

CHAPTER XIX

DIGGING STICK, HOE AND PLOUGH CULTIVATION

IN Part II a number of cultivating peoples in various types of country and raising different crops by various methods were considered. The world distribution of the various food plants and the problems concerned with the development of the different methods of cultivation will be considered later; for the present we shall review the differences of habitat, the variation in actual methods and the wide variation in the social and political organizations based on a cultivating economy. The chapters of Part II cannot pretend to cover all the variations of agricultural economy in the non-European world. Nearly a quarter of mankind—the great populations of China—lacks any exemplification. Our attention is, however, mainly directed to the simpler societies, and, moreover, the salient characteristics of Chinese agriculture and society are so well known and have been so well portrayed in a number of accessible studies that no summary is required here. Nor has a full account of a people practising a rudimentary agriculture in temperate latitudes been introduced, for in the Old World Western or Chinese civilizations have long since invaded the northern areas, establishing plough cultivation, incorporating earlier peoples in larger political units and assimilating them to their civilization, while in North America European occupation also destroyed the native economies of the north-east before adequate studies and records were made. Indeed, save in eastern North America and the north island of New Zealand practically no primitive cultivation survived in temperate latitudes when European explorers first came to know the more remote parts of the earth.

The range of economic and social variation among cultivators is greater than that among food-gatherers, and this variability is not related in any simple way with the physical conditions. It extends not only to the nature of the crops grown and the technical methods of production, but also to the social uses to which the production is put and the political organization developed therefrom, while the use of the plough and of methods of renewing fertility obviously raises into a separate

category the more advanced agriculturists, among whom a far higher density of population is possible.

The cultivation of the simpler peoples is often referred to as ^{Hand} migratory hoe tillage, but it is in the first place necessary to realize that some of them, under favourable physical conditions, are *not* migratory. Where annually flooded river plains are available for cultivation the silt borne by the inundations often suffices to maintain fertility for long periods. The Hopi, on whose fields the silt accumulation is slow and rather irregular, supplement it by a very wide spacing and alternation of their plants. Pueblo agriculture is not migratory: irrigation, whether by natural flood waters or by artificially constructed channels, demands a considerable degree of permanence in field sites, and migratory tillage is not characteristic of arid regions. It is, however, almost universally found where cultivation is dependent on direct precipitation alone. Surviving most extensively at the present day in the tropical savanas and forests of Africa, it is also found in the more remote parts of southern Asia and Indonesia as well as in the Pacific.

Further, many of these more primitive cultivators do not employ the hoe. Their tools are no more elaborate than the root-getting equipment of food-gatherers—a digging stick with which to make holes for the seeds and cuttings, and sometimes to break the clods, and occasionally a wooden blade to chop down the tops of weeds. The hoe, with which the surface of the plot can be completely if superficially dug, is practically confined to those areas in which a knowledge of iron working exists, and is limited to Africa and Asia. The stone and shell adzes of Oceania are not agricultural implements, while the so-called hoes of animal blade bone used in eastern North America are of service only in hilling up the loose surface soil round plants. They could not be used to break the ground. It must not be assumed that the hoe was everywhere unknown before the introduction of metals. While maize can be planted in drilled holes, hoeing of some kind is essential for the broadcast sowing of the Old World cereals, wheat and barley, which are of great antiquity. Less efficient stone bladed hoes almost certainly preceded metal ones in the early centres of agriculture in the Old World; they have, however, been nearly everywhere superseded by iron tools. On the outer fringes of cultivation in Oceania—with its exclusive concentration on roots and fruits—the hoe, if introduced, failed to be generally adopted, while in the New World it was apparently unknown.

In the tropical forests, apart from modern and mostly ^{Crops} European introductions, the cultivation of roots and the

tending of fruit trees is dominant. The millets in the Old World and maize in the New are the only old-established grains in lowland forest country, and can both, on botanical evidence, be safely regarded as intruders. The millets are easy crops for the forest cultivators since they are relatively insensitive to changes in temperature and available moisture. In the forests they have, however, like maize from the New World, been introduced from without, and have everywhere failed to displace the dominant roots. Some of the relations between millet and root cultivation in Africa have already been briefly discussed.

