On the Origin of Agriculture.

Author(s): H. Ling Roth

Source: *The Journal of the Anthropological Institute of Great Britain and Ireland*, Vol. 16 (1887), pp. 102-136

Published by: [Royal Anthropological Institute of Great Britain and Ireland](#)

Stable URL: <http://www.jstor.org/stable/2841785>

Accessed: 15/06/2014 20:55

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at <http://www.jstor.org/page/info/about/policies/terms.jsp>

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact support@jstor.org.

Royal Anthropological Institute of Great Britain and Ireland is collaborating with JSTOR to digitize, preserve and extend access to *The Journal of the Anthropological Institute of Great Britain and Ireland*.

<http://www.jstor.org>

- From the U.S. GEOLOGICAL SURVEY.—Mineral Resources of the United States, 1883 and 1884. By Albert Williams, jun.
- From the REGISTRAR-GENERAL OF VICTORIA.—Patents and Patentees. Vol. XV.
- From the SOCIETÀ ITALIANA DI ANTROPOLOGIA.—Archivio per l'Antropologia e la Etnologia. Vol. XV. Fas. 3; Quadri Statistici.
- From the AKADEMIJA UMIEJĘTNOSCI (KRAKOW).—Zbiór Wiadomości do Antropologii Krajowej. Tom. IX. Dodatek do Tom. IX.
- From the BERLIN GESELLSCHAFT FÜR ANTHROPOLOGIE. Zeitschrift für Ethnologie. 1885. Heft 6.
- From the ACADEMY.—Atti della Reale Accademia dei Lincei. Vol. II. Fas. 5, 6.
- From the CLUB.—Transactions of the Essex Field Club. Vol. IV. Part 1; Appendix to Vol. VI; Journal. Vol. IV. Part 1.
- From the PUBLISHER.—Essays in the study of Folk-Songs. By the Countess Evelyn Martinengo-Cesaresco.
- From the SOCIETY.—Proceedings of the Royal Society. Vol. XXXIX. No. 241.
- Proceedings of the Society of Antiquaries of Scotland. 1884–85.
- Proceedings of the American Philosophical Society. Vol. XXIII. No. 121.
- Bulletin de la Société d'Anthropologie de Paris. 1885. July to Dec.
- Bulletin de la Société de Borda, Dax. 1886. Part 1.
- Journal of the Society of Arts. Nos. 1740–1742.
- Annual Report of the Yorkshire Philosophical Society. 1885.
- From the EDITOR.—Nature. Nos. 856–858.
- Journal of Mental Science. 1886. April.
- L'Homme. 1886. No. 4.
- Revue d'Ethnographie. 1886. No. 1.
- Bullettino di Paletnologia Italiana. Tom. II. N. 1, 2.
- Science. Nos. 162, 163.
- American Antiquarian. Vol. VIII. No. 2.

The following paper was read by the author:—

On the ORIGIN of AGRICULTURE.

By H. LING ROTH, Esq.

Introduction.

At first sight it may appear strange that hitherto so little has been done to investigate the Origin or early days of Agriculture, for while almost every other branch of man's early history has been well studied, this branch alone seems to have been forgotten. The late Mr. Darwin, Mons. A. de Candolle, Dr. Pickering, Mons. N. Joly, Mr. E. B. Tylor, and Dr. Daniel Wilson have

certainly given the subject some attention, but they have hardly treated it from an anthropological point of view. One reason for the neglect of this study may lie in the general indifference, if not contempt, with which tillers of the soil are usually regarded. Indeed, history is full of the scorn with which manly or warlike races look down upon husbandry. Gibbon tells us that the agricultural class among the Huns was despised by its fellows ("Decline and Fall" III, xxvi, 152) and that the epithet of *Crustnich* or wheat-eater, expressed the contempt or envy of the carnivorous Highlander (*ibid.*, III, xxv, 107). Sir A. H. Layard describes ("Nineveh and Babylon," abrid. ed., p. 131) how it is that the Shamar and Aneyza tribes have no cattle or sheep, "those animals being looked upon as the peculiar property of tribes who have forgotten their independence and degraded themselves by the cultivation of the soil." Mr. Eug. Schuyler ("Turkestan," I, p. 37) states that the Khirghiz look down with contempt on those engaged in agriculture. According to Herodotus (Thalia 22) the Ichthyophagi showed their contempt for bread by alluding to it as dirt. And we have evidence to this day of the disdain with which an intelligent nation treat their peasantry (Jour. Stat. Soc., xlviii, 83). These facts may explain to a limited extent why travellers tell us so little about the cultivation of the soil amongst savages. The allusions to it in their journals are frequent enough; we are told that its state is good, bad or indifferent, but with regard to the details of the methods employed we are supplied with very scanty information. Yet a full knowledge of this peaceful art is quite as necessary for estimating the stage of progress at which a wild or semi-savage tribe has arrived, as are the minute particulars we get of their warfare and warlike preparations. The other cause of the neglect may lie in the fact that few of our anthropological students have anything to do with farming so that the fellow feeling, if we may so term it, called forth in other investigations, is here wanting.

At this late hour it is of course out of the question to attempt to describe definitely how agriculture originated, but we can at least form some satisfactory idea as to the manner in which early man became a tiller of the soil.

Before proceeding with our investigation, we will see what savages or semi-barbaric nations believe to have been the creators of agriculture, and then briefly summarise the theories held by learned men on the question.

Savage Views.

To ascertain the views or ideas of savages on this subject we cannot do better than to pick out from their numerous deities

those whose good or ill will affected in any way the cultivation of the soil. The Nahua nations had a god of cereals—Centeotl, and a goddess of provisions—Chicomencoatl, to whom they made offerings, and in whose honour they fasted once a year for four days (H. H. Bancroft, "Native Races of the Pacific States," New York, 1875, II, 317). The Mayas had innumerable agricultural gods, among whom were Chac and Yzama, the gods of the corn-fields (*ibid.*, 691) Ekchuah and others, the patron gods of the cocoa-planters, and Chichac Chob and others, the gods of plentiful harvests (*ibid.*, 701-3). But the great god or goddess of this part of the world was Centeotl—the goddess of agriculture in whose honour very great festivals were held (*ibid.*, III, p. 349). The Peruvians evidently regarded the Sun as a great god of agriculture (Lasso de la Vega, Roy. Com. Pt. 2, Bk. vii, p. 257). At his festival the Inca himself presided (Prescott "Hist. Cong. Peru," London, 1878, p. 63), and turned the soil in order to show what a worthy occupation that of the husbandman is. At Sennaar, James Bruce tells us ("Travels in Abyssinia," Nimmo's Pop. ed., p. 255), the king was obliged once a year with his own hand to plough and sow a piece of land. Evidently among these people and the Peruvians, agriculture was held in exceptional respect. The Finns are said to have been taught agriculture by Wainamöinen, the son of the lord of the vault of air (A. Lang, "Custom and Myth," p. 163). The Lingga Dyaks have a good spirit, Pulang Ganah, who gives fertility to the earth, and "to him are addressed the offerings at the feasts given while preparing rice cultivation" (Spencer St. John, "Life in the Forests of the Far East," 1862, I, p. 60). They say rice was the gift of heaven, and describe how it came to be cultivated (*ibid.*, p. 202). Some of the African agricultural tribes offered pombé and sometimes a goat or a fowl to their crop-protecting idols (V. L. Cameron, "Across Africa," 1877, I, p. 330). The Rev. W. Ellis informs us that at Tahiti there was a god of agriculture, and he gives a circumstantial account of the mythical origin of the bread-fruit tree ("Polynesian Researches," 1831, 2nd Ed., I, p. 68), while from Mr. Im Thurn ("Among the Indians of Guiana," 1883, p. 252) we learn that the British Guiana Indians originally obtained cassava from heaven. According to Herodotus (Mel. 5) the Scythians believed they had obtained the plough from the same sphere. And Mr. E. B. Tylor mentions that Pheebee Yau, the Ceres of the Karens, "sits on a stump and watches the growing and ripening corn;" and that the Khonds worship "Bürbi Pennu, the goddess of vegetation, and Pidzu Pennu, the rain god. Among the Finns and Esths, it is the earth-mother who appropriately undertakes the task of bringing forth the fruits, &c., ("Primitive Culture," II, p. 278). The hill tribes of Goomsur and Boad have an earth

goddess to whom they offered living human sacrifices (John Campbell, "Personal Narrative of Thirteen Years' Service among the Wild Tribes of Khondistan," Lond., 1864, pp. 51 and 56). According to H. M. Stanley ("Through the Dark Continent," I, pp. 345-6) the Waganda appeared to have believed that their ancestor Kintu brought the art of agriculture with him when he entered and settled in the country. There is, in fact, no limit to the list of gods of agricultural peoples.

That all tribes or races who have made some progress in the art of cultivation of the soil should have imaged a deity or deities whom they worship for the sake of protection or aid in their labours was to have been expected. But the Scythians, Dyaks, Tahitians, Guiana Indians, and Peruvians, appear also to believe that their gods taught them or supplied them with a knowledge of the element of agriculture. This fact might be construed to mean that there exist traditions among these races, of heroes, who in past times taught their ancestors the art in question; in other words, that agriculture did not originate with them but was introduced. Unfortunately, as Sir J. Lubbock has pointed out ("Pre-historic Times," 1878, p. 437), tradition at best "is untrustworthy and shortlived."* So much then for savage explanation.

Modern Views.

We now come to contemporary views on the subject, held by men who have given this question their attention, or, who have otherwise studied the development of early man. Dr. Dan. Wilson, in the first edition of his "Pre-historic Man" (1862, II, p. 466), speaks of agriculture "following closely in the wake of the domestication of animals by pastoral man," and C. G. Anton ("Gesch. der Deutschen Landwirthschaft," Görlitz, 1799, pp. 10 and 11) seems to incline to a similar belief. As we have already seen, the pastoral tribes of the old world look upon agriculture with positive contempt. But perhaps we are not wrong in saying that the idea is generally entertained that the origin of agriculture is intimately connected with the domestication of animals. We cannot, however, find any evidence to warrant such a belief.

Mr. Bailey describes the tamed buffalo and dog in use by the Wild Veddahs ("Wild Tribes of the Veddahs of Ceylon,"

* In "The Trustworthiness of Early Tradition," by Brooke Herford (pp. 158-169, vol. lii, *Atlantic Monthly*, 1883), an attempt is made to prove that in pre-historic times traditions were most carefully handed down by men regularly employed in teaching younger members the songs of their forefathers. Amongst races who have attained a high state of civilisation without however attaining to the art of writing we may accept tradition as more or less correctly handed down to us, but our knowledge of savages certainly does not in any way lead us to conclude that their traditions are similarly to be relied upon.

Trans. Ethnol. Soc., 2nd Ser., II, pp. 286–288) but all accounts of the Village Veddahs (Knox, Tennent, Davy) are silent as to the domesticated animals of these semi-agricultural tribes. The ancient Peruvians domesticated the llamas but only to use them as beasts of burden and not as draught-cattle (Lasso de la Vega, *op. cit.*, Bk. 8, ch. xvi and xvii). The agricultural tribes of Brazil have tame birds in large quantities (A. R. Wallace, "Narrative of Trav. on the Amazons," 1853, p. 305), but according to Mr. H. W. Bates ("Naturalist on the River Amazons," 1863, I, 191) the Brazilian aborigines, even those who cultivated the soil had "no notion of domesticating animals for use." Most of the North American tribes seem to have had domesticated dogs; the inhabitants of Terra Florida (F. de Soto, Vol. ix, Hakluyt Soc., pp. 49, 56, 61) had domesticated dogs and fowls; and the Nahua nations domesticated several species of animals and birds (H. H. Bancroft *op. cit.*, II, 353). The Bushmen and Australians have also domesticated dogs (Darwin, "Variation Anim. and Plants under Domestication," 2nd Ed., I, p. 24). Indeed, excepting only the Andamans (E. H. Man, "Aborig. of Andaman Is." 1885), it is doubtful whether any savages have existed to our knowledge without having domesticated animals or birds of some sort. Sir John Lubbock ("Pre-historic Times," 1878, p. 600) considers it "most probable that the dog was long the only domesticated animal." He enumerates the uses to which the dog was put thus (*ibid.*, p. 571): "The Esquimaux forced him to draw the sledge; the Chinook kept him for the sake of his wool; the South Sea Islanders, having no game, bred the dog for food; the Chonos Indians taught him to fish [and to catch birds]" and so on. Here we have the earliest known domesticated animal put to a variety of uses by people who *are*, and by people who are *not* tillers of the soil. We have thus examples of early domestication of animals without a coeval husbandry, but no examples (as far as we can ascertain) of an early agriculture without a co-existent domestication of animals. It is therefore probable that while agriculture followed domestication there is no connection between the two arts. But their order of rotation indicates the steps of mental progress involved. The taming of an animal is quicker, and therefore easier, of accomplishment than the cultivation of a crop and it is therefore to have been expected that the domestication of animals should precede agriculture. In other words we may say that the agricultural state did not necessarily arise out of or succeed the pastoral state, but that the former is merely indicative of greater advance towards civilisation than the latter.

In his "Prehistoric Annals of Scotland" (Lond., 1863, I, 490),

Dr. Wilson says: "In every step of human progress tools have been the first requisite; and efficient implements are so indispensable for any extensive culture of the soil that we can have little hesitation in assigning the birth time of true agriculture to an early epoch in the period of the metallurgic arts." Is this so? Mr. T. Williams ("Fiji and the Fijians," I, p. 63) describes the Fijian plough as "a stick not larger or longer than the handle of an ordinary hay fork. The bark is kept on, except at the end which is used for digging, and which is tapered off on one side after the shape of a quill toothpick." In New Zealand where "the field rivals any in Europe," E. Dieffenbach ("Travels in New Zealand," II, 123) states that the land is "dug up with a pole, which has a foot piece firmly attached to it, and which is used in the same manner as our spade;" he adds, "sometimes a hoe is used, formed of Lydian or green stone fixed to a handle." Amongst the Nahua nations (Mexicans, etc.) three instruments were used in cultivating the soil: one "was a kind of oaken shovel or spade, in handling which both hands and feet were used," a second "was a copper implement with a wooden handle, used somewhat as a hoe, etc.," but "a simple sharp stick, the point of which was hardened in the fire, or more rarely tipped with copper, was the implement in most common use" (H. H. Bancroft *op. cit.*, II, 248). Lastly, according to Lasso de la Vega (*op. cit.*, xlv, p. 8) the Peruvians had an implement or spade which was simply a sharp pointed stake, traversed by a horizontal piece and worked by six or eight men. These instruments were all efficient, that is to say, the natives carried out their work successfully, and by their means the agriculture in which the tillers were employed was already of a high standard. With the exception of the Nahuas, the nations using them were still deep in the stone age.

Monsieur Joly ("Man before Metals," 1883, p. 253) says: "In order to discover the first distinct traces of the culture of the fields, we must go back to the time of the builders of the lake cities of the Neolithic age." Dr. Pickering ("Races of Man," 1851, ch. xix, Origin of Agric.) was more interested in throwing light on the question: *Where* did agriculture originate? a question generally considered to be of more importance than the one immediately before us, *How* did agriculture originate? He believed that agriculture had its origin on the tablelands of Mexico, Peru, Thibet and Abyssinia, apparently on account of the freedom from forest and the regular climate, for he says (p. 309), "Supposing a useful plant to be discovered, its cultivation would require a clearing which seems too complex an idea for a first suggestion. On the other hand, the aridity of most open countries precludes cultivation, unless with the aid of irrigation."

But it does not follow that the discovery of a useful plant should lead to its cultivation. Were this the case the men who planted could not be in the low state implied, and the cleaning of the land or a system of irrigation would not present difficulties.

Mr. E. B. Tylor ("Anthropology," London, 1881, p. 214) does not consider agriculture an out-of-the-way invention; he believes that "the rudest savage, skilled as he is in the habits of the food plants he gathers, must know well enough that if seeds or roots are put in a proper place in the ground they will grow," and he considers that it is "rather from roving life, bad climate, or sheer idleness, that so many tribes gather what nature gives, but plant nothing." Undoubtedly, every savage knows the edible fruits and roots in his district, that they have their localities and seasons but from what we shall see of his mental inactivity it is to be doubted whether he ever thinks at all about the conditions of plant reproduction. The state we describe as his idleness has also much to do with his neglect of agriculture, but then to a certain extent, this defect is compensated for by the extra amount of labour he imposes on his woman. Perhaps we have misunderstood Mr. Tylor's meaning, but to speak of a bad climate is, if we may be permitted to say so, to use an unhappy term, its meaning being too relative to apply to the question before us. If a climate be so bad as to prevent the first growth of any edible plants, then, of course, man could not be expected to grow them, but we have here not to deal with impossible conditions, and we may take it for granted that wherever a plant is indigenous, the climate, however bad, would not prevent its cultivation. We hope also to show that in the early days of agriculture roving habits were not necessarily obstructive factors.

Mr. Darwin's theory ("Variation of Animals and Plants, etc.," 2nd ed., 1885, I, pp. 326-7) may be condensed thus: "The savage inhabitants of each land having found out by many and hard trials what plants were useful . . . would after a time take the first step in cultivation by planting them near their usual abodes," and he quotes Livingstone and Du Chaillu as having seen wild fruit trees which had been planted by the Batokas and other savages. "The next step in cultivation, and this would require little forethought, would be to sow the seeds of useful plants," then "an unusually good variety of a native plant" being grown on the manured soil near the hovels "might attract the attention of some wise old savage; and he would transplant it, or sow its seed." Mr. Darwin considered that "transplanting any superior variety, or sowing its seeds, hardly implies more forethought than might be expected at an early and rude period

of civilisation," and he quotes as possible evidence in this direction the West Australian law mentioned by Sir George Grey "that no plant bearing seed is to be dug up after it has flowered" ("Journals of Exped. in N. and N.W. Australia," 1841, II, 292). The law mentioned by Sir George Grey loses considerable importance when read by the following statement of Mr. A. C. Gregory, the well-known explorer, in reference to that law amongst these same Australians: "A native discovering a *Zamia* fruit unripe will put his mark upon it, and no other native will touch this; the original finder of the fruit may rest perfectly certain that when it becomes ripe he has only to go and fetch it for himself" (see Appendix I). This would lead one to suppose that Grey's law was a local one in the early stages of the development of property rather than one intended to affect the general future welfare of the tribe.*

Monsieur A. De Candolle, judging by the Australians and Patagonians ("Orig. of Cultivated Plants," Lond., 1884, p. 2), says that the lowest savages do not entertain the idea of cultivating plants if they consider that the plants are not productive and easy to rear; he also considers as other necessary conditions "a not too rigorous climate; in hot countries, the moderate duration of drought; some degree of security and settlement; lastly, a pressing necessity, due to insufficient resources in fishing, hunting, or in the production of indigenous and nutritious plants."

Dr. Pritchard ("Researches into the Physical History of Mankind," vol. v., p. 301), agreeing with Mr. Gallatin, says that the art of agriculture "was not communicated to the Americans from the Old World. This opinion is based on the fact that maize, the staple of American agriculture, is indigenous to the New World, supported by the fact that the despotic system in vogue there was favourable to its origin.

The Conditions Necessary for a Predisposition to Cultivate the Soil.

When we examine the intricate conditions under which agriculture is carried on amongst us at the present day, it becomes

* The Lampongs, a settled agriculture race, have a similar method of marking wild dammar trees and thereby becoming owners thereof (H. O. Forbes, "Naturalist's Wanderings," Lond., 1886, p. 136), and of the wild hunting Kubus in Sumatra the same author tells us, "When traversing the forest, if one of them, on finding a bee-infested or a dammar-yielding tree, clear the brush around it, make one or two hacks in the bark, and repeat a form of spell, it is regarded by the others as his possession, which will be undisputed. This is the only property, if such it may be called, that they possess" (*ibid.*, p. 242).

Among the Abipones (Dobrizhoffer "Gesch. d. Abiponer," Vienna, 1783, vol. ii, p. 138) animals or birds caught, or fruit found, belonged to him who first caught or found them.

a matter of no small difficulty for us to imagine a period when man should have raised food from the soil without any of the, to us apparently essential, pre-suppositions having been complied with. With us, apart from the primary indispensability of a suitable climate and soil, we see that the farmer requires security from domestic and foreign foes, in other words a reliable government, a certain amount of capital and labour, freedom from animal pests, a fixed settlement and—that primary incentive to toil in civilisation—want. Eliminating capital and labour, we will proceed to ascertain how far these conditions are fulfilled among agricultural savages at the present day, and to what extent they were likely to have been fulfilled at the period when man discovered how to cultivate the soil, or when circumstances so developed themselves that man passed insensibly into the agricultural age. If we begin with the obstruction to cultivation caused by the ravages of animals and vegetable parasites and thieves, we find that some of these pests can be overcome, but that in the presence of others, man appears to be helpless. Caillé (“Travels through Central Africa,” 1830, I, p. 308) calls attention to the fact that the Foulahs, an advanced nation of husbandmen, “bring their fowls with them into the fields to eat up the insects.” E. Dieffenbach mentions that the Maories collected the caterpillars which destroyed their crops (“Travels in New Zealand,” II, 124), and Captain Speke (“Journey of the Discovery of the Source of the Nile,” p. 93) says that at Karague the natives in order to save themselves from starvation caused by the depredations of sparrows, “were obliged to grow a bitter corn which the birds disliked.” On the other hand, there are pests which savages have not been able to overcome. Dr. H. Barth (“Travels and Disc. in N. and C. Africa,” IV, 319 and 323) refers to the destructiveness of the black and red worms. On the Amazons (Mr. H. W. Bates, *op. cit.*, I, p. 128), the Saüba ants are so destructive that the inhabitants said “it was useless trying to grow anything thereabouts,” and Mr. Thos. Belt (“The Naturalist in Nicaragua,” 1873, p. 77) gives a similar account of the leaf-cutting ant at St. Domingo. Mice are also heavy tax-gatherers (Livingstone, “Second Journey,” Lond., 1875, Pop. ed., p. 164). Rats and mice are so destructive to rice-fields that the Dyaks have to select new ground every four or five years (C. Bock, “Head Hunters of Borneo,” p. 201). Neither is man free from the larger pests. At Ehetilla, Sir S. Baker (“Nile Tributaries of Abyssinia,” new ed., 1880, p. 173) describes how the elephants destroyed the dhourra crops, and Capt. Cameron (*op. cit.*, I, p. 322) records that where a “large herd of elephants had passed, the scene of destruction was amazing.” Finally Bradley

("Travel and Sport in Burmah, &c.," 1876, p. 123) tells how the rhinoceros, as well as elephants and buffalo, "often nearly ruin the villagers by breaking into the rice and maize fields," and he also mentions that tigers were in one district so destructive to human life as to drive the husbandmen to seek fresh quarters (p. 66).^{*} There is no end to examples of this class, and as these hindrances to agriculture still exist in semi-civilised and sparsely-populated countries, as well as, to a limited extent, with us at home, it is not unreasonable to infer that the efforts of man from the time of his earliest attempts to grow crops have been similarly obstructed.

We come then to the conditions of general absence of security to life and property from foreign foes. Throughout the early part of his narrative Captain Speke refers, page after page, to the ravages committed by the Watuta; Bates (*op. cit.*, II, p. 124) speaks of the destruction of the plantations of the Mundurucus by the Pararuates, and Capt. Bruce (*op. cit.*, p. 188) tells us how the Abyssinian agriculturists had been driven to the mountain tops. Livingstone describes ("First Exped.," Pop. ed., p. 36) how the agricultural Bakalahari were hunted south, and ("Second Journey," Pop. ed., p. 397) how the country was destroyed by the Ajawas. Mungo Park ("Travels in the Interior of Africa," ch. viii, p. 87) refers to the utter destruction caused by African wars, and Capt. Cameron (*op. cit.*, pp. 278-9) tells a similar story. Spencer St. John (*op. cit.*, II, p. 29) refers to the annihilation of agricultural districts by the Kayan head hunters. The pages of Dieffenbach's "Travels in New Zealand" give us similar pictures. In Fiji and Tahiti (Williams, *op. cit.*, pp. 43 *et. seq.*) matters were not much better. There is, in fact, hardly a book on travels in savage or barbarous countries which does not bear evidence of the destruction to agriculture by invading tribes, and yet, in spite of them all, agriculture has continued to progress. Indeed Mr. H. H. Johnston ("The Kilima-njaro Expedition," London, 1885, p. 405) gives us a graphic description of the manner in which a warlike race, the Masai, after turning the country into a wilderness, have almost, in spite of themselves, taken again to agriculture.

With regard to the protection afforded to private property as an inducement to cultivate the soil, this is a question which hardly affects our inquiry, for in early days it is doubtful whether there existed an individual right in agricultural produce. "Judging from the evidences in so many countries of the

^{*} In Java villages are also sometimes deserted by the inhabitants owing to tiger attacks, (see Arthur Adams, "Travels of a Naturalist in Japan and Manchuria," p. 49).

existence of village communities holding land in common," Sir John Lubbock ("Orig. of Civil.," 4th ed., p. 456) concludes that "there seems strong reason to suppose that in the history of human progress the individual property in land was always preceded by a period in which moveable property alone was individual, while the land was common. It is difficult to imagine that since the land was common, that the produce was not likewise common." As evidence in this direction we may cite the case of the Australians who divide the spoil of the chase or the gin's vegetable collections without any reference to the individuals who obtained them. The North American Indians, the Peruvians, the Chittagong Hill Tribes, the Borneans, and the South Sea Islanders, all appear to have cultivated in common, and to have possessed common rights in the produce.

Then as to a settled abode. When we look into history we find nations were apparently ever given to wandering. After a while wanderings become restricted. The Khirghiz, ancient nomads, are now bound in the steppes by certain limits, beyond which they cannot roam without coming into collision with other hordes (E. Schuyler, *op. cit.*, I, p. 37); they have also fixed summer and winter quarters. Of the Kurdish tribes (the Kochas) Mr. A. H. Layard (*op. cit.*, p. 191) says they change encampments according to season; they go to high peaks in summer, and to the low grounds of Tigris and Zab in the winter. The Wahumba, a branch of the great Masai nation, move, according to Capt. V. L. Cameron (*op. cit.*, I, 121), "from place to place in search of pasture" for their cattle. Brough Smyth, in his work on "The Aborigines of Victoria" (Melbourne, I, p. 123) says "it is necessary for a tribe to move very frequently from place to place, always keeping within the boundaries of the country which it calls its own—now to the spot where eels can be taken, often to the feeding grounds of the Kangaroo," &c., &c., and Sir George Grey (*op. cit.*) in describing the roots eaten by the West Australians says, "some of these are in season in every period of the year, and the natives regulate their visits to the different districts accordingly." The Obongos (Du Chaillu, "A Journey to Ashango Land," 1867, 322-3) similarly wander in search of vegetable foods and wild animals. The Negritos, the supposed aborigines of the Philippines, have no fixed abodes "but shift from place to place within a circumference of four or five leagues" (Sir John Bowring, "A Journey to the Philippine Islands," 1859, p. 171). In Borneo we have the wandering Pakatau and Punau, who move to a new spot "when they have exhausted the jungle around of wild beasts and other food" (Spencer St. John, *op. cit.*, I, p. 45). To go to the New World, we find that the Abipones roam from one district to another accordingly as they

found their food (Dobrizhoffer, "Gesch. der Abiponer," Vienna, 1783, Vol. II, 139). The Nehannes spend the summer on the coast and the winter inland (H. H. Bancroft, *op. cit.*, I, p. 125). The Haidahs have temporary dwellings for the summer, besides permanent well-guarded villages (*ibid.*, p. 169), and the same may be said of the Nootkas (*ibid.*, p. 183). The aborigines of Florida were, according to De Vaca ("Hist. of America," W. Robertson, 1822, II, p. 386), great wanderers, and Capt. R. W. Coppinger says the Fuegians have seasonal changes of dwelling ("Cruise of the Alert," 1883, p. 195).

In all the above cases—and there is no end to them—the tribes wander either for the sake of food for themselves or for their flocks. We can understand their doing so well enough. But it astonishes us not a little to meet with tribes who cultivate the soil, and who if not exactly wanderers like the Fuegians and Australians, are at least wanting in what we call fixed settlements. J. Pallme ("Travels in Kordofan," 1844, p. 88) tells us that owing to the scarcity of water "there are certain districts in Kordofan, the agricultural population of which inhabit two different villages in the year," one in the wet season for cultivation, and one in the dry season to be near the wells, and Mr. H. M. Jenkins, F.G.S. (privately communicated) informs us that something very similar to this exists in Norway and Sweden to this day. The Coroades in the Brazils who cultivate the soil, "very commonly quit their abodes and settle where new fruits are ripening, or where the chase is more productive (Spix and Martius, "Travels in Brazil, II, pp. 248 and 257). Mr. Im Thurn (*op. cit.*, p. 252) refers to the periodical desertion of their fields by the Indians, and which movement he ascribes to superstition. According to D'Albertis ("New Guinea," Lond., 1880, I, p. 218) some of the natives of New Guinea on the death of the head of the family, forsake house and plantation and build a new house and prepare a new plantation some distance away from the old home. Some of the Maories were nomadic agriculturists (Dieffenbach, *op. cit.*, I, p. 120). The Ainos, we are told by Miss I. Bird ("Unbeaten Tracks in Japan," 1881, II, p. 62), are continually exhausting and clearing fresh land. The Dyaks do not desert their farms because the land is exhausted, but because it is less trouble to cut down fresh jungle than to eradicate the weeds which have sprung up after the padi has been gathered ("Sarawak," by H. Low, 1848, p. 231). Sir Emerson Tennent ("Ceylon," II, 443) states that "the Village Veddahs, who hold a position intermediate between the Rock-, or Wild-, and the Coast-Veddahs, are still migratory in their habits, removing their huts as facilities vary for cultivating a little corn and yams." Of the Chittagong hill tribes, Capt. T.

H. Lewin ("Hill Tribes of S. India," p. 40) tells us: "The site of the village is changed as often as the spots fit for cultivation in the vicinity are exhausted." The Tsawkoo Karens abandon both villages and plantations after three years' cultivation (A. R. McMahon, p. 279, "The Karens of the Golden Chersonese," London, 1876.) The Lepchas are nomadic agriculturists who remain as long as three years in the same locality (E. T. Dalton, "Descriptive Ethnology of Bengal," 1872, p. 101). The Juangs (*ibid.*, p. 154) "are still semi-nomadic in their habits, living together in villages during a portion of the year, but often changing the sites, and occupying huts in the midst of their patches of cultivation, whilst crops are on the ground." Finally, the Santals are so fond of the chase that "when through their own labour, the spread of cultivation has effected this denudation [of the forests] they select a new site, however prosperous they may have been in the old, and retire into the backwoods" (*ibid.*, p. 208).

