arietinum); oil seeds like anusulu, nuvvulu (Sesamum indicum), avise (Linum usitatissimum), avalu (Brassica juncea) and amudalu (Ricinus communis); several kinds of cikkudulu (beans), the common varieties being Vicia fabra and Dolichos lablab; squashes like gummadi (Cucurbita maxima) and anapa (Lagenaria vulgaris); leafy vegetables, the most common being a few varieties of Amaranthus sp.; konda mirapa (a hill variety of chili); and yams or tuber crops and several kinds of rice. It is no wonder that the Konda Reddis not only believe that there is comfort in podu cultivation, but also compare the podu field to a grocer's shop.

The konda panta is raised in upland podu fields, and the mixing of crops varies annually and from settlement to settlement. Usually one or two varieties of millets and grams are broadcast in alternating rows, and beans, squashes and yams are planted along the boundaries. While some varieties of rice are cultivated in the upland podu fields, others are exclusively cultivated in the lowlands. At the present state of our knowledge there is no way of knowing when, from where and how these plants were adopted into the subsistence system of the shifting cultivators.

However, there is one pyrophyte, a weedy millet known as cippa gaddi (gaddi=grass), which is of special interest. This colonizes freshly made podu fields, becomes abundant in the second year, and more abundant in the third year with a corresponding increase in the yield of grain. The grain, called cippa biyyamu, is smaller than that of samalu (Panicum miliare) and has a tough husk. It is harvested for consumption, and Konda Reddis in the hill settlements beyond Rampachodavaram store this grain in considerable quantities. It would be most rewarding to excavate some of the terminal Pleistocene and early post-Pleistocene sites to test if the exploitation of this and other weedy plants is of great antiquity.

RICE AGRICULTURE

Some speculation can be attempted about the origins of domesticated rice. According to S.D. Sharma (personal communication), the Central Rice Institute at Cuttack has collected about 1700 local rice varieties in the Eastern Ghats. He suggests, as a crude

estimate, that about two or three thousand local rice varieties are grown by the aborigines in this region. He further draws attention to the two species of wild rice in the Eastern Ghats, which are Oryza nivara and O.sativa var.spontanea, and says that the Indian as well as the Japanese scientists who studied these local varieties agree that they are primitive and that the area could be treated as a secondary centre for the origin of the Asian cultivated rice. He also points out the different local names for wild rice in this zone, such as passer (or phasser/passei/phassei), which is the name for O.nivara over a vast tract. Other names are balunga, jhar, uridhan, janglidhan deobhat, akasatadi, vanji and dhan (used by the Gonds and Kolams of Abilabad). Balludan (black rice), batadan, sapoordan, ninnudan, bogadu sapoor and oldu sapoor (scented variety) are names used for wild rices (possibly landraces) in the Araku valley. Some of these names are interesting; uridhan refers to rice that grows near settlements; janglidhan means rice that grows wild; deobhat indicates the rice given by god; and akasatadi is the rice that springs up with the onset of the monsoon. All these rice varieties are gathered by shifting cultivators.

Sharma (personal communication) opines that rice originated among Austric peoples somewhere between Central India and South China. Zide and Zide (1973) cite the observation of a rice entomologist that in terms of the number and diversity of rice pests and time judged necessary by entomologists for their development, the Jeypore tract of Orissa would qualify as a possible area of origin and proliferation of rice. According to Chang (1976), the area of origin of domesticated rice falls between 20°N and 23°N, stretching from the central Ganga valley to the South China Sea, so that northeastern India would be one likely place for early cultivation. It is also plausible, following the observations of Whyte (1972), that wild annual rices suitable for domestication would have been present in many parts of China, Southeast Asia and India, so that (Whyte quoted in Glover 1985) it would be quite reasonable to expect early and independent domestication of rice occurring in many regions. Only excavation of some of the Eastern Ghats sites for retrieval of palaeobotanical data, and phytolith studies, will advance their speculative hypotheses further.

As far as the prehistoric exploitation of wild and domestic varieties of rice in the Eastern Ghats is concerned, we can make some assumptions on the basis of archaeological evidence from the Belan valley of the Vindhyas (Sharma et al. 1980). At Chopani-Mando, carbonized grains of wild rice occur in lumps of burnt clay in association with mullers and querns in the advanced Mesolithic phase. At Koldihwa, a Neolithic site three kilometers east of Chopani-Mando, potsherd have been found which contained rice husks from both domestic and wild species. This Neolithic occupation has three radiocarbon dates: 6570 ± 210, 5440 ± 240 and 5430 ± 185 BC; and this claimed evidence for domestication of rice in the Vindhyas is potentially the earliest in the world. Though, to be cautious, one should wait for more confirmatory dates, the archaeological context of the Vindhyan

evidence cannot be underestimated. On this reckoning, the exploitation of wild and domesticated rice in the Eastern Ghats may be expected to be of at least early post-Pleistocene date.

TUBER CROP HORTICULTURE

The shifting cultivators of the Eastern Ghats cultivate several tuber crops in the hedges of podu fields, of which some are domesticated and some forest varieties. The commonly grown domesticated species include Manihot esculenta, Dioscorea rotundata, Dioscorea alata and Colacasia esculenta. Forest species include Dioscorea glabra, D.pentaphylla, D.hispida, Typhonium trilobatum and Ipomoea digitata. Many other species and varieties for which Linnean names are unrecorded are also grown. Some of these grow to a depth of two meters or more and weigh about five to ten kilograms; some yield several tubers; and some, especially those with native names ending with the suffix mati, are highly toxic. The toxic varieties are processed by washing; they are cut into slices, placed in a perforated basket, put in a running stream for a week and later boiled seven times. Most of these yams are stored for between one and three months.

In the Eastern Ghats, a dependence on forest yams is common not only with the shifting cultivators but also with traditional hunter-gatherers such as the Chenchus and Yanadis. Moreover, the practice of replanting the vine after harvesting forest yams is also prevalent, even among the Chenchus. According to Harris (1977:215-216) the small scale propagation or 'proto-cultivation' of tuberous plants by vegetative techniques may be an ancient and widespread practice among tropical hunter-gatherers, which complemented the produce of fishing and hunting, but which usually remained of minor importance except when population pressure or other stress resulting from culture contact induced specialized cultivation of these plants for food. Such small scale propagation is envisaged as part of a long phase of proto-cultivation which preceded the emergence of specialized agricultural systems in the tropics.

CONCLUSIONS

The archaeological record of the Eastern Ghats, as outlined earlier, indicates that the terminal Pleistocene and early post-Pleistocene occupations were geographically discontinuous; being confined to certain ecological niches. It may be surmised that the pattern may have been one of intensified exploitation of specific habitats by sparsely distributed groups, rather than a demographic build up over a contiguous wide belt. Such an intensified exploitation of localized biomes over long periods could have resulted in population pressure on resources leading to a greater reliance on forest yams and the exploitation of grains; the latter could have colonized the newly manipulated forest environments.

From the ethnographic traditions discussed above, we may expect that tuber crop horticulture may antedate rice agriculture, and we will have to wait for future investigations to determine whether the domesticated varieties of yams and rices now extant in the lower Godavari valley and the northern parts of the Eastern Ghats are of local origin, or introduced from the neighbouring eastern and northeastern belts.

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