The cultivation of roots and fruit trees has little technical relation to the raising of grains, for they are not grown from seed but from eyes and cuttings. The produce of tropical root and fruit cultivation where there is no prolonged drought is not concentrated sharply in a short harvest season: yams, taro and manioc can be dug for the greater part of the year, while individual coconuts and breadfruit, pineapples and other fruits are almost continually coming to fruition. The storage of agricultural produce for long periods is therefore unnecessary, save where large accumulations are required for social purposes. Grain growing, on the other hand, has a strongly seasonal character. Where cultivation is undertaken in areas in which for reasons of drought, cold or river flood, there is only one planting a year, the harvest of a few weeks has to maintain the community for the entire year. This circumstance imposed by the character of the habitat finds its parallel among gathering peoples in similar areas; the Hopi store corn as the Paiute grass seeds, and since they are more dependent on the corn and would scorn to eke out the winter and spring on pine nuts, must accumulate it in relatively large quantities. Those cultivators in areas with long seasonal droughts or cold winters, who are mostly grain growers, must store food like the food-gatherers in parallel regions. The root cultivators of equatorial forests need store but little more than the Semang, and in the case of the Boro actually store almost nothing.

It is not possible to regard the root and fruit cultivators of tropical forests as forming an economic category within which a fairly uniform level of general civilization, distinct from that of the grain-growing peoples, is achieved. The contrasts between the peoples of the Amazon Basin, of Oceania and of tropical Africa will have been sufficiently apparent. The skill and attention devoted to crop production in forest Africa and Polynesia would appear to be generally lacking in equatorial South America and in some parts of Melanesia. This range of cultural achievement can be matched among millet cultivators

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in Africa and maize-growing peoples in America. The general level of culture, both economic and political, among the higher civilizations of the New World did not, apart from achievement in architecture, excel that of the great negro States of the Guinea coast.

Cultivation may replace almost entirely or in part the digging of wild roots and the collection of seeds and fruits, but it does not of necessity curtail hunting and fishing. Where the women cultivate the men may be entirely free for these pursuits. In Oceania, although cultivation was shared by both men and women, fishing remains an equally important economic pursuit, which among the ruling classes of central Polynesia had far higher prestige than agriculture. The noblest chief in Tahiti would direct and take part in fishing expeditions, but he had no direct connexion with agriculture.

Where, however, cultivation is more intensive and is adopted as a male task, hunting and fishing decline in importance or are relegated to specialists. The Yoruba have afforded a good instance of this situation; with increase of population dependent on an assiduous root cultivation, the bush has been so extensively cleared that there is little game over the greater part of their country. The ordinary man is occupied continuously with his fields and does not hunt, while fishing, even in the riverine villages, is largely a specialized activity. Nevertheless, although the Yoruba and other West Africans are devoted farmers, the gathering of wild products has not completely disappeared, and one of their most important staples, palm oil, is gathered entirely from wild trees.

With plough cultivation farming tends to absorb a still greater proportion of the energy of the community and to reduce their need and opportunity for gathering and hunting. The coconut and areca palms and the breadfruit trees, so often treated as semi-wild in Melanesia, are in Cochin carefully tended, and more often deliberately planted. Game is practically non-existent on the closely settled plains, and fishing alone remains important as an auxiliary source of food.

A limited use of domestic animals as a source of animal food-supply, replacing wild game, is found among the lower cultivators in the Old World. Generally, however, far less attention is devoted to increasing and improving the quality of these resources than to the products of cultivation. The domestic animals are indeed often of ritual rather than economic importance; the pigs of the Melanesians and the goats and fowls of the Yoruba are a meagre supplement to a dominantly vegetarian diet.