There are more explanations than one of the continued existence of wandering habits among semi-agriculturists. The roving disposition may be due in part to the old customs of a passing state in which perhaps search for food and superstition in connection with death, on which occasion many tribes think it necessary to shift their quarters, may have much to do. But it is probably rare that cultivated land is deserted on account of its arriving at the state described as "exhausted," *i.e.* when crops can no longer be grown in consequence of the withdrawal, through too much cultivation, of their food constituents, for savages do not cultivate on such an intense system as to bring about that state of the soil. Indeed, Sir John Lawes (see Appendix IV) says well when he tells us that exhaustion means more particularly that weeds have choked the growing crop. In some parts of Sumatra it would appear that the alang-alang grass takes possession of the cultivated ground, and drives the Lampongs to clear forest land which does not give such good crops of rice as the other level lands (H. O. Forbes "Naturalist's Wanderings," p. 131). But there appears to us to be considerable justification for believing that savages may have searched for fresh lands when their soils have arrived at that condition which farmers express by stating that for particular crops the soil loses its productive power. This condition is due to unnatural causes brought about by cultivation, and which a brief reference to Darwin's "Variation of Animals and Plants under Domestication" (2nd ed., 1885) may help to explain. Darwin has pointed out that in natural selection the variation is for the benefit of the plant or animal undergoing change, whereas with

cases of selection by man the variation is brought about for man's benefit and not for that of the creature that man for the time being is tampering with, and that as a consequence a weakened constitution may attend such domestication (*op. cit.*, II, 232). This is the reason why at the present day crops of turnips or clover cannot be grown consecutively on the same land, a reason which is confirmed by the fact that agricultural chemists do not consider the unsuccessful continuous growth of these crops to be due to withdrawal of the proper food constituents. It may be objected, how is it then that wheat can be grown tolerably well continuously on the same soil? The answer is that wheat, having been cultivated so many thousand years—over 5000 at least (we are unable to trace the original wild species)—has, through time, to a considerable extent overcome this weakness, whilst the turnip, which has barely been an agricultural crop for two hundred years, has not yet had time to adapt itself in the same degree to altered circumstances as wheat has. To continue, Darwin was inclined to think that when cereals were first cultivated the ears and grain may have “increased quickly in size in the same manner as the roots of the wild carrot and parsnip are known to increase quickly in bulk under cultivation” (*op. cit.*, I, 338). Therefore, when cultivation had already become a fixed art, the crop cultivated improved in quality, but then came the weakened stage during which the more enlightened savage agriculturist, giving way also to old tradition, forsook the old soil and searched for new.*

We now come to a very potent factor, and one to which most people would ascribe the savage's first attempt at cultivating the soil—namely, want of food. We are so accustomed to look forward to the morrow that it becomes difficult for us to conceive the existence of a people who give it no thought. To us it seems strange that any man knowing he has no food for the next day should either devour the whole of his present stock or not take any other precaution towards securing the necessary supply until the necessity makes itself painfully apparent.

* The preference of the savage for forest as against prairie soil has different explanations. Sir John Lawes (Appendix IV) tells us that the prairie soil is the richer of the two. This would imply that the savage does not know how to make the best of his surrounding conditions. It may be so; but the preference has a very reasonable explanation. We must remember that the burning of dense forest, leaves the ground comparatively much cleaner than burned grass land, and whilst on the former, vines and undergrowth spring up slowly and do not at first obstruct the crop to any extent, on the latter the grass comes up thicker than before, and people unfurnished with the broad or more modern hoes cannot cope with it. The Dyak explanation previously referred to is therefore a good one.

Whatever may be our preconceived notions, we shall now see that savage man does not trouble about his to-morrow's meals, any more than does a beast of the field. Mr. E. M. Curr, who spent some twenty years in daily contact with native Australians, emphatically records his opinion ("Recollections of Squatting in Victoria," 1883, p. 262) as follows:—"It is a noteworthy fact connected with the Bangerang, and indeed, as far as I am aware, with the whole aboriginal population (notwithstanding what Captain Grey asserts to the contrary in connection with the blacks of West Australia) that as they neither sowed nor reaped, so they never abstained from eating the whole of any food they had got, with a view to the wants of the morrow. If anything was left for Tuesday, it was merely that they had been unable to consume it on the Monday. In this they were like the beasts of the forests. To-day they would feast—aye, gorge—no matter about the morrow. So also they never spared a young animal with a view to its growing bigger." Dr. Robertson (*op. cit.*, II, p. 97) quoting from Dr. Edward Bancroft, who visited Guiana at the close of the seventeenth century, says of the Indian, who then, as now, cultivated yams, "he is then least solicitous about supplying his wants when the means of satisfying them are most precarious and produced with the greatest difficulty." The testimony of a traveller two hundred years later proves that that Indian is still the same improvident being (Im Thurn, *op. cit.*, p. 253). De Vaca, who spent nine years among the savages of Florida, describes how these wanderers were always in want of sufficient food (Robertson, II, p. 386). Of the Hottentots, who had been taught something already by the missionaries, W. J. Burchell ("Travels in Interior of South Africa," 1822, I, p. 365) complains, "Some of the people cultivate a little corn, but so foolish and improvident are they, that as soon as the harvest is gathered in, they eat, I may almost say, night and day, till the little they have is devoured." He adds that they are always either in a state of feast or fast. Of the Bachapins he says (*ibid.*, i, p. 588), "that although agriculture is considered important, it is not carried far enough to put the natives in plenty, and they often suffer want." Speaking of an agricultural tribe of Arabs, James Hamilton ("Wanderings in North Africa," 1856, p. 115) bewails a similar want of foresight. In a description of the Columbians (H. H. Bancroft, *op. cit.*, I, 267) we are told, "Life with all these nations is but a struggle for food." Yet it was the missionaries who introduced agriculture among them, and the same author in an account of the wild tribes of Central America (*ibid.*, I, 722), tells us: "No regularity is observed in eating, but food is taken at any hour, and with voracity; nor will they take the trouble to procure

more, until the whole stock is consumed and hunger drives them from their hammocks. The Poyas and Guajiqueros seem to be the only tribes who have any idea of providing for the future." The New Mexicans (Apaches and others) making more or less pretensions to agriculture, seldom "raise a sufficient supply for the year's consumption (*ibid.*, I, 487)." Even the Mexicans were an improvident people and want was no stranger to them (*ibid.*, II, 347). Although agriculturists, the Malays, "as in all parts of the interior, have barely enough food for their own consumption" (C. Bock, *op. cit.*, 1881, p. 118). Major W. F. Butler ("The Great Lone Land," p. 362) reports on the half-breeds of Manitoba: "Even starvation, that most potent inducement to toil, seems powerless to promote habits of industry and agriculture;" he refers to the great privations these men undergo, and adds that *like the Indians*, "they refuse to credit the gradual extinction of the buffalo, and persist in still depending on that animal for food." Although the dying out of the bread-fruit trees with the Tahitians, their staff of life, was pointed out to the natives by the missionaries, the Rev. W. Ellis (*op. cit.*, I, p. 33) informs us that they could not be induced to plant fresh ones. Finally Livingstone, records how foolish the African tribes thought him when he occasionally deposited "date seeds in the soil" ("First Expedition," Pop. ed., 1875, p. 176).

On the other hand, we have a few instances where a minimum of forethought concerning food is exhibited. Mr. Darwin noticed (*op. cit.*, I, p. 327) "that the Fuegians when they find a stranded whale bury large portions in the sand." And we have the case of the Poyas and Guajiqueros already referred to. The Esquimaux store up large quantities of meat for winter's use, and the Wapato and other Hyperboreans (Bancroft, *op. cit.*, I, p. 234) to some extent, preserved nuts, berries, &c., also for winter's food. The Wild Veddahs were said to preserve flesh in honey in hollow trees hermetically sealed with clay (R. Knox, "An Historical Relation of Ceilon," 1681, p. 63.) Mr. Darwin (*op. cit.*, I, p. 325) quotes Sir Joseph Hooker and Sir Andrew Smith in order to show how savages occasionally suffer from famine, but there is no instance on record in which a savage race was driven to cultivation by want of food, nor are we likely to discover such an instance.

In a case of vegetable and fruit famine, when the otherwise neglected wild food begins to affect man and beast, savages commence to poach on their neighbours' grounds, and, being repulsed, take to eating the weaker members of their own tribe, as is done to this day in Australia. A succession of famines, or even a prolonged one, necessarily leaves more available food afterwards for the survivors and hence any lurking idea that

K

there exists a necessity to cultivate the ground would be successfully dissipated. Allowing that a savage, wiser than the rest, had an inkling that the cultivation of vegetable fruits might help to avoid disastrous dearth, it is very doubtful whether he would have the power to enforce his views, for, after all the chiefs of savage races such as the Australians, Fuegians and Bushmen, can exert little influence over their co-members beyond the enforcement of tribal customs. The question of a sudden introduction of agriculture can in our view be only connected with a state of comparatively high mental activity in the savage. It will, therefore, be useful to glance for a moment at his mental state.

In his detailed account of the life of the Fuegians ("Fitzroy's Journal of the Voyage of the Beagle," III, ch. xi, p. 239) Darwin says: "We can hardly put ourselves in the position of these savages to understand their actions," the difficulty being due partly to our want of knowledge of these people, and partly to the fact that they apparently cannot or do not reason. We are told of the Bushmen (W. J. Burchell, *op. cit.*, I, p. 365) "that whether capable of reflection or not, these individuals never exerted it," and Spix and Martius say, unfortunately the Indian is so unaccustomed to exercise his intellectual qualities that it is very difficult to obtain satisfactory information from him. As final and thoroughly reliable evidence regarding the inactivity of the savage intellect, we may accept the conclusions arrived at by Sir John Lubbock, in his introductory chapter to the "Origin of Civilisation." On page 7 he states, "Though savages always have a reason, such as it is, for what they do and what they believe, their reasons often are very absurd;" and on page 9, "Again, the mind of the savage, like that of a child, is easily fatigued, and he will then give random answers to spare himself the trouble of thought." Hence a savage mind is not likely to grasp the real position which would arise from cultivation of the soil, and which would be the inducement to turn to husbandry. So that if we allow that famine or forethought for food induced the savage to turn agriculturist we should be crediting him with a power of immediate adaptation to circumstances which he does not possess.

The Position of Women and their Connection with the Soil.

Amongst the rudest tribes we find a well defined division of labour between the sexes. The men do the hunting and fishing, and the women the cooking and the general work which goes under the name of drudgery. The women, being the weaker sex, are also terribly knocked about. Sir John Lubbock, in

summing up the evidence of travellers on the position of the women, says :—"Their wives, or dogs, as some of the Indians [of North America] call them, are indeed well treated as long as they do all the work and there is plenty to eat ; but throughout the continent, as indeed among all savages, the domestic drudgery falls to their lot, while the men hunt and make war, &c." ("Prehistoric Times," p. 562), and on page 582 he refers to "the harsh, not to say cruel treatment which is almost universal among savages." There are a few exceptions to this rule. The Vedda's appear to treat their women with some sort of decency, and the Maori women held a not unsatisfactory position (*ibid.*, p. 479). Mr. H. Hale says that the Caroline Islanders, known for their peaceable disposition, treated their women almost as equals ("United States Exploring Expedition," 1846, VI, pp. 72-3), and according to Serpa Pinto ("How I crossed Africa," I, p. 341), the Ambuellas treat their women with some consideration, but, he adds, that as a rule among other tribes the women are the most abject slaves of their husbands. Mr. H. O. Forbes (*op. cit.*, p. 400) bears witness to the miserable position of the women among the Aléfurus. However, the consensus of opinion regarding the bad treatment and the slave-like position of the women among savages is so clear that we need make no further quotation.

The chase, snaring, and fishing are undoubtedly more pleasant pastimes than digging up yams or diving for sea eggs. There is an important savage pastime which we must not omit to mention. The letting of blood and the watching of the wretched victim as it shivers out its existence are pleasures in which savages revel. We have had to deal with aboriginal Australians and South Sea Islanders in Queensland, and have caught them in the act of playing with their prey in a very much crueller manner than a cat plays with a mouse. We have further evidence of this love for blood in the tortures the North American Indians inflicted on their prisoners ; in the horrible religious rites of the Mexicans ; in the Dyak head hunting expeditions ; in the cannibal feasts of Haïtians, Maories, Fijians and Tahitians, and in the blood-thirstiness which is met with in all parts of Africa. The men, being the stronger sex, reserve these pleasures to themselves, and to the women is thus left the work necessary to the welfare of the tribe, and in which, according to the men's notions, there is no fun. In one of his numerous works ("Onéota," Lond., 1845, p. 82) on the North American Indians, Mr. Schoolcraft says : "It is well known that corn planting and corn gathering, at least among all the still *uncolonised* tribes, are left entirely to the females and children, and a few superannuated old men" ; and, he adds, that this labour is not compulsory, but is looked

upon as a just equivalent for man's labour in the chase and defence. We would, however, be inclined to think that the men had very much the better part of the bargain. When a party or tribe of blacks on the coast range of Queensland shift camp, the men, women, and children spread out in a long line or semi-circle, driving all before them. No woman, excepting perhaps an old gin, will dare to throw her waddy at a started wallaby or kangaroo-rat, but she will call the attention of the nearest man or boy to its presence; and *vice versa* if a man pass an edible root, he will tell the woman next to him to dig it up. A man will pick berries to eat as he goes by, or climb a tree after an opossum, but when it comes to touching the soil, that is the woman's work. In other cases the women are sent out alone to gather vegetable food, while the men go out on the chase, or remain at their ease preparing for it, *i.e.*, repairing and making spears, &c.

As the women appear everywhere with the savage in his lowest known stage to be told off for all work in connection with the collection of vegetable food, it is more than probable that they rather than the men were the first to make tentatives towards acts which may be regarded as originating agriculture.

The First Step.

In speaking of the West Australians, Mr. A. C. Gregory explains that in digging up the wild yams, the natives "invariably re-insert the head of a yam, so as to be sure of a future crop, but beyond this they do absolutely nothing which may be regarded as a tentative in the direction of cultivating plants for their use" (*see* Appendix II). This step towards cultivation among savages is the earliest of which we have any knowledge, but it can hardly be considered to be the first step. How the women discovered that the yam heads alone would suffice for propagation is left open to conjecture. The heads might not have been so palatable as the full body of the yam, and to save themselves the trouble of carrying the whole to the camps the women probably left the cut off heads on the ground or in the holes, and these tops have then grown into good edible roots. For a considerable period, doubtless, the women would not take much notice of this fact, but (had not European immigration interfered) it is easy to imagine how to save themselves the further trouble of having to hunt for fresh yam fields, they would have poked the yam head into the holes, and later on kicked a little of the disturbed soil over them. Some of the Sakeys of the Malay Peninsula have arrived at this possible stage. They content themselves with poking the tubers of the

various vegetables consumed by them into soil which appears propitious without any previous preparation ("Perak et les Orang Sakeys," by B. de St. Pol Lias, Paris, 1883, p. 279). In this case cultivation, if one may so term it, has already become of some importance and the sort of the soil has become a consideration. These people have maize, which they do not appear to cultivate, and it is, of course—owing to maize being indigenous to America—of late introduction.

The first attempt or rather step towards the cultivation of grain may have arisen in a similar way to that of the West Australian yams. It is, however, probable that when man began to harvest and carry the crop to the camp many seeds were scattered on the track, and thus there would be some foundation for supposing that the cultivation of the edible grasses began near the home for the time being. The lowest form of the cultivation of seed-propagated crops is to be found among the Juangs (Dalton, *op. cit.*, p. 154), for with them the seed is "all thrown into the ground at once to come up as it can." But this stage of cultivation, crude as it is, records already considerable progress. In the harvesting of self-sown edible grasses, many of the seeds would be trodden slightly into the ground or covered with dust and being thus to a small extent preserved the ensuing crops would probably be improved ones, if not in quality at any rate in quantity. Later on the women might purposely cover up the seed or scratch it in with their digging sticks. And still later, as the Borneans do (Spencer St. John, *op. cit.*, I, p. 320) they would go a step further and put the seed in a hole made with a pointed stick, which act, in fact, amounts to dibbling. Further progress is exemplified by the Lepchas (Dalton, *op. cit.*, p. 101), who already scratch the upper layer of vegetable mould for the reception of the seed, and lastly real tillage is arrived at by digging the ground over, as we see it done by the Mandans with their hoes made of buffalo or elk shoulder blades (Geo. Catlin, "Illus. of the Manners and Customs of the North American Indians," 1866, II, p. 121). This development of the art of agriculture thus appears to proceed smoothly enough, but in practice it must have been an exceedingly slow one, for every progressive step, from the sole harvesting of the seed to its first rude sowing, means an advance in the mental powers of the savage adopting it. To this day some of the North and West Australians reap annually thousands of acres of panicum and grind it into meal (Gregory, *see* Appendix II), but they do not in any way cultivate this cereal. Dr. Ch. Pickering was astonished that "on the Sacramento River of California, where, by a singular approximation to the use of grain, minute seeds of grasses

and other plants constitute an article of food, the natives, nevertheless, have not advanced beyond gathering the spontaneous crop" ("Races of Men," p. 310). The Mongols of Ala-Shan rely for a very important portion of their sustenance on the sulhir grass (*Agriophyllum Gobicum*), which grows on the bare sand, and which Prezhevsky ("Mongolia, the Tangut Country," &c., 1876, I, pp. 233-5) calls the gift of the desert, but it is not cultivated. We need not be astonished at those people in not cultivating edible grasses which are of such great importance to them, for we find even well advanced tribes and nations relying upon similar wild growing food. Some of the Maories largely consumed the amylaceous seed covers of the *Elacocarpus hinau* (Dieffenbach, *op. cit.*, I, p. 399) and although agriculturists, they did not cultivate the plant, and Dr. H. Barth (*loc. cit.*, III, 447), mentions that among the Bagirmi, a settled agricultural nation, "rice is not cultivated, but collected, in great quantities after the rains."

Again the first step towards tillage of the soil would much depend on the nature of the plant which is the subject of the first experiment, if one may so term it. "When portions of the stem or tubes of the taro (*Arum esculentum*), are thrown away by the side of streams, they naturalise themselves easily" (De Candolle, *op. cit.*, p. 73). Cocoa nuts, when strewn about strike root and thrive (Dr. Karl Scherzer, "Voyage of the Novara," II, ch. i, p. 31). And we think a curious light is thrown on the manner in which plants successively became cultivated, by the Guiana Indian's statement (recorded by Im Thurn, *op. cit.*, p. 252), that when cassava was originally given them they tried at first to grow it by sowing the seeds and planting the tubers, and only succeeded in its cultivation by discovering at last that cuttings must be stuck into the ground. From this account we may infer that these Indians had already cultivated plants propagated by their seed or their tubers.

The Rotation in which Plants became Cultivated and the Homes of Agriculture.

The foregoing naturally leads to the question: Did the cultivation of edible seed-yielding plants precede that of edible root-plants? or perhaps it would be better to ask: Were plants which are propagated by their seed domesticated before plants which are propagated by tubers, cuttings, or suckers? We may not be able to answer this question, but we can throw some light upon it. The Aztec's chief agricultural products were the cacao-tree, maize, the banana, and the aloe (W. H. Prescott, "Hist. of Conq. of Mexico," 1878, ch. v, p. 66). The two first were

propagated by the seed, the latter two by suckers. De Candolle (*op. cit.*, p. 310) says Prescott was misinformed about the banana which came from Southern Asia. The North American Indians appear to have cultivated maize only, but they also gathered what is called a white turnip (G. Catlin, *op. cit.*, I, p. 56). The Peruvians cultivated maize, a grain resembling rice, the banana, the aloe, cassava, the potatoe, &c. (Prescott, "Hist. of Conq. of Peru," 1878, ch. iv, pp. 66-68), or in other words, plants propagated by seeds, suckers, cuttings and tubers, but not by sets. The British Guiana Indians (Im Thurn, p. 251) cultivate a large variety of plants; they appear to lack maize, but they possess other plants propagated by seed, such as tobacco. The aborigines on the Amazon (A. R. Wallace, *op. cit.*, 1853, p. 483) cultivated a similar variety of plants. According to Spix and Martius (*op. cit.*, II, p. 257) the Coroados had plantations of maize, mandioca, beans, etc.

De Candolle (*op. cit.*, pp. 380-382) considers sorghum to have its home in Africa, and to this day, where maize, wheat, or rice have not penetrated, sorghum continues to be the staple cultivated vegetable food of the Africans. We have not been able to ascertain that the aborigines of Africa ever cultivated any esculents but those propagated by seed.

Until the introduction of the potato, the Indo-Europeans seem to have contented themselves chiefly with cereals. But the Singhalese and Chinese, besides rice, must also have cultivated the yam, since that vegetable is supposed to have come originally from either of their homes (De Candolle, *op. cit.*, p. 438).

In the South Seas we have the Fijians who cultivate yams, sweet potatoes, taro (*Arum esculentum*) qai or masawe (*Dracæna terminalis*), the banana and plantain, the bread-fruit tree, and the sugar cane (Th. Williams, *op. cit.*, I, pp. 60-63), none of which are grown from the seed. Maize, tobacco, and the papaw were of course late introductions. The chief articles of vegetable diet of the Tahitians were the bread-fruit tree, the taro, the yam (*Dioscoria alata*), the sweet potato, and other roots (W. Ellis, *op. cit.*, I, pp. 41-47), and the cocoa-nut. The Maories' original vegetable foods consisted of taro, fern-root (*Pteris esculenta*), the vegetable berries of the *Dacrydium excelsum*, the pulp of a fern-tree (*Cyathea medullaris*), the sweet root of the *Dracæna indivisa*, &c. (Dieffenbach, *op. cit.*, II, p. 18), but travellers do not appear to have reported whether the natives cultivated any of the above except the taro and *Dracæna*. Mr. Thos. West ("Ten Years in South-Central Polynesia," 1865, ch. vi) gives some valuable information regarding the agriculture of the Friendly Islanders, whose cultivated plants resemble those of

the Tahitians. Thus, with the exception of the cocoa-nut, the South Sea Islanders appear to be wanting in esculents which are propagated by the seed, a fact which inclines to the supposition that in this part of the world agriculture had an independent origin.

For similar reasons we may infer that America, Africa and Asia-Europe were the original homes of separate systems of an indigenous agriculture, based on the manner of propagation of the various plants referred to.

To see how far and in what way a knowledge of agriculture may have spread, we must, for a moment, turn to the relations which existed, or which still exist, among independent savage races.

The Spread of Agriculture.

We are told that when Columbus landed at Cuba "all the inhabitants fled as he approached the shore" (W. Robertson, *op. cit.*, I, p. 129); the same at Hayti, where the inhabitants fled in great consternation towards the woods (*ibid.*, I, 132). At Dominica, Marigalante, Guadeloupe, Antigua, Puerto Rico, and several other islands, the Spaniards "never landed without meeting such a reception as discovered the martial and daring spirit of the natives" (*ibid.*, I, 157). When Juan Ponce de Leon tried to land in Florida he was vigorously opposed (*ibid.*, I, p. 272), and Juan Diaz de Solis lost his life in making a descent on Rio de la Plata (*ibid.*, I, p. 292). When Cordova discovered Yucatan he endeavoured by small presents to gain the goodwill of the people. The people invited him with every appearance of cordiality, but they set an ambush and attempted to destroy him and his followers (*ibid.*, I, 328). On the river Potonchan, near Campeachy, he and his sailors were attacked by the natives and almost completely annihilated (*ibid.*, I, 330). Captains Behring and Tschirikoff on their voyages of discovery in the year 1741 both touched separately on the north-west coast of California, "each set some of his people ashore; but in one place the inhabitants fled as the Russians approached, in another they carried off those who landed and destroyed the boats" (*ibid.*, II, p. 40). To come to other more uncivilised portions of the world, we find that in Ceylon the Veddahs are to this day averse to meeting with strangers (Sir E. Tennent, "Ceylon," II, p. 437). When Chatham Island was first discovered by Broughton (Capt. G. Vancouver's "Voyage of Discoveries," 1798, Vol. I), the natives behaved treacherously, and Capt. Fitzroy remarks on the treachery of the Fijians (*op. cit.*, II, ch. xxiii, pp. 560-561) quoting La Perouse on this subject, with whom he evidently agrees. The Andaman Islanders are noted for their hostility to strangers (E. H. Man, *op. cit.*). Tasman was driven

away by the Maories in 1642 ("An Account of several late Voyages and Discoveries," London, 1694, pp. 134-5 and 141), and he mentions that when, twenty-seven years previously, Capt. W. Schouten discovered Moa, that navigator was similarly attacked. In the records of Australian discovery it is the same as in America, the natives run away or fight. J. M. Stuart, who made five important expeditions into the interior (during one of which he succeeded in crossing the continent), met with the natives forty-four times, yet owing to fear on their part he was able to communicate with them only thirteen times; on thirteen other occasions they were hostile, and in July, 1860, they compelled his expedition to return (*see* Appendix I). Mr. A. C. Gregory gives the following account (*see* Appendix II) of the position Australians take up where strangers are concerned: "Natives will occasionally attack whites without any provocation. Once the party was attacked in a part of the interior of the west coast where previously no European could possibly have penetrated, and after the fight the natives acknowledged that they had seen some bacon fat in the camp which they wished to possess, and that they would not have made an attack had they deemed the Europeans so powerful. As the whites push out, however, the pioneers being often men of reckless character, troubles with the gins (females) and retaliation by means of a night surprise, are more often the cause of native attacks than otherwise; but even when all acts of offence have been avoided by the whites, the aggressive character of the aboriginals has always led to war between the diverse races." Im Thurn, in classifying the Indians of British Guiana, refers to "the degree of mutual hostility between the various groups" (*op. cit.*, p. 162), and says though every group ignores all others as far as it can, and, when perforce it must meet others, regards these as hostile, yet this feeling of aversion is greater between the tribes of different branches—for example, between true Caribs and Arawaks—than between two of the same branch—for example, Macusis and Arecunas. Bock (*op. cit.*, p. 76) refers to the voluntary isolation in which the Poonans live. All this would tend to show that savages are, as a rule, averse to meeting foreigners of whatever nation or of whatever stage of civilisation. Concerning the general state of warfare in which savages live, we have already spoken. On the other hand, we have a few instances on record where savages have treated strangers in a truly friendly spirit; thus the Pelew islanders succoured Captain Wilson and his party (G. Keate, "Narrative of the Shipwreck of the 'Antelope,'" London, 1796) and the Fuegians behaved more than humanely to the crew of the lost "Wager" (Byron's "Loss of the 'Wager,'" London, 1751).

Whether this active or passive hostility on the part of savages towards strangers is due to some unexplained ideas bearing on self preservation is immaterial to our enquiry. We have only to deal with its effect, an effect which is necessarily a great bar to progress, as exemplified by the exchange of ideas and commodities, and, in so far as it interests us at present, to the spread of agriculture.

It may be objected that exogamy and slavery to a very great extent neutralise the effect of the isolation brought about by the fear of strangers. In his highly interesting work on "Custom and Myth" (Lond., 1884), Mr. Andrew Lang concludes that the transmission of myth would be aided by slavery and exogamy (p. 24) and he points out (p. 102) that the diffusion of tales is undoubtedly due to exogamy. It has, however, yet to be seen whether man in a low state keeps a slave long enough for the prisoner either to learn the new language or to communicate his own and whether, indeed, apart from keeping females for wives, any slaves are made at all. According to Spix and Martius (*op. cit.*, p. 508), the roving Macus attack the settled Indians to kill and eat them. Amongst the Fuegians, after an encounter "those who are vanquished and taken, if not already dead, are killed and eaten by the conquerors" ("Prehistoric Times," p. 554). The Kukis (Dalton, *op. cit.*, p. 44) in their wars spared only the children whom they adopted and the savage Kayans of Borneo ("Primitive Culture," i, p. 414) make slaves in order to kill them at funerals. As Mr. Tylor aptly remarks, their system is "a great impediment to an intercourse with them." The Tring Dyaks also make captures partly "for slavery and ultimate death by torture" (Bock, *op. cit.*, p. 218). The Australians never make slaves of captives, they eat them or destroy them for the sake of their kidney fat. The Bushmen of South Africa apparently make no slaves. The Koniagas, classed by Bancroft as wild, held only women in thralldom: "The male prisoners of war they either killed immediately or reserved for torture" (*op. cit.*, I, p. 80). The Thlinkets had slaves and although not agriculturists were well advanced in the arts (*ibid.*, I, p. 107). The Tacullis had slaves (*ibid.*, I, p. 124) but they were also great traders. The same may be said of the Columbians (*ibid.*, p. 168). Amongst some tribes of Californians slavery "in any form is rare" (*ibid.*, I, p. 338) and amongst others doubtful. The New Mexicans, who were incipient agriculturists, had slaves (*ibid.*, I, pp. 489, 501, 510). The Chinooks held slaves without being agriculturists, but according to Pickering (*op. cit.*, p. 18) they showed "greater advance in the arts over the hunting tribes of North America." The Hawaiians (W. Ellis, *op. cit.*, IV, p. 161), the Tahitians (*ibid.*, III, p. 95) and the Maories (*ibid.*, III, p. 343) all made slaves for the

purpose of obtaining aid to till the soil, the last-named requiring them also for their feasts. Commander J. E. Erskine ("Journ. of a Cruise Western Pacific," 1853, p. 182) refers to the fact that the Fijians will not sacrifice their slaves, if others for sacrifice are obtainable, as these islanders are careful agriculturists (*ibid.*, p. 171). Hence we conclude that savages in the lowest known scale make no slaves, but eat or sacrifice their captives, that tribes who have made some advance in the arts, even without becoming husbandmen, commence to make slaves of prisoners of war, and that agricultural tribes make slavery an institution.

We have seen how savages treat their women. It is not to be expected that they would treat their slaves any better, although there were exceptions, as for example, the New Mexicans, who appear to have treated their prisoners well (H. H. Bancroft, I, p. 510). Nor is it likely that men in the unhappy position of a slave to a savage would wittingly teach their masters new methods in the arts. On the contrary, the dissemination of anecdote, myth, &c., is explicable on the ground of the pleasure it gives captives to recount the exploits of their favourite heroes, or to sing their praises of and to worship their own fetiches, &c. Unwittingly, slaves could spread information by performing their tasks their own way, but, considering the contempt in which a slave's doings are held, it is not likely that the owners would profit thereby, even supposing the newly introduced method were an improved one. So while it is not likely that agriculture was spread by means of slavery, the children may have picked up the slave's romances.

With regard to the influence of exogamy on the spread of agriculture, the conditions are very different. Notwithstanding the numerous examples of doing work differently which are constantly before the eyes of a captive woman's child, the mother's influence must make considerable impression on the female children, and if the mother belong to an agricultural tribe some of her knowledge of cultivation may pass to her girls. But this is not the only way in which such applied knowledge would spread. Accustomed to a certain routine, the newly captive wife might, as a matter of course, commence to till the ground or sow the seed in her new quarters, of course after her own fashion. From what we have shown above it is probable that exogamy preceded slavery, consequently a man would be able to trust his woman and would not be in continual expectation of her running away as in the case of a slave. Having some knowledge of the habits of her tribe, he might command her to procure for him the vegetables she was in the habit of obtaining for her tribe in her original home. It is, therefore, far from unlikely for the

spread of agriculture to be due to the system of wife-capture. Indeed, in North America we have all the elements for the spread of agriculture by this means. Exogamy was almost universal amongst the Indians, and amongst them we find agricultural and hunting tribes living side by side while agriculture was in every stage of development.

The Development of Digging Implements.

When savages commenced to advance beyond the stage of dibbling and required to loosen the soil in some way the simple digging stick became an inefficient implement. Soil can be broken up or pulverised in three ways. It is accomplished in one method by pegging away at the soil with a simple pointed stick in a vertical up and down motion; another method is to drive a stick into the ground obliquely and to raise the soil by leverage; the third method is to drag a sharp tool over the surface of the soil. The two latter methods are probably merely developments of the first.

The first system can be seen in operation to this day in the greater part of Australia, and is described by Sir Geo. Grey, who says the natives "carry a long pointed stick, which is held in the right hand, and driven firmly into the ground, where it is shaken so as to loosen the earth, which is scooped up and thrown out with the fingers of the left hand" (*op. cit.*, II, p. 292). The natives of Tanna (New Hebrides) dig up the soil in the same way, but instead of using the right hand only, two men work it with both hands. So also the Tahitians, before the advent of Europeans, appear to have used a plain point-hardened stick in the same fashion (W. Ellis, *op. cit.*, I, pp. 138-9). The digging stick itself used in this manner seems incapable of development.

The second method, that of digging as we understand it, was, until lately, the one pursued by the Fijians. The tool used is the digging stick with the digging end "tapered off on one side after the shape of a quill toothpick. . . . When preparing a piece of ground for yams, a number of men are employed, divided into groups of three or four. Each man being furnished with a digging stick, they drive them into the ground so as to enclose a circle of about two feet in diameter. When by repeated strokes the sticks reach the depth of eighteen inches, they are used as levers, and the mass of soil between them is thus loosened and raised. Two or three lads follow with short sticks, and break the clods, &c." (T. Williams, *op. cit.*, I, pp. 63-4). D'Albertis describes a similar mode of preparing the soil in New Guinea, but in this case the men stand in a row (*op. cit.*, p. 325). It is also like the method described by Lieut. Kittoe to have been in

vogue in Orissa in 1838, excepting only that with the tribes there the men worked independently of each other (John Campbell, *op. cit.*, p. 7). In one direction this method leads to the development of the spade which is to be seen in an intermediate form amongst the Maories. Thus Dieffenbach says of New Zealand, the land "is dug with a pole, which has a foot piece firmly attached to it and which is used in the same manner as our spade" (*op. cit.*, II, pp. 123-4). In the other direction this method has probably led to the makeshift plough of Chiloe, described as follows by Capt. Fitzroy: "Two poles of hard wood (*luma*) about three yards long and proportionately large, trimmed to a sharp point at one end and rounded at the other, are held by the middle, one in each hand, and pointed very obliquely in the ground; in this direction they are forced forward, by pressing against the blunt end with the abdomen, which is defended by a sheepskin, suspended in the form of an apron. After these have penetrated twelve or fourteen inches in the soil, a second person, generally a woman or a boy, places a stout stick under the poles, 'or *lumas*,' as they are called, close to the earth to form a solid support for them. The large ends are then forced down, the ground turned up, and the *lumas* pushed forward again, while the woman uses her stick to turn the clods over, to the right and left alternately. These clods are afterwards broken up by a wooden tool in the shape of a pickaxe . . ." (*op. cit.*, I, 286).

The third or dragging method, that of the plough, originated from the hoe (E. B. Tylor, "Origin of the Plough," *Journ. Anthropol. Inst.*, x, 77), which, according to Mr. Tylor, is a development of the implement known as the Swedish hack. This hack is probably the ancestor of a variety of instruments, among which are the plough, the hatchet, and the adze, the two last-named being the same implement with their blades set in different planes. Indeed, Mr. Tylor has called attention to a Kafir axe, with a moveable blade, so that the implement is at times an axe, and at others an adze. George Keate (*op. cit.*, p. 312) and Spencer St. John (*op. cit.*, I, p. 74), call our attention to similar implements in use in different parts of the savage world. But the development of the hoes is manifold. Major Serpa Pinto gives illustrations (*op. cit.*, I, pp. 129 and 161) of hoes in use in Bihé, which have two handles both in the same *vertical* plane and Dr. Livingstone ("First Expedition," Pop. ed., 1875, p. 275) describes a two handled hoe, in which the handles are both in the same *horizontal* plane, and which hoe is "worked with a sort of dragging motion." Mr. Tylor has so well described the development of the plough, that we need not go over the same ground, but shall call attention to an error of Mr. Prescott's in the description given

of the tilling implement of the ancient Peruvians. This implement Mr. Prescott called a plough and mis-translated ("History of Conq. of Peru," London, 1878, p. 65) as a spade drawn through the ground. As Mr. Tylor has already pointed out, and as we have shown above, the action of the spade is out of the line of the development of the plough. But Mr. Clements Markham, in translating the same passage from Lasso de la Vega's "Royal Commentaries of Peru" (Hakluyt Society, vol. xlv, p. 8), shows the implement to have been a long-handled, deep, narrow spade, worked by several men.

In the foregoing pages we have attempted to explain how the Art of Agriculture may have arisen. We are aware that certain links in the chain of evidence are somewhat weak, and if we have not succeeded in dealing with this question as completely as we could have desired, we shall be satisfied if our endeavours should lead to more interest being taken in a subject which hitherto has been much overlooked.

APPENDIX I.

The Journals of John McDouall Stuart. Edited by W. Hardman, London, 1865.

Extracts showing the number of times Stuart and his party in their five Australian expeditions actually came in contact with the natives :—

June 25, 1858	The natives would not approach.
April 26, 1859	Much frightened.
" 29, "	Stole a blanket.
May 11, "	Would not approach.
" 13, "	Frightened, but friendly.
June 26, "	" "
Nov. 16, "	Took to flight.
Dec. 17, "	" and remained watching.
April 6, 1860	Took to flight.
May 22, "	"
June 13, "	Hostile.
" 23, "	Friendly.
" 26, "	Drove back the expedition.
July 17, "	Took to flight.
Feb. 14, 1861	Set fire to grass to drive expedition back.
Mar. 6, "	Afraid but plucky.
April 20, "	Would not approach.
May 26, "	Attack.
Aug. 23, "	Set fire to grass to drive expedition back.
May 13, 1862	" "
June 26, "	Followed and set fire to grass.

July	1, 1862	Afraid but friendly.
"	2, "	" " "
"	3, "	Ran away.
Aug.	3, "	Bold and doubtful.
"	4, "	Set fire to grass.
"	6, "	Followed and set fire to grass.
"	8, "	Set fire to grass.
"	12, "	Took to flight.
"	13, "	One black begged for fish-hooks.
"	15, "	Friendly.
"	25, "	Set fire to grass.
"	30, "	Followed at safe distance.
"	" "	Two blacks friendly.
Sept.	6, "	Set fire to grass.
"	13, "	Afraid, but approached.
"	15, "	Armed and doubtful, and afraid of horse.
"	29, "	Took to flight.
Oct.	2, "	Set fire to grass.
"	3, "	Took to flight.
"	5, "	" " "
"	10, "	Tried to frighten expedition by incantations in order to get at water-hole.
"	12, "	Afraid but inquisitive.
"	25, "	Took to flight.

The tracks and other signs of the presence of natives were daily visible, but of forty-four opportunities for intercourse with the natives, the expedition were only able practically to communicate thirteen times.

APPENDIX II.

Memoranda on the Aborigines of Australia.

By A. C. Gregory, Esq.

[About the year 1882, I interviewed Mr. A. C. Gregory, C.M.G., etc., the well-known explorer. He was kind enough, not only to allow me to take notes of the information he imparted, but also to correct them afterwards. The MSS. of these notes have been handed to the Council of the Anthropological Institute in whose possession they now are. H. L. R.]

"The natives on the West Coast of Australia are in the habit amongst other things of digging up yams as a portion of their means of subsistence; the yams are called 'ajuca' in the north and 'wirang' in the south. In digging up these yams they invariably re-insert the head of the yams so as to be sure of a future crop, but beyond this they do absolutely nothing which may be regarded as a tentative in the direction of cultivating plants for their use. They are not destructive—that is to say, they do not destroy for destruction's sake—but only to obtain necessities; they often, however, in their battues destroy very much more game than they can consume. A native discovering a *Zamia* fruit unripe will put his mark upon it and no other native will touch this; the

original finder of the fruit may rest perfectly certain that when it becomes ripe he has only to go and fetch it for himself.

"There appears to be a tacit understanding that except on invitation—no tribe should infringe on the lands of its neighbouring tribe and also that no individual of a tribe should hunt on the lands belonging to others of the same tribe without consent, although young men frequently infringe upon this law. Each tribe has its own district in which it reigns supreme; such district is again subdivided into portions belonging to the individuals of that tribe, the children inherit and females share equally with the males in the distribution of landed property.

"On Cooper's Creek, the natives reap a *Panicum* grass. Fields of 1,000 acres are there met with growing this cereal. The natives cut it down by means of stone knives, cutting down the stalk half way, beat out the seed, leaving the straw which is often met with in large heaps; they winnow by tossing seed and husk in the air, the wind carrying away the husks. The grinding into meal is done by means of two stones—a large irregular slab and a small cannon-ball-like one; the seed is laid on the former and ground, sometimes dry and at others with water into a meal. On the Victoria River and the west coast this grass is not found in such large quantities as in the interior.

"The natives know when the rainy season is about to set in by the constellations; they have an astronomical mythology, something like that of the ancients, each star being the abode of some great man amongst them, who was more or less distinguished in the past, and of some animal or bird. On the west coast they know the approach of the wet season when the star Sirius is near the meridian early in the evening—the months of May, June, and July being their wet season. They can foretell tolerably accurately also at other seasons the approach of rain or storms by the prevailing winds and the form of the clouds, but much of this naturally depends on the locality—in some parts of Australia weather forecasting being more reliable than at others. A change of weather being always more or less favourable to hunting they naturally come to note the characteristics of impending weather changes.

"The stories they tell of the stars are probably traditional, and though possibly subject to verbal variations and embellishment, they have sufficient power of imagination to improvise on the moment's notice, and hence their yarns if not absolutely repetitions would always bear reference to events or stories they had either experienced or heard of on previous occasions such as corroborees or camp fires.

"Their weapons, implements, &c., depend very much on the local requirements. Thus, at Cooper's Creek there is little game, hence they have no skin bags, but make bags out of woven grass. On the west coast they have hardened wood spears, but on the north-west coast where rocks would soon destroy the point, the natives make use of stone-headed spears. The only implement of one exact pattern universal throughout Australia is the boomerang,

Bows and arrows are only used on the coast near Cape York, and are not Australian, but imported from New Guinea. They make use of a digging stick which may be compared to a short stumpy spear about 6 to 7 feet long, the head slightly flattened, and about $1\frac{1}{2}$ inches broad, charred and scraped.

"Exceptionally intelligent natives are occasionally met with, some of whom show remarkable pluck, but the intellectual powers and characters of the aboriginals vary as much as in any other race.

"Natives will occasionally attack whites without any provocation. Once the party was attacked in a part of the interior of the west coast, where previously no Europeans could possibly have penetrated, and after the fight the natives acknowledged that they had seen some bacon fat in the camp which they wished to possess, and that they would not have made an attack had they deemed the Europeans so powerful. As the whites push out, however, the pioneers being often men of reckless character, troubles with the gins (females), retaliation, by means of a night surprise, are more often the cause of native attacks than otherwise. But even where all acts of offence have been avoided by the whites the aggressive character of the aboriginals has always led to war between the diverse races.

"Natives probably are occasionally destroyed by floods, by insufficient foreknowledge, or want of care the same as animals. On one occasion a party of three natives were destroyed by a fire of their own lighting—the fire closed round behind them in the scrub, and their only chance of escape lay in their going through the flames the consequences of which act cost them their lives.

"The importance of the native coloured drawing published by Grey, in his 'Travels,' is much exaggerated. The colours are by no means so bright as printed, and the drawings are, generally of a very primitive kind, more or less crude outlines of hands or weapons placed on the face of rocks, and lines marked round the edge of the object. The colours are charcoal red, yellow, blue, and white clays, without any special preparation."

APPENDIX III.

A Few Notes on the Farming, etc., of the Kafirs and Basutos. By H. E. Rouquette, Esq.

[At my request, in January, 1885, Mr. Rouquette, nearly six years resident in South Africa, was kind enough to write out these notes, which have likewise been handed to the Council of the A.I.—H. L. R.]

"THE soil chosen for cultivation is nearly always low lying, alongside streams and rivers, and sheltered, if possible, from the south-west or cold winds. Here the ground is usually very rich from the alluvial earth constantly washed down from the surrounding mountains and hills by the heavy rains, and the vegetation in consequence grows very rank. This is a point also considered, for where a special kind of grass called 'tambooti' grows luxuriantly

the soil will always yield good crops. The 'tambooti' is a grass growing about five or six feet high, and is extensively used for thatching purposes both by the whites and blacks; the stem is a little thicker than wheat straw, and when dry is used by the Kafirs for lighting purposes instead of candles; the root has a sweet scent, and is collected and dried, and, when required for use, pounded and mixed with water for personal washing, in order to give a perfume to their bodies.

"Before commencing to till the land the grass is always first burnt off, and when the rains set in, in the spring, about October, and the ground becomes sufficiently softened after the six dry winter months, ploughing begins. After the first ploughing the ground is allowed to lie for a year until the following spring, in order that the roots may wither and rot; it is then reploughed, and if the earth is sufficiently broken up, the land is sown, otherwise it is ploughed over again.

"Sowing is usually done by scattering the seed broadcast and ploughing or hoeing it in. In gullies and places where the plough cannot be used, or where the Kafirs do not possess ploughs, the land is broken up with iron hoes bought at the stores. The two kinds principally used are *A*, the common English hoe; and *B*, a circular disc with a digit projecting from the same plane.

"*A* is usually used by the more advanced Kafirs, and where ploughs have first broken up the ground; a thick stick for a handle being put through the ring at the top. *B* is stronger than the other, and is more used in the districts which are less civilized and where the plough is not so frequently used. A handle is fixed on by driving the point through the end of a stick at right angles to it. Weeds grow very rapidly and soon choke the crops if the land is not kept constantly hoed, until the mealies, &c. attain a certain height. Frequently through the laziness of the Kafirs in not attending to this and thinning the plants sufficiently, heavy crops are a rarity.

"The natives thresh wheat, beans, and Kafir corn (amabele) a kind of millet seed, by beating the ears with sticks or rubbing them in their hands; mealies by rubbing two cobs together.

"The grain is winnowed by pouring it from baskets to the ground from a height, when the wind carries away the husks.

"The women do all the work with the exception of ploughing, which involves the use of oxen, and the men only do this on account of their superstition, which does not allow women to have anything to do with the cattle.

"There are no fences, but the small boys of the kraal are employed to herd the cattle from the growing crops, and they are assisted in this by burning the grass off around their gardens. When the Kafir corn is in seed, the women and girls are in the gardens from early morning till eve to frighten the birds away.

"Besides the grain crops the Kafirs cultivate pumpkins, Kafir potatoes, sweet potatoes (batata) or yams, and madumba—the latter is a tuber about the size of a Brazil nut, and grows and has a leaf

like the coladium. It is poisonous, I was told, unless boiled and the skin peeled off. The pumpkins are generally sown broadcast amongst the mealies, partly to keep the weeds from growing up, and partly for shelter from the hot sun. The Basutos are much more advanced in civilization than any other Kafirs, and are the only ones that cultivate wheat.

"Mealies and Kafir corn are universally grown by both Basutos and Kafirs, but not other produce. When the mealies are gathered they are stowed away in pits dug in the cattle kraal, each pit holding about 10 cwt.; this is for dryness and to keep them from being attacked by the weevil, a small beetle.

"The implements used are mostly the American No. 75 plough and the English hoe; the latter can be bought for 2s. or 3s. at the stores, and there are very few Kafirs who cannot save money enough to buy one. In fact, a hoe is part of the dowry given to a girl when she gets married, by the father or the head of the kraal. Kafirs are very jealous of their tools, and few will lend them, without payment, to another, the women particularly so. The Kafirs still use stone and wooden implements in some part of the country, the latter for digging holes, and in digging up roots, &c., and the former for hatchets, chisels, &c. I have also seen a plough made by a Basuto, but I think from the appearance of it, the native must have copied an American plough. The mould-board was of wood, with a sharpened stone attached to it for a share, the knife also was a stone sharpened. The fastenings were raw hide and rope made from the bark of creepers; the other parts being of wood.

"Cattle are not merely a sign of wealth, but are also kept for food. Formerly the men used only to eat beef, and fowls were only eaten by the children, pork never being eaten by any Kafirs. Now, cattle, sheep, goats, pigs, and fowls are eaten indiscriminately by men, women, and children. Horse flesh is also consumed by Basutos, but not by other Kafirs."

APPENDIX IV.

Letters from Sir J. B. LAWES, Bart., F.R.S., Rothamsted Park, St. Albans, on the exhaustion of soils, on the comparative exhaustion by root or cereal crops, and on the comparative fertility of forest and prairie soils.

(A)

"Craig House, Dalmally, 13 Oct., 1885.

DEAR MR. ROTH,

We have grown forty-two crops of wheat without manure, and the produce is now about fourteen bushels per acre, or more than the average of the United States or Australia. A few years ago we thought that the decline in the produce was a quarter of a bushel per annum, but latterly the decline is very much less, still the loss of fertility in the soil is measurable by chemical analysis. The term exhaustion as ordinarily applied to soils means, I think, that the weeds have choked the crop. I allowed a portion of my four-

L 2

teen bushels to seed itself, and I then left it to contend against the weeds. In one year the crop was almost destroyed, yielding less than one bushel per acre, while the produce of two bushels sown and kept clean yielded fourteen bushels. The cereal grain crops possess a power to find food in an unmanured soil which neither potatoes nor turnips possess. I have an unmanured rotation which has been going on for nearly forty years, turnips come in every fourth year. The second crop of Swedes, although kept clean, ceased to produce bulbs, and you may say the root producing power of the land ceased for ever; but fine crops of wheat and barley are still being grown. We have recently published analysis of a number of Manitoba soils showing what enormous stores of fertility exist in those prairie soils. . . .

Yours truly,
J. B. LAWES."

(B)

"Craig House, Dalmally, 18 Oct., 85.

DEAR MR. ROTH,

We have grown unmanured potatoes for ten years, but for twenty years previously the land had been growing wheat without manure; the last crop of potatoes was $2\frac{1}{4}$ tons per acre. As a general rule the soils under forest trees are much poorer than the soils under pasture or prairie vegetation. I believe this fact is well-known by experience in the United States. I have a wood which I should think had been covered with oak trees for several centuries, there is hardly any underwood or any green undergrowth and the leaf fall must have rotted underneath. I made an analysis of this soil a few years ago, and it was very much poorer than the soil of my permanent pasture which had been mown for thirty years, and had received no manure. Some of the Manitoba soils almost equal the Russia Black soils in fertility.

Yours truly,
J. B. LAWES."

The Secretary read the following extracts from a letter addressed by Dr. S. J. Hickson to Dr. E. B. Tylor, dated from Talisse, North Celebes, Dec. 1, 1885 :—

NOTES *on the* SENGIRESE.

By DR. S. J. HICKSON.

I HAVE just returned from a most interesting trip to the Sengirese and Talauer Islands. The Sengirese race seems to be an exceedingly interesting one and well worthy of further investigation.

At Manganitu in Great Sengir I had opportunities of ob-