ALPHONSE CANDOLLE

ORIGIN OF CULTIVATED PLANTS

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Candolle A.

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Содержание

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AUTHOR'S PREFACE

The knowledge of the origin of cultivated plants is interesting to agriculturists, to botanists, and even to historians and philosophers concerned with the dawnings of civilization.

I went into this question of origin in a chapter in my work on geographical botany; but the book has become scarce, and, moreover, since 1855 important facts have been discovered by travellers, botanists, and archæologists. Instead of publishing a second edition, I have drawn up an entirely new and more extended work, which treats of the origin of almost double the number of species belonging to the tropics and the temperate zones. It includes almost all plants which are cultivated, either on a large scale for economic purposes, or in orchards and kitchen gardens.

I have always aimed at discovering the condition and the habitat of each species before it was cultivated. It was needful to this end to distinguish from among innumerable varieties that which should be regarded as the most ancient, and to find out from what quarter of the globe it came. The problem is more difficult than it appears at first sight. In the last century and up to the middle of the present authors made little account of it, and the most able have contributed to the propagation of erroneous ideas. I believe that three out of four of Linnæus' indications of the original home of cultivated plants are incomplete or incorrect. His statements have since been repeated, and in spite of what modern writers have proved touching several species, they are still repeated in periodicals and popular works. It is time that mistakes, which date in some cases from the Greeks and Romans, should be corrected. The actual condition of science allows of such correction, provided we rely upon evidence of varied character, of which some portion is quite recent, and even unpublished; and this evidence should be sifted as we sift evidence in historical research. It is one of the rare cases in which a science founded on observation should make use of testimonial proof. It will be seen that this method leads to satisfactory results, since I have been able to determine the origin of almost all the species, sometimes with absolute certainty, and sometimes with a high degree of probability.

I have also endeavoured to establish the number of centuries or thousands of years during which each species has been in cultivation, and how its culture spread in different directions at successive epochs.

A few plants cultivated for more than two thousand years, and even some others, are not now known in a spontaneous, that is, wild condition, or at any rate this condition is not proved. Questions of this nature are subtle. They, like the distinction of species, require much research in books and in herbaria. I have even been obliged to appeal to the courtesy of travellers or botanists in all parts of the world to obtain recent information. I shall mention these in each case with the expression of my grateful thanks.

In spite of these records, and of all my researches, there still remain several species which are unknown wild. In the cases where these come from regions not completely explored by botanists, or where they belong to genera as yet insufficiently studied, there is hope that the wild plant may be one day discovered. But this hope is fallacious in the case of well-known species and countries. We are here led to form one of two hypotheses; either these plants have since history began so changed in form in their wild as well as in their cultivated condition that they are no longer recognized as belonging to the same species, or they are extinct species. The lentil, the chick-pea, probably no longer exist in nature; and other species, as wheat, maize, the broad bean, carthamine, very rarely found

wild, appear to be in course of extinction. The number of cultivated plants with which I am here concerned being two hundred and forty-nine, the three, four, or five species, extinct or nearly extinct, is a large proportion, representing a thousand species, out of the whole number of phanerogams. This destruction of forms must have taken place during the short period of a few hundred centuries, on continents where they might have spread, and under circumstances which are commonly considered unvarying. This shows how the history of cultivated plants is allied to the most important problems of the general history of organized beings.

Geneva, 1882.

PART I.
General Remarks

CHAPTER I.
IN WHAT MANNER AND AT WHAT EPOCHS CULTIVATION BEGAN IN DIFFERENT COUNTRIES

The traditions of ancient peoples, embellished by poets, have commonly attributed the first steps in agriculture and the introduction of useful plants, to some divinity, or at least to some great emperor or Inca. Reflection shows that this is hardly probable, and observation of the attempts at agriculture among the savage tribes of our own day proves that the facts are quite otherwise.

In the progress of civilization the beginnings are usually feeble, obscure, and limited. There are reasons why this should be the case with the first attempts at agriculture or horticulture. Between the custom of gathering wild fruits, grain, and roots, and that of the regular cultivation of the plants which produce them, there are several steps. A family may scatter seeds around its dwelling, and provide itself the next year with the same product in the forest. Certain fruit trees may exist near a dwelling without our knowing whether they were planted, or whether the hut was built beside them in order to profit by them. War and the chase often interrupt attempts at cultivation. Rivalry and mistrust cause the imitation of one tribe by another to make but slow progress. If some great personage command the cultivation of a plant, and institute some ceremonial to show its utility, it is probably because obscure and unknown men have previously spoken of it, and that successful experiments have been already made. A longer or shorter succession of local and short-lived experiments must have occurred before such a display, which is calculated to impress an already numerous public. It is easy to understand that there must have been determining causes to excite these attempts, to renew them, to make them successful.

The first cause is that such or such a plant, offering some of those advantages which all men seek, must be within reach. The lowest savages know the plants of their country; but the example of the Australians and Patagonians shows that if they do not consider them productive and easy to rear, they do not entertain the idea of cultivating them. Other conditions are sufficiently evident: 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, such as the chestnut, the date-palm, the banana, or the breadfruit tree. When men can live without work it is what they like best. Besides, the element of hazard in hunting and fishing attracts primitive, and sometimes civilized man, more than the rude and regular labour of cultivation.

I return to the species which savages are disposed to cultivate. They sometimes find them in their own country, but often receive them from neighbouring peoples, more favoured than themselves by natural conditions, or already possessed of some sort of civilization. When a people is not established on an island, or in some place difficult of access, they soon adopt certain plants, discovered elsewhere, of which the advantage is evident, and are thereby diverted from the cultivation of the poorer species of their own country. History shows us that wheat, maize, the sweet potato, several species of the genus Panicum, tobacco, and other plants, especially annuals, were widely diffused before the historical period. These useful species opposed and arrested the timid attempts made here and there on less productive or less agreeable plants. And we see in our own day, in various countries, barley replaced by wheat, maize preferred to buckwheat and many kinds of millet, while some

vegetables and other cultivated plants fall into disrepute because other species, sometimes brought from a distance, are more profitable. The difference in value, however great, which is found among plants already improved by culture, is less than that which exists between cultivated plants and others completely wild. Selection, that great factor which Darwin has had the merit of introducing so happily into science, plays an important part when once agriculture is established; but in every epoch, and especially in its earliest stage, the choice of species is more important than the selection of varieties.

The various causes which favour or obstruct the beginnings of agriculture, explain why certain regions have been for thousands of years peopled by husbandmen, while others are still inhabited by nomadic tribes. It is clear that, owing to their well-known qualities and to the favourable conditions of climate, it was at an early period found easy to cultivate rice and several leguminous plants in Southern Asia, barley and wheat in Mesopotamia and in Egypt, several species of Panicum in Africa, maize, the potato, the sweet potato, and manioc in America. Centres were thus formed whence the most useful species were diffused. In the north of Asia, of Europe, and of America, the climate is unfavourable, and the indigenous plants are unproductive; but as hunting and fishing offered their resources, agriculture must have been introduced there late, and it was possible to dispense with the good species of the south without great suffering. It was different in Australia, Patagonia, and even in the south of Africa. The plants of the temperate region in our hemisphere could not reach these countries by reason of the distance, and those of the intertropical zone were excluded by great drought or by the absence of a high temperature. At the same time, the indigenous species are very poor. It is not merely the want of intelligence or of security which has prevented the inhabitants from cultivating them. The nature of the indigenous flora has so much to do with it, that the Europeans, established in these countries for a hundred years, have only cultivated a single species, the *Tetragonia*, an insignificant green vegetable. I am aware that Sir Joseph Hooker[1] has enumerated more than a hundred Australian species which may be used in some way; but as a matter of fact they were not cultivated by the natives, and, in spite of the improved methods of the English colonists, no one does cultivate them. This clearly demonstrates the principle of which I spoke just now, that the choice of species is more important than the selection of varieties, and that there must be valuable qualities in a wild plant in order to lead to its cultivation.

In spite of the obscurity of the beginnings of cultivation in each region, it is certain that they occurred at very different periods. One of the most ancient examples of cultivated plants is in a drawing representing figs, found in Egypt in the pyramid of Gizeh. The epoch of the construction of this monument is uncertain. Authors have assigned a date varying between fifteen hundred and four thousand two hundred years before the Christian era. Supposing it to be two thousand years, its actual age would be four thousand years. Now, the construction of the pyramids could only have been the work of a numerous, organized people, possessing a certain degree of civilization, and consequently an established agriculture, dating from some centuries back at least. In China, two thousand seven hundred years before Christ, the Emperor Chenming instituted the ceremony at which every year five species of useful plants are sown – rice, sweet potato, wheat, and two kinds of millet.[2] These plants must have been cultivated for some time in certain localities before they attracted the emperor's attention to such a degree. Agriculture appears, then, to be as ancient in China as in Egypt. The constant relations between Egypt and Mesopotamia lead us to suppose that an almost contemporaneous cultivation existed in the valleys of the Euphrates and the Nile. And it may have been equally early in India and in the Malay Archipelago. The history of the Dravidian and Malay peoples does not reach far back, and is sufficiently obscure, but there is no reason to believe that cultivation has not been known among them for a very long time, particularly along the banks of the rivers.

[1] Hooker, *Flora Tasmaniæ*, i. p. cx.

[2] Bretschneider, *On the Study and Value of Chinese Botanical Works*, p. 7.

The ancient Egyptians and the Phœnicians propagated many plants in the region of the Mediterranean, and the Aryan nations, whose migrations towards Europe began about 2500, or at latest 2000 years B.C., carried with them several species already cultivated in Western Asia. We shall see, in studying the history of several species, that some plants were probably cultivated in Europe and in the north of Africa prior to the Aryan migration. This is shown by names in languages more ancient than the Aryan tongues; for instance, Finn, Basque, Berber, and the speech of the Guanchos of the Canary Isles. However, the remains, called kitchen-middens, of ancient Danish dwellings, have hitherto furnished no proof of cultivation or any indication of the possession of metal.[3] The Scandinavians of that period lived principally by fishing and hunting, and perhaps eked out their subsistence by indigenous plants, such as the cabbage, the nature of which does not admit any remnant of traces in the dung-heaps and rubbish, and which, moreover, did not require cultivation. The absence of metals does not in these northern countries argue a greater antiquity than the age of Pericles, or even the palmy days of the Roman republic. Later, when bronze was known in Sweden – a region far removed from the then civilized countries – agriculture had at length been introduced. Among the remains of that epoch was found a carving of a cart drawn by two oxen and driven by a man.[4]

The ancient inhabitants of Eastern Switzerland, at a time when they possessed instruments of polished stone and no metals, cultivated several plants, of which some were of Asiatic origin. Heer[5] has shown, in his admirable work on the lake-dwellings, that the inhabitants had intercourse with the countries south of the Alps. They may also have received plants cultivated by the Iberians, who occupied Gaul before the Kelts. At the period when the lake-dwellers of Switzerland and Savoy possessed bronze, their agriculture was more varied. It seems that the lake-dwellers of Italy, when in possession of this metal, cultivated fewer species than those of Savoy,[6] and this may be due either to a greater antiquity or to local circumstances. The remains of the lake-dwellers of Laybach and of the Mondsee in Austria prove likewise a completely primitive agriculture; no cereals have been found at Laybach, and but a single grain of wheat at the Mondsee.[7] The backward condition of agriculture in this eastern part of Europe is contrary to the hypothesis, based on a few words used by ancient historians, that the Aryans sojourned first in the region of the Danube, and that Thrace was civilized before Greece. In spite of this example, agriculture appears in general to have been more ancient in the temperate parts of Europe than we should be inclined to believe from the Greeks, who were disposed, like certain modern writers, to attribute the origin of all progress to their own nation.

In America, agriculture is perhaps not quite so ancient as in Asia and Egypt, if we are to judge from the civilization of Mexico and Peru, which does not date even from the first centuries of the Christian era. However, the widespread cultivation of certain plants, such as maize, tobacco, and the sweet potato, argues a considerable antiquity, perhaps two thousand years or thereabouts. History is at fault in this matter, and we can only hope to be enlightened by the discoveries of archæology and geology.

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[3] De Naidaillac, *Les Premiers Hommes et les Temps Préhistoriques*, i. pp. 266, 268. The absence of traces of agriculture among these remains is, moreover, corroborated by Heer and Cartailhac, both well versed in the discoveries of archæology.

[4] M. Montelius, from Cartailhac, *Revue*, 1875, p. 237.

[5] Heer, *Die Pflanzen der Pfahlbauten*, in 4to, Zurich, 1865. See the article on "Flax."

[6] Perrin, *Étude Préhistorique de la Savoie*, in 4to, 1870; Castelfranco, *Notizie intorno alla Stazione lacustre di Lagozza*; and Sordelli, *Sulle piante della torbiera della Lagozza*, in the *Actes de la Soc. Ital. des Scien. Nat.*, 1880.

[7] Much, *Mittheil d. Anthropol. Ges. in Wien*, vol. vi.; Sacken, *Sitzber. Akad. Wien.*, vol. vi. Letter of Heer on these works and analysis of them in Naidaillac, i. p. 247.

CHAPTER II.
METHODS FOR DISCOVERING OR PROVING THE ORIGIN OF SPECIES

1. *General reflections.* As most cultivated plants have been under culture from an early period, and the manner of their introduction into cultivation is often little known, different means are necessary in order to ascertain their origin. For each species we need a research similar to those made by historians and archæologists – a varied research, in which sometimes one process is employed, sometimes another; and these are afterwards combined and estimated according to their relative value. The naturalist is here no longer in his ordinary domain of observation and description; he must support himself by historical proof, which is never demanded in the laboratory; and botanical facts are required, not with respect to the physiology of plants – a favourite study of the present day – but with regard to the distinction of species and their geographical distribution.

I shall, therefore, have to make use of methods of which some are foreign to naturalists, others to persons versed in historical learning. I shall say a few words of each, to explain how they should be employed and what is their value.

2. *Botany.* One of the most direct means of discovering the geographical origin of a cultivated species, is to seek in what country it grows spontaneously, and without the help of man. The question appears at the first glance to be a simple one. It seems, indeed, that by consulting floras, works upon species in general, or herbaria, we ought to be able to solve it easily in each particular case. Unfortunately it is, on the contrary, a question which demands a special knowledge of botany, especially of geographical botany, and an estimate of botanists and of collectors, founded on a long experience. Learned men, occupied with history or with the interpretation of ancient authors, are liable to grave mistakes when they content themselves with the first testimony they may happen to light upon in a botanical work. On the other hand, travellers who collect plants for a herbarium are not always sufficiently observant of the places and circumstances in which they find them. They often neglect to note down what they have remarked on the subject. We know, however, that a plant may have sprung from others cultivated in the neighbourhood; that birds, winds, etc., may have borne the seeds to great distances; that they are sometimes brought in the ballast of vessels or mixed with their cargoes. Such cases present themselves with respect to common species, much more so with respect to cultivated plants which abound near human dwellings. A collector or traveller had need be a keen observer to judge if a plant has sprung from a wild stock belonging to the flora of the country, or if it is of foreign origin. When the plant is growing near dwellings, on walls, among rubbish-heaps, by the wayside, etc., we should be cautious in forming an opinion.

It may also happen that a plant strays from cultivation, even to a distance from suspicious localities, and has nevertheless but a short duration, because it cannot in the long run support the conditions of the climate or the struggle with the indigenous species. This is what is called in botany an *adventive* species. It appears and disappears, a proof that it is not a native of the country. Every flora offers numerous examples of this kind. When these are more abundant than usual, the public is struck by the circumstance. Thus, the troops hastily summoned from Algeria into France in 1870, disseminated by fodder and otherwise a number of African and southern species which excited wonder, but of which no trace remained after two or three winters.

Some collectors and authors of floras are very careful in noting these facts. Thanks to personal relations with some of them, and to frequent references to their herbaria and botanical works, I flatter myself I am acquainted with them. I shall, therefore, willingly cite their testimony in doubtful cases. For certain countries and certain species I have addressed myself directly to these eminent naturalists. I have appealed to their memory, to their notes, to their herbaria, and from the answers they have

been so kind as to return, I have been enabled to add unpublished documents to those found in works already made public. My sincere thanks are due for information of this nature received from Mr. C. B. Clarke on the plants of India, from M. Boissier on those of the East, from M. Sagot on the species of French Guiana, from M. Cosson on those of Algeria, from MM. Decaisne and Bretschneider on the plants of China, from M. Pancic on the cereals of Servia, from Messrs. Bentham and Baker on the specimens of the herbarium at Kew, lastly from M. Edouard André on the plants of America. This zealous traveller was kind enough to lend me some most interesting specimens of species cultivated in South America, which he found presenting every appearance of indigenous plants.

A more difficult question, and one which cannot be solved at once, is whether a plant growing wild, with all the appearance of the indigenous species, has existed in the country from a very early period, or has been introduced at a more or less ancient date.

For there are naturalized species, that is, those that are introduced among the plants of the ancient flora, and which, although of foreign origin, persist there in such a manner that observation alone cannot distinguish them, so that historical records or botanical considerations, whether simple or geographical, are needed for their detection. In a very general sense, taking into consideration the lengthened periods with which science is concerned, nearly all species, especially in the regions lying outside the tropics, have been once naturalized; that is to say, they have, from geographical and physical circumstances, passed from one region to another. When, in 1855, I put forward the idea that conditions anterior to our epoch determined the greater number of the facts of the actual distribution of plants – this was the sense of several of the articles, and of the conclusion of my two volumes of geographical botany[8]– it was received with considerable surprise. It is true that general considerations of palæontology had just led Dr. Unger,[9] a German savant, to adopt similar ideas, and before him Edward Forbes had, with regard to some species of the southern counties of the British Isles, suggested the hypothesis of an ancient connection with Spain.[10] But the proof that it is impossible to explain the habitations of the whole number of present species by means of the conditions existing for some thousands of years, made a greater impression, because it belonged more especially to the department of botanists, and did not relate to only a few plants of a single country. The hypothesis suggested by Forbes became an assured fact and capable of general application, and is now a truism of science. All that is written on geographical or zoological botany rests upon this basis, which is no longer contested.

This principle, in its application to each country and each species, presents a number of difficulties; for when a cause is once recognized, it is not always easy to discover how it has affected each particular case. Luckily, so far as cultivated plants are concerned, the questions' which occur do not make it necessary to go back to very ancient times, nor to dates which cannot be defined by a given number of years or centuries. No doubt the modern specific forms date from a period earlier than the great extension of glaciers in the northern hemisphere – a phenomenon of several thousand years' duration, if we are to judge from the size of the deposits transported by the ice; but cultivation began after this epoch, and even in many instances within historic time. We have little to do with previous events. Cultivated species may have changed their abode before cultivation, or in the course of a longer time they may have changed their form; this belongs to the general study of all organized life, and we are concerned only with the examination of each species since its cultivation or in the time immediately before it. This is a great simplification.

The question of age, thus limited, may be approached by means of historical or other records, of which I shall presently speak, and by the principles of geographical botany.

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[8] Alph. de Candolle, *Géographie Botanique Raisonnée*, chap. x. p. 1055; chap. xi., xix., xxvii.

[9] Unger, *Versuch einer Geschichte der Pflanzenwelt*, 1852.

[10] Forbes, *On the Connection between the Distribution of the Existing Fauna and Flora of the British Isles, with the Geological Changes which have affected their Area*, in 8vo, *Memoirs of the Geological Survey*, vol. i. 1846.

I shall briefly enumerate these, in order to show in what manner they can aid in the discovery of the geographical origin of a given plant.

As a rule, the abode of each species is constant, or nearly constant. It is, however, sometimes disconnected; that is to say, that the individuals of which it is composed are found in widely separated regions. These cases, which are extremely interesting in the study of the vegetable kingdom and of the surface of the globe, are far from forming the majority. Therefore, when a cultivated species is found wild, frequently in Europe, more rarely in the United States, it is probable that, in spite of its indigenous appearance in America, it has become naturalized after being accidentally transported thither.

The genera of the vegetable kingdom, although usually composed of several species, are often confined to a single region. It follows, that the more species included in a genus all belonging to the same quarter of the globe, the more probable it is that one of the species, apparently indigenous in another part of the world, has been transported thither and has become naturalized there, by escaping from cultivation. This is especially the case with tropical genera, because they are more often restricted either to the old or to the new world.

Geographical botany teaches us what countries have genera and even species in common, in spite of a certain distance, and what, on the contrary, are very different, in spite of similarity of climate or inconsiderable distance. It also teaches us what species, genera, and families are scattered over a wide area, and the more limited extent of others. These data are of great assistance in determining the probable origin of a given species. Naturalized plants spread rapidly. I have quoted examples elsewhere[11] of instances within the last two centuries, and similar facts have been noted from year to year. The rapidity of the recent invasion of *Anacharis Alsinastrum* into the rivers of Europe is well known, and that of many European plants in New Zealand, Australia, California, etc., mentioned in several floras or modern travels.

The great abundance of a species is no proof of its antiquity. *Agave Americana*, so common on the shores of the Mediterranean, although introduced from America, and our cardoon, which now covers a great part of the Pampas of La Plata, are remarkable instances in point. As a rule, an invading species makes rapid way, while extinction is, on the contrary, the result of the strife of several centuries against unfavourable circumstances.[12]

The designation which should be adopted for allied species, or, to speak scientifically, allied forms, is a problem often presented in natural history, and more often in the category of cultivated species than in others. These plants are changed by cultivation. Man adopts new and convenient forms, and propagates them by artificial means, such as budding, grafting, the choice of seeds, etc. It is clear that, in order to discover the origin of one of these species, we must eliminate as far as possible the forms which appear to be artificial, and concentrate our attention on the others. A simple reflection may guide this choice, namely, that a cultivated species varies chiefly in those parts for which it is cultivated. The others remain unmodified, or present trifling alterations, of which the cultivator takes no note, because they are useless to him. We may expect, therefore, to find the fruit of a wild fruit tree small and of a doubtfully agreeable flavour, the grain of a cereal in its wild state small, the tubercles of a wild potato small, the leaves of indigenous tobacco narrow, etc., without, however, going so far as to imagine that the species developed rapidly under cultivation, for man would not have begun to cultivate it if it had not from the beginning presented some useful or agreeable qualities.

When once a cultivated plant has been reduced to such a condition as permits of its being reasonably compared with analogous spontaneous forms, we have still to decide what group of nearly similar plants it is proper to designate as constituting a species. Botanists alone are competent to pronounce an opinion on this question, since they are accustomed to appreciate differences and

[11] A. de Candolle, *Géographie Botanique Raisonnée*, chap. vii. and x.

[12] *Ibid.*, chap. viii. p. 804.

resemblances, and know the confusion of certain works in the matter of nomenclature. This is not the place to discuss what may reasonably be termed a species. I have stated in some of my articles the principles which seem to me the best. As their application would often require a study which has not been made, I have thought it well occasionally to treat quasi-specific forms as a group which appears to me to correspond to a species, and I have sought the geographical origin of these forms as though they were really specific.

To sum up: botany furnishes valuable means of guessing or proving the origin of cultivated plants and for avoiding mistakes. We must, however, by no means forget that practical observation must be supplemented by research in the study. After gaining information from the collector who sees the plants in a given spot or district, and who draws up a flora or a catalogue of species, it is indispensable to study the known or probable geographical distribution in books and in herbaria, and to reflect upon the principles of geographical botany and on the questions of classification, which cannot be done by travelling or collecting. Other researches, of which I shall speak presently, must be combined with those of botany if we would arrive at satisfactory conclusions.

3. *Archæology and Palæontology.* The most direct proof which can be conceived of the ancient existence of a species in a given country is to see its recognizable fragments in old buildings or deposits, of a more or less certain date.

The fruits, seeds, and different portions of plants taken from ancient Egyptian tombs, and the drawings which surround them in the pyramids, have given rise to most important researches, which I shall often have to mention. Nevertheless, there is a possible source of error; the fraudulent introduction of modern plants into the sarcophagi of the mummies. This was easily discovered in the case of some grains of maize, for instance, a plant of American origin, which were introduced by the Arabs; but species cultivated in Egypt within the last two or three thousand years may have been added, which would thus appear to have belonged to an earlier period. The tumuli or mounds of North America, and the monuments of the ancient Mexicans and Peruvians, have furnished records about the plants cultivated in that part of the world. Here we are concerned with an epoch subsequent to the pyramids of Egypt.

The deposits of the Swiss lake-dwellings have been the subject of important treatises, among which that of Heer, quoted just now, holds the first place. Similar works have been published on the vegetable remains found in other lakes or peat mosses of Switzerland, Savoy, Germany, and Italy. I shall quote them with reference to several species. Dr. Gross has been kind enough to send me seeds and fruits taken from the lake-dwellings of Neuchâtel; and my colleague, Professor Heer, has favoured me with several facts collected at Zurich since the publication of his work. I have already said that the rubbish-heaps of the Scandinavian countries, called kitchen-middens, have furnished no trace of cultivated vegetables.