Supplemen-
tary Food-
supply

Domestic
Animals

Among plough cultivators where an entirely new use for domestic animals is found—that of draught—their value as food is often not fully exploited. This situation is characteristic throughout India and China, in the one case associated with a number of definite religious prohibitions and in the other with an aversion for nearly all meat but that of the scavenging pigs and fowls. The resistance of the northern Chinese to the adoption of the pastoral patterns of the nomadic peoples on their northern fringes—especially to the eating of beef and dairy products—is a remarkable instance in point.

In the New World domestic animals were of no importance in the food-supply outside the central Andean region in which the llama was reared. This animal, related to the wild guanaco, had been completely domesticated long before the Spanish conquest; it afforded meat as well as wool, besides being used as a pack animal. Large herds were pastured in the area of Inca civilization, and they were reared in smaller numbers by marginal peoples to the north and on the central Chilean coast.

In the Old World the combination of agricultural and pastoral activities in a single economy is, outside the higher civilizations of the Ancient East and the West, largely confined to the African grasslands. For herding these undoubtedly offered favourable conditions. But stock raising here, as will be seen later, is less a concurrent development than a superposition of cattle rearing on an older hoe cultivation in which goats and sheep alone may have been kept in small numbers. The dominance and prestige of pastoral peoples have invested cattle breeding with a religious significance, and herds far in excess of economic need and with very limited use for food-supply are maintained. Cultivation over much of eastern Africa south of the Equator is women's work, and stock raising has largely replaced hunting as the male pursuit. This dual economy is, however, restricted to the savanas and, in the rearing of horned cattle, a consideration of real importance is the unfavourable character of dense forest country for herbivorous live stock. Horned cattle are virtually excluded from the wetter African tropics by their liability to fly-borne disease, while in monsoon forest the grazing is of very poor quality. Sheep and goats, although not native to the tropical forests, are reared in small numbers by most of the African cultivators, and dogs are occasionally bred for food, but the greater proportion of the meat is provided by hunting. The pig, which is a forest animal and lives on roots, fruits and shoots, and the fowl, originally native to the forests of south-eastern Asia, fall into a different category, and both have been adopted by the

forest cultivators, although pig rearing is little developed in Africa.

There are great differences in the development of crafts. Crafts With their few and poor stone tools wood-working is very inferior among the Boro, despite the fact that they build surprisingly large communal houses, while the finest constructional achievement of any people lacking metals is to be found in Polynesia. Specialized tools of stone, shell and bone are here employed by skilled professional craftsmen in the production of elaborate and beautiful canoes, houses and utensils. The marked difference between Polynesia and Melanesia in this respect exemplifies the great gap that can exist between peoples in similar habitats and with a basically similar economy. The Polynesian standards of craftsmanship, perhaps largely dependent on later cultural introductions from the Asiatic mainland, are generally unknown in Melanesia; where the gap is bridged in Fiji it can be safely ascribed to Polynesian influence. The plank boats of parts of the Solomons are exceptional in Melanesia, and are more reasonably to be regarded as due to an alien influence rather than as a local development.

Weaving is found among the lower cultivators on the fringes of higher civilizations. In grasslands, and even in arid regions, it is favoured by the opportunity for growing textile material itself or for gathering the fibrous parts of wild plants and trees. The relations with the North African and Mediterranean areas of higher civilization implied by cotton growing and weaving in the western Sudan and those of the Pueblos and some other cultivators of the south-west with southern Mexico, illustrate such extensions and the diffusion involved. Weaving is not, however, uniformly distributed among cultivators in accordance with habitat conditions suitable for cultivated or wild plants which would provide suitable fibres. It is absent in the grass-land country of eastern Africa, over the greater part of which, had cotton been known or appreciated as a textile material, it could readily have been grown.

Weaving has not generally reached or been adopted by the forest cultivators either in Africa or south-eastern Asia. The Yoruba, who grow cotton in the northern part of their territory, are an exception, and their weaving shows both in technique and in the raw materials used that the craft is an introduction from the north. The general absence of weaving in the forest areas is probably due to a number of interacting factors. Apart from the degree of remoteness and the difficult nature of the country, there is little need for clothing; the inner bark

of a number of trees can be beaten out into a fairly durable wrapping. The making of bark cloth appears to be of great antiquity, as it is of very wide extension and once established would tend to inhibit the adoption of weaving. Moreover, there is often a lack of native fibres with which to replace those available to the grassland peoples.

Pottery

Pottery is more widespread, both in the New World and the Old. Its geographical distribution is nearly everywhere as wide as that of cultivation, and, sporadically, it has extended farther, as among the Yokuts and some Paiute in western America and among some of the southern Bushmen. The potter's wheel is, however, hardly ever found among the lower cultivators. In the New World this instrument for the more rapid and symmetrical production of pottery was entirely unknown. In the Old World, on the other hand, it must be credited with a great antiquity, for wheel-made pottery more than five thousand years old has been recovered from the earliest cities in lower Mesopotamia. Among the settled plough cultivating peoples wheel-made pottery is universal, and the very simple form of the wheel used in Cochin has been described. For the failure of the potter's wheel to reach the lower cultivators of the Old World the relatively small demand for pots at any one time, the general absence of specialization in communities where the majority of women are their own potters, and the sporadic character of trading in such wares, might generally be adduced. It is, however, surprising that it failed to reach the densely populated West African states, in which there was considerable specialization of crafts, while the Melanesians of the Gulf of Papua afford examples of communities which trade hand-made pottery on a considerable scale over a wide area. Such a condition, although it might produce receptivity to the introduction of the potter's wheel, does not of itself lead to the local invention of the device.

Iron Working

The cultivating peoples of Asia and Africa have nearly all of them an advantage over those of Oceania and the New World in the possession of iron tools. The smithing, if not the smelting, of iron is found nearly everywhere in the Old World among both agricultural and pastoral peoples and extends as far as eastern Cape Colony and the western coast lands of New Guinea. Iron knives, sickles, and in most areas hoes, facilitate the work of cultivation, while iron weapons and utensils are of great value in other phases of economic life.

It is well known that the use of iron developed later than that of copper and bronze in the history of civilization, but no people in the Old World has depended on copper or bronze as

a primary material for metal working in recent times and most of the lower cultivators and pastoralists are ignorant of their manufacture. The production and working of iron has spread more widely than that of copper and has ousted it as the main material of the metal worker. In Africa, bronze and brass working is undertaken almost entirely for ornamental purposes rather than for the production of tools and utensils. Its manufacture and use here may well be considerably more recent than that of iron. The only copper and bronze users who were, when first known to Europeans, ignorant of iron were the peoples of the higher civilizations of middle America from southern Mexico to Peru.

The use of copper, at first for ornaments and small imple-
 ments such as needles, appears very early in the oldest agri-
 cultural settlements in the Ancient East. Bronze was being
 manufactured on a large scale in Sumer before 3000 B.C., and
 the art of core casting was highly developed. But iron does
 not begin to replace these metals as the material for imple-
 ments in the Near East until nearly two thousand years later.
 It is at first sight difficult to understand why this should be so.
 Iron ores are more abundant and widespread and often more
 accessible than copper and far more so than the tin also neces-
 sary for making the alloy bronze; iron can be reduced at even
 lower temperatures than copper. Despite its deterioration by
 rust if exposed and neglected, iron has many and obvious
 advantages over bronze. It is stronger and yet more elastic.
 It will take and keep a finer cutting edge. The reason un-
 doubtedly is that the working of iron awaited a series of
 experiments and discoveries quite distinct from those habitually
 employed in the smelting of copper and tin. To understand
 this it is necessary to view the processes of iron smelting from
 the point of view of a coppersmith. It has already been seen
 that native copper, although not abundant from a modern
 point of view, occurs fairly frequently and has in a number of
 areas been hammered into useful tools. Some copper ores often
 have a promisingly metallic appearance before smelting, but,
 still more important, when the coppersmith has placed his ore
 in an open furnace he is rewarded with a flow of molten metal
 practically ready for use. Throughout two millennia or more
 the burning of certain kinds of stone in a furnace to produce a
 reddish metal had become a fixed pattern. Experiments—both
 deliberate and unintentional—may have been and probably
 were made with other likely 'stones', but they yielded no flow
 of metal. To a coppersmith the smelting of iron ore would
 appear a complete failure—it would result in a spongy mass of

Its Develop-
 ment

fused stone full of air-holes and as unmetallic a product as could be imagined, for the small, pasty globules of iron would be embedded and concealed in the mass of slag and cinders. Fire it as he would no coherent mass of metal would emerge. Hammered cold it merely fractured, while no quickly appreciable result came from hammering it when still hot. The great centres of bronze working in the Ancient East, with their specialized smelting and smithing methods, offered neither good chances for lucky accidents with iron ore, nor rewards to deliberate experiment along traditional lines.

The Ancient
East

Nevertheless, iron objects were made and used during these times. The number of such objects so far discovered is infinitesimal in comparison with the finds of copper and bronze, but they are quite definite. A few iron beads that must be dated well before 3000 B.C. were found with pre-dynastic objects in Middle Egypt. A few iron objects have been found in the Sumerian city of Ur (c. 3000 B.C.), while very recently a bronze dagger handle, found at Khafaje, a Mesopotamian settlement near Baghdad, occupied probably before 3000 B.C., shows traces of the rust of an iron dagger tang. At Knossus in Crete (c. 1800 B.C.), in the tomb of Tutankhamen (c. 1350 B.C.), and at a few other sites in Egypt, early iron objects have been discovered. In Babylonia in the time of Hammurabi (2000 B.C.) iron was known as a rare and valuable substance, and it had fifteen or twenty times the value of copper. Nearly all of the few early iron objects recovered are ornaments, not tools. Iron was for a long time a rare metal, and both the rarity and the ornamental use indicate fairly clearly that there was not at these times any established technique for smelting the abundant oxides of iron. It is therefore legitimate to conclude that most, if not all, of these objects were made by working iron found in a metallic state. The iron of the Khafaje dagger is, however, of neither meteoric nor telluric origin. Very small nodules of iron might have been occasionally observed and recovered from the slag of copper furnaces in which, as might well happen, had been smelted an ore containing both copper and iron. But natural metallic iron, although rare, is no rarer than the frequency of these finds would suggest, for it can occasionally be picked up on the ground surface in fallen meteorites. The meteoric origin of the iron in these early objects—betrayed by the nickel content—has been proven in several cases where analysis has been possible.

But from the middle of the thirteenth century B.C. iron rapidly becomes far more abundant throughout the Ancient

East. Tools and weapons are made from it, and within three centuries important manufacturing centres have sprung up in many cities between the Levant and the Persian Gulf. The Iron Age was definitely established. The occasion, date and even the place of the first advances are by no means precisely known, but it is clear that at some time shortly before 1300 B.C. the essential discovery was made that metallic iron could, by a new technique, be obtained in large quantities from certain abundant rocks.

The successful smelting of iron ore does not demand a hotter furnace than that required for reducing copper ores, but it does require a larger and more continuous body of heat and a suitable flux with which the impurities of the ore can combine. A larger furnace and a more powerful blast are therefore necessary to maintain the smelting process.¹ Furthermore, the product of a primitive furnace must be subjected to a far more prolonged hammering at red heat than was customary among copper workers, in order to beat out the slag and cinders and to consolidate the metallic mass.

Both the directions in which the new iron objects and later the new process itself spread, and the classical traditions of the beginnings of iron working afford some evidence of the time and place of discovery. In southern Syria iron hoes and sickles came into use before 1200 B.C., and shortly after this the Egyptian Pharaoh was importing iron objects. From 1100 B.C. onwards iron weapons are referred to in Assyrian inscriptions. It is clear from the Egyptian records that in this first period a virtual monopoly of this new manufacture was held by the Hittites of north-eastern Asia Minor, from whom the Pharaoh solicited further consignments of iron goods. Greek tradition coincides with these facts in ascribing the beginnings of iron working to the eastern Chalybes, who lived in the foothills of the Caucasus and continued to be renowned for their iron work in Classical times. By the middle of the thirteenth century B.C. Hittite iron working was already in an advanced state and developed on a fairly large scale, so that the new metal had probably been produced from ores for a century or more in some part of north-eastern Anatolia or the southern Caucasus. By 1200 B.C. local smelting was developing in western Anatolia, Cyprus and Syria, and iron copies of bronze swords appeared in Greece. By the ninth century iron working was probably established in Egypt and Assyria and iron tools

¹ The use of bellows, as distinct from simple tubes blown by the mouth, is not shown in Egyptian wall paintings of metal working until the middle of the second millennium. It may, however, be considerably older in other areas where the technique of metal working was more advanced.

became fairly abundant. Iron had also, by this time, reached southern Italy, whence it spread north by stages into central Europe, where independent centres of iron manufacture were established by about 750 B.C. It is, however, important to realize that for some purposes iron long remained inferior to bronze. Where the furnaces were not hot enough to cause some carbon to combine with the iron and so produce a low carbon steel, weapons and utensils could not be hardened by quenching in water. Although this device was known before classical times in Greece it would be effective only with steely iron. Even in the Dark Ages swords often bent in battle and had to be straightened underfoot. To produce iron objects as tough as bronze demanded an advanced technique or a man-ganiferous ore.

The archaeological evidence from the Near East is by now sufficiently extensive to refute the once popular hypothesis that iron working was a discovery of negro Africa which spread north into the Ancient World. The earliest evidence of iron working in Nubia is found in the heaps of iron slag in the Egyptian provincial town Meroe which are not older than 700 B.C. The craft of the African smith has undoubtedly spread slowly southwards from people to people in the period that has since elapsed. The use of copper and bronze appears never to have crossed the Sahara in pre-iron days, so that the peoples of Africa first learnt of metals with the introduction of iron working. The production of iron everywhere in the Old World almost certainly derives from a single Near Eastern centre in which the essential discoveries and inventions were made during the latter part of the second millennium B.C.

Oceania

That the Oceanians, with very few exceptions, lack weaving and pottery as well as any use of metal, although some of these crafts are known to most of the lower cultivators, serves as a reminder that highly developed craftsmanship in certain directions and a considerable degree of social elaboration are neither dependent on nor productive of a wide range of fundamental crafts. It is clear that lack of certain crafts may restrict the scope of material civilization, but it is equally obvious that such a lack does not automatically relegate the culture to a low plane. A mere enumeration of the presence or absence of crafts and comparisons based on this cannot serve to indicate the relative qualities of culture.

In the absence of ores there was no opportunity for the working of metals in Oceania, but reasons for the absence of pottery and weaving crafts in Polynesia are difficult to assess definitely. The limited resources may again be largely responsible,

though pottery is made in a few areas, while in parts of Melanesia at least it was made by earlier settlements in places where it is no longer known to-day. Weaving is general in Micronesia, but has spread only to a few Melanesian and west Polynesian islands. The effects of long and sometimes rapid migrations and the great distances between island groups may be in part responsible for the difficulty of introducing new crafts or their rapid loss. But it must not be forgotten that several food plants and domestic animals were brought into Oceania and were successfully carried to nearly every corner of the Polynesian world. It is possible that bark cloth, the skilful use of wood and the stone oven, so well adapted to the climate and food resources, militated against the adoption or survival of pottery in the area just as bark cloth would reduce the receptivity to weaving.

At the one end of the social range the hand cultivating peoples Society are grouped in communities smaller and less complex than those of the more successful food-gatherers. On the other hand, states with populations of a million and more have been successfully organized. The settlements of the Yuma on the Lower Colorado were probably never as large or stable as the larger villages on the Northwest Coast which indeed, in a very different way, rivalled the Pueblos in size of population and in complexity of social and ritual organization. But under favourable conditions cultivators with their greater and more assured food-supply for a given unit of territory are able to proceed much further in social and political elaboration. In short, the variation is greater by extension at the higher end, and a higher proportion of cultivators is organized in large communities and states with a formal political organization. Most living examples must now be drawn from Africa, but in the sixteenth century native states of great size were to be found in Central America and in the Peruvian Andes.

The regulation of land-holding among cultivators ranges Land from communal conditions substantially similar to those obtaining among many food-gatherers, to the development of feudal tenures and private property. The local village territory of the Boro or Melanesians, and even of the Yoruba, is in one sense as communal as the lands of a collecting group. With migratory tillage and brush clearing, ownership of the land itself, save in the sense of group control of the territory as a whole, has in general little value. Good land promising a rich reward is undoubtedly appreciated in advance, but there is nearly always an abundance of such land within the territory

for all the labour available; it is the actual work of clearing and cultivating that is of great significance. To cleared and productive land there are nearly always individual or family rights. A single plot can be used for several seasons, and a particular area may have special convenience for a household or association with a particular group of kinsmen. In Melanesia it would appear very common for a kin group of several families to have the more or less exclusive cultivation of a definite tract of bush; for others to intrude on it would be unneighbourly. Unfortunately there are no detailed records covering a period of years concerning any of these peoples that would make it clear how far families or kin groups actually do lay claim to tracts of land and retain them for many years during which their cultivation oscillates to and fro allowing periods of recuperation to individual plots. Among the Yoruba magical beliefs and religious sentiments associated with land occupation would, as has been shown, seem to give fairly definite fixity of tenure, including that over land which is recuperating after a period of cultivation. The injunction against occupying land showing evidence of former cultivation in the shape of fences, store huts and so on, embodies customary precept. There is no formal system of renting and leasing land, but the existence of slavery here and elsewhere in Africa does lead to the partial development of estates, and dependants who make regular gifts to the powerful family which guards their rights are in a sense tenants at will. Since, however, trade in agricultural products is limited in its scope, slave cultivators merely relieve their masters of part of the labour of cultivation and provide for the needs of his household. They do not appear, moreover, to be debarred by their slavery from clearing land of their own.

The native land systems of central Polynesia had so largely passed away before detailed investigations were made that their precise character will never perhaps be known, but there does appear to have been a considerable development of manorial estates in the hands of a landed nobility, sometimes paramount, sometimes in both political and economic dependence on a higher chief. The landowners of Tahiti had, it seemed, a lien on the produce of their cultivators, but the detailed manner of their control remains obscure. Since, however, the cultivation, although probably more stable than in Melanesia, involved the frequent clearing of new plots and irrigated beds, the control may have been over a territory as a whole and over the services of the cultivators within it rather than over particular fields.

Under plough cultivation and manuring, however, agricultural land acquires a very different value. With relatively short fallow periods and rotation of crops good land can be maintained in cultivation indefinitely and can feed considerably more people than those required to till it. A large number of specialists in non-agricultural crafts, and others who are agriculturally non-productive, can thus be maintained. Private or family ownership of rigidly delimited fields thus becomes an economic asset of great value in any society which permits the landowner, as distinct from the cultivator, to claim the surplus and thereby enjoy leisure and command the services of craftsmen. The native agriculture and society of Cochin have provided, in an area extremely productive according to the standards of simple plough cultivation, an illustration of the economic specialization and social differentiation that becomes possible. The rich reward in crops from the plough cultivation of ricelands supports a dense population among whom the fruits of cultivation are distributed by a system of feudal tenures, leases and tenancies formerly combined with slavery.

Plough cultivation is nearly everywhere associated with much knowledge and considerable equipment, in addition to the use of the plough itself. These include the use of water-lifting devices such as the *shaduf*, the *picotah* of India and the Persian wheel, the regular use of manures—vegetable, fish, animal and also, in eastern Asia, human excrement. With the plough is found crop rotation and an appreciation of the value of pulses as restorers of the nitrogen content of the soil which is depleted by cultivation of cereals.¹ The ripe grain is trodden out by animals or threshed by driving over it wooden sleds, sometimes studded with chipped stone blades, as was the Roman *tribulum*. All these and many other details of agricultural practice are unknown to the lower cultivators.

The plough itself is not, however, the *sine qua non* of more advanced agriculture. In some parts of eastern Asia it is of little importance and may even find no use at all. Where rice-fields are built in terraces on steep hillsides, as in some parts of southern China, Java and the Philippine Islands, or where every inch of available land is divided into minute rice plots as in the small plains of southern Japan, cultivation is undertaken almost entirely by hand.

In this connexion the hill-terrace rice cultivators of the mountainous interior of Luzon in the Philippine Archipelago

¹ This frequent planting of beans between the rows of corn in aboriginal North America may indicate an unformulated appreciation of the same fact. No such idea is, however, expressed by the Hopi and I have been unable to find any other consideration of the matter.

Plough
Cultivation

The
Philippines

should be considered. These people, particularly the Igorot and the Ifugao, are extremely skilled cultivators. The narrow man-made terraces, some of them having boulder-faced retaining walls thirty feet high, are carried up hillsides in tier after tier for many hundreds of feet. Streams and considerable rivers are dammed to divert their waters into canals, which are, in favourable localities, carried for miles along the hillsides, bridging ravines and other rivers in wooden troughs. A typical Igorot village of five hundred to a thousand inhabitants is surrounded by hundreds of acres of riceland. Nevertheless these peoples have no knowledge of the plough, although they possess domestic cattle which could be of service as draught animals and also in the cultivation of the lowland fields which are devoted to root crops and millet, and actually provide a rather higher proportion of the food-supply than do the irrigated rice terraces. In the actual breaking up of the soil they remain low cultivators, for it is merely loosened and turned with long wooden paddles—a slightly elaborated digging stick. Moreover, although their irrigation is very developed, they do not possess any of the water-lifting devices known to the paddy growers of the Asiatic mainland. Where no channel reaches a plot water is laboriously carried in small hand-made pots. Although iron is smelted and forged into knives and spears and small ornaments, no iron tools are used in cultivation.

In social and political organization and general culture they are closer to an African forest people than to the peoples of India or China. The villages are autonomous units, each with its own lands. Slavery existed until recently, but every household cultivates for itself and land is not rented or sold. A large household of related families with many plots of cultivated lands is wealthier than its fellows, while the men of poor villages work for a season at a time for the wealthy owners of numerous rice and sweet potato plots in neighbouring territories. But there is no division into landowners and landless. Even the poorest who have no rice-fields yet possess unirrigated plots in which sweet potatoes and millets can be grown. Both in their technique of cultivation and in their political and social organization these people stand midway between the hand cultivators and the plough cultivators of southern and eastern Asia. Whatever the history of their agricultural and social development, their economy and organization are very significant.

It is legitimate to regard the higher agriculture of the Old World as a complex of activities involving in general a more or

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less standard equipment (including such elements as the plough, beasts of burden, water lifts and iron sickles), a basic economic pattern of individual land ownership with the leasing or rental of property, and a political organization characterized by a ruling land-owning class at one end and landless serfs at the other. But it must at the same time be recognized that in some areas some elements of this complex have been established where others were never introduced or failed to take root. The rice growers of the interior Philippine Archipelago, remote from the Asiatic mainland, and a few Indonesian peoples afford instances of this partial diffusion.