The tufa of the south of France contains leaves and other remains of plants, which have been discovered by MM. Martins, Planchon, de Saporta, and other savants. Their date is not, perhaps, always earlier than that of the first lacustrine deposits, and it is possible that it agrees with that of ancient Egyptian monuments, and of ancient Chinese books. Lastly, the mineralogic strata, with which geologists are specially concerned, tell us much about the succession of vegetable forms in different countries; but here we are dealing with epochs far anterior to agriculture, and it would be a strange and certainly a most valuable chance if a modern cultivated species were discovered in the European tertiary epoch. No such discovery has hitherto been made with any certainty, though uncultivated species have been recognized in strata prior to the glacial epoch of the northern hemisphere. For the rest, if we do not succeed in finding them, the consequences will not be clear, since it may be said, either that such a plant came at a later date from a different region, or that it had formerly another form which renders its recognition impossible in a fossil state.

4. *History.* Historical records are important in order to determine the date of certain cultures in each country. They also give indications as to the geographical origin of plants when they have been propagated by the migrations of ancient peoples, by travellers, or by military expeditions.

The assertions of authors must not, however, be accepted without examination.

The greater number of ancient historians have confused the fact of the cultivation of a species in a country with that of its previous existence there in a wild state. It has been commonly asserted, even in our own day, that a species cultivated in America or China is a native of America or China. A no less common error is the belief that a species comes originally from a given country because it has come to us from thence, and not direct from the place in which it is really indigenous. Thus the Greeks and Romans called the peach the Persian apple, because they had seen it cultivated in Persia, where it probably did not grow wild. It was a native of China, as I have elsewhere shown. They called the pomegranate, which had spread gradually from garden to garden from Persia to Mauritania, the apple of Carthage (*Malum Punicum*). Very ancient authors, such as Herodotus and Berosius, are yet more liable to error, in spite of their desire to be accurate.

We shall see, when we speak of maize, that historical documents which are complete forgeries may deceive us about the origin of a species. It is curious, for it seems to be no one's interest to lie about such agricultural facts. Fortunately, facts of botany and archæology enable us to detect errors of this nature.

The principal difficulty, which commonly occurs in the case of ancient historians, is to find the exact translation of the names of plants, which in their books always bear the common names. I shall speak presently of the value of these names and how the science of language may be brought to bear on the questions with which we are occupied, but I must first indicate those historical notions which are most useful in the study of cultivated plants.

Agriculture came originally, at least so far as the principal species are concerned, from three great regions, in which certain plants grew, regions which had no communication with each other. These are – China, the south-west of Asia (with Egypt), and intertropical America. I do not mean to say that in Europe, in Africa, and elsewhere savage tribes may not have cultivated a few species locally, at an early epoch, as an addition to the resources of hunting and fishing; but the great civilizations based upon agriculture began in the three regions I have indicated. It is worthy of note that in the old world agricultural communities established themselves along the banks of the rivers, whereas in America they dwelt on the high lands of Mexico and Peru. This may perhaps have been due to the original situation of the plants suitable for cultivation, for the banks of the Mississippi, of the Amazon, of the Orinoco, are not more unhealthy than those of the rivers of the old world.

A few words about each of the three regions.

China had already possessed for some thousands of years a flourishing agriculture and even horticulture, when she entered for the first time into relations with Western Asia, by the mission of Chang-Kien, during the reign of the Emperor Wu-ti, in the second century before the Christian era. The records, known as Pent-sao, written in our Middle Ages, state that he brought back the bean, the cucumber, the lucern, the saffron, the sesame, the walnut, the pea, spinach, the water-melon, and other western plants,[13] then unknown to the Chinese. Chang-Kien, it will be observed, was no ordinary ambassador. He considerably enlarged the geographical knowledge, and improved the economic condition of his countrymen. It is true that he was constrained to dwell ten years in the West, and that he belonged to an already civilized people, one of whose emperors had, 2700 B.C., consecrated with imposing ceremonies the cultivation of certain plants. The Mongolians were too barbarous, and came from too cold a country, to have been able to introduce many useful species into China; but when we consider the origin of the peach and the apricot, we shall see that these plants were brought into China from Western Asia, probably by isolated travellers, merchants or others,

[13] Bretscheider, *On the Study and Value*, etc., p. 15.

who passed north of the Himalayas. A few species spread in the same way into China from the West before the embassy of Chang-Kien.

Regular communication between China and India only began in the time of Chang-Kien, and by the circuitous way of Bactriana;[14] but gradual transmissions from place to place may have been effected through the Malay Peninsula and Cochin-China. The writers of Northern China may have been ignorant of them, and especially since the southern provinces were only united to the empire in the second century before Christ.[15]

Regular communications between China and Japan only took place about the year 57 of our era, when an ambassador was sent; and the Chinese had no real knowledge of their eastern neighbours until the third century, when the Chinese character was introduced into Japan.[16]

The vast region which stretches from the Ganges to Armenia and the Nile was not in ancient times so isolated as China. Its inhabitants exchanged cultivated plants with great facility, and even transported them to a distance. It is enough to remember that ancient migrations and conquests continually intermixed the Turanian, Aryan, and Semitic peoples between the Caspian Sea, Mesopotamia, and the Nile. Great states were formed nearly at the same time on the banks of the Euphrates and in Egypt, but they succeeded to tribes which had already cultivated certain plants. Agriculture is older in that region than Babylon and the first Egyptian dynasties, which date from more than four thousand years ago. The Assyrian and Egyptian empires afterwards fought for supremacy, and in their struggles they transported whole nations, which could not fail to spread cultivated species. On the other hand, the Aryan tribes who dwelt originally to the north of Mesopotamia, in a land less favourable to agriculture, spread westward and southward, driving out or subjugating the Turanian and Dravidian nations. Their speech, and those which are derived from it in Europe and Hindustan, show that they knew and transported several useful species.[17] After these ancient events, of which the dates are for the most part uncertain, the voyages of the Phœnicians, the wars between the Greeks and Persians, Alexander's expedition into India, and finally the Roman rule, completed the spread of cultivation in the interior of Western Asia, and even introduced it into Europe and the north of Africa, wherever the climate permitted.

Later, at the time of the crusades, very few useful plants yet remained to be brought from the East. A few varieties of fruit trees which the Romans did not possess, and some ornamental plants, were, however, then brought to Europe.

The discovery of America in 1492 was the last great event which caused the diffusion of cultivated plants into all countries. The American species, such as the potato, maize, the prickly pear, tobacco, etc., were first imported into Europe and Asia. Then a number of species from the old world were introduced into America. The voyage of Magellan (1520-1521) was the first direct communication between South America and Asia. In the same century the slave trade multiplied communications between Africa and America. Lastly, the discovery of the Pacific Islands in the eighteenth century, and the growing facility of the means of communication, combined with a general idea of improvement, produced that more general dispersion of useful plants of which we are witnesses at the present day.

5. *Philology.* The common names of cultivated plants are usually well known, and may afford indications touching the history of a species, but there are examples in which they are absurd, based upon errors, or vague and doubtful, and this involves a certain caution in their use.

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[14] *Ibid.*

[15] *Ibid.*, p. 23.

[16] *Atsuma-gusa. Recueil pour servir à la connaissance de l'extrême Orient*, Turretini, vol. vi., pp. 200, 293.

[17] There are in the French language two excellent works, which give the sum of modern knowledge with regard to the East and Egypt. The one is the *Manuel de l'Histoire Ancienne de l'Orient*, by François Lenormand, 3 vols. in 12mo, Paris, 1869; the other, *L'Histoire Ancienne des Peuples de l'Orient*, by Maspero, 1 vol. in 8vo, Paris, 1878.

I could quote a number of such names in all languages; it is enough to mention, in French, *blé de Turquie*, maize, a plant which is not a wheat, and which comes from America; in English, Jerusalem artichoke (*Helianthus tuberosus*), which does not come from Jerusalem, but from North America, and is no artichoke.

A number of names given to foreign plants by Europeans when they are settled in the colonies, express false or insignificant analogies. For instance, the *New Zealand flax* resembles the true flax as little as possible; it is merely that a textile substance is obtained from its leaves. The *mahogany apple* (cashew) of the French West India Isles is not an apple, nor even the fruit of a pomaceous tree, and has nothing to do with mahogany.

Sometimes the common names have changed, in passing from one language to another, in such a manner as to give a false or absurd meaning. Thus the tree of Judea of the French (*Cercis Siliquastrum*) has become the Judas tree in English. The fruit called by the Mexicans *ahuaca*, is become the *avocat* (lawyer) of the French colonists.

Not unfrequently names of plants have been taken by the same people at successive epochs or in different provinces, sometimes as generic, sometimes as specific names. The French word *blé*, for instance, may mean several species of the genus Triticum, and even of very different nutritious plants (maize and wheat), or a given species of wheat.

Several common names have been transferred from one plant to another through error or ignorance. Thus the confusion made by early travellers between the sweet potato (*Convolvulus Batatas*) and the potato (*Solanum tuberosum*) has caused the latter to be called potato in English and *patatas* in Spanish.

If modern, civilized peoples, who have great facilities for comparing species, learning their origin and verifying their names in books, have made such mistakes, it is probable that ancient nations have made many and more grave errors. Scholars display vast learning in explaining the philological origin of a name, or its modifications in derived languages, but they cannot discover popular errors or absurdities. It is left for botanists to discover and point them out. We may note, in passing, that the double or compound names are the most doubtful. They may consist of two mistakes; one in the root or principal name, the other in the addition or accessory name, destined almost always to indicate the geographical origin, some visible quality, or some comparison with other species. The shorter a name is, the better it merits consideration in questions of origin or antiquity; for it is by the succession of years, of the migrations of peoples, and of the transport of plants, that the addition of often erroneous epithets takes place. Similarly, in symbolic writing, like that of the Chinese and the Egyptians, unique and simple signs indicate long-known species, not imported from foreign countries, while complicated signs are doubtful or indicate a foreign origin. We must not forget, however, that the signs have often been rebuses, based on chance resemblances in the words, or on superstitious and fanciful ideas.

The identity of a common name for a given species in several languages may have two very different explanations. It may be because a plant has been spread by a people which has been dispersed and scattered. It may also result from the transmission of a plant from one people to another with the name it bore in its original home. The first case is that of the hemp, of which the name is similar, at least as to the root, in all the tongues derived from the primitive Aryan stock. The second is seen in the American name of tobacco, the Chinese of tea, which have spread into a number of countries, without any philological or ethnographic filiation. This case has occurred oftener in modern than in ancient times, because the rapidity of communications allows of the simultaneous introduction of a plant and of its name, even where the distance is great.

The diversity of names for the same species may also spring from various causes. As a rule, it indicates an early existence in different countries, but it may also arise from the mixture of races, or from names of varieties which take the place of the original name. Thus in England we find, according

to the county, a Keltic, Saxon, Danish, or Latin name; and flax bears in Germany the names of *flachs* and *lein*, words which are evidently of different origin.

When we desire to make use of the common names to gather from them certain probabilities regarding the origin of species, it is necessary to consult dictionaries and the dissertations of philologists; but we must take into account the chances of error in these learned men, who, since they are neither cultivators nor botanists, may have made mistakes in the application of a name to a species.

The most considerable collection of common names is that of Nemnich, published in 1793.[18] I have another in manuscript which is yet more complete, drawn up in our library by an old pupil of mine, Moritzi, by means of floras and of several books of travel written by botanists. There are, besides, dictionaries of the names of the species in given countries or in some special language. This kind of glossary does not often contain explanations of etymology; but in spite of what Hehn[19] may say, a naturalist possessed of an ordinary general education can recognize the connection or the fundamental differences between certain names in different languages, and need not confound modern with ancient languages. It is not necessary to be initiated into the mysteries of suffixes or affixes, of dentals and labials. No doubt the researches of a philologist into etymologies are more profound and valuable, but this is rarely necessary when our researches have to do with cultivated plants. Other sciences are more useful, especially that of botany; and philologists are more often deficient in these than naturalists are deficient in philology, for the very evident reason that more place is given to languages than to natural history in general education. It appears to me, moreover, that philologists, notably those who are occupied with Sanskrit, are always too eager to find the etymology of every name. They do not allow sufficiently for human stupidity, which has in all time given rise to absurd words, without any real basis, and derived only from error or superstition.

The filiation of modern European tongues is known to every one. That of ancient languages has, for more than half a century, been the object of important labours. Of these I cannot here give even a brief notice. It is sufficient to recall that all modern European languages are derived from the speech of the Western Aryans, who came from Asia, with the exception of Basque (derived from the Iberian language), Finnish, Turkish, and Hungarian, into which, moreover, words of Aryan origin have been introduced. On the other hand, several modern languages of India, Ceylon, and Java, are derived from the Sanskrit of the Eastern Aryans, who left Central Asia after the Western Aryans. It is supposed, with sufficient probability, that the first Western Aryans came into Europe 2500 B.C., and the Eastern Aryans into India a thousand years later.

Basque (or Iberian), the speech of the Guanchos of the Canary Isles, of which a few plant names are known, and Berber, are probably connected with the ancient tongues of the north of Africa.

Botanists are in many cases forced to doubt the common names attributed to plants by travellers, historians, and philologists. This is a consequence of their own doubts respecting the distinction of species and of the well-known difficulty of ascertaining the common name of a plant. The uncertainty becomes yet greater in the case of species which are more easily confounded or less generally known, or in the case of the languages of little-civilized nations. There are, so to speak, degrees of languages in this respect, and the names should be accepted more or less readily according to these degrees.

In the first rank, for certainty, are placed those languages which possess botanical works. For instance, it is possible to recognize a species by means of a Greek description by Dioscorides or Theophrastus, and by the less complete Latin texts of Cato, Columella, or Pliny. Chinese books also give descriptions. Dr. Bretschneider, of the Russian legation at Pekin, has written some excellent papers upon these books, from which I shall often quote.[20]

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[18] Nemnich, *Allgemeines polyglotten-Lexicon der Naturgeschichte*, 2 vols. in 4to.

[19] Hehn, *Kulturpflanzen und Hausthiere in ihren Uebergang aus Asien*, in 8vo, 3rd edit. 1877.

[20] Bretschneider, *On the Study and Value of Chinese Botanical Works, with Notes on the History of Plants and Geographical Botany from Chinese Sources*, in 8vo, 51 pp., with illustrations, Foochoo, without date, but the preface bears the date Dec. 1870. *Notes on Some Botanical Questions*, in 8vo, 14 pp., 1880.

The second degree is that of languages possessing a literature composed only of theological and poetical works, or of chronicles of kings and battles. Such works make mention here and there of plants, with epithets or reflections on their mode of flowering, their ripening, their use, etc., which allow their names to be divined, and to be referred to modern botanical nomenclature. With the added help of a knowledge of the flora of the country, and of the common names in the languages derived from the dead language, it is possible to discover approximately the sense of some words. This is the case with Sanskrit,[21] Hebrew,[22] and Armenian.[23]

Lastly, a third category of dead languages offers no certainty, but merely presumptions or hypothetical and rare indications. It comprehends those tongues in which there is no written work, such as Keltic, with its dialects, the ancient Sclavonic, Pelasgic, Iberian, the speech of the primitive Aryans, Turanians, etc. It is possible to guess certain names or their approximate form in these dead languages by two methods, both of which should be employed with caution.

The first and best is to consult the languages derived, or which we believe to be derived, directly from the ancient tongues, as Basque for the Iberian language, Albanian for the Pelasgic, Breton, Erse, and Gaelic for Keltic. The danger lies in the possibility of mistake in the filiation of the languages, and especially in a mistaken belief in the antiquity of a plant-name which may have been introduced by another people. Thus the Basque language contains many words which seem to have been taken from the Latin at the time of the Roman rule. Berber is full of Arab words, and Persian of words of every origin, which probably did not exist in Zend.

The other method consists in reconstructing a dead language which had no literature, by means of those which are derived from it; for instance, the speech of the Western Aryans, by means of the words common to several European languages which have sprung from it. Fick's dictionary will hardly serve for the words of ancient Aryan languages, for he gives but few plant-names, and his arrangement renders it unintelligible to those who have no knowledge of Sanskrit. Adolphe Pictet's work[24] is far more important to naturalists, and a second edition, augmented and improved, has been published since the author's death. Plant-names and agricultural terms are explained and discussed in this work, in a manner all the more satisfactory that an accurate knowledge of botany is combined with philology. If the author attributes perhaps too much importance to doubtful etymologies, he makes up for it by other knowledge, and by his excellent method and lucidity.

The plant-names of the Euskarian or Basque language have been considered from the point of view of their probable etymology by the Comte de Charencey, in *Les Actes de la Société Philologique* (vol. i. No. 1, 1869). I shall have occasion to quote this work, of which the difficulties were great, in the absence of all literature and of all derived languages.

6. *The necessity for combining the different methods.* The various methods of which I have spoken are of unequal value. It is clear that when we have archæological records about a given species, like those of the Egyptian monuments, or of the Swiss lake-dwellings, these are facts of remarkable accuracy. Then come the data furnished by botany, especially those on the spontaneous existence of a species in a given country. These, if examined with care, may be very important. The assertions contained in the works of historians or even of naturalists respecting an epoch at which science was

[21] Wilson's dictionary contains names of plants, but botanists have more confidence in the names indicated by Roxburgh in his *Flora Indica* (edit. of 1832, 3 vols. in 8vo), and in Piddington's *English Index to the Plants of India*, Calcutta, 1832. Scholars find a greater number of words in the texts, but they do not give sufficient proof of the sense of these words. As a rule, we have not in Sanskrit what we have in Hebrew, Greek, and Chinese – a quotation of phrases concerning each word translated into a modern language.

[22] The best work on the plant-names in the Old Testament is that of Rosenmüller, *Handbuch der biblischen Alterkunde*, in 8vo, vol. iv., Leipzig, 1830. A good short work, in French, is *La Botanique de la Bible*, by Fred. Hamilton, in 8vo, Nice, 1871.

[23] Reynier, a Swiss botanist, who had been in Egypt, has given the sense of many plant-names in the Talmud. See his volumes entitled *Economie Publique et Rurale des Arabes et des Juifs*, in 8vo, 1820; and *Economie Publique et Rurale des Egyptiens et des Carthaginois*, in 8vo, Lausanne, 1823. The more recent works of Duschak and Löw are not based upon a knowledge of Eastern plants, and are unintelligible to botanists because of names in Syriac and Hebrew characters.

[24] Adolphe Pictet, *Les Origines des Peuples Indo-Européens*, 3 vols, in 8vo, Paris, 1878.

only beginning, have not the same value. Lastly, the common names are only an accessory means, especially in modern languages, and a means which, as we have seen, is not entirely trustworthy. So much may be said in a general way, but in each particular case one method or the other may be more or less important.

Each can only lead to probabilities, since we are dealing with facts of ancient date which are beyond the reach of direct and actual observation. Fortunately, if the same probability is attained in three or four different ways, we approach very near to certainty. The same rule holds good for researches into the history of plants as for researches into the history of nations. A good author consults historians who have spoken of events, the archives in which unpublished documents are found, the inscriptions on ancient monuments, the newspapers, private letters, finally memoirs and even tradition. He gathers probabilities from every source, and then compares these probabilities, weighs and discusses them before deciding. It is a labour of the mind which requires intelligence and judgment. This labour differs widely from observation employed in natural history, and from pure reason which is proper to the exact sciences. Nevertheless, when, by several methods, we reach the same probability, I repeat that the latter is very nearly a certainty. We may even say that it is as much a certainty as historical science can pretend to attain.

I have the proof of this when I compare my present work with that which I composed by the same methods in 1855. For the species which I then studied, I have now more authorities and better authenticated facts, but my conclusions on the origin of each species have scarcely altered. As they were already based on a combination of methods, probabilities have usually become certainties, and I have not been led to conclusions absolutely contrary to those previously formed.

Archæological, philological, and botanical data become more and more numerous. By their means the history of cultivated plants is perfected, while the assertions of ancient authors lose instead of gaining in importance. From the discoveries of antiquaries and philologists, moderns are better acquainted than the Greeks with Chaldea and ancient Egypt. They can prove mistakes in Herodotus. Botanists on their side correct Theophrastus, Dioscorides, and Pliny from their knowledge of the flora of Greece and Italy, while the study of classical authors to which learned men have applied themselves for three centuries has already furnished all that it has to give. I cannot help smiling when, at the present day, savants repeat well-known Greek and Latin phrases, and draw from them what they call conclusions. It is trying to extract juice from a lemon which has already been repeatedly squeezed. We must say it frankly, the works which repeat and commentate on the ancient authors of Greece and Rome without giving the first place to botanical and archæological facts, are no longer on a level with the science of the day. Nevertheless, I could name several German works which have attained to the honour of a third edition. It would have been better to reprint the earlier publications of Fraas and Lenz, of Targioni and Heldreich, which have always given more weight to the modern data of botany, than to the vague descriptions of classic authors; that is to say, to facts than to words and phrases.

PART II.
On the Study of Species, considered as to their Origin, their early Cultivation, and the Principal Facts of their Diffusion.[25]

CHAPTER I.
PLANTS CULTIVATED FOR THEIR SUBTERRANEAN PARTS, SUCH AS ROOTS, TUBERCLES, OR BULBS.[26]

Radish.—*Raphanus sativus*, Linnæus.

The radish is cultivated for what is called the root, which is, properly speaking, the lower part of the stem with the tap root.[27] Every one knows how the size, shape, and colour of those organs which become fleshy vary according to the soil or the variety.

There is no doubt that the species is indigenous in the temperate regions of the old world; but, as it has been cultivated in gardens from the earliest historic times, from China and Japan to Europe, and as it sows itself frequently round cultivated plots, it is difficult to fix upon its starting-point.

Formerly *Raphanus sativus* was confounded with kindred species of the Mediterranean region, to which certain Greek names were attributed; but Gay, the botanist, who has done a good deal towards eliminating these analogous forms,[28] considered *R. sativus* as a native of the East, perhaps of China. Linnæus also supposed this plant to be of Chinese origin, or at least that variety which is cultivated in China for the sake of extracting oil from the seeds.[29] Several floras of the south of Europe mention the species as subspontaneous or escaped from cultivation, never as spontaneous. Ledebour had seen a specimen found near Mount Ararat, had sown the seeds of it and verified the species.[30] However, Boissier,[31] in 1867, in his *Eastern Flora*, says that it is only subspontaneous in the cultivated parts of Anatolia, near Mersivan (according to Wied), in Palestine (on his own authority), in Armenia (according to Ledebour), and probably elsewhere, which agrees with the assertions found in European floras.[32] Buhse names a locality, the Ssahend mountains, to the south of the Caucasus, which appears to be far enough from cultivation. The recent *Flora of British India*[33] and the earlier *Flora of Cochin-China* by Loureiro, mention the radish only as a cultivated species. Maximowicz saw it in a garden in the north-east of China.[34] Thunberg speaks of it as a plant of general cultivation in Japan, and growing also by the side of the roads,[35] but the latter fact is not repeated by modern authors, who are probably better informed.[36]

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[25] A certain number of species whose origin is well known, such as the carrot, sorrel, etc., are mentioned only in the summary at the beginning of the last part, with an indication of the principal facts concerning them.

[26] Some species are cultivated sometimes for their roots and sometimes for their leaves or seeds. In other chapters will be found species cultivated sometimes for their leaves (as fodder) or for their seeds, etc. I have classed them according to their commonest use. The alphabetical index refers to the place assigned to each species.

[27] See the young state of the plant when the part of the stem below the cotyledons is not yet swelled. Turpin gives a drawing of it in the *Annales des Sciences Naturelles*, series 1, vol xxi. pl. 5.

[28] In A. de Candolle, *Géogr. Bot. Raisonnée*, p. 826.

[29] Linnæus, *Spec. Plant*, p. 935.

[30] Ledebour, *Fl. Ross.*, i. p. 225.

[31] Boissier, *Fl. Orient*, i. p. 400.

[32] Buhse, *Aufzählung Transcaucasien*, p. 30.

[33] Hooker, *Flora of British India*, i. p. 166.

[34] Maximowicz, *Primitiæ Floræ Amurensis*, p. 47.

[35] Thunberg, *Fl. Jap.*, p. 263.

Herodotus (*Hist.*, 1. 2, c. 125) speaks of a radish which he calls *surmaia*, used by the builders of the pyramid of Cheops, according to an inscription upon the monument. Unger[37] copied from Lepsius' work two drawings from the temple of Karnak, of which the first, at any rate, appears to represent the radish.

From all this we gather, first, that the species spreads easily from cultivation in the west of Asia and the south of Europe, while it does not appear with certainty in the flora of Eastern Asia; and secondly, that in the regions south of the Caucasus it is found without any sign of culture, so that we are led to suppose that the plant is wild there. From these two reasons it appears to have come originally from Western Asia between Palestine, Anatolia, and the Caucasus, perhaps also from Greece; its cultivation spreading east and west from a very early period.

The common names support these hypotheses. In Europe they offer little interest when they refer to the quality of the root (*radis*), or to some comparison with the turnip (*ravanello* in Italian, *rabica* in Spanish, etc.), but the ancient Greeks coined the special name *raphanos* (easily reared). The Italian word *ramoraccio* is derived from the Greek *armoracia*, which was used for *R. sativus* or some allied species. Modern interpreters have erroneously referred this name to *Cochlearia Armoracia* or horse-radish, which I shall come to presently. Semitic[38] languages have quite different names (*fugla* in Hebrew, *fuil*, *fidgel*, *figl*, etc., in Arab.). In India, according to Roxburgh,[39] the common name of a variety with an enormous root, as large sometimes as a man's leg, is *moola* or *moolee*, in Sanskrit *mooluka*. Lastly, for Cochin-China, China, and Japan, authors give various names which differ very much one from the other. From this diversity a cultivation which ranged from Greece to Japan must be very ancient, but nothing can thence be concluded as to its original home as a spontaneous plant.

A totally different opinion exists on the latter point, which we must also examine. Several botanists[40] suspect that *Raphanus sativus* is simply a particular condition, with enlarged root and non-articulated fruit, of *Raphanus raphanistrum*, a very common plant in the temperate cultivated districts of Europe and Asia, and which is also found in a wild state in sand and light soil near the sea – for instance, at St. Sebastian, in Dalmatia, and at Trebizond.[41] Its usual haunts are in deserted fields; and many common names which signify wild radish, show the affinity of the two plants. I should not insist upon this point if their supposed identity were a mere presumption, but it rests upon experiments and observations which it is important to know.

In *R. raphanistrum* the siliqua is articulated, that is to say, contracted at intervals, and the seeds placed each in a division. In *R. sativus* the siliqua is continuous, and forms a single cavity. Some botanists had made this difference the basis of two distinct genera, *Raphanistrum* and *Raphanus*. But three accurate observers, Webb, Gay, and Spach, have noticed among plants of *Raphanus sativus*, raised from the same seed, both unilocular and articulated pods, some of them bilocular, others plurilocular. Webb[42] arrived at the same results when he afterwards repeated these experiments, and he observed yet another fact of some importance: the radish which sows itself by chance, and is not cultivated, produced the siliquæ of *Raphanistrum*.[43] Another difference between the two plants is in the root, fleshy in *R. sativus*, slender in *R. raphanistrum*; but this changes with cultivation, as appears from the experiments of Carrière, the head gardener of the nurseries of the Natural History Museum in Paris.[44] It occurred to him to sow the seeds of the slender-rooted *Raphanistrum* in both stiff and

[36] Franchet and Savatier, *Enum. Plant Jap.*, i. p. 39.

[37] Unger, *Pflanzen des Alten Ægyptens*, p. 51, figs. 24 and 29.

[38] In my manuscript dictionary of common names, drawn from the floras of thirty years ago.

[39] Roxburgh, *Fl. Ind.*, iii. p. 126.

[40] Webb, *Phytogr. Canar.*, p. 83; *Iter. Hisp.*, p. 71; Bentham, *Fl. Hong Kong*, p. 17; Hooker, *Fl. Brit. Ind.*, i. p. 166.

[41] Willkomm and Lange, *Prod. Fl. Hisp.*, iii. p. 748; Viviani, *Flor. Dalmat.*, iii. p. 104; Boissier, *Fl. Orient.*, i. p. 401.

[42] Webb, *Phytographia Canariensis*, i. p. 83.

[43] Webb, *Iter. Hispaniense*, 1838, p. 72.

[44] Carrière, *Origine des Plantes Domestiques démontrée par la Culture du Radis Sauvage*, in 8vo, 24 pp., 1869.

light soil, and in the fourth generation he obtained fleshy radishes, of varied colour and form like those of our gardens. He even gives the figures, which are really curious and conclusive. The pungent taste of the radish was not wanting. To obtain these changes, Carrière sowed in September, so as to make the plant almost biennial instead of annual. The thickening of the root was the natural result, since many biennial plants have fleshy roots.

The inverse experiment remains to be tried – to sow cultivated radishes in a poor soil. Probably the roots would become poorer and poorer, while the siliquæ would become more and more articulated.

From all the experiments I have mentioned, *Raphanus sativus* might well be a variety of *R. raphanistrum*, an unstable variety determined by the existence of several generations in a fertile soil. We cannot suppose that ancient uncivilized peoples made essays like those of Carrière, but they may have noticed plants of *Raphanistrum* grown in richly manured soil, with more or less fleshy roots; and this soon suggested the idea of cultivating them.

I have, however, one objection to make, founded on geographical botany. *Raphanus raphanistrum* is a European plant which does not exist in Asia.[45] It cannot, therefore, be this species that has furnished the inhabitants of India, China, and Japan with the radishes which they have cultivated for centuries. On the other hand, how could *R. raphanistrum*, which is supposed to have been modified in Europe, have been transmitted in ancient times across the whole of Asia? The transport of cultivated plants has commonly proceeded from Asia into Europe. Chang-Kien certainly brought vegetables from Bactriana into China in the second century B.C., but the radish is not named among the number.

Horse-radish—*Cochlearia Armoracia*, Linnæus.

This Crucifer, whose rather hard root has the taste of mustard, was sometimes called in French *cran*, or *cranson de Bretagne*. This was an error caused by the old botanical name *Armoracia*, which was taken for a corruption of *Armorica* (Brittany). *Armoracia* occurs in Pliny, and was applied to a crucifer of the Pontine province, which was perhaps *Raphanus sativus.* After I had formerly[46] pointed out this confusion, I expressed myself as follows on the mistaken origin of the species: —*Cochlearia Armoracia* is not wild in Brittany, a fact now established by the researches of botanists in the west of France. The Abbé Delalande mentions it in his little work, entitled *Hœdic et Houat*,[47] in which he gives so interesting an account of the customs and productions of these two little islands of Brittany. He quotes the opinion of M. le Gall, who, in an unpublished flora of Morbihan, declares the plant foreign to Brittany. This proof, however, is less strong than others, since the south coast of the peninsula of Brittany is not yet sufficiently known to botanists, and the ancient Armorica extended over a portion of Normandy where the wild horse-radish is now found.[48] This leads me to speak of the original home of the species. English botanists mention it as wild in Great Britain, but are doubtful about its origin. Watson[49] considers it as introduced by cultivation. The difficulty of extirpating it, he says, from places where it is cultivated, is well known to gardeners. It is therefore not surprising that this plant should take possession of waste ground, and persist there so as to appear indigenous. Babington[50] mentions only one spot where the species appears to be really wild, namely, Swansea. We will try to solve the problem by further arguments.

Cochlearia Armoracia is a plant belonging to the temperate, and especially to the eastern regions of Europe. It is diffused from Finland to Astrakhan, and to the desert of Cuman.[51] Grisebach mentions

[45] Ledebour, *Fl. Ross.*; Boissier, *Fl. Orient.* Works on the flora of the valley of the Amur.

[46] A. de Candolle, *Géographie Botanique Raisonnée*, p. 654.

[47] Delalande, *Hœdic et Houat*, 8vo pamphlet, Nantes, 1850, p. 109.

[48] Hardouin, Renou, and Leclerc, *Catalogue du Calvados*, p. 85; De Brebisson, *Fl. de Normandie*, p. 25.

[49] Watson, *Cybele*, i. p. 159.

[50] Babington, *Manual of Brit. Bot.*, 2nd edit., p. 28.

[51] Ledebour, *Fl. Ross.*, i. p. 159.

also several localities in Turkey in Europe, near Enos, for instance, where it abounds on the sea-shore.[52]

The further we advance towards the west of Europe, the less the authors of floras appear sure that the plant is indigenous, and the localities assigned to it are more scattered and doubtful. The species is rarer in Norway than in Sweden,[53] in the British Isles than in Holland, where a foreign origin is not attributed to it.[54]

The specific names confirm the impression of its origin in the east rather than in the west of Europe; thus the name *chren*[55] in Russia recurs in all the Sclavonic languages, *krenai* in Lithuanian, *chren* in Illyrian,[56] etc. It has introduced itself into a few German dialects, round Vienna,[57] for instance, where it persists, in spite of the spread of the German tongue. We owe to it also the French names *cran* or *cranson*. The word used in Germany, *Meerretig*, and in Holland, *meer-radys*, whence the Italian Swiss dialect has taken the name *méridi*, or *mérédi*, means sea-radish, and is not primitive like the word *chren*. It comes probably from the fact that the plant grows well near the sea, a circumstance common to many of the *Cruciferæ*, and which should be the case with this species, for it is wild in the east of Russia where there is a good deal of salt soil. The Swedish name *peppar-rot*[58] suggests the idea that the species came into Sweden later than the introduction of pepper by commerce into the north of Europe. However, the name may have taken the place of an older one, which has remained unknown to us. The English name of horse-radish is not of such an original nature as to lead to a belief in the existence of the species in the country before the Saxon conquest. It means a very strong radish. The Welsh name *rhuddygl maurth*[59] is only the translation of the English word, whence we may infer that the Kelts of Great Britain had no special name, and were not acquainted with the species. In the west of France, the name *raifort*, which is the commonest, merely means strong root. Formerly it bore in France the names of German, or Capuchin mustard, which shows a foreign and recent origin. On the contrary, the word *chren* is in all the Sclavonic languages, a word which has penetrated into some German and French dialects under the forms of *kreen*, *cran*, and *cranson*, and which is certainly of a primitive nature, and shows the antiquity of the species in temperate Eastern Europe. It is therefore most probable that cultivation has propagated and naturalized the plant westward from the east for about a thousand years.

Turnips—*Brassica species et varietates radice in crassata.*

The innumerable varieties and subvarieties of the turnip known as swedes, Kohl-rabi, etc., may be all attributed to one of the four species of Linnæus —*Brassica napus*, *Br. oleracea*, *Br. rapa*, *Br. campestris*– of which the two last should, according to modern authors, be fused into one. Other varieties of the species are cultivated for the leaves (cabbages), for the inflorescence (cauliflowers), or for the oil which is extracted from the seed (colza, rape, etc.). When the root or the lower part of the stem[60] is fleshy, the seed is not abundant, nor worth the trouble of extracting the oil; when those organs are slender, the production of the seed, on the contrary, becomes more important, and decides the economic use of the plant. In other words, the store of nutritious matter is placed sometimes in the lower, sometimes in the upper part of the plant, although the organization of the flower and fruit is similar, or nearly so.

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[52] Grisebach, *Spicilegium Fl. Rumel.*, i. p. 265.

[53] Fries, *Summa*, p. 30.

[54] Miquel, *Disquisitio pl. regn. Batav.*

[55] Moritzi, *Dict. Inéd. des Noms Vulgaires.*

[56] Moritzi, *ibid.*; Viviani, *Fl. Dalmat.*, iii. p. 322.

[57] Neilreich, *Fl. Wien*, p. 502.

[58] Linnæus, *Fl. Suecica*, No. 540.

[59] H. Davies, *Welsh Botanology*, p. 63.

[60] In turnips and swedes the swelled part is, as in the radish, the lower part of the stem, below the cotyledons, with a more or less persistent part of the root. (See Turpin. *Ann. Sc. Natur.*, ser. 1, vol. xxi.) In the Kohl-rabi (*Brassica oleracea caulo-rapa*) it is the stem.

Touching the question of origin, we need not occupy ourselves with the botanical limits of the species, and with the classification of the races, varieties, and sub-varieties,[61] since all the *Brassicæ* are of European and Siberian origin, and are still to be seen in these regions wild, or half wild, in some form or other.

Plants so commonly cultivated and whose germination is so easy often spread round cultivated places; hence some uncertainty regarding the really wild nature of the plants found in the open country. Nevertheless, Linnæus mentions that *Brassica napus* grows in the sand on the sea-coast in Sweden (Gothland), Holland, and England, which is confirmed, as far as Sweden is concerned, by Fries,[62] who, with his usual attention to questions of this nature, mentions *Br. Campestris*, L. (type of the *Rapa* with slender roots), as really wild in the whole Scandinavian peninsula, in Finland and Denmark. Ledebour[63] indicates it in the whole of Russia, Siberia, and the Caspian Sea.

The floras of temperate and southern Asia mention rapes and turnips as cultivated plants, never as escaped from cultivation.[64] This is already an indication of foreign origin. The evidence of philology is no less significant.

There is no Sanskrit name for these plants, but only modern Hindu and Bengalee names, and those only for *Brassica rapa* and *B. oleracea*.[65] Kæmpfer[66] gives Japanese names for the turnip —*busei*, or more commonly *aona*– but there is nothing to show that these names are ancient. Bretschneider, who has made a careful study of Chinese authors, mentions no *Brassica*. Apparently they do not occur in any of the ancient works on botany and agriculture, although several varieties are now cultivated in China.

It is just the reverse in Europe. The old languages have a number of names which seem to be original. *Brassica rapa* is called *meipen* or *erfinen*[67] in Wales; *repa* and *rippa* in several Slav tongues,[68] which answers to the Latin *rapa*, and is allied to the *neipa* of the Anglo-Saxons. The *Brassica napus* is in Welsh *bresych yr yd*; in Erse *braisscagh buigh*, according to Threlkeld,[69] who sees in *braisscagh* the root of the Latin *Brassica*. A Polish name, *karpiele*, a Lithuanian, *jellazoji*,[70] are also given, without speaking of a host of other names, transferred sometimes in popular speech from one species to another. I shall speak of the names of *Brassica oleracea* when I come to vegetables.

The Hebrews had no names for cabbages, rapes, and turnips,[71] but there are Arab names: *selgam* for the *Br. napus*, and *subjum* or *subjumi* for *Br. rapa*; words which recur in Persian and even in Bengali, transferred perhaps from one species to another. The cultivation of these plants has therefore been diffused in the south-west of Asia since Hebrew antiquity.

Finally, every method, whether botanical, historical, or philological, leads us to the following conclusions: —

Firstly, the *Brassicæ* with fleshy roots were originally natives of temperate Europe.

Secondly, their cultivation was diffused in Europe before, and in Asia after, the Aryan invasion.

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[61] This classification has been the subject of a paper by Augustin Pyramus de Candolle, *Transactions of the Horticultural Society*, vol. v.

[62] Fries, *Summa Veget. Scand.*, i. p. 29.

[63] Ledebour, *Fl. Ross.*, i. p. 216.

[64] Boissier, *Flora Orientalis*; Sir J. Hooker, *Flora of British India*; Thunberg, *Flora Japonica*; Franchet and Savatier, *Enumeratio Plantarum Japonicarum*.

[65] Piddington, *Index*.

[66] Kæmpfer, *Amœn.*, p. 822.

[67] Davies, *Welsh Botanology*, p. 65.

[68] Moritzi, *Dict. MS.*, compiled from published floras.

[69] Threlkeld, *Synopsis Stirpium Hibernicarum*, 1 vol. in 8vo, 1727.

[70] Moritzi, *Dict. MS.*

[71] Rosenmüller, *Biblische Naturgeschichte*, vol. i., gives none.

Thirdly, the primitive slender-rooted form of *Brassica napus*, called *Br. campestris*, had probably from the beginning a more extended range, from the Scandinavian peninsula towards Siberia and the Caucasus. Its cultivation was perhaps introduced into China and Japan, through Siberia, at an epoch which appears not to be much earlier than Greco-Roman civilization.

Fourthly, the cultivation of the various forms or species of *Brassica* was diffused throughout the south-west of Asia at an epoch later than that of the ancient Hebrews.

Skirret—*Sium Sisarum*, Linnæus.

This vivacious Umbellifer, furnished with several diverging roots in the form of a carrot, is believed to come from Eastern Asia. Linnæus indicates China, doubtfully; and Loureiro,[72] China and Cochin-China, where he says it is cultivated. Others have mentioned Japan and the Corea, but in these countries there are species which it is easy to confound with the one in question, particularly *Sium Ninsi* and *Panax Ginseng*. Maximowicz,[73] who has seen these plants in China and in Japan, and who has studied the herbariums of St. Petersburgh, recognizes only the Altaic region of Siberia and the North of Persia as the home of the wild *Sium Sisarum*. I am very doubtful whether it is to be found in the Himalayas or in China, since modern works on the region of the river Amoor and on British India make no mention of it.

It is doubtful whether the ancient Greeks and Romans knew this plant. The names *Sisaron* of Dioscorides, *Siser* of Columella and of Pliny,[74] are attributed to it. Certainly the modern Italian name *sisaro* or *sisero* seems to confirm this idea; but how could these authors have failed to notice that several roots descend from the base of the stem, whereas all the other umbels cultivated in Europe have but a single tap-root? It is just possible that the *siser* of Columella, a cultivated plant, may have been the parsnip; but what Pliny says of the *siser* does not apply to it. According to him it was a medicinal plant, *inter medica dicendum*.[75] He says that Tiberius caused a quantity to be brought every year from Germany, which proves, he adds, that it thrives in cold countries.

If the Greeks had received the plant direct from Persia, Theophrastus would probably have known it. It came perhaps from Siberia into Russia, and thence into Germany, in which case the anecdote about Tiberius might well apply to the skirret. I cannot find any Russian name, certainly, but the Germans have original names, *Krizel* or *Grizel*, *Görlein* or *Gierlein*, which indicate an ancient cultivation, more than the ordinary name *Zuckerwurzel*, or sugar-root.[76] The Danish name has the same meaning —*sokerot*, whence the English *skirret*. The name *sisaron* is not known in modern Greece; nor was it known there even in the Middle Ages, and the plant is not now cultivated in that country.[77] There are reasons for doubt as to the true sense of the words *sisaron* and *siser*. Some botanists of the sixteenth century thought that *sisaron* was perhaps the *parsnip* proper, and Sprengel[78] supports this idea.

The French names *chervis* and *girole*[79] would perhaps teach us something if we knew their origin. Littré derives *chervis* from the Spanish *chirivia*, but the latter is more likely derived from the French. Bauhin[80] mentions the low Latin names *servillum*, *chervillum*, or *servillam*, words which are not in Ducange's dictionary. This may well be the origin of *chervis*, but whence came *servillum* or *chervillum*?

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[72] Linnæus, *Species*, p. 361; Loureiro, *Fl. Cochinchinensis*, p. 225.

[73] Maximowicz, *Diagnoses Plantarum Japonicæ et Manshuriæ*, in *Mélanges Biologiques du Bulletin de l'Acad., St. Petersburg*, decad 13, p. 18.

[74] Dioscorides, *Mat. Med.*, 1. 2, c. 139; Columella, 1. 11, c. 3, 18, 35; Lenz, *Bot. der Alten*, p. 560.

[75] Pliny, *Hist. Plant.*, 1. 19, c. 5.

[76] Nemnich, *Polygl. Lexicon*, ii. p. 1313.

[77] Lenz, *Bot. der Alten*, p. 560; Heldreich, *Nutzpflanzen Griechenlands*; Langkavel, *Bot. der Späteren Griechen*.

[78] Sprengel, *Dioscoridis*, etc., ii. p. 462.

[79] Olivier de Serres, *Théâtre de l'Agriculture*, p. 471.

[80] Bauhin, *Hist. Pl.*, iii. p. 154.

Arracacha or **Arracacia**—*Arracacha esculenta*, de Candolle.

An umbel generally cultivated in Venezuela, New Granada, and Ecuador as a nutritious plant. In the temperate regions of those countries it bears comparison with the potato, and even yields, we are assured, a lighter and more agreeable *fecula*. The lower part of the stem is swelled into a bulb, on which, when the plant thrives well, tubercles, or lateral bulbs, form themselves, and persist for several months, which are more prized than the central bulb, and serve for future planting.[81]

The species is probably indigenous in the region where it is cultivated, but I do not find in any author a positive assertion of the fact. The existing descriptions are drawn from cultivated stocks. Grisebach indeed says that he has seen (presumably in the herbarium at Kew) specimens gathered in New Granada, in Peru, and in Trinidad,[82] but he does not say whether they were wild. The other species of the same genus, to the number of a dozen, grow in the same districts of America, which renders the above-mentioned origin more probable.

The introduction of the arracacha into Europe has been attempted several times without success. The damp climate of England accounts for the failure of Sir William Hooker's attempts; but ours, made at two different times, under very different conditions, have met with no better success. The lateral bulbs did not form, and the central bulb died in the house where it was placed for the winter. The bulbs presented to different botanical gardens in France and Italy and elsewhere shared the same fate. It is clear that if the plant is in America really equal to the potato in productiveness and taste, this will never be the case in Europe. Its cultivation does not in America spread as far as Chili and Mexico, like that of the potato and sweet potato, which confirms the difficulty of propagation observed elsewhere.

Madder—*Rubia tinctorum*, Linnæus.

The madder is certainly wild in Italy, Greece, the Crimea, Asia Minor, Syria, Persia, Armenia, and near Lenkoran.[83] As we advance westward in the south of Europe, the wild, indigenous nature of the plant becomes more and more doubtful. There is uncertainty even in France. In the north and east the plant appears to be "naturalized in hedges and on walls,"[84] or "subspontaneous," escaped from former cultivation.[85] In Provence and Languedoc it is more spontaneous or wild, but here also it may have spread from a somewhat extensive cultivation. In the Iberian peninsula it is mentioned as "subspontaneous."[86] It is the same in the north of Africa.[87] Evidently the natural, ancient, and undoubted habitation is western temperate Asia and the south-east of Europe. It does not appear that the plant has been found beyond the Caspian Sea in the land formerly occupied by the Indo-Europeans, but this region is still little known. The species only exists in India as a cultivated plant, and has no Sanskrit name.[88]

Neither is there any known Hebrew name, while the Greeks, Romans, Slavs, Germans, and Kelts had various names, which a philologist could perhaps trace to one or two roots, but which nevertheless indicate by their numerous modifications an ancient date. Probably the wild roots were gathered in the fields before the idea of cultivating the species was suggested. Pliny, however, says[89]

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[81] The best information about the cultivation of this plant was given by Bancroft to Sir W. Hooker, and may be found in the *Botanical Magazine*, pl. 3092. A. P. de Candolle published, in *La 5e Notice sur les Plantes Rares des Jardin Bot. de Genève*, an illustration showing the principal bulb.

[82] Grisebach, *Flora of British West-India Islands.*

[83] Bertoloni, *Flora Italica*, ii. p. 146; Decaisne, *Recherches sur la Garance*, p. 68; Boissier, *Flora Orientalis*, iii. p. 17; Ledebour, *Flora Rossica*, ii. p. 405.

[84] Cosson and Germain, *Flore des Environs de Paris*, ii. p. 365.

[85] Kirschleger, *Flore d'Alsace*, i. p. 359.

[86] Willkomm and Lange, *Prodromus Floræ Hispanicæ*, ii. p. 307.

[87] Ball, *Spicilegium Floræ Maroccanæ*, p. 483; Munby, *Catal. Plant. Alger.*, edit. 2, p. 17.

[88] Piddington, *Index*.

[89] Plinius, lib. 19, cap. 3.

that it was cultivated in Italy in his time, and it is possible that the custom was of older date in Greece and Asia Minor.

The cultivation of madder is often mentioned in French records of the Middle Ages.[90] It was afterwards neglected or abandoned, until Althen reintroduced it into the neighbourhood of Avignon in the middle of the eighteenth century. It flourished formerly in Alsace, Germany, Holland, and especially in Greece, Asia Minor, and Syria, whence the exportation was considerable; but the discovery of dyes extracted from inorganic substances has suppressed this cultivation, to the great detriment of the provinces which drew large profits from it.

Jerusalem Artichoke—*Helianthus tuberosus*, Linnæus.

It was in the year 1616 that European botanists first mentioned this Composite, with a large root better adapted for the food of animals than of man. Columna[91] had seen it in the garden of Cardinal Farnese, and called it *Aster peruanus tuberosus*. Other authors of the same century gave it epithets showing that it was believed to come from Brazil, or from Canada, or from the Indies, that is to say, America. Linnæus[92] adopted, on Parkinson's authority, the opinion of a Canadian origin, of which, however, he had no proof. I pointed out formerly[93] that there are no species of the genus Helianthus in Brazil, and that they are, on the contrary, numerous in North America.

Schlechtendal,[94] after having proved that the Jerusalem artichoke can resist the severe winters of the centre of Europe, observes that this fact is in favour of the idea of a Canadian origin, and contrary to the belief of its coming from some southern region. Decaisne[95] has eliminated from the synonymy of *H. tuberosus* several quotations which had occasioned the belief in a South American or Mexican origin. Like the American botanists, he recalls what ancient travellers had narrated of certain customs of the aborigines of the Northern States and of Canada. Thus Champlain, in 1603, had seen, "in their hands, roots which they cultivate, and which taste like an artichoke." Lescarbot[96] speaks of these roots with the artichoke flavour, which multiply freely, and which he had brought back to France, where they began to be sold under the name of *topinambaux*. The savages, he says, call them *chiquebi*. Decaisne also quotes two French horticulturists of the seventeenth century, Colin and Sagard, who evidently speak of the Jerusalem artichoke, and say it came from Canada. It is to be noted that the name Canada had at that time a vague meaning, and comprehended some parts of the modern United States. Gookin, an American writer on the customs of the aborigines, says that they put pieces of the Jerusalem artichoke into their soups.[97]

Botanical analogies and the testimony of contemporaries agree, as we have seen, in considering this plant to be a native of the north-east of America. Dr. Asa Gray, seeing that it is not found wild, had formerly supposed it to be a variety of *H. doronicoides* of Lamarck, but he has since abandoned this idea (*American Journal of Science*, 1883, p. 224). An author gives it as wild in the State of Indiana.[98] The French name *topinambour* comes apparently from some real or supposed Indian name. The English name Jerusalem artichoke is a corruption of the Italian *girasole*, sunflower, combined with an allusion to the artichoke flavour of the root.

Salsify—*Tragopogon porrifolium*, Linnæus.

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[90] De Gasparin, *Traité d'Agriculture*, iv. p. 253.

[91] Columna, *Ecphrasis*, ii. p. 11.

[92] Linnæus, *Hortus Cliffortianus*, p. 420.

[93] A. de Candolle, *Géogr. Bot. Raisonnée*, p. 824.

[94] Schlechtendal, *Bot. Zeit.* 1858, p. 113.

[95] Decaisne, *Recherches sur l'Origine de quelques-unes de nos Plantes Alimentaires*, in *Flore des Serres et Jardins*, vol. 23, 1881, p. 112.

[96] Lescarbot, *Histoire de la Nouvelle France*, edit. 3, 1618, t. vi. p. 931.

[97] Pickering, *Chron. Arrang.*, pp. 749, 972.

[98] *Catalogue of Indiana Plants*, 1881, p. 15.

The salsify was more cultivated a century or two ago than it is now. It is a biennial composite, found wild in Greece, Dalmatia, Italy, and even in Algeria.[99] It frequently escapes from gardens in the west of Europe, and becomes half-naturalized.[100]

Commentators[101] give the name *Tragopogon* (goat's beard) of Theophrastus sometimes to the modern species, sometimes to *Tragopogon crocifolium*, which also grows in Greece. It is difficult to know if the ancients cultivated the salsify or gathered it wild in the country. In the sixteenth century Olivier de Serres says it was a new culture in his country, the south of France. Our word *Salsifis* comes from the Italian *Sassefrica*, that which rubs stones, a senseless term.

Scorzonera—*Scorzonera hispanica*, Linnæus.

This plant is sometimes called the Spanish salsify, from its resemblance to *Tragopogon porrifolium*; but its root has a brown skin, whence its botanical name, and the popular name *écorce noire* in some French provinces.

It is wild in Europe, from Spain, where it abounds, the south of France, and Germany, to the region of Caucasus, and perhaps even as far as Siberia, but it is wanting in Sicily and Greece.[102] In several parts of Germany the species is probably naturalized from cultivation.

It seems that this plant has only been cultivated within the last hundred or hundred and fifty years. The botanists of the sixteenth century speak of it as a wild species introduced occasionally into botanical gardens. Olivier de Serres does not mention it.

It was formerly supposed to be an antidote against the bite of adders, and was sometimes called the viper's plant. As to the etymology of the name *Scorzonera*, it is so evident, that it is difficult to understand how early writers, even Tournefort,[103] have declared the origin of the word to be *escorso*, viper in Spanish or Catalan. Viper is in Spanish more commonly *vibora*.

There exists in Sicily a *Scorzonera deliciosa*, Gussone, whose very sugary root is used in the confection of bonbons and sherbets, at Palermo.[104] How is it that its cultivation has not been tried? It is true that I tasted at Naples *Scorzonera* ices, and found them detestable, but they were perhaps made of the common species (*Scorzonera hispanica*).

Potato—*Solanum tuberosum*, Linnæus.

In 1855 I stated and discussed what was then known about the origin of the potato, and about its introduction into Europe.[105] I will now add the result of the researches of the last quarter of a century. It will be seen that the data formerly acquired have become more certain, and that several somewhat doubtful accessory questions have remained uncertain, though the probabilities in favour of what formerly seemed the truth have grown stronger.

It is proved beyond a doubt that at the time of the discovery of America the cultivation of the potato was practised, with every appearance of ancient usage, in the temperate regions extending from Chili to New Granada, at altitudes varying with the latitude. This appears from the testimony of all the early travellers, among whom I shall name Acosta for Peru,[106] and Pedro Cieca, quoted by de l'Ecluse,[107] for Quito.

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[99] Boissier, *Fl. Orient.*, iii. p. 745; Viviani, *Fl. Dalmat.*, ii. p. 108; Bertoloni, *Fl. Ital.*, viii. p. 348; Gussone, *Synopsis Fl. Siculæ*, ii. p. 384; Munby, *Catal. Alger.*, edit. 2, p. 22.

[100] A. de Candolle, *Géogr. Bot. Raisonnée*, p. 671.

[101] Fraas, *Synopsis Fl. Class.*, p. 196; Lenz, *Bot. der Alten*, p. 485.

[102] Willkomm and Lange, *Prodromus Floræ Hispanicæ*, ii. p. 223; De Candolle, *Flore Française*, iv. p. 59; Koch, *Synopsis Fl. Germ.*, edit. 2, p. 488; Ledebour, *Fl. Ross.*, ii. p. 794; Boissier, *Fl. Orientalis*, iii. p. 767; Bertoloni, *Fl. Ital.*, viii. p. 365.

[103] Tournefort, *Éléments de Botanique*, p. 379.

[104] Gussone, *Synopsis Floræ Siculæ*.

[105] A. de Candolle, *Géogr. Bot. Raisonnée*, pp. 810, 816.

[106] Acosta, p. 163, *verso*.

[107] De l'Ecluse (or Clusius), *Rariarum Plantarum Historiæ*, 1601, lib. 4, p. lxxix., with illustration.

In the eastern temperate region of South America, on the heights of Guiana and Brazil, for instance, the potato was not known to the aborigines, or if they were acquainted with a similar plant, it was *Solanum Commersonii*, which has also a tuberous root, and is found wild in Montevideo and in the south of Brazil. The true potato is certainly now cultivated in the latter country, but it is of such recent introduction that it has received the name of the English Batata.[108] According to Humboldt it was unknown in Mexico,[109] a fact confirmed by the silence of subsequent authors, but to a certain degree contradicted by another historical fact. It is said that Sir Walter Raleigh, or rather Thomas Herriott, his companion in several voyages, brought back to Ireland, in 1585 or 1586, some tubers of the Virginian potato.[110] Its name in its own country was *openawk*. From Herriott's description of the plant, quoted by Sir Joseph Banks,[111] there is no doubt that it was the potato, and not the batata, which at that period was sometimes confounded with it. Besides, Gerard[112] tells us that he received from Virginia the potato which he cultivated in his garden, and of which he gives an illustration which agrees in all points with *Solanum tuberosum*. He was so proud of it that he is represented, in his portrait at the beginning of the work, holding in his hand a flowering branch of this plant.

The species could scarcely have been introduced into Virginia or Carolina in Raleigh's time (1585), unless the ancient Mexicans had possessed it, and its cultivation had been diffused among the aborigines to the north of Mexico. Dr. Roulin, who has carefully studied the works on North America, has assured me that he has found no signs of the potato in the United States before the arrival of the Europeans. Dr. Asa Gray also told me so, adding that Mr. Harris, one of the men most intimately acquainted with the language and customs of North American tribes, was of the same opinion. I have read nothing to the contrary in recent publications, and we must not forget that a plant so easy of cultivation would have spread itself even among nomadic tribes, had they possessed it. It seems to me most likely that some inhabitants of Virginia – perhaps English colonists – received tubers from Spanish or other travellers, traders or adventurers, during the ninety years which had elapsed since the discovery of America. Evidently, dating from the conquest of Peru and Chili, in 1535 to 1585, many vessels could have carried tubers of the potato as provisions, and Sir Walter Raleigh, making war on the Spaniards as a privateer, may have pillaged some vessel which contained them. This is the less improbable, since the Spaniards had introduced the plant into Europe before 1585.

Sir Joseph Banks[113] and Dunal[114] were right to insist upon the fact that the potato was first introduced by the Spaniard, since for a long time the credit was generally given to Sir Walter Raleigh, who was the second introducer, and even to other Englishmen, who had introduced, not the potato but the *batata* (sweet potato), which is more or less confounded with it.[115] A celebrated botanist, de l'Ecluse,[116] had nevertheless defined the facts in a remarkable manner. It is he who published the first good description and illustration of the potato, under the significant name of *Papas Peruanorum*. From what he says, the species has little changed under the culture of nearly three centuries, for it yielded in the beginning as many as fifty tubers of unequal size, from one to two inches long, irregularly ovoid, reddish, ripening in November (at Vienna). The flower was more or less pink externally, and reddish within, with five longitudinal stripes of green, as is often seen now. No doubt numerous varieties have been obtained, but the original form has not been lost. De l'Ecluse compares

[108] De Martius, *Flora Brasil.*, vol. x. p. 12.

[109] Von Humboldt, *Nouvelle Espagne*, edit. 2, vol. ii. p. 451; *Essai sur la Géographie des Plantes*, p. 29.

[110] At that epoch Virginia was not distinguished from Carolina.

[111] Banks, *Trans. Hort. Soc.*, 1805, vol. i. p. 8.

[112] Gerard, *Herbal*, 1597, p. 781, with illustration.

[113] Banks, *Trans. Hort. Soc.*, 1805, vol. i. p. 8.

[114] Dunal, *Hist. Nat. des Solanum*, in 4to.

[115] The plant imported by Sir John Hawkins and Sir Francis Drake was clearly the sweet potato, Sir J. Banks says; whence it results that the questions discussed by Humboldt touching the localities visited by these travellers do not apply to the potato.

[116] De l'Ecluse, *Rariarum Plantarum Historiæ*, 1601, lib. 4. p. lxxviii.

the scent of the flower with that of the lime, the only difference from our modern plant. He sowed seeds which produced a white-flowered variety, such as we sometimes see now.

The plants described by de l'Ecluse were sent to him in 1588, by Philippe de Sivry, Seigneur of Waldheim and Governor of Mons, who had received them from some one in attendance on the papal legate in Belgium. De l'Ecluse adds that the species had been introduced into Italy from Spain or America (*certum est vel ex Hispania, vel ex America habuisse*), and he wonders that, although the plant had become so common in Italy that it was eaten like a turnip and given to the pigs, the learned men of the University of Padua only became acquainted with it by means of the tuber which he sent them from Germany. Targioni[117] has not been able to discover any proof that the potato was as widely cultivated in Italy at the end of the sixteenth century as de l'Ecluse asserts, but he quotes Father Magazzini of Vallombrosa, whose posthumous work, published in 1623, mentions the species as one previously brought, without naming the date, from Spain or Portugal by barefooted friars. It was, therefore, towards the end of the sixteenth or at the beginning of the seventeenth century that the cultivation of the potato became known in Tuscany. Independently of what de l'Ecluse and the agriculturist of Vallombrosa say of its introduction from the Iberian peninsula, it is not at all likely that the Italians had any dealings with Raleigh's companions.

No one can doubt that the potato is of American origin; but in order to know from what part of that vast continent it was brought, it is necessary to know if the plant is found wild there, and in what localities.

To answer this question clearly, we must first remove two causes of error: the confusion of allied species of the genus *Solanum* with the potato; and the other, the mistakes made by travellers as to the wild character of the plant.

The allied species are *Solanum Commersonii* of Dunal, of which I have already spoken; *S. maglia* of Molina, a Chili species; *S. immite* of Dunal, a native of Peru; and *S. verrucosum*[118] of Schlechtendal, which grows in Mexico. These three kinds of *Solanum* have smaller tubers than *S. tuberosum*, and differ also in other characteristics indicated in special works on botany. Theoretically, it may be believed that all these, and other forms growing in America, are derived from a single earlier species, but in our geological epoch they present themselves with differences which seem to me to justify specific distinctions, and no experiments have proved that by crossing one with another a product would be obtained of which the seed (not the tubers) would propagate the race. Leaving these more or less doubtful questions of species, let us try to ascertain whether the common form of *Solanum tuberosum* has been found wild, and merely remark that the abundance of tuberous solanums growing in the temperate regions of America, from Chili or Buenos Ayres as far as Mexico, confirms the fact of an American origin. If we knew nothing more, this would be a strong presumption in favour of this country being the original home of the potato.

The second cause of error is very clearly explained by the botanist Weddell,[119] who has carefully explored Bolivia and the neighbouring countries. "When we reflect," he says, "that on the arid Cordillera the Indians often establish their little plots of cultivation on points which would appear almost inaccessible to the great majority of our European farmers, we understand that when a traveller chances to visit one of these cultivated plots, long since abandoned, and finds there a plant of *Solanum tuberosum* which has accidentally persisted, he gathers it in the belief that it is really wild; but of this there is no proof."

We come now to facts. These abound concerning the wild character of the plant in Chili.

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[117] Targioni-Tozzetti, *Lezzioni*, ii. p. 10; *Cenni Storici sull' Introduzione di Varie Piante nell' Agricoltura di Toscana*, 1 vol. in 8vo, Florence, 1853, p. 37.

[118] *Solanum verrucosum*, whose introduction into the neighbourhood of Gex, near Geneva, I mentioned in 1855, has since been abandoned because its tubers are too small, and because it does not, as it was hoped, withstand the *potato-fungus*.

[119] *Chloris Andina*, in 4to. p. 103.

In 1822, Alexander Caldcleugh,[120] English consul, sent to the London Horticultural Society some tubers of the potato which he had found in the ravines round Valparaiso. He says that these tubers are small, sometimes red, sometimes yellowish, and rather bitter in taste.[121] "I believe," he adds, "that this plant exists over a great extent of the littoral, for it is found in the south of Chili, where the aborigines call it *maglia*." This is probably a confusion with *S. maglia* of botanists; but the tubers of Valparaiso, planted in London, produced the true potato, as we see from a glance at Sabine's coloured figure in the *Transactions of the Horticultural Society*. The cultivation of this plant was continued for some time, and Lindley certified anew, in 1847, its identity with the common potato.[122] Here is the account of the Valparaiso plant, given by a traveller to Sir William Hooker.[123] "I noticed the potato on the shore as far as fifteen leagues to the north of this town, and to the south, but I do not know how far it extends. It grows on cliffs and hills near the sea, and I do not remember to have seen it more than two or three leagues from the coast. Although it is found in mountainous places, far from cultivation, it does not exist in the immediate neighbourhood of the fields and gardens where it is planted, excepting when a stream crosses these enclosures and carries the tubers into uncultivated places." The potato described by these two travellers had white flowers, as is seen in some cultivated European varieties, and like the plant formerly reared by de l'Ecluse. We may assume that this is the natural colour of the species, or at least one of the most common in its wild state.

Darwin, in his voyage in the *Beagle*, found the potato growing wild in great abundance on the sand of the sea-shore, in the archipelago of Southern Chili, and growing with a remarkable vigour, which may be attributed to the damp climate. The tallest plants attained to the height of four feet. The tubers were small as a rule, though one of them was two inches in diameter. They were watery, insipid, but with no bad taste when cooked. "The plant is undoubtedly wild," says the author,[124] "and its specific identity has been confirmed first by Henslow, and afterwards by Sir Joseph Hooker in his *Flora Antarctica*.[125]"

A specimen in the herbarium collected by Claude Gay, considered by Dunal to be *Solanum tuberosum*, bears this inscription: "From the centre of the Cordilleras of Talcagouay, and of Cauquenes, in places visited only by botanists and geologists." The same author, Gay, in his *Flora Chilena*,[126] insists upon the abundance of the wild potato in Chili, even among the Araucanians in the mountains of Malvarco, where, he says, the soldiers of Pincheira used to go and seek it for food. This evidence sufficiently proves its wild state in Chili, so that I may omit other less convincing testimony – for instance, that of Molina and Meyen, whose specimens from Chili have not been examined.

The climate of the coast of Chili is continued upon the heights as we follow the chain of the Andes, and the cultivation of the potato is of ancient date in the temperate regions of Peru, but the wild character of the species there is not so entirely proved as in the case of Chili.[127] Pavon declared he found it on the coast at Chancay, and near Lima. The heat of these districts seems very great for a species which requires a temperate or even a rather cold climate. Moreover, the specimen in Boissier's herbarium, gathered by Pavon, belongs, according to Dunal,[128] to another species, to which he has given the name of *S. immite*. I have seen the authentic specimen, and have no doubt that it belongs to

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[120] Sabine, *Trans. Hort. Soc.*, vol. v. p. 249.

[121] No importance should be attached to this flavour, nor to the watery quality of some of the tubers, since in hot countries, even in the south of Europe, the potato is often poor. The tubers, which are subterranean ramifications of the stem, are turned green by exposure to the light, and are rendered bitter.

[122] *Journal Hort. Soc.*, vol. iii. p. 66.

[123] Hooker, *Botanical Miscellanies*, 1831. vol. ii. p. 203.

[124] *Journal of the Voyage*, etc., edit. 1852, p. 285.

[125] Vol. i. part 2, p. 329.

[126] Vol. v. p. 74.

[127] Ruiz and Pavon, *Flora Peruviana*, ii. p. 38.

[128] Dunal, *Prodromus*, xiii., sect. i. p. 22.

a species distinct from the *S. tuberosum*. Sir W. Hooker[129] speaks of McLean's specimen, gathered in the hills round Lima, without any information as to whether it was found wild. The specimens (more or less wild) which Matthews sent from Peru to Sir W. Hooker belong, according to Sir Joseph,[130] to varieties which differ a little from the true potato. Mr. Hemsley,[131] who has seen them recently in the herbarium at Kew, believes them to be "distinct forms, not more distinct, however, than certain varieties of the species."

Weddell,[132] whose caution in this matter we already know, expresses himself as follows: – "I have never found *Solanum tuberosum* in Peru under such circumstances as left no doubt that it was indigenous; and I even declare that I do not attach more belief to the wild nature of other plants found scattered on the Andes outside Chili, hitherto considered as indigenous."

On the other hand. M. Ed. André[133] collected with great care, in two elevated and wild districts of Columbia, and in another near Lima, specimens which he believed he might attribute to *S. tuberosum*. M. André has been kind enough to lend them to me. I have compared them attentively with the types of Dunal's species in my herbarium and in that of M. Boissier. None of these Solanaceæ belong, in my opinion, to *S. tuberosum*, although that of La Union, near the river Cauca, comes nearer than the rest. None – and this is yet more certain – answers to *S. immite* of Dunal. They are nearer to *S. columbianum* of the same author than to *S. tuberosum* or *S. immite*. The specimen from Mount Quindio presents a singular characteristic – it has pointed ovoid berries.[134]

In Mexico the tuberous Solanums attributed to *S. tuberosum*, or, according to Hemsley,[135] to allied forms, do not appear to be identical with the cultivated plant. They belong to *S. Fendleri*, which Dr. Asa Gray considered at first as a separate species, and afterwards[136] as a variety of *S. tuberosum* or of *S. verrucosum*.

We may sum up as follows: —

1. The potato is wild in Chili, in a form which is still seen in our cultivated plants.

2. It is very doubtful whether its natural home extends to Peru and New Granada.

3. Its cultivation was diffused before the discovery of America from Chili to New Granada.

4. It was introduced, probably in the latter half of the sixteenth century, into that part of the United States now known as Virginia and North Carolina.

5. It was imported into Europe between 1580 and 1585, first by the Spaniards, and afterwards by the English, at the time of Raleigh's voyages to Virginia.[137]

Batata, or **Sweet Potato**—*Convolvulus batatas*, Linnæus; *Batatas edulis*, Choisy.

The roots of this plant, swelled into tubers, resemble potatoes, whence it arose that sixteenth-century navigators applied the same name to these two very different species. The sweet potato belongs to the Convolvulus family, the potato to the Solanum family; the fleshy parts of the former are roots, those of the latter subterranean branches.[138] The sweet potato is sugary as well as farinaceous. It is cultivated in all countries within or near the tropics, and perhaps more in the new than in the old world.[139]

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[129] Hooker, *Bot. Miscell.*, ii.

[130] Hooker, *Fl. Antarctica*.

[131] *Journal Hort. Soc.*, new series, vol. v.

[132] Weddell, *Chloris Andina*, p. 103.

[133] André, in *Illustration Horticole*, 1877, p. 114.

[134] The form of the berries in *S. columbianum* and *S. immite* is not yet known.

[135] Hemsley, *Journal Hort. Soc.*, new series, vol. v.

[136] Asa Gray, *Synoptical Flora of North America*, ii. p. 227.

[137] See, for the successive introduction into the different parts of Europe, Clos, *Quelques Documents sur l'Histoire de la Pomme de Terre*, in 8vo, 1874, in *Journal d'Agric. Pratiq. du Midi de la France*.

[138] Turpin gives figures which clearly show these facts. *Mém. du Muséum*, vol. xix. plates 1, 2, 5.

[139] Dr. Sagot gives interesting details on the method of cultivation, the product, etc., in the *Journal Soc. d'Hortic. de France*, second

Its origin is, according to a great number of authors, doubtful. Humboldt,[140] Meyen,[141] and Boissier[142] hold to its American, Boyer,[143] Choisy,[144] etc., to its Asiatic origin. The same diversity is observed in earlier works. The question is the more difficult since the Convolvulaceæ is one of the most widely diffused families, either from a very early epoch or in consequence of modern transportation.

There are powerful arguments in favour of an American origin. The fifteen known species of the genus *Batatas* are all found in America; eleven in that continent alone, four both in America and the old world, with possibility or probability of transportation. The cultivation of the common sweet potato is widely diffused in America. It dates from a very early epoch. Marcgraff[145] mentions it in Brazil under the name of *jetica*. Humboldt says that the name *camote* comes from a Mexican word. The word *Batatas* (whence comes by a mistaken transfer the word potato) is given as American. Sloane and Hughes[146] speak of the sweet potato as of a plant much cultivated, and having several varieties in the West Indies. They do not appear to suspect that it had a foreign origin. Clusius, who was one of the first to mention the sweet potato, says he had eaten some in the south of Spain, where it was supposed to have come from the new world.[147] He quotes the names *Batatas*, *camotes*, *amotes*, *ajes*,[148] which were foreign to the languages of the old world. The date of his book is 1601. Humboldt[149] says that, according to Gomara, Christopher Columbus, when he appeared for the first time before Queen Isabella, offered her various productions from the new world, sweet potatoes among others. Thus, he adds, the cultivation of this plant was already common in Spain from the beginning of the sixteenth century. Oviedo,[150] writing in 1526, had seen the sweet potato freely cultivated by the natives of St. Domingo, and had introduced it himself at Avila, in Spain. Rumphius[151] says positively that, according to the general opinion, sweet potatoes were brought by the Spanish Americans to Manilla and the Moluccas, whence the Portuguese diffused it throughout the Malay Archipelago. He quotes the popular names, which are not Malay, and which indicate an introduction by the Castillians. Lastly, it is certain that the sweet potato was unknown to the Greeks, Romans, and Arabs; that it was not cultivated in Egypt even eighty years ago,[152] a fact which it would be hard to explain if we supposed its origin to be in the old world.

On the other hand, there are arguments in favour of an Asiatic origin. The Chinese *Encyclopædia of Agriculture* speaks of the sweet potato, and mentions different varieties;[153] but Bretschneider[154] has proved that the species is described for the first time in a book of the second or third century of our era. According to Thunberg,[155] the sweet potato was brought to Japan by the Portuguese. Lastly, the plant cultivated at Tahiti, in the neighbouring islands, and in New

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series, vol. v. pp. 450-458.

[140] Humboldt, *Nouvelle Espagne*, edit. 2, vol. ii. p. 470.

[141] Meyen, *Grundrisse Pflanz. Geogr.*, p. 373.

[142] Boissier, *Voyage Botanique en Espagne*.

[143] Boyer, *Hort. Maurit.*, p. 225.

[144] Choisy, in *Prodromus*, p. 338.

[145] Marcgraff, *Bres.*, p. 16, with illustration.

[146] Sloane, *Hist. Jam.*, i. p. 150; Hughes, *Barb.*, p. 228.

[147] Clusius, *Hist.*, ii. p. 77.

[148] *Ajes* was a name for the yam (Humboldt, *Nouvelle Espagne*).

[149] Humboldt, *ibid.*

[150] Oviedo, Ramusio's translation, vol. iii. pt. 3.

[151] Rumphius, *Amboin.*, v. p. 368.

[152] Forskal, p. 54; Delile, *Ill.*

[153] D'Hervey Saint-Denys, *Rech. sur l'Agric. des Chin.*, 1850, p. 109.

[154] *Study and Value of Chinese Botanical Works*, p. 13.

[155] Thunberg, *Flora Japon.*, p. 84.

Zealand, under the names *umara*, *gumarra*, and *gumalla*, described by Forster[156] under the name of *Convolvulus chrysorhizus*, is, according to Sir Joseph Hooker, the sweet potato.[157] Seemann[158] remarks that these names resemble the Quichuen name of the sweet potato in America, which is, he says, *cumar*. The cultivation of the sweet potato became general in Hindustan in the eighteenth century.[159] Several popular names are attributed to it, and even, according to Piddington,[160] a Sanskrit name, *ruktalu*, which has no analogy with any name known to me, and is not in Wilson's Sanskrit Dictionary. According to a note given me by Adolphe Pictet, *ruktalu* seems a Bengalee name composed from the Sanskrit *alu* (*Rukta* plus *âlu*, the name of *Arum campanulatum*). This name in modern dialects designates the yam and the potato. However, Wallich[161] gives several names omitted by Piddington. Roxburgh[162] mentions no Sanskrit name. Rheede[163] says the plant was cultivated in Malabar, and mentions common Indian names.

The arguments in favour of an American origin seem to me much stronger. If the sweet potato had been known in Hindustan at the epoch of the Sanskrit language it would have become diffused in the old world, since its propagation is easy and its utility evident. It seems, on the contrary, that this cultivation remained long unknown in the Sunda Isles, Egypt, etc. Perhaps an attentive examination might lead us to share the opinion of Meyer,[164] who distinguished the Asiatic plant from the American species. However, this author has not been generally followed, and I suspect that if there is a different Asiatic species it is not, as Meyer believed, the sweet potato described by Rumphius, which the latter says was brought from America, but the Indian plant of Roxburgh.

Sweet potatoes are grown in Africa; but either the cultivation is rare, or the species are different. Robert Brown[165] says that the traveller Lockhardt had not seen the sweet potato of whose cultivation the Portuguese missionaries make mention. Thonning[166] does not name it. Vogel brought back a species cultivated on the western coast, which is certainly, according to the authors of the *Flora Nigritiana*, *Batatas paniculata* of Choisy. It was, therefore, a plant cultivated for ornament or for medicinal purposes, for its root is purgative.[167] It might be supposed that in certain countries in the old or new world *Ipomœa tuberosa*. L., had been confounded with the sweet potato; but Sloane[168] tells us that its enormous roots are not eatable.[169]

Ipomœa mammosa, Choisy (*Convolvulus mammosus*, Loureiro; *Batata mammosa*, Rumphius), is a Convolvulaceous plant with an edible root, which may well be confounded with the sweet potato, but whose botanical character is nevertheless distinct. This species grows wild near Amboyna (Rumphius), where it is also cultivated. It is prized in Cochin-China.

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[156] Forster, *Plantæ Escul.*, p. 56.

[157] Hooker, *Handbook of New Zealand Flora*, p. 194.

[158] Seemann, *Journal of Bot.*, 1866, p. 328.

[159] Roxburgh, edit. Wall., ii. p. 69.

[160] Piddington, *Index*.

[161] Wallich, *Flora Ind.*

[162] Roxburgh, edit. 1832, vol. i. p. 483.

[163] Rheede, *Mal.*, vii. p. 95.

[164] Meyer, *Primitiæ Fl. Esseq.*, p. 103.

[165] R. Brown, *Bot. Congo*, p. 55.

[166] Schumacher and Thonning, *Besk. Guin.*

[167] Wallich, in Roxburgh, *Fl. Ind.*, ii. p. 63.

[168] Sloane, *Jam.*, i. p. 152.

[169] Several Convolvulaceæ have large roots, or more properly root-stocks, but in this case it is the base of the stem with a part of the root which is swelled, and this root-stock is always purgative, as in the Jalap and Turbith, while in the sweet potato it is the lateral roots, a different organ, which swell.

As for the sweet potato (*Batatas edulis*), no botanist, as far as I know, has asserted that he found it wild himself, either in India or America.[170] Clusius[171] affirms upon hearsay that it grows wild in the new world and in the neighbouring islands.

In spite of the probability of an American origin, there remains, as we have seen, much that is unknown or uncertain touching the original home and the transport of this species, which is a valuable one in hot countries. Whether it was a native of the new or of the old world, it is difficult to explain its transportation from America to China at the beginning of our era, and to the South Sea Islands at an early epoch, or from Asia and from Australia to America at a time sufficiently remote for its cultivation to have been early diffused from the Southern States to Brazil and Chili. We must assume a prehistoric communication between Asia and America, or adopt another hypothesis, which is not inapplicable to the present case. The order *Convolvulaceæ* is one of those rare families of dicotyledons in which certain species have a widely extended area, extending even to distant continents.[172] A species which can at the present day endure the different climates of Virginia and Japan may well have existed further north before the epoch of the great extension of glaciers in our hemisphere, and prehistoric men may have transported it southward when the climatic conditions altered. According to this hypothesis, cultivation alone preserved the species, unless it is at last discovered in some spot in its ancient habitation – in Mexico or Columbia, for instance.[173]

Beetroot—*Beta vulgaris* and *B. maritima*, Linnæus; *Beta vulgaris*, Moquin.

This plant is cultivated sometimes for its fleshy root (red beet), sometimes for its leaves, which are used as a vegetable (white beet), but botanists are generally agreed in not dividing the species. It is known from other examples that plants slender rooted by nature easily become fleshy rooted from the effects of soil or cultivation.

The slender-rooted variety grows wild in sandy soil, and especially near the sea in the Canary Isles, and all along the coasts of the Mediterranean Sea, and as far as the Caspian Sea, Persia, and Babylon,[174] perhaps even as far as the west of India, whence a specimen was brought by Jaquemont, although it is not certain that it was growing wild. Roxburgh's Indian flora, and Aitchison's more recent flora of the Punjab and of the Sindh, only mention the plant as a cultivated species.

It has no Sanskrit name,[175] whence it may be inferred that the Aryans had not brought it from western temperate Asia, where it exists. The nations of Aryan race who had previously migrated into Europe probably did not cultivate it, for I find no name common to the Indo-European languages. The ancient Greeks, who used the leaves and roots, called the species *teutlion*;[176] the Romans, *beta*. Heldreich[177] gives also the ancient Greek name *sevkle*, or *sfekelie* which resembles the Arab name *selg*, *silq*,[178] among the Nabatheans. The Arab name has passed into the Portuguese *selga*. No Hebrew name is known. Everything shows that its cultivation does not date from more than three or four centuries before the Christian era.

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[170] No. 701 of Schomburgh, coll. 1, is wild in Guiana. According to Choisy, it is a variety of the *Batatas edulis*; according to Bentham (Hook, *Jour. Bot.*, v. p. 352), of the *Batatas paniculata*. My specimen, which is rather imperfect, seems to me to be different from both.

[171] Clusius, *Hist.*, ii. p. 77.

[172] A. de Candolle, *Géogr. Bot. Raisonné*, pp. 1041-1043, and pp. 516-518.

[173] Dr. Bretschneider, after having read the above, wrote to me from Pekin that the cultivated sweet potato is of origin foreign to China, according to Chinese authors. The handbook of agriculture of Nung-chang-tsuan-shu, whose author died in 1633, asserts this fact. He speaks of a sweet potato wild in China, called *chu*, the cultivated species being *kan-chu*. The *Min-shu*, published in the sixteenth century, says that the introduction took place between 1573 and 1620. The American origin thus receives a further proof.

[174] Moquin-Tandon, in *Prodromus*, vol. xiii. pt. 2, p. 55; Boissier, *Flora Orientalis*, iv. p. 898; Ledebour, *Fl. Rossica*, iii. p. 692.

[175] Roxburgh, *Flora Indica*, ii. p. 59; Piddington, *Index*.

[176] Theophrastus and Dioscorides, quoted by Lenz, *Botanik der Griechen und Römer*, p. 446; Fraas, *Synopsis Fl. Class.*, p. 233.

[177] Heldreich, *Die Nutzpflanzen Griechenlands*, p. 22.

[178] Alawâm, *Agriculture nabathéenne*, from E. Meyer, *Geschichte der Botanik*, iii. p. 75.

The red and white roots were known to the ancients, but the number of varieties has greatly increased in modern times, especially since the beetroot has been cultivated on a large scale for the food of cattle and for the production of sugar. It is one of the plants most easily improved by selection, as the experiments of Vilmorin have proved.[179]

Manioc—*Manihot utilissima*, Pohl; *Jatropha manihot*, Linnæus.

The manioc is a shrub belonging to the Euphorbia family, of which several roots swell in their first year; they take the form of an irregular ellipse, and contain a fecula (tapioca) with a more or less poisonous juice.

It is commonly cultivated in the equatorial or tropical regions, especially in America from Brazil to the West Indies. In Africa the cultivation is less general, and seems to be more recent. In certain Asiatic colonies it is decidedly of modern introduction. It is propagated by budding.

Botanists are divided in opinion whether the innumerable varieties of manioc should be regarded as forming one, two, or several different species. Pohl[180] admitted several besides his *Manihot utilissima*, and Dr. Müller,[181] in his monograph on the Euphorbiaceæ, places the variety *aipi* in an allied species, *M. palmata*, a plant cultivated with the others in Brazil, and of which the root is not poisonous. This last character is not so distinct as might be believed from certain books and even from the assertions of the natives. Dr. Sagot,[182] who has compared a dozen varieties of manioc cultivated at Cayenne, says expressly, "There are maniocs more poisonous than others, but I doubt whether any are entirely free from noxious principles."

It is possible to account for these singular differences of properties in very similar plants by the example of the potato. The *Manihot* and *Solanum tuberosum* both belong to suspected families (*Euphorbiaceæ* and *Solanaceæ*). Several of their species are poisonous in some of their organs; but the fecula, wherever it is found, is never harmful, and the same holds good of the cellular tissue, freed from all deposit; that is to say, reduced to cellulose. In the preparation of cassava, or manioc flour, great care is taken to scrape the outer skin of the root, then to pound or crush the fleshy part so as to express the more or less poisonous juice, and finally the paste is submitted to a baking which expels the volatile parts.[183] Tapioca is the pure fecula without the mixture of the tissues which still exist in the cassava. In the potato the outer pellicle contracts noxious qualities when it is allowed to become green by exposure to the light, and it is well known that unripe or diseased tubers, containing too small a proportion of fecula with much sap, are not good to eat, and would cause positive harm to persons who consumed any quantity of them. All potatoes, and probably all maniocs, contain something harmful, which is observed even in the products of distillation, and which varies with several causes; but only matter foreign to the fecula should be mistrusted.

The doubts about the number of species into which the cultivated manihots should be divided are no source of difficulty regarding the question of geographic origin. On the contrary, we shall see that they are an important means of proving an American origin.

The Abbé Raynal had formerly spread the erroneous opinion that the manioc was imported into America from Africa. Robert Brown[184] denied this in 1818, but without giving reasons in support of his opinion; and Humboldt,[185] Moreau de Jonnes,[186] and Saint Hilaire[187] insisted upon its American origin. It can hardly be doubted for the following reasons: —

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[179] *Notice sur l'Amélioration des Plantes par le Semis*, p. 15.

[180] Pohl, *Plantarum Brasiliæ Icones et Descriptiones*, in fol., vol. i.

[181] J. Müller, in *Prodromus*, xv., sect. 2, pp. 1062-1064.

[182] Sagot, *Bull. de la Soc. Bot. de France*, Dec. 8, 1871.

[183] I give the essentials of the preparation; the details vary according to the country. See on this head: Aublet, *Guyane*, ii. p. 67; Decourtilz, *Flora des Antilles*, iii. p. 113; Sagot, etc.

[184] R. Brown, *Botany of the Congo*, p. 50.

[185] Humboldt, *Nouvelle Espagne*, edit. 2, vol. ii. p. 398.

[186] *Hist. de l'Acad. des Sciences*, 1824.

1. Maniocs were cultivated by the natives of Brazil, Guiana, and the warm region of Mexico before the arrival of the Europeans, as all early travellers testify. In the West Indies this cultivation was, according to Acosta,[188] common enough in the sixteenth century to inspire the belief that it was also there of a certain antiquity.

2. It is less widely diffused in Africa, especially in regions at a distance from the west coast. It is known that manioc was introduced into the Isle of Bourbon by the Governour Labourdonnais.[189] In Asiatic countries, where a plant so easy to cultivate would probably have spread had it been long known on the African continent, it is mentioned here and there as an object of curiosity of foreign origin.[190]

3. The natives of America had several ancient names for the varieties of manioc, especially in Brazil,[191] which does not appear to have been the case in Africa, even on the coast of Guinea.[192]

4. The varieties cultivated in Brazil, in Guiana, and in the West Indies are very numerous, whence we may presume a very ancient cultivation. This is not the case in Africa.

5. The forty-two known species of the genus *Manihot*, without counting *M. utilissima*, are all wild in America; most of them in Brazil, some in Guiana, Peru, and Mexico; not one in the old world.[193] It is very unlikely that a single species, and that the cultivated one, was a native both of the old and of the new world, and all the more so since in the family *Euphorbiaceæ* the area of the woody species is usually restricted, and since phanerogamous plants are very rarely common to Africa and America.

The American origin of the manioc being thus established, it may be asked how the species has been introduced into Guinea and Congo. It was probably the result of the frequent communications established in the sixteenth century by Portuguese merchants and slave-traders.

The *Manihot utilissima* and the allied species or variety called *aipi*, which is also cultivated, have not been found in an undoubtedly wild state. Humboldt and Bonpland, indeed, found upon the banks of the Magdalena a plant of *Manihot utilissima* which they called *almost* wild,[194] but Dr. Sagot assures me that it has not been found in Guiana, and that botanists who have explored the hot region in Brazil have not been more fortunate. We gather as much from the expressions of Pohl, who has carefully studied these plants, and who was acquainted with the collections of Martius, and had no doubt of their American origin. If he had observed a wild variety identical with those which are cultivated, he would not have suggested the hypothesis that the manioc is obtained from his *Manihot pusilla*[195] of the province of Goyaz, a plant of small size, and considered as a true species or as a variety of *Manihot palmata*.[196] Martius declared in 1867, that is after having received a quantity of information of a later date than his journey, that the plant was not known in a wild state.[197] An early traveller, usually accurate, Piso,[198] speaks of a wild *mandihoca*, of which the Tapuyeris, the natives of the coast to the north of Rio Janeiro, ate the roots. “It is,” he says, “very like the cultivated plant;” but the illustration he gives of it appears unsatisfactory to authors who have studied the maniocs. Pohl attributes it to

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[187] Guillemin, *Archives de Botanique*, i. p. 239.

[188] Acosta, *Hist. Nat. des Indes*, French trans., 1598, p. 163.

[189] Thomas, *Statistique de Bourbon*, ii. p. 18.

[190] The catalogue of the botanical gardens of Buitenzorg, 1866, p. 222, says expressly that the *Manihot utilissima* comes from Bourbon and America.

[191] *Aypi*, *mandioca*, *manihot*, *manioch*, *yuca*, etc., in Pohl, *Icones and Desc.*, i. pp. 30, 33. Martius, *Beiträge z. Ethnographie, etc., Braziliens*, ii. p. 122, gives a number of names.

[192] Thonning (in Schumacher, *Besk. Guin.*), who is accustomed to quote the common names, gives none for the manioc.

[193] J. Müller, in *Prodromus*, xv., sect. 1, p. 1057.

[194] Kunth, in Humboldt and B., *Nova Genera*, ii. p. 108.

[195] Pohl, *Icones et Descr.*, i. p. 36, pl. 26.

[196] Müller, in *Prodromus*.

[197] De Martius, *Beiträge zur Ethnographie*, etc., i. pp. 19, 136.

[198] Piso, *Historia Naturalis Braziliæ*, in folio, 1658, p. 55, *cum icone*.

his *M. aipi*, and Dr. Müller passes it over in silence. For my part, I am disposed to believe what Piso says, and his figure does not seem to me entirely unsatisfactory. It is better than that by Vellozo, of a wild manioc which is doubtfully attributed to *M. aipi*.[199] If we do not accept the origin in eastern tropical Brazil, we must have recourse to two hypotheses: either the cultivated maniocs are obtained from one of the wild species modified by cultivation, or they are varieties which exist only by the agency of man after the disappearance of their fellows from modern wild vegetation.

Garlic—*Allium sativum*, Linnæus.

Linnæus, in his *Species Plantarum*, indicates Sicily as the home of the common garlic; but in his *Hortus Cliffortianus*, where he is usually more accurate, he does not give its origin. The fact is that, according to all the most recent and complete floras of Sicily, Italy, Greece, France, Spain, and Algeria, garlic is not considered to be indigenous, although specimens have been gathered here and there which had more or less the appearance of being so. A plant so constantly cultivated and so easily propagated may spread from gardens and persist for a considerable time without being wild by nature. I do not know on what authority Kunth[200] mentions that the species is found in Egypt. According to authors who are more accurate[201] in their accounts of the plants of that country, it is only found there under cultivation. Boissier, whose herbarium is so rich in Eastern plants, possesses no wild specimens of it. The only country where garlic has been found in a wild state, with the certainty of its really being so, is the desert of the Kirghis of Sungari; bulbs were brought thence and cultivated at Dorpat,[202] and specimens were afterwards seen by Regel.[203] The latter author also says that he saw a specimen which Wallich had gathered as wild in British India; but Baker,[204] who had access to the rich herbarium at Kew, does not speak of it in his review of the "*Alliums* of India, China, and Japan."

Let us see whether historical and philological records confirm the fact of an origin in the south-west of Siberia alone.

Garlic has been long cultivated in China under the name of *suan*. It is written in Chinese by a single sign, which usually indicates a long known and even a wild species.[205] The floras of Japan[206] do not mention it, whence I gather that the species was not wild in Eastern Siberia and Dahuria, but that the Mongols brought it into China.

According to Herodotus, the ancient Egyptians made great use of it. Archæologists have not found the proof of this in the monuments, but this may be because the plant was considered unclean by the priests.[207]

There is a Sanskrit name, *mahoushouda*,[208] become *loshoun* in Bengali, and to which appears to be related the Hebrew name *schoum* or *schumin*,[209] which has produced the Arab *thoum* or *toum*. The Basque name *baratchouria* is thought by de Charencey[210] to be allied with Aryan names. In support of his hypothesis I may add that the Berber name, *tiskert*, is quite different, and that consequently the Iberians seem to have received the plant and its name rather from the Aryans than from their probable ancestors of Northern Africa. The Lettons call it *kiplohks*, the Esthonians *krunslauk*, whence probably the German *Knoblauch*. The ancient Greek name appears to have been *scorodon*, in modern

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[199] *Jatropia Sylvestris Vell. Fl. Flum.*, 16, t. 83. See Müller, in *D. C. Prodromus*, xv. p. 1063.

[200] Kunth, *Enum.*, iv. p. 381.

[201] Schweinfurth and Ascherson, *Aufzählung*, p. 294.

[202] Ledebour, *Flora Altaica*, ii. p. 4; *Flora Rossica*, iv. p. 162.

[203] Regel, *Allior. Monogr.*, p. 44.

[204] Baker, in *Journal of Bot.*, 1874, p. 295.

[205] Bretschneider, *Study and Value*, etc., pp. 15, 4, and 7.

[206] Thunberg, *Fl. Jap.*; Franchet and Savatier, *Enumeratio*, 1876, vol. ii.

[207] Unger, *Pflanzen des Alten Ægyptens*, p. 42.

[208] Piddington, *Index*.

[209] Hiller, *Hierophyton*; Rosenmüller, Bibl. *Alterthum*, vol. iv.

[210] De Charencey, *Actes de la Soc. Phil.*, 1st March, 1869.

Greek *scordon*. The names given by the Slavs of Illyria are *bili* and *cesan*. The Bretons say *quinen*,[211] the Welsh *craf*, *cenhinnen*, or *garlleg*, whence the English *garlic*. The Latin *allium* has passed into the languages of Latin origin.[212] This great diversity of names intimates a long acquaintance with the plant, and even an ancient cultivation in Western Asia and in Europe. On the other hand, if the species has existed only in the land of the Kirghis, where it is now found, the Aryans might have cultivated it and carried it into India and Europe; but this does not explain the existence of so many Keltic, Slav, Greek, and Latin names which differ from the Sanskrit. To explain this diversity, we must suppose that its original abode extended farther to the west than that known at the present day, an extension anterior to the migrations of the Aryans.

If the genus Allium were once made, as a whole, the object of such a serious study as that of Gay on some of its species,[213] perhaps it might be found that certain wild European forms, included by authors under *A. arenarium*, L., *A. arenarium*, Sm., or *A. scorodoprasum*, L., are only varieties of *A. sativum*. In that case everything would agree to show that the earliest peoples of Europe and Western Asia cultivated such form of the species just as they found it from Tartary to Spain, giving it names more or less different.

Onion —*Allium Cepa*, Linnæus.

I will state first what was known in 1855;[214] I will then add the recent botanical observations which confirm the inferences from philological data.

The onion is one of the earliest of cultivated species. Its original country is, according to Kunth, unknown.[215] Let us see if it is possible to discover it. The modern Greeks call *Allium Cepa*, which they cultivate in abundance, *krommunda*.[216] This is a good reason for believing that the *krommuon* of Theophrastus[217] is the same species, as sixteenth-century writers already supposed.[218] Pliny[219] translated the word by *cæpa*. The ancient Greeks and Romans knew several varieties, which they distinguished by the names of countries: *Cyprium*, *Cretense*, *Samothraciae*, etc. One variety cultivated in Egypt[220] was held to be so excellent that it received divine honours, to the great amusement of the Romans.[221] Modern Egyptians designate *A. Cepa* by the name of *basal*[222] or *bussul*,[223] whence it is probable that the *bezalim* of the Hebrews is the same species, as commentators have said.[224] There are several distinct names —*palandu*, *latarka*, *sakandaka*,[225] and a number of modern Indian names. The species is commonly cultivated in India, Cochin-China, China,[226] and even in Japan.[227] It was largely consumed by the ancient Egyptians. The drawings on their monuments often represent this species.[228]

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[211] Davies, *Welsh Botanology*.

[212] All these common names are found in my dictionary compiled by Moritzi from floras. I could have quoted a larger number, and mentioned the probable etymologies, as given by philologists – Hehn, for instance, in his *Kulturpflanzen aus Asien*, p. 171 and following; but this is not necessary to show its origin and early cultivation in several different countries.

[213] *Annales des Sc. Nat.*, 3rd series, vol. viii.

[214] A. de Candolle, *Géogr. Bot. Raisonnée*, ii. p. 828.

[215] Kunth, *Enumer.*, iv. p. 394.

[216] Fraas, *Syn. Fl. Class.*, p. 291.

[217] Theophrastus, *Hist.*, l. 7, c. 4.

[218] J. Bauhin, *Hist.*, ii. p. 548.

[219] Pliny, *Hist.*, l. 19, c. 6.

[220] *Ibid.*

[221] Juvenalis, *Sat.* 15.

[222] Forskal, p. 65.

[223] Ainslie's *Mat. Med. Ind.*, i. p. 269.

[224] Hiller, *Hieroph.*, ii. p. 36; Rosenmüller, *Handbk. Bibl. Alterk.*; iv. p. 96.

[225] Piddington, *Index*; Ainslie's *Mat. Med. Ind.*

[226] Roxburgh, *Fl. Ind.*, ii.; Loureiro, *Fl. Cochin.*, p. 249.

[227] Thunberg, *Fl. Jap.*, p. 132.

[228] Unger, *Pflanzen d. Alt. Ægypt.*, p. 42, figs. 22, 23, 24.

Thus its cultivation in Southern Asia and the eastern region of the Mediterranean dates from a very early epoch. Moreover, the Chinese, Sanskrit, Hebrew, Greek, and Latin names have no apparent connection. From this last fact we may deduce the hypothesis that its cultivation was begun after the separation of the Indo-European nations, the species being found ready to hand in different countries at once. This, however, is not the present state of things, for we hardly find even vague indications of the wild state of *A. Cepa*. I have not discovered it in European or Caucasian floras; but Hasselquist[229] says, "It grows in the plains near the sea in the environs of Jericho." Dr. Wallich mentioned in his list of Indian plants, No. 5072, specimens which he saw in districts of Bengal, without mentioning whether they were cultivated. This indication, however insufficient, together with the antiquity of the Sanskrit and Hebrew names, and the communication which is known to have existed between the peoples of India and of Egypt, lead me to suppose that this plant occupied a vast area in Western Asia, extending perhaps from Palestine to India. Allied species, sometimes mistaken for *A. Cepa*, exist in Siberia.[230]

The specimens collected by Anglo-Indian botanists, of which Wallich gave the first idea, are now better known. Stokes discovered *Allium Cepa* wild in Beluchistan. He says, "wild on the Chehil Tun." Griffith brought it from Afghanistan and Thomson from Lahore, to say nothing of other collectors, who are not explicit as to the wild or cultivated nature of their specimens.[231] Boissier possesses a wild specimen found in the mountainous regions of the Khorassan. The umbels are smaller than in the cultivated plant, but there is no other difference. Dr. Regel, jun., found it to the south of Kuldscha, in Western Siberia.[232] Thus my former conjectures are completely justified; and it is not unlikely that its habitation extends even as far as Palestine, as Hasselquist said.

The onion is designated in China by a single sign (pronounced *tsung*), which may suggest a long existence there as an indigenous plant.[233] I very much doubt, however, that the area extends so far to the east.

Humboldt[234] says that the Americans have always been acquainted with onions, in Mexican *xonacatl*. "Cortes," he says, "speaking of the comestibles sold at the market of the ancient Tenochtillan, mentions onions, leeks, and garlic." I cannot believe, however, that these names applied to the species cultivated in Europe. Sloane, in the seventeenth century, had only seen one *Allium* cultivated in Jamaica (*A. Cepa*), and that was in a garden with other European vegetables.[235] The word *xonacatl* is not in Hernandez, and Acosta[236] says distinctly that the onions and garlics of Peru are of European origin. The species of the genus Allium are rare in America.

Spring, or **Welsh Onion**—*Allium fistulosum*, Linnæus.

This species was for a long time mentioned in floras and works on horticulture as of unknown origin; but Russian botanists have found it wild in Siberia towards the Altaï mountains, on the Lake Baïkal in the land of the Kirghis.[237] The ancients did not know the plant.[238] It must have come into Europe through Russia in the Middle Ages, or a little later. Dodoens,[239] an author of the sixteenth century, has given a figure of it, hardly recognizable, under the name of *Cepa oblonga*.

Shallot—*Allium ascalonicum*, Linnæus.

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[229] Hasselquist, *Voy. and Trav.*, p. 279.

[230] Ledebour, *Fl. Rossica*, iv. p. 169.

[231] Aitchison, *A Catalogue of the Plants of the Punjab and the Sindh*, in 8vo, 1869, p. 19; Baker, in *Journal of Bot.*, 1874, p. 295.

[232] *Ill. Hortic.*, 1877, p. 167.

[233] Bretschneider, *Study and Value*, etc., pp. 47 and 7.

[234] *Nouvelle Espagne*, 2nd edit., ii. p. 476.

[235] Sloane, *Jam.*, i. p. 75.

[236] Acosta. *Hist. Nat. des Indes*, French trans., p. 165.

[237] Ledebour, *Flora Rossica*, iv. p. 169.

[238] Lenz, *Botanik. der Alten Griechen und Römer*, p. 295.

[239] Dodoens, *Pemptades*, p. 687.

It was believed, according to Pliny,[240] that this plant took its name from Ascalon, in Judæa; but Dr. Fournier[241] thinks that the Latin author mistook the meaning of the word *Askalônion* of Theophrastus. However this may be, the word has been retained in modern languages under the form of *échalote* in French, *chalote* in Spanish, *scalogno* in Italian, *Aschaluch* or *Eschlauch* in German.

In 1855 I had spoken of the species as follows:[242]—

"According to Roxburgh,[243] *Allium ascalonicum* is much cultivated in India. The Sanskrit name *pulandu* is attributed to it, a word nearly identical with *palandu*, attributed to *A. Cepa*.[244] Evidently the distinction between the two species is not clear in Indian or Anglo-Indian works.

"Loureiro says he saw *Allium ascalonicum* cultivated in Cochin-China,[245] but he does not mention China, and Thunberg does not indicate this species in Japan. Its cultivation, therefore, is not universal in the east of Asia. This fact, and the doubt about the Sanskrit name, lead me to think that it is not ancient in Southern Asia. Neither, in spite of the name of the species, am I convinced that it existed in Western Asia. Rauwolf, Forskal, and Delile do not mention it in Siberia, in Arabia, or in Egypt. Linnæus[246] mentions Hasselquist as having found the species in Palestine. Unfortunately, he gives no details about the locality, nor about its wild condition. In the *Travels* of Hasselquist[247] I find a *Cepa montana* mentioned as growing on Mount Tabor and on a neighbouring mountain, but there is nothing to prove that it was this species. In his article on the onions and garlics of the Hebrews he mentions only *Allium Cepa*, then *A. porrum* and *A. sativum*. Sibthorp did not find it in Greece,[248] and Fraas[249] does not mention it as now cultivated in that country. According to Koch,[250] it is naturalized among the vines near Fiume. However, Viviani[251] only speaks of it as a cultivated plant in Dalmatia.

"From all these facts I am led to believe that *Allium ascalonicum* is not a species. It is enough to render its primitive existence doubtful, to remark: (1) that Theophrastus and ancient writers in general have spoken of it as a form of the *Allium Cepa*, having the same importance as the varieties cultivated in Greece, Thrace, and elsewhere; (2) that its existence in a wild state cannot be proved; (3) that it is little cultivated, or not all, in the countries where it is supposed to have had its origin, as in Syria, Egypt, and Greece; (4) that it is commonly without flowers, whence the name of *Cepa sterilis* given by Bauhin, and the number of its bulbs is an allied fact; (5) when it does flower, the organs of the flower are similar to those of *A. Cepa*, or at least no difference has been hitherto discovered, and according to Koch[252] the only difference in the whole plant is that the stalk and leaves are less swelled, although fistulous."

Such was formerly my opinion.[253] The facts published since 1855 do not destroy my doubts, but, on the contrary, justify them. Regel, in 1875, in his monograph of the genus Allium, declares he has only seen the shallot as a cultivated species. Aucher Eloy has distributed a plant from Asia Minor under the name of *A. ascalonicum*, but judging from my specimen this is certainly not the species. Boissier tells me that he has never seen *A. ascalonicum* in the East, and it is not in his

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[240] Pliny, *Hist.*, l. 19, c. 6.

[241] He will treat of this in a publication entitled *Cibaria*, which will shortly appear.

[242] *Géog. Bot. Raisonnée*, p. 829.

[243] Roxburgh, *Fl. Ind.*; edit. 1832, vol. ii. p. 142.

[244] Piddington, *Index*.

[245] Loureiro, *Fl. Cochin.*, p. 251.

[246] Linnæus, *Species*, p. 429.

[247] Hasselquist, *Voy. and Trav.*, 1766, pp. 281, 282.

[248] Sibthorp, *Prodr.*

[249] Fraas, *Syn. Fl. Class.*, p. 291.

[250] Koch, *Syn. Fl. Germ.*, 2nd edit., p. 833.

[251] Viviani, *Fl. Dalmat.*, p. 138.

[252] Koch, *Syn. Fl. Germ.*

[253] A. de Candolle, *Géogr. Bot. Raisonnée*, p. 829.

herbarium. The plant from the Morea which bears this name in the flora of Bory and Chaubard is quite a different species, which he has named *A. gomphrenoides*. Baker,[254] in his review of the Alliums of India, China, and Japan, mentions *A. ascalonicum* in districts of Bengal and of the Punjab, from specimens of Griffith and Aitchison; but he adds, "They are probably cultivated plants." He attributes to *A. ascalonicum Allium sulvia*, Ham., of Nepal, a plant little known, and whose wild character is uncertain. The shallot produces many bulbs, which may be propagated or preserved in the neighbourhood of cultivation, and thus cause mistakes as to its origin.

Finally, in spite of the progress of botanical investigations in the East and in India, this form of Allium has not been found wild with certainty. It appears to me, therefore, more probable than ever that it is a modification of *A. Cepa*, dating from about the beginning of the Christian era – a modification less considerable than many of those observed in other cultivated plants, as, for instance, in the cabbage.

Rocambole—*Allium scorodoprasum*, Linnæus.

If we cast a glance at the descriptions and names of *A. scorodoprasum* in works on botany since the time of Linnæus, we shall see that the only point on which authors are agreed is the common name of *rocambole*. As to the distinctive characters, they sometimes approximate the plant to *Allium sativum*, sometimes regard it as altogether distinct. With such different definitions, it is difficult to know in what country the plant, well known in its cultivated state as the *rocambole*, is found wild. According to Cosson and Germain,[255] it grows in the environs of Paris. According to Grenier and Godron,[256] the same form grows in the east of France. Burnat says he found the species undoubtedly wild in the Alpes-Maritimes, and he gave specimens of it to Boissier. Willkomm and Lange do not consider it to be wild in Spain,[257] though one of the French names of the cultivated plant is *ail* or *eschalote d'Espagne*. Many other European localities seem to me doubtful, since the specific characters are so uncertain. I mention, however, that, according to Ledebour,[258] the plant which he calls *A. scorodoprasum* is very common in Russia from Finland to the Crimea. Boissier received a specimen of it from Dobrutscha, sent by the botanist Sintenis. The natural habitat of the species borders, therefore, on that of *Allium sativum*, or else an attentive study of all these forms will show that a single species, comprising several varieties, extends over a great part of Europe and the bordering countries of Asia.

The cultivation of this species of onion does not appear to be of ancient date. It is not mentioned by Greek and Roman authors, nor in the list of plants recommended by Charlemagne to the intendants of his gardens.[259] Neither does Olivier de Serres speak of it. We can only give a small number of original common names among ancient peoples. The most distinctive are in the North. *Skovlög* in Denmark, *keipe* and *rackenboll* in Sweden.[260] *Rockenbolle*, whence comes the French name, is German. It has not the meaning given by Littré. Its etymology is *Bolle*, onion, growing among the rocks, *Rocken*.[261]

Chives—*Allium schœnoprasum*, Linnæus.

This species occupies an extensive area in the northern hemisphere. It is found all over Europe, from Corsica and Greece to the south of Sweden, in Siberia as far as Kamtschatka, and also in North America, but only near the Lakes Huron and Superior and further north[262]– a remarkable

[254] Baker, in *Journ. of Bot.*, 1874, p. 295.

[255] Cosson and Germain, *Flore*, ii. p. 553.

[256] Grenier and Godron, *Flore de France*, iii. p. 197.

[257] Willkomm and Lange, *Prodr. Fl. Hisp.*, i. p. 885.

[258] Ledebour, *Flora Rossica*, iv. p. 163.

[259] Le Grand d'Aussy, *Histoire de la Vie des Français*, vol. i. p. 122.

[260] Nemnich, *Polyglott. Lexicon*, p. 187.

[261] *Ibid.*

[262] Asa Gray, *Botany of the Northern States*, edit. 5, p. 534.

circumstance, considering its European habitat. The variety found in the Alps is the nearest to the cultivated form.[263]

The ancient Greeks and Romans must certainly have known the species, since it is wild in Italy and Greece. Targioni believes it to be the *Scorodon schiston* of Theophrastus; but we are dealing with words without descriptions, and authors whose specialty is the interpretation of Greek text like Fraas and Lenz, are prudent enough to affirm nothing. If the ancient names are doubtful, the fact of the cultivation of the plant at this epoch is yet more so. It is possible that the custom of gathering it in the fields existed.

Colocasia—*Arum esculentum*, Linnæus; *Colocasia antiquorum*, Schott.[264]

This species is cultivated in the damp districts of the tropics, for the swelled lower portion of the stem, which forms an edible rhizome similar to the subterraneous part of the iris. The petioles and the young leaves are also utilized as a vegetable. Since the different forms of the species have been properly classed, and since we have possessed more certain information about the floras of the south of Asia, we cannot doubt that this plant is wild in India, as Roxburgh[265] formerly, and Wight[266] and others have more recently asserted; likewise in Ceylon,[267] Sumatra,[268] and several islands of the Malay Archipelago.[269]

Chinese books make no mention of it before a work of the year 100 B.C.[270] The first European navigators saw it cultivated in Japan and as far as the north of New Zealand,[271] in consequence probably of an early introduction, and without the certain co-existence of wild stocks. When portions of the stem or of the tuber are thrown away by the side of streams, they naturalize themselves easily. This was perhaps the case in Japan and the Fiji Islands,[272] judging from the localities indicated. The colocasia is cultivated here and there in the West Indies, and elsewhere in tropical America, but much less than in Asia or Africa, and without the least indication of an American origin.

In the countries where the species is wild there are common names, sometimes very ancient, totally different from each other, which confirms their local origin. Thus the Sanskrit name is *kuchoo*, which persists in modern Hindu languages – in Bengali, for instance.[273] In Ceylon the wild plant is styled *gahala*, the cultivated plant *kandalla*.[274] The Malay names are *kelady*,[275] *tallus*, *tallas*, *tales*, or *taloes*,[276] from which perhaps comes the well-known name of the Otahitans and New Zealanders —*tallo* or *tarro*,[277] *dalo*[278] in the Fiji Islands. The Japanese have a totally distinct name, *imo*,[279] which shows an existence of long duration either indigenous or cultivated.

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[263] De Candolle, *Flore Française*, iv. p. 227.

[264] *Arum Egyptium*, Columma, *Ecphrasis*, ii. p. 1, tab. 1; Rumphius, *Amboin*, vol. v. tab. 109. *Arum colocasia* and *A. esculentum*, Linnæus; *Colocasia antiquorum*, Schott, *Melet.*, i. 18; Engler, in *D. C. Monog. Phaner.*, ii. p. 491.

[265] Roxburgh, *Fl. Ind.*, iii. p. 495.

[266] Wight, *Icones*, t. 786.

[267] Thwaites, *Enum. Plant. Zeylan.*, p. 335.

[268] Miquel, *Sumatra*, p. 258.

[269] Rumphius, *Amboin*, vol. v. p. 318.

[270] Bretschneider, *On the Study and Value*, etc., p. 12.

[271] Forster, *De Plantis Escul.*, p. 58.

[272] Franchet and Savatier, *Enum.*, p. 8; Seemann, *Flora Vitiensis*, p. 284.

[273] Roxburgh, *Fl. Ind.*

[274] Thwaites, *Enum. Plant. Zeylan*.

[275] Rumphius, *Amboin*.

[276] Miquel, *Sumatra*, p. 258; Hasskarl, *Cat. Horti. Bogor. Alter.*, p. 55.

[277] Forster, *De Plantis Escul.*, p. 58.

[278] Seemann, *Flora Vitiensis*.

[279] Franchet and Savatier, *Enum.*

European botanists first knew the colocasia in Egypt, where it has perhaps not been very long cultivated. The monuments of ancient Egypt furnish no indication of it, but Pliny[280] spoke of it as the *Arum Ægyptium*. Prosper Alpin saw it in the sixteenth century, and speaks of it at length.[281] He says that its name in its country is *culcas*, which Delile[282] writes *qolkas*, and *koulkas*. It is clear that this Arab name of the Egyptian arum has some analogy with the Sanskrit *kuchoo*, which is a confirmation of the hypothesis, sufficiently probable, of an introduction from India or Ceylon. De l'Ecluse[283] had seen the plant cultivated in Portugal, as introduced from Africa, under the name *alcoleaz*, evidently of Arab origin. In some parts of the south of Italy, where the plant has become naturalized, it is, according to Parlatore, called *aro di Egitto*.[284]

The name *colocasia*, given by the Greeks to a plant of which the root was used by the Egyptians, may evidently come from *colcas*, but it has been transferred to a plant differing from the true colcas. Indeed, Dioscorides applies it to the Egyptian bean, or *nelumbo*,[285] which has a large root, or rather rhizome, rather stringy and not good to eat. The two plants are very different, especially in the flower. The one belongs to the *Araceæ*, the other to the *Nymphæaceæ*; the one belongs to the class of *Monocotyledons*, the other to that of the *Dicotyledons*. The nelumbo of Indian origin has ceased to grow in Egypt, while the colocasia of modern botanists has persisted there. If there is any confusion, as seems probable in the Greek authors, it must be explained by the fact that the colcas rarely flowers, at least in Egypt. From the point of view of botanical nomenclature, it matters little that mistakes were formerly made about the plants to which the name colocasia should be applied. Fortunately, modern scientific names are not based upon the doubtful definitions of the ancient Greeks and Romans, and it is sufficient to say now, if the etymology is insisted upon, that colocasia comes from colcas in consequence of an error.

Apé, or **Large-rooted Alocasia**—*Alocasia macrorrhiza*, Schott; *Arum macrorrhizum*, Linnæus.

This araceous plant, which Schott places now in the genus Colocasia, now in the Alocasia, and whose names are far more complicated than might be supposed from those indicated above,[286] is less frequently cultivated than the common colocasia, but in the same manner and nearly in the same countries. Its rhizomes attain the length of a man's arm. They have a distinctly bitter taste, which it is indispensable to remove by cooking.

The aborigines of Otahiti call it *apé*, and those of the Friendly Isles *kappe*.[287] In Ceylon, the common name is *habara*, according to Thwaites.[288] It has other names in the Malay Archipelago, which argues an existence prior to that of the more recent peoples of these regions.

The plant appears to be wild, especially in Otahiti.[289] It is also wild in Ceylon, according to Thwaites, who has studied botany for a long time in that island. It is mentioned also in India[290] and in Australia,[291] but its wild condition is not affirmed – a fact always difficult to establish in the case of a species cultivated on the banks of streams, and which is propagated by bulbs. Moreover, it is

[280] Pliny, *Hist.*, l. 19, c. 5.

[281] Alpinus, *Hist. Ægypt. Naturalis*, edit. 2, vol. i. p. 166; ii. p. 192.

[282] Delile, *Fl. Ægypt. Ill.*, p. 28; *De la Colocase des Anciens*, in 8vo, 1846.

[283] Clusius, *Historia*, ii. p. 75.

[284] Parlatore, *Fl. Ital.*, ii. p. 255.

[285] Prosper Alpinus, *Hist. Ægypt. Naturalis*; Columna; Delile, *Ann. du Mus.*, i. p. 375; *De la Colocase des Anciens*; Reynier, *Economie des Egyptiens*, p. 321.

[286] See Engler, in *D. C. Monographiæ Phanerogarum*, ii. p. 502.

[287] Forster, *De Plantis Esculentis Insularum Oceani Australis*, p. 58.

[288] Thwaites, *Enum. Pl. Zeyl.*, p. 336.

[289] Nadeaud, *Enum. des Plantes Indigènes*, p. 40.

[290] Engler, in *D. C. Monog. Phaner.*

[291] Bentham, *Flora Austr.*, viii. p. 155.

sometimes confounded with the *Colocasia indica* of Kunth, which grows in the same manner, and is found here and there in cultivated ground; and this species grows wild, or is naturalized in the ditches and streams of Southern Asia, although its history is not yet well known.

Konjak—*Amorphophallus Konjak*, Koch; *Amorphophallus Rivieri*, du Rieu, var. *Konjak*, Engler.[292]

The konjak is a tuberous plant of the family Araceæ, extensively cultivated by the Japanese, a culture of which Vidal has given full details in the *Bulletin de la Société d'Acclimatation* of July, 1877. It is considered by Engler as a variety of *Amorphophallus Rivieri*, of Cochin-China, of which horticultural periodicals have given several illustrations in the last few years.[293] It can be cultivated in the south of Europe, like the dahlia, as a curiosity; but to estimate the value of the bulbs as food, they should be prepared with lime-water, in Japanese fashion, so as to ascertain the amount of fecula which a given area will produce.

Dr. Vidal gives no proof that the Japanese plant is wild in that country. He supposes it to be so from the meaning of the common name, which is, he says, *konniyakou* or *yamagonniyakou*, *yama* meaning "mountain." Franchet and Savatier[294] have only seen the plant in gardens. The Cochin-China variety, believed to belong to the same species, grows in gardens, and there is no proof of its being wild in the country.

Yams—*Dioscorea sativa*, *D. batatas*, *D. japonica* and *D. alata*.

The yams, monocotyledonous plants, belonging to the family *Dioscorideæ*, constitute the genus *Dioscorea*, of which botanists have described about two hundred species, scattered over all tropical and sub-tropical countries. They usually have rhizomes, that is, underground stems or branches of stems, more or less fleshy, which become larger when the annual, exposed part of the plant is near its decay.[295] Several species are cultivated in different countries for these farinaceous rhizomes, which are cooked and eaten like potatoes.

The botanical distinction of the species has always presented difficulties, because the male and female flowers are on different individuals, and because the characters of the rhizomes and the lower part of the exposed stems cannot be studied in the herbarium. The last complete work is that of Kunth,[296] published in 1850. It requires revision on account of the number of specimens brought home by travellers in these last few years. Fortunately, with regard to the origin of cultivated species, certain historical and philological considerations will serve as a guide, without the absolute necessity of knowing and estimating the botanical characters of each.

Roxburgh enumerates several *Dioscoreæ*[297] cultivated in India, but he found none of them wild, and neither he nor Piddington[298] mentions Sanskrit names. This last point argues a recent cultivation, or one of originally small extent, in India, arising either from indigenous species as yet undefined, or from foreign species cultivated elsewhere. The Bengali and Hindu generic name is *alu*, preceded by a special name for each species or variety; *kam alu*, for instance, is *Dioscorea alata*. The absence of distinct names in each province also argues a recent cultivation. In Ceylon, Thwaites[299] indicates six wild species, and he adds that *D. sativa*, L., *D. alata*, L., and *D. purpurea*, Roxb., are cultivated in gardens, but are not found wild.

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[292] Engler, in *D. C. Monogr. Phaner.*, vol. ii. p. 313.

[293] *Gardener's Chronicle*, 1873, p. 610; *Flore des Serres et Jardins*, t. 1958, 1959; Hooker, *Bot. Mag.*, t. 6195.

[294] Franchet and Savatier, *Enum. Pl. Japoniæ*, ii. p. 7.

[295] M. Sagot, *Bull. de la Soc. Bot. de France*, 1871, p. 306, has well described the growth and cultivation of yams, as he has studied them in Cayenne.

[296] Kunth, *Enumeratio*, vol. v.

[297] These are *D. globosa*, *alata*, *rubella*, *fasciculata*, *purpurea*, of which two or three appear to be merely varieties.

[298] Piddington, *Index*.

[299] Thwaites, *Enum. Plant. Zeyl.*, p. 326.

The Chinese yam, *Dioscorea batatas* of Decaisne,[300] extensively cultivated by the Chinese under the name of *Sain-in*, and introduced by M. de Montigny into European gardens, where it remains as a luxury, has not hitherto been found wild in China. Other less-known species are also cultivated by the Chinese, especially the *chou-yu*, *tou-tchou*, *chan-yu*, mentioned in their ancient works on agriculture, and which has spherical rhizomes (instead of the pyriform spindles of the *D. batatas*). The names mean, according to Stanislas Julien, mountain arum, whence we may conclude the plant is really a native of the country. Dr. Bretschneider[301] gives three *Dioscoreæ* as cultivated in China (*D. batatas*, *alata*, *sativa*), adding, "The *Dioscorea* is indigenous in China, for it is mentioned in the oldest work on medicine, that of the Emperor Schen-nung."

Dioscorea japonica, Thunberg, cultivated in Japan, has also been found in clearings in various localities, but Franchet and Savatier[302] say that it is not positively known to what degree it is wild or has strayed from cultivation. Another species, more often cultivated in Japan, grows here and there in the country according to the same authors. They assign it to *Dioscorea sativa* of Linnæus; but it is known that the famous Swede had confounded several Asiatic and American species under that name, which must either be abandoned or restricted to one of the species of the Indian Archipelago. If we choose the latter course, the true *D. sativa* would be the plant cultivated in Ceylon with which Linnæus was acquainted, and which Thwaites calls the *D. sativa* of Linnæus. Various authors admitted the identity of the Ceylon plant with others cultivated on the Malabar coast, in Sumatra, Java, the Philippine Isles, etc. Blume[303] asserts that *D. sativa*, L., to which he attributes pl. 51 in Rheede's *Hortus Malabaricus*, vol. viii., grows in damp places in the mountains of Java and of Malabar. In order to put faith in these assertions, it would be necessary to have carefully studied the question of species from authentic specimens.

The yam, which is most commonly cultivated in the Pacific Isles under the name *ubi*, is the *Dioscorea alata* of Linnæus. The authors of the seventeenth and eighteenth centuries speak of it as widely spread in Tahiti, in New Guinea, in the Moluccas, etc.[304] It is divided into several varieties, according to the shape of the rhizome. No one pretends to have found this species in a wild state, but the flora of the islands whence it probably came, in particular that of Celebes and of New Guinea, is as yet little known.

Passing to America, we find there also several species of this genus growing wild, in Brazil and Guiana, for instance, but it seems more probable that the cultivated varieties were introduced. Authors indicate but few cultivated species or varieties (Plumier one, Sloane two) and few common names. The most widely spread is *yam*, *igname*, or *inhame*, which is of African origin, according to Hughes, and so also is the plant cultivated in his time in Barbados.[305]

He says that the word *yam* means "to eat," in several negro dialects on the coast of Guinea. It is true that two travellers nearer to the date of the discovery of America, whom Humboldt quotes,[306] heard the word *igname* pronounced on the American continent: Vespucci in 1497, on the coast of Paria; Cabral in 1500, in Brazil. According to the latter, the name was given to a root of which bread was made, which would better apply to the manioc, and leads me to think there must be some mistake, more especially since a passage from Vespucci, quoted elsewhere by Humboldt,[307] shows

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[300] Decaisne, *Histoire et Culture de l'Igname de Chine*, in the *Revue Horticole*, 1st July and Dec. 1853; *Flore des Serres et Jardins*, x. pl. 971.

[301] *On the Study and Value*, etc., p. 12.

[302] Franchet and Savatier, *Enum. Plant. Japoniæ*, ii. p. 47.

[303] Blume, *Enum. Plant. Javæ*, p. 22.

[304] Forster, *Plant. Esculent.*, p. 56; Rumphius, *Amboin*, vol. v., pl. 120, 121, etc.

[305] Hughes, *Hist. Nat. Barb.*, 1750, p. 226.

[306] Humboldt, *Nouvelle Espagne*, 2nd edit., vol. ii. p. 468.

[307] *Ibid.*, p. 403.

the confusion he made between the manioc and the yam. *D. Cliffortiana*, Lam., grows wild in Peru[308] and in Brazil,[309] but it is not proved to be cultivated. Presl says *verosimiliter colitur*, and the *Flora Brasiliensis* does not mention cultivation.

The species chiefly cultivated in French Guiana, according to Sagot,[310] is *Dioscoreæ triloba*, Lam., called Indian yam, which is also common in Brazil and the West India Islands. The common name argues a native origin, whereas another species, *D. cayennensis*, Kunth, also cultivated in Guiana, but under the name of *negro-country yam*, was most likely brought from Africa, an opinion the more probable that Sir W. Hooker likens a yam cultivated in Africa on the banks of the Nun and the Quorra,[311] to *D. cayennensis*. Lastly, the *free yam* of Guiana is, according to Dr. Sagot, *D. alata* introduced from the Malay Archipelago and Polynesia.

In Africa there are fewer indigenous *Dioscoreæ* than in Asia and America, and the culture of yams is less widely spread. On the west coast, according to Thonning,[312] only one or two species are cultivated; Lockhardt[313] only saw one in Congo, and that only in one locality. Bojer[314] mentions four cultivated species in Mauritius, which are, he says, of Asiatic origin, and one, *D. bulbifera*, Lam., from India, if the name be correct. He asserts that it came from Madagascar, and has spread into the woods beyond the plantations. In Mauritius it bears the name *Cambare marron*. Now, *cambare* is something like the Hindu name *kam*, and *marron* (marroon) indicates a plant escaped from cultivation. The ancient Egyptians cultivated no yams, which argues a cultivation less ancient in India than that of the colocasia. Forskal and Delile mention no yams cultivated in Egypt at the present day.

To sum up: several *Dioscoreæ* wild in Asia (especially in the Asiatic Archipelago), and others less numerous growing in America and in Africa, have been introduced into cultivation as alimentary plants, probably more recently than many other species. This last conjecture is based on the absence of a Sanskrit name, on the limited geographical range of cultivation, and on the date, which appears to be not very ancient, of the inhabitants of the Pacific Isles.

Arrowroot—*Maranta arundinacea*, Linnæus. A plant of the family of the *Scitamineæ*, allied to the genus *Canna*, of which the underground suckers[315] produce the excellent fecula called arrowroot. It is cultivated in the West India Islands and in several tropical countries of continental America. It has also been introduced into the old world – on the coast of Guinea, for instance.[316]

Maranta arundinacea is certainly American. According to Sloane,[317] it was brought from Dominica to Barbados, and thence to Jamaica, which leads us to suppose that it was not indigenous in the West Indies. Körnicke, the last author who studied the genus Maranta,[318] saw several specimens which were gathered in Guadaloupe, in St. Thomas, in Mexico, in Central America, in Guiana, and in Brazil; but he did not concern himself to discover whether they were taken from wild, cultivated, or naturalized plants. Collectors hardly ever indicate this; and for the study of the American continent (excepting the United States) we are unprovided with local floras, and especially with floras made by botanists residing in the country. In published works I find the species mentioned as cultivated[319]

[308] Hænke, in Presl, *Rel.*, p. 133.

[309] Martius, *Fl. Bras.*, v. p. 43.

[310] Sagot, *Bull. Soc. Bot. France*, 1871, p. 305.

[311] Hooker, *Fl. Nigrit*, p. 53.

[312] Schumacher and Thonning, *Besk. Guin*, p. 447.

[313] Brown, *Congo*, p. 49.

[314] Bojer, *Hortus Mauritianus*.

[315] See Tussac's description, *Flore des Antilles*, i. p. 183.

[316] Hooker, *Niger Flora*, p. 531.

[317] Sloane, *Jamaica*, 1707, vol. i. p. 254.

[318] In *Bull. Soc. des Natur. de Moscou*, 1822, vol. i. p. 34.

[319] Aublet, *Guyane*, i. p. 3.

or growing in plantations,[320] or without any explanation. A locality in Brazil, in the thinly peopled province of Matto Grosso, mentioned by Körnicke, supposes an absence of cultivation. Seemann[321] mentions that the species is found in sunny spots near Panama.

A species is also cultivated in the West Indies, Maranta*indica*, which, Tussac says, was brought from the East Indies. Körnicke believes that *M. ramosissima* of Wallich found at Sillet, in India, is the same species, and thinks it is a variety of *M. arundinacea*. Out of thirty-six more or less known species of the genus Maranta, thirty at least are of American origin. It is therefore unlikely that two or three others should be Asiatic. Until Sir Joseph Hooker's *Flora of British India* is completed, these questions on the species of the *Scitamineæ* and their origin will be very obscure.

Anglo-Indians obtain arrowroot from another plant of the same family, *Curcuma angustifolia*, Roxburgh, which grows in the forests of the Deccan and in Malabar.[322] I do not know whether it is cultivated.

[320] Meyer, *Flora Essequibo*, p. 11.

[321] Seemann, *Bot. of Herald.*, p. 213.

[322] Roxburgh, *Fl. Ind.*, i. p. 31; Porter, *The Tropical Agriculturalist* p. 241; Ainslie, *Materia Medica*, i. p. 19.

CHAPTER II.
PLANTS CULTIVATED FOR THEIR STEMS OR LEAVES

Article I.—Vegetables

Common Cabbage—*Brassica oleracea*, Linnæus.

The cabbage in its wild state, as it is represented in *Eng. Bot.*, t. 637, the *Flora Danica*, t. 2056, and elsewhere, is found on the rocks by the sea-shore: (1) in the Isle of Laland, in Denmark, the island of Heligoland, the south of England and Ireland, the Channel Isles, and the islands off the coast of Charente Inférieure;[323] (2) on the north coast of the Mediterranean, near Nice, Genoa, and Lucca.[324] A traveller of the last century, Sibthorp, said that he found it at Mount Athos, but this has not been confirmed by any modern botanist, and the species appears to be foreign in Greece, on the shores of the Caspian, as also in Siberia, where Pallas formerly said he had seen it, and in Persia.[325] Not only the numerous travellers who have explored these countries have not found the cabbage, but the winters of the east of Europe and of Siberia appear to be too severe for it. Its distribution into somewhat isolated places, and in two different regions of Europe, suggests the suspicion either that plants apparently indigenous may in several cases be the result of self-sowing from cultivation,[326] or that the species was formerly common, and is tending to disappear. Its presence in the western islands of Europe favours the latter hypothesis, but its absence in the islands of the Mediterranean is opposed to it.[327]

Let us see whether historical and philological data add anything to the facts of geographical botany.

In the first place, it is in Europe that the countless varieties of cabbage have been formed,[328] principally since the days of the ancient Greeks. Theophrastus distinguished three, Pliny double that number, Tournefort twenty, De Candolle more than thirty. These modifications did not come from the East – another sign of an ancient cultivation in Europe and of a European origin.

The common names are also numerous in European languages, and rare or modern in those of Asia. Without repeating a number of names I have given elsewhere,[329] I shall mention the five or six distinct and ancient roots from which the European names are derived.

Kap or *kab* in several Keltic and Slav names. The French name *cabus* comes from it. Its origin is clearly the same as that of *caput*, because of the head-shaped form of the cabbage.

Caul, *kohl*, in several Latin (*caulis*, stem or cabbage), German (*Chôli* in Old German, *Kohl* in modern German, *kaal* in Danish), and Keltic languages (*kaol* and *kol* in Breton, *cal* in Irish).[330]

Bresic, *bresych*, *brassic*, of the Keltic and Latin (*brassica*) languages, whence, probably, *berza* and *verza* of the Spaniards and Portuguese, *varza* of the Roumanians.[331]

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[323] Fries, *Summa*, p. 29; Nylander, *Conspectus*, p. 46; Bentham, *Handb. Brit. Fl.*, edit. 4, p. 40; Mackay, *Fl. Hibern.*, p. 28; Brebisson, *Fl. de Normandie*, edit. 2, p. 18; Babbington, *Primitiæ Fl. Sarnicæ*, p. 8; Clavaud, *Flore de la Gironde*, i. p. 68.

[324] Bertoloni, *Fl. Ital.*, vii. p. 146; Nylander, *Conspectus*.

[325] Ledebour, *Fl. Ross.*; Griesbach, *Spiciligium Fl. Rumel.*; Boissier, *Flora Orientalis*, etc.

[326] Watson, who is careful on these points, doubts whether the cabbage is indigenous in England (*Compendium of the Cybele*, p. 103), but most authors of British floras admit it to be so.

[327] *Br. balearica* and *Br. cretica* are perennial, almost woody, not biennial; and botanists are agreed in separating them from *Br. oleracea*.

[328] Aug. Pyr. de Candolle has published a paper on the divisions and subdivisions of *Br. oleracea* (*Transactions of the Hort. Soc.*, vol. v., translated into German and in French in the *Bibl. Univ. Agric.*, vol. viii.), which is often quoted.

[329] Alph. de Candolle, *Géogr. Bot. Raisonnée*, p. 839.

[330] Ad. Pictet, *Les Origines Indo-Européennes*, edit. 2, vol. i. p. 380.

[331] Brandza, *Prodr. Fl. Romane*, p. 122.

Aza of the Basques (Iberians), considered by de Charencey[332] as proper to the Euskarian tongue, but which differs little from the preceding.

Krambai, *crambe*, of the Greeks and Latins.

The variety of names in Keltic languages tends to show the existence of the species on the west coast of Europe. If the Aryan Kelts had brought the plant from Asia, they would probably not have invented names taken from three different sources. It is easy to admit, on the contrary, that the Aryan nations, seeing the cabbage wild, and perhaps already used in Europe by the Iberians or the Ligurians, either invented names or adopted those of the earlier inhabitants.

Philologists have connected the *krambai* of the Greeks with the Persian name *karamb*, *karam*, *kalam*, the Kurdish *kalam*, the Armenian *gaghamb*;[333] others with a root of the supposed mother-tongue of the Aryans; but they do not agree in matters of detail. According to Fick,[334] *karambha*, in the primitive Indo-Germanic tongue, signifies "*Gemüsepflanze* (vegetable), *Kohl* (cabbage), *karambha* meaning stalk, like *caulis*." He adds that *karambha*, in Sanskrit, is the name of two vegetables. Anglo-Indian writers do not mention this supposed Sanskrit name, but only a name from a modern Hindu dialect, *kopee*.[335] Pictet, on his side, speaks of the Sanskrit word *kalamba*, "vegetable stalk, applied to the cabbage."

I have considerable difficulty, I must own, in admitting these Eastern etymologies for the Greco-Latin word *crambe*. The meaning of the Sanskrit word (if it exists) is very doubtful, and as to the Persian word, we ought to know if it is ancient. I doubt it, for if the cabbage had existed in ancient Persia, the Hebrews would have known it.[336]

For all these reasons, the species appears to me of European origin. The date of its cultivation is probably very ancient, earlier than the Aryan invasions, but no doubt the wild plant was gathered before it was cultivated.

Garden-Cress—*Lepidium sativum*, Linnæus.

This little Crucifer, now used as a salad, was valued in ancient times for certain properties of the seeds. Some authors believe that it answers to a certain *cardamon* of Dioscorides; while others apply that name to *Erucaria aleppica*.[337] In the absence of sufficient description, as the modern common name is *cardamon*,[338] the first of these two suppositions is probably correct.

The cultivation of the species must date from ancient times and be widely diffused, for very different names exist: *reschad* in Arab, *turehtezuk*[339] in Persian, *diéges*[340] in Albanian, a language derived from the Pelasgic; without mentioning names drawn from the similarity of taste with that of the water-cress (*Nasturtium officinale*). There are very distinct names in Hindustani and Bengali, but none are known in Sanskrit.[341]

At the present day the plant is cultivated in Europe, in the north of Africa, in Eastern Asia, India, and elsewhere, but its origin is somewhat obscure. I possess several specimens gathered in India, where Sir Joseph Hooker[342] does not consider the species indigenous. Kotschy brought it back from Karrak, or Karek Island, in the Persian Gulf. The label does not say that it was a cultivated

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[332] De Charencey, *Recherches sur les Noms Basques*, in *Actes de la Société Philologique*, 1st March, 1869.

[333] Ad. Pictet, *Les Origines Indo-Européennes*, edit. 2, vol. i. p. 380.

[334] Fick, *Vörterb. d. Indo-Germ. Sprachen*, p. 3-4.

[335] Piddington, *Index*; Ainslie, *Mat. Med. Ind.*

[336] Rosenmüller, *Bibl. Alterth.*, mentions no name.

[337] See Fraas, *Syn. Fl. Class.*, pp. 120,124; Lenz, *Bot. der Alten*, p. 617.

[338] Sibthorp, *Prodr. Fl. Græc.*, ii. p. 6; Heldreich, *Nutzpfl. Griechenl.*, p. 47.

[339] Ainslie, *Mat. Med. Ind.*, i. p. 95.

[340] Heldreich, *Nutz. Gr.*

[341] Piddington, *Index*; Ainslie, *Mat. Med. Ind.*, i. p. 95.

[342] Hooker, *Fl. Brit. Ind.*, i. p. 160.

plant. Boissier[343] mentions it without comment, and he afterwards speaks of specimens from Ispahan and Egypt gathered in cultivated ground. Olivier is quoted as having found the cress in Persia, but it is not said whether it was growing wild.[344] It has been asserted that Sibthorp found it in Cyprus, but reference to his work shows it was in the fields.[345] Poech does not mention it in Cyprus.[346] Unger and Kotschy[347] do not consider it to be wild in that island. According to Ledebour,[348] Koch found it round the convent on Mount Ararat; Pallas near Sarepta; Falk on the banks of the Oka, a tributary of the Volga; lastly, H. Martius mentions it in his flora of Moscow; but there is no proof that it was wild in these various localities. Lindemann,[349] in 1860, did not reckon the species among those of Russia, and he only indicates it as cultivated in the Crimea.[350] According to Nyman,[351] the botanist Schur found it wild in Transylvania, while the Austro-Hungarian floras either do not mention the species, or give it as cultivated, or growing in cultivated ground.

I am led to believe, by this assemblage of more or less doubtful facts, that the plant is of Persian origin, whence it may have spread, after the Sanskrit epoch, into the gardens of India, Syria, Greece, and Egypt, and even as far as Abyssinia.[352]

Purslane—*Portulaca oleracea*, Linnæus.

Purslane is one of the kitchen garden plants most widely diffused throughout the old world from the earliest times. It has been transported into America,[353] where it spreads itself, as in Europe, in gardens, among rubbish, by the wayside, etc. It is more or less used as a vegetable, a medicinal plant, and is excellent food for pigs.

A Sanskrit name for it is known, *lonica* or *lounia*, which recurs in the modern languages of India.[354] The Greek name *andrachne* and the Latin *portulaca* are very different, as also the group of names, *cholza* in Persian, *khursa* or *koursa* in Hindustani, *kourfa kara-or* in Arab and Tartar, which seem to be the origin of *kurza noka* in Polish, *kurj-noha* in Bohemian, *Kreusel* in German, without speaking of the Russian name *schrucha*, and some others of Eastern Asia.[355] One need not be a philologist to see certain derivations in these names showing that the Asiatic peoples in their migrations transported with them their names for the plant, but this does not prove that they transported the plant itself. They may have found it in the countries to which they came. On the other hand, the existence of three or four different roots shows that European peoples anterior to the Asiatic migrations had already names for the species, which is consequently very ancient in Europe as well as in Asia.

It is very difficult to discover in the case of a plant so widely diffused, and which propagates itself so easily by means of its enormous number of little seeds, whether a specimen is cultivated, naturalized by spreading from cultivation, or really wild.

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[343] Boissier, *Fl. Orient*, vol. i.

[344] De Candolle, *Syst.*, ii. p. 533.

[345] Sibthorp and Smith, *Prodr. Fl. Græcæ*, ii. p. 6.

[346] Poech, *Enum. Pl. Cypri*, 1842.

[347] Unger and Kotschy, *Inseln Cypern.*, p. 331.

[348] Ledebour, *Fl. Ross.*, i. p. 203.

[349] Lindemann, *Index Plant. in Ross.*, *Bull. Soc. Nat. Mosc.* 1860, vol. xxxiii.

[350] Lindemann, *Prodr. Fl. Cherson*, p. 21.

[351] Nyman, *Conspectus Fl. Europ.*, 1878, p. 65.

[352] Schweinfurth, *Beitr. Fl. Æth.*, p. 270.

[353] In the United States purslane was believed to be of foreign origin (Asa Gray, *Fl. of Northern States*, ed. 5; *Bot. of California*, i. p. 79), but in a recent publication, Asa Gray and Trumbull give reasons for believing that it is indigenous in America as in the old world. Columbus had noticed it at San Salvador and at Cuba; Oviedo mentions it in St. Domingo and De Lery in Brazil. This is not the testimony of botanists, but Nuttall and others found it wild in the upper valley of the Missouri, in Colorado, and Texas, where, however, from the date, it might have been introduced. – Author's Note, 1884.

[354] Piddington, *Index to Indian Plants*.

[355] Nemnich, *Polyglot. Lex. Naturgesch.*, ii. p. 1047.

It does not appear to be so ancient in the east as in the west of the Asiatic continent, and authors never say that it is a wild plant.[356] In India the case is very different. Sir Joseph Hooker says[357] that it grows in India to the height of five thousand feet in the Himalayas. He also mentions having found in the north-west of India the variety with upright stem, which is cultivated together with the common species in Europe. I find nothing positive about the localities in Persia, but so many are mentioned, and in countries so little cultivated, on the shores of the Caspian Sea, in the neighbourhood of the Caucasus, and even in the south of Russia,[358] that it is difficult not to admit that the plant is indigenous in that central region whence the Asiatic peoples overran Europe. In Greece the plant is wild as well as cultivated.[359] Further to the west, in Italy, etc., we begin to find it indicated in floras, but only growing in fields, gardens, rubbish-heaps, and other suspicious localities.[360]

Thus the evidence of philology and botany alike show that the species is indigenous in the whole of the region which extends from the western Himalayas to the south of Russia and Greece.

New Zealand Spinach—*Tetragonia expansa*, Murray.

This plant was brought from New Zealand at the time of Cook's famous voyage, and cultivated by Sir Joseph Banks, and hence its name. It is a singular plant from a double point of view. In the first place, it is the only cultivated species which comes from New Zealand; and secondly, it belongs to an order of usually fleshy plants, the *Ficoideæ*, of which no other species is used. Horticulturists[361] recommend it as an annual vegetable, of which the taste resembles that of spinach, but which bears drought better, and is therefore a resource in seasons when spinach fails.

Since Cook's voyage it has been found wild chiefly on the sea coast, not only in New Zealand but also in Tasmania, in the south and west of Australia, in Japan, and in South America.[362] It remains to be discovered whether in the latter places it is not naturalized, for it is found in the neighbourhood of towns in Japan and Chili.[363]

Garden Celery—*Apium graveolens*, Linnæus.

Like many Umbellifers which grow in damp places, wild celery has a wide range. It extends from Sweden to Algeria, Egypt, Abyssinia, and in Asia from the Caucasus to Beluchistan, and the mountains of British India.[364]

It is spoken of in the *Odyssey* under the name of *selinon*, and in Theophrastus; but later, Dioscorides and Pliny[365] distinguish between the wild and cultivated celery. In the latter the leaves are blanched, which greatly diminishes their bitterness. The long course of cultivation explains the numerous garden varieties. The one which differs more widely from the wild plant is that of which the fleshy root is eaten cooked.

Chervil—*Scandix cerefolium*, Linnæus; *Anthriscus cerefolium*, Hoffmann.

Not long ago the origin of this little Umbellifer, so common in our gardens, was unknown. Like many annuals, it sprang up on rubbish-heaps, in hedges, in waste places, and it was doubted whether it should be considered wild. In the west and south of Europe it seems to have been introduced, and more or less naturalized; but in the south-east of Russia and in western temperate Asia it appears to be

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[356] Loureiro, *Fl. Cochin.*, i. p. 359; Franchet and Savatier, *Enum. Pl. Japon.*, i. p. 53; Bentham, *Fl. Hongkong*, p. 127.

[357] Hooker, *Fl. Brit. Ind.*, i. p. 240.

[358] Ledebour, *Fl. Ross.*, ii. p. 145; Lindemann, in *Prodr. Fl. Chers.*, p. 74, says, "In desertis et arenosis inter Cherson et Berislaw, circa Odessam."

[359] Lenz, *Bot. der Alten*, p. 632; Heldreich, *Fl. Attisch. Ebene.*, p. 483.

[360] Bertoloni, *Fl. It.*, vol. v.; Gussone, *Fl. Sic.*, vol. i.; Moris, *Fl. Sard.*, vol. ii.; Willkomm and Lange, *Prodr. Fl. Hisp.*, vol. iii.

[361] *Botanical Magazine*, t. 2362; *Bon Jardinier*, 1880, p. 567.

[362] Sir J. Hooker, *Handbook of New Zealand Flora*, p. 84; Bentham, *Flora Australiensis*, iii. p. 327; Franchet and Savatier, *Enum. Plant. Japoniæ*, i. p. 177.

[363] Cl. Gay, *Flora Chilena*, ii. p. 468.

[364] Fries, *Summa Veget. Scand.*; Munby, *Catal. Alger.*, p. 11; Boissier, *Fl. Orient.*, vol. ii. p. 856; Schweinfurth and Ascherson, *Aufzählung*, p. 272; Hooker, *Fl. Brit. Ind.*, ii. p. 679.

[365] Dioscorides, *Mat. Med.*, l. 3, c. 67, 68; Pliny, *Hist.*, l. 19, c. 7, 8; Lenz, *Bot. der Alten Griechen und Römer*, p. 557.

indigenous. Steven[366] tells us that it is found "here and there in the woods of the Crimea." Boissier[367] received several specimens from the provinces to the south of the Caucasus, from Turcomania and the mountains of the north of Persia, localities of which the species is probably a native. It is wanting in the floras of India and the east of Asia.

Greek authors do not mention it. The first mention of the plant by ancient writers occurs in Columella and Pliny,[368] that is, at the beginning of the Christian era. It was then cultivated. Pliny calls it *cerefolium*. The species was probably introduced into the Greco-Roman world after the time of Theophrastus, that is in the course of the three centuries which preceded our era.

Parsley—*Petroselinum sativum*, Mœnch.

This biennial Umbellifer is wild in the south of Europe, from Spain to Turkey. It has also been found at Tlemcen in Algeria, and in Lebanon.[369]

Dioscorides and Pliny speak of it under the names of *Petroselinon* and *Petroselinum*,[370] but only as a wild medicinal plant. Nothing proves that it was cultivated in their time. In the Middle Ages Charlemagne counted it among the plants which he ordered to be cultivated in his gardens.[371] Olivier de Serres in the sixteenth century cultivated parsley. English gardeners received it in 1548.[372] Although this cultivation is neither ancient nor important, it has already developed two varieties, which would be called species if they were found wild; the parsley with crinkled leaves, and that of which the fleshy root is edible.

Smyrnium, or **Alexanders**—*Smyrnium olus-atrum*, Linnæus.

Of all the Umbellifers used as vegetables, this was one of the commonest in gardens for nearly fifteen centuries, and it is now abandoned. "We can trace its beginning and end. Theophrastus spoke of it as a medicinal plant under the name of *Ipposelinon*, but three centuries later Dioscorides[373] says that either the root or the leaves might be eaten, which implies cultivation. The Latins called it *olus-atrum*, Charlemagne *olisatum*, and commanded it to be sown in his farms.[374] The Italians made great use of it under the name *macerone*.[375] At the end of the eighteenth century the tradition existed in England that this plant had been formerly cultivated; later English and French horticulturists do not mention it.[376]

The *Smyrnium olus-atrum* is wild throughout Southern Europe, in Algeria, Syria, and Asia Minor.[377]

Corn Salad, or **Lamb's Lettuce**—*Valerianella olitoria*, Linnæus.

Frequently cultivated as a salad, this annual, of the Valerian family, is found wild throughout temperate Europe to about the sixtieth degree of latitude, in Southern Europe, in the Canary Isles, Madeira, and the Azores, in the north of Africa, Asia Minor, and the Caucasus.[378] It often grows in cultivated ground, near villages, etc., which renders it somewhat difficult to know where it grew before cultivation. It is mentioned, however, in Sardinia and Sicily, in the meadows and mountain

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[366] Steven, *Verzeichniss Taurischen Halbinseln*, p. 183.

[367] Boissier, *Fl. Orient.*, ii. p. 913.

[368] Lenz, *Bot. d. Alt. Gr. und R.*, p. 572.

[369] Munby, *Catal. Alger.*, edit. 2, p. 22; Boissier, *Fl. Orient.*, ii. p. 857.

[370] Dioscorides, *Mat. Med.*, l. 3, c. 70; Pliny, *Hist.*, l. 20, ch. 12.

[371] The list of these plants may be found in Meyer, *Gesch. der Bot.*, iii. p. 401.

[372] Phillips, *Companion to the Kitchen Garden*, ii. p. 35.

[373] Theophrastus, *Hist.*, l. 1, 9; l. 2, 2; l. 7, 6; Dioscorides, *Mat. Med.*, l. 3, c. 71.

[374] E. Meyer, *Gesch. der Bot.*, iii. p. 401.

[375] Targioni, *Cenni Storici*, p. 58.

[376] *English Botany*, t. 230; Phillips, *Companion to the Kitchen Garden; Le Bon Jardinier*.

[377] Boissier, *Fl. Orient.*, ii. p. 927.

[378] Krok, *Monographie des Valerianella*, Stockholm, 1864, p. 88; Boissier, *Fl. Orient.*, iii. p. 104.

pastures.[379] I suspect that it is indigenous only in these islands, and that everywhere else it is introduced or naturalized. The grounds for this opinion are the fact that no name which it seems possible to assign to this plant has been found in Greek or Latin authors. We cannot even name any botanist of the Middle Ages or of the sixteenth century who has spoken of it. Neither is it mentioned among the vegetables used in France in the seventeenth century, either by the *Jardinier Français* of 1651, or by Laurenberg's work, *Horticultura* (Frankfurt, 1632). The cultivation and even the use of this salad appear to be modern, a fact which has not been noticed.

Cardoon—*Cynara cardunculus*, Linnæus.

Artichoke—*Cynara scolymus*, Linnæus; *C. cardunculus*, var. *sativa*, Moris.

For a long time botanists have held the opinion that the artichoke is probably a form obtained by cultivation from the wild cardoon.[380] Careful observations have lately proved this hypothesis. Moris,[381] for instance, having cultivated, in the garden at Turin, the wild Sardinian plant side by side with the artichoke, affirmed that true characteristic distinctions no longer existed.

Willkomm and Lange,[382] who have carefully observed the plant in Spain, both wild and cultivated, share the same opinion. Moreover, the artichoke has not been found out of gardens; and since the Mediterranean region, the home of all the *Cynaræ*, has been thoroughly explored, it may safely be asserted that it exists nowhere wild.

The cardoon, in which we must also include *C. horrida* of Sibthorp, is indigenous in Madeira and in the Canary Isles, in the mountains of Marocco near Mogador, in the south and east of the Iberian peninsula, the south of France, of Italy, of Greece, and in the islands of the Mediterranean Sea as far as Cyprus.[383] Munby[384] does not allow *C. cardunculus* to be wild in Algeria, but he does admit *Cynara humilis* of Linnæus, which is considered by a few authors as a variety.

The cultivated cardoon varies a good deal with regard to the division of the leaves, the number of spines, and the size – diversities which indicate long cultivation. The Romans eat the receptacle which bears the flowers, and the Italians also eat it, under the name of *girello*. Modern nations cultivate the cardoon for the fleshy part of the leaves, a custom which is not yet introduced into Greece.[385]

The artichoke offers fewer varieties, which bears out the opinion that it is a form derived from the cardoon. Targioni,[386] in an excellent article upon this plant, relates that the artichoke was brought from Naples to Florence in 1466, and he proves that ancient writers, even Athenæus, were not acquainted with the artichoke, but only with the wild and cultivated cardoons. I must mention, however, as a sign of its antiquity in the north of Africa, that the Berbers have two entirely distinct names for the two plants: *addad* for the cardoon, *taga* for the artichoke.[387]

It is believed that the *kactos*, *kinara*, and *scolimos* of the Greeks, and the *carduus* of Roman horticulturists, were *Cynara cardunculus*,[388] although the most detailed description, that of Theophrastus, is sufficiently confused. "The plant," he said, "grows in Sicily" – as it does to this day – "and," he added, "not in Greece." It is, therefore, possible that the plants observed in our day in that country may have been naturalized from cultivation. According to Athenæus,[389] the Egyptian king

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[379] Bertoloni, *Fl. Ital.*, i. p. 185; Moris, *Fl. Sard.*, ii. p. 314; Gussone, *Synopsis Fl. Siculæ*, edit. 2, vol. i. p. 30.

[380] Dodoens, *Hist. Plant.*, p. 724; Linnæus, *Species*, p. 1159; De Candolle, *Prodr.*, vi. p. 620.

[381] Moris, *Flora Sardoa*, ii. p. 61.

[382] Willkomm and Lange, *Prodr. Fl. Hisp.*, ii. p. 180.

[383] Webb, *Phyt. Canar.*, iii. sect. 2, p. 384; Ball, *Spicilegium Fl. Maroc.*, p. 524; Willkomm and Lange, *Pr. Fl. Hisp.*; Bertoloni, *Fl. Ital.*, ix. p. 86; Boissier, *Fl. Orient.*, iii. p. 357; Unger and Kotschy, *Inseln Cypern.*, p. 246.

[384] Munby, *Catal.*, edit. 2.

[385] Heldreich, *Nutzpflanzen Griechenlands*, p. 27.

[386] Targioni, *Cenni Storici*, p. 52.

[387] *Dictionnaire Français-Berbère*, published by the Government, 1 vol. in 8vo.

[388] Theophrastus, *Hist.*, l. 6, c. 4; Pliny, *Hist.*, l. 19, c. 8; Lenz, *Bot. der Alten Griechen and Römer*, p. 480.

[389] Athenæus, *Deipn.*, ii. 84.

Ptolemy Energetes, of the second century before Christ, had found in Libya a great quantity of wild *kinara*, by which his soldiers had profited.

Although the indigenous species was to be found at such a little distance, I am very doubtful whether the ancient Egyptians cultivated the cardoon or the artichoke. Pickering and Unger[390] believed they recognized it in some of the drawings on the monuments; but the two figures which Unger considers the most admissible seem to me extremely doubtful. Moreover, no Hebrew name is known, and the Jews would probably have spoken of this vegetable had they seen it in Egypt. The diffusion of the species in Asia must have taken place somewhat late. There is an Arab name, *hirschuff* or *kerschouff*, and a Persian name, *kunghir*,[391] but no Sanskrit name, and the Hindus have taken the Persian word *kunjir*,[392] which shows that it was introduced at a late epoch. Chinese authors do not mention any *Cynara*.[393] The cultivation of the artichoke was only introduced into England in 1548.[394] One of the most curious facts in the history of *Cynara cardanculus* is its naturalization in the present century over a vast extent of the Pampas of Buenos Ayres, where its abundance is a hindrance to travellers.[395] It is becoming equally troublesome in Chili.[396] It is not asserted that the artichoke has anywhere been naturalized in this manner, and this is another sign of its artificial origin.

Lettuce—*Latuca Scariola*, var. *sativa*.

Botanists are agreed in considering the cultivated lettuce as a modification of the wild species called *Latuca Scariola*.[397] The latter grows in temperate and southern Europe, in the Canary Isles, Madeira,[398] Algeria,[399] Abyssinia,[400] and in the temperate regions of Eastern Asia. Boissier speaks of specimens from Arabia Petrea to Mesopotamia and the Caucasus.[401] He mentions a variety with crinkled leaves, similar therefore to some of our garden lettuces, which the traveller Hausknecht brought with him from the mountains of Kurdistan. I have a specimen from Siberia, found near the river Irtysch, and it is now known with certainty that the species grows in the north of India, in Kashmir, and in Nepal.[402] In all these countries it is often near cultivated ground or among rubbish, but often also in rocky ground, clearings, or meadows, as a really wild plant.

The cultivated lettuce often spreads from gardens, and sows itself in the open country. No one, as far as I know, has observed it in such a case for several generations, or has tried to cultivate the wild *L. Scariola*, to see whether the transition is easy from the one form to the other. It is possible that the original habitat of the species has been enlarged by the diffusion of cultivated lettuces reverting to the wild form. It is known that there has been a great increase in the number of cultivated varieties in the course of the last two thousand years. Theophrastus indicated three;[403] *le Bon Jardinier* of 1880 gives forty varieties existing in France.

The ancient Greeks and Romans cultivated the lettuce, especially as a salad. In the East its cultivation possibly dates from an earlier epoch. Nevertheless it does not appear, from the original

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[390] Pickering, *Chron. Arrangement*, p. 71; Unger, *Pflanzen der Alten Ægyptens*, p. 46, figs. 27 and 28.

[391] Ainslie, *Mat. Med. Ind.*, i. p. 22.

[392] Piddington, *Index*.

[393] Bretschneider, *Study*, etc., and Letters of 1881.

[394] Phillips, *Companion to the Kitchen Garden*, p. 22.

[395] Aug. de Saint Hilary, *Plantes Remarkables du Bresil*, Introd., p. 58; Darwin, *Animals and Plants under Domestication*, ii. p. 34.

[396] Cl. Gay, *Flora Chilena*, iv. p. 317.

[397] The author who has gone into this question most carefully is Bischoff, in his *Beiträge zur Flora Deutschlands und der Schweitz*, p. 184. See also Moris, *Flora Sardoa*, ii. p. 530.

[398] Webb, *Phytogr. Canariensis*, iii. p. 422; Lowe, *Flora of Madeira*, p. 544.

[399] Munby, *Catal.*, edit. 2, p. 22, under the name of *L. sylvestris*.

[400] Schweinfurth and Ascherson, *Aufzählung*, p. 285.

[401] Boissier, *Fl. Orient.*, iii. p. 809.

[402] Clarke, *Compos. Indicæ*, p. 263.

[403] Theophrastus, l. 7, c. 4.

common names both in Asia and Europe, that this plant was generally or very anciently cultivated. There is no Sanskrit nor Hebrew name known, nor any in the reconstructed Aryan tongue. A Greek name exists, *tridax*; Latin, *latuca*; Persian and Hindu, *kahn*; and the analogous Arabic form *chuss* or *chass*. The Latin form exists also, slightly modified, in the Slav and Germanic languages,[404] which may indicate either that the Western Aryans diffused the plant, or that its cultivation spread with its name at a later date from the south to the north of Europe.

Dr. Bretschneider has confirmed my supposition[405] that the lettuce is not very ancient in China, and that it was introduced there from the West. He says that the first work in which it is mentioned dates from A.D. 600 to A.D. 900.[406]

Wild Chicory—*Cichorium Intybus*, Linnæus.

The wild perennial chicory, which is cultivated as a salad, as a vegetable, as fodder, and for its roots, which are used to mix with coffee, grows throughout Europe, except in Lapland, in Marocco, and Algeria,[407] from Eastern Europe to Afghanistan and Beluchistan,[408] in the Punjab and Kashmir,[409] and from Russia to Lake Baikal in Siberia.[410] The plant is certainly wild in most of these countries; but as it often grows by the side of roads and fields, it is probable that it has been transported by man from its original home. This must be the case in India, for there is no known Sanskrit name.

The Greeks and Romans employed this species wild and cultivated,[411] but their notices of it are too brief to be clear. According to Heldreich, the modern Greeks apply the general name of *lachana*, a vegetable or salad, to seventeen different chicories, of which he gives a list.[412] He says that the species commonly cultivated is *Cichorium divaricatum*, Schousboe (*C. pumilum*, Jacquin); but it is an annual, and the chicory of which Theophrastus speaks was perennial.

Endive—*Cichorium Endivia*, Linnæus.

The white chicories or endives of our gardens are distinguished from *Cichorium Intybus*, in that they are annuals, and less bitter to the taste. Moreover, the hairs of the pappus which crowns the seed are four times longer, and unequal instead of being equal. As long as this plant was compared with *C. Intybus*, it was difficult not to admit two species. The origin of *C. Endivia* is uncertain. When we received, forty years ago, specimens of an Indian *Cichorium*, which Hamilton named *C. cosmia*, they seemed to us so like the endive that we supposed the latter to have an Indian origin, as has been sometimes suggested;[413] but Anglo-Indian botanists said, and continue to assert, that in India the plant only grows under cultivation.[414] The uncertainty persisted as to the geographical origin. After this, several botanists[415] conceived the idea of comparing the endive with an annual species, wild in the region of the Mediterranean, *Cichorium pumilum*, Jacquin (*C. divaricatum*, Schousboe), and the differences were found to be so slight that some have suspected, and others have affirmed, their specific identity. For my part, after having seen wild specimens from Sicily, and compared the good illustrations published by Reichenbach (*Icones*, vol. xix., pls. 1357, 1358), I am disposed to take the cultivated endives for varieties of the same species as *C. pumilum*. In this case the oldest name

[404] Nemnich, *Polygl. Lexicon*.

[405] A. de Candolle, *Géogr. Bot. Raisonnée*, p. 843.

[406] Bretschneider, *Study and Value of Chinese Botanical Works*, p. 17.

[407] Ball, *Spicilegium Fl. Marocc.*, p. 534; Munby, *Catal.*, edit. 2, p. 21.

[408] Boissier, *Fl. Orient.*, iii. p. 715.

[409] Clarke, *Compos. Ind.*, p. 250.

[410] Ledebour, *Fl. Ross.*, ii. p. 774.

[411] Dioscorides, ii. c. 160; Pliny, xix. c. 8; Palladius, xi. c. 11. See other authors quoted by Lenz, *Bot. d. Alten*, p. 483.

[412] Heldreich, *Die Nutzpflanzen Griechenlands*, pp. 28, 76.

[413] Aug. Pyr. de Candolle, *Prodr.*, vii. p. 84; Alph. de Candolle, *Géogr. Bot.*, p. 845.

[414] Clarke, *Compos. Ind.*, p. 250.

[415] De Viviani, *Flora Dalmat.*, ii. p. 97; Schultz in Webb, *Phyt. Canar.*, sect. ii. p. 391; Boissier, *Fl. Orient.*, iii. p. 716.

being *C. Endivia*, it is the one which ought to be retained, as has been done by Schultz. It resembles, moreover, a popular name common to several languages.

The wild plant exists in the whole region, of which the Mediterranean is the centre, from Madeira,[416] Marocco,[417] and Algeria,[418] as far as Palestine,[419] the Caucasus, and Turkestan.[420] It is very common in the islands of the Mediterranean and in Greece. Towards the west, in Spain and Madeira, for instance, it is probable that it has become naturalized from cultivation, judging from the positions it occupies in the fields and by the wayside.

No positive proof is found in ancient authors of the use of this plant by the Greeks and Romans;[421] but it is probable that they made use of it and several other *Cichoria*. The common names tell us nothing, since they may have been applied to two different species. These names vary little,[422] and suggest a cultivation of Græco-Roman origin. A Hindu name, *kasni*, and a Tamul one, *koschi*,[423] are mentioned, but no Sanskrit name, and this indicates that the cultivation of this plant was of late origin in the east.

Spinach—*Spinacia oleracea*, Linnæus.

This vegetable was unknown to the Greeks and Romans.[424] It was new to Europe in the sixteenth century,[425] and it has been a matter of dispute whether it should be called *spanacha*, as coming from Spain, or *spinacia*, from its prickly fruit.[426] It was afterwards shown that the name comes from the Arabic *isfânâdsch*, *esbanach*, or *sepanach*, according to different authors.[427] The Persian name is *ispany*, or *ispanaj*,[428] and the Hindu *isfany*, or *palak*, according to Piddington, and also *pinnis*, according to the same and to Roxburgh. The absence of any Sanskrit name shows a cultivation of no great antiquity in these regions. Loureiro saw the spinach cultivated at Canton, and Maximowicz in Mantschuria;[429] but Bretschneider tells us that the Chinese name signifies *herb of Persia*, and that Western vegetables were commonly introduced into China a century before the Christian era.[430] It is therefore probable that the cultivation of this plant began in Persia from the time of the Græco-Roman civilization, or that it did not quickly spread either to the east or to the west of its Persian origin. No Hebrew name is known, so that the Arabs must have received both plant and name from the Persians. Nothing leads us to suppose that they carried this vegetable into Spain. Ebn Baithar, who was living in 1235, was of Malaga; but the Arabic works he quotes do not say where the plant was cultivated, except one of them, which says that its cultivation was common at Nineveh and Babylon. Herrera's work on Spanish agriculture does not mention the species, although it is inserted in a supplement of recent date, whence it is probable that the edition of 1513 did not speak of it; so that the European cultivation must have come from the East about the fifteenth century.

Some popular works repeat that spinach is a native of Northern Asia, but there is nothing to confirm this supposition. It evidently comes from the empire of the ancient Medes and Persians.

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[416] Lowe, *Flora of Madeira*, p. 521.

[417] Ball, *Spicilegium*, p. 534.

[418] Munby, *Catal.*, edit. 2, p. 21.

[419] Boissier, *Fl. Orient.*, iii. p. 716.

[420] Bunge, *Beiträge zur Flora Russlands und Central Asiens*, p. 197.

[421] Lenz, *Bot. der Alten*, p. 483; Heldreich, *Die Nutzpflanzen Griechenlands*, p. 74.

[422] Nemnich, *Polygl. Lex.*, at the word *Cichorium Endivia*.

[423] Royle, *Ill. Himal.*, p. 247; Piddington, *Index*.

[424] J. Bauhin, *Hist.*, ii. p. 964; Fraas, *Syn. Fl. Class.*; Lenz, *Bot. der Alten*.

[425] Brassavola, p. 176.

[426] Mathioli, ed Valgr., p. 343.

[427] Ebn Baithar, ueberitz von Sondtheimer, i. p. 34; Forskal, *Egypt*, p. 77; Delile, *Ill. Ægypt.*, p. 29.

[428] Roxburgh, *Fl. Ind.*, ed. 1832, v. iii. p. 771, applied to *Spinacia tetandra*, which seems to be the same species.

[429] Maximowicz, *Primitiæ Fl. Amur.*, p. 222.

[430] Bretschneider, *Study and Value of Chin. Bot. Works*, pp. 15, 17.

According to Bosc,[431] the traveller, Olivier brought back some seeds of it, found in the East in the open country. This would be a positive proof, if the produce of these seeds had been examined by a botanist in order to ascertain the species and the variety. In the present state of our knowledge it must be owned that spinach has not yet been found in a wild state, unless it be a cultivated modification of *Spinacia tetandra*, Steven, which is wild to the south of the Caucasus, in Turkestan, in Persia, and in Afghanistan, and which is used as a vegetable under the name of *schamum*.[432]

Without entering here into a purely botanical discussion, I may say that, after reading the descriptions quoted by Boissier, and looking at Wight's[433] plate of *Spinacia tetandra*, Roxb., cultivated in India, and the specimens of several herbaria, I see no decided difference between this plant and the cultivated spinach with prickly fruit. The term *tetandra* implies that one of the plants has five and the other four stamens, but the number varies in our cultivated spinaches.[434]

If, as seems probable, the two plants are two varieties, the one cultivated, the other sometimes wild and sometimes cultivated, the oldest name, *S. oleracea*, ought to persist, especially as the two plants are found in the cultivated grounds of their original country.

The *Dutch* or *great spinach*, of which the fruit has no spines, is evidently a garden product. Tragus, or Bock was the first to mention it in the sixteenth century.[435]

Amaranth—*Amarantus gangeticus*, Linnæus.

Several annual amaranths are cultivated as a green vegetable in Mauritius, Bourbon, and the Seychelles Isles, under the name of *brède de Malabar*.[436] This appears to be the principal species. It is much cultivated in India. Anglo-Indian botanists mistook it for a time for *Amarantus oleraceus* of Linnæus, and Wight gives an illustration of it under this name,[437] but it is now acknowledged to be a different species, and belongs to *A. gangeticus*. Its numerous varieties, differing in size, colour, etc., are called in the Telinga dialect *tota kura*, with the occasional addition of an adjective for each. There are other names in Bengali and Hindustani. The young shoots sometimes take the place of asparagus at the table of the English.[438] *A. melancholicus*, often grown as an ornamental plant in European gardens, is considered one of the forms of this species.

Its original home is perhaps India, but I cannot discover that the plant has ever been found there in a wild state; at least, this is not asserted by any author. All the species of the genus *Amarantus* spread themselves in cultivated ground, on rubbish-heaps by the wayside, and thus become half-naturalized in hot countries as well as in Europe. Hence the extreme difficulty in distinguishing the species, and above all in guessing or proving their origin. The species most nearly akin to *A. gangeticus* appear to be Asiatic.

A. gangeticus is said by trustworthy authorities to be wild in Egypt and Abyssinia;[439] but this is perhaps only the result of such naturalization as I spoke of just now. The existence of numerous varieties and of different names in India, render its Indian origin most probable.

The Japanese cultivate as vegetables *A. caudatus*, *A. mangostanus*, and *A. melancholicus* (or *gangeticus*) of Linnæus,[440] but there is no proof that any of them are indigenous. In Java *A. polystachyus*, Blume, is cultivated; it is very common among rubbish, by the wayside, etc.[441]

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[431] *Dict. d'Agric.*, v. p. 906.

[432] Boissier, *Fl. Orient.*, vi. p. 234.

[433] Wight, *Icones*, t. 818.

[434] Nees, *Gen. Plant. Fl. Germ.*, 1. 7, pl. 15.

[435] Bauhin, *Hist.*, ii. p. 965.

[436] *A. gangeticus*, *A. tristis*, and *A. hybridis* of Linnæus, according to Baker, *Flora of Mauritius*, p. 266.

[437] Wight, *Icones*, p. 715.

[438] Roxburgh, *Flora Indica*, edit. 2, vol. iii. p. 606.

[439] Boissier, *Flora Orientalis*, iv. p. 990; Schweinfurth and Ascherson, *Aufzählung*, etc., p. 289.

[440] Franchet and Savatier, *Enum. Plant. Japoniæ*, i. p. 390.

[441] Hasskarl, *Plant. Javan. Rariores*, p. 431.

I shall speak presently of the species grown for the seed.

Leek—*Allium ampeloprasum*, var. *Porrum*.

According to the careful monograph by J. Gay,[442] the leek, as early writers[443] suspected, is only a cultivated variety of *Allium ampeloprasum* of Linnæus, so common in the East, and in the Mediterranean region, especially in Algeria, which in Central Europe sometimes becomes naturalized in vineyards and round ancient cultivations.[444] Gay seems to have mistrusted the indications of the floras of the south of Europe, for, contrary to his method with other species of which he gives the localities out of Algeria, he only quotes in the present case the Algerian localities; admitting, however, the identity of name in the authors for other countries.

The cultivated variety of *Porrum* has not been found wild. It is only mentioned in doubtful localities, such as vineyards, gardens, etc. Ledebour[445] indicates for *A. ampeloprasum* the borders of the Crimea, and the provinces to the south of the Caucasus. Wallich brought a specimen from Kamaon, in India,[446] but we cannot be sure that it was wild. The works on Cochin-China (Loureiro), China (Bretschneider), and Japan (Franchet and Savatier) make no mention of it.

Article II.—Fodder

Lucern—*Medicago sativa*, Linnæus.

The lucern was known to the Greeks and Romans. They called it in Greek *medicai*, in Latin medica, or *herba medica*, because it had been brought from Media at the time of the Persian war, about 470 years before the Christian era.[447] The Romans often cultivated it, at any rate from the beginning of the first or second century. Cato does not speak of it,[448] but it is mentioned by Varro, Columella, and Virgil. De Gasparin[449] notices that Crescenz, in 1478, does not mention it in Italy, and that in 1711 Tull had not seen it beyond the Alps. Targioni, however, who could not be mistaken on this head, says that the cultivation of lucern was maintained in Italy, especially in Tuscany, from ancient times.[450] It is rare in modern Greece.[451] French cultivators have often given to the lucern the name of *sainfoin*, which belongs properly to *Onobrychis sativa*; and this transposition still exists, for instance in the neighbourhood of Geneva. The name *lucern* has been supposed to come from the valley of Luzerne, in Piedmont; but there is another and more probable origin. The Spaniards had an old name, *eruye*, mentioned by J. Bauhin,[452] and the Catalans call it *userdas*[453] whence perhaps the patois name in the south of France, *laouzerdo*, nearly akin to *luzerne*. It was so commonly cultivated in Spain that the Italians have sometimes called it *herba spagna*.[454] The Spaniards have, besides the names already given, *mielga*, or *melga*, which appears to come from *Medica*, but they principally used names derived from the Arabic —*alfafa*, *alfasafat*, *alfalfa*. In the thirteenth century, the famous physician Ebn Baithar, who wrote at Malaga, uses the Arab word *fisfisat*, which he derives from the

[442] Gay, *Ann. des Sc. Nat.*, 3rd series, vol. viii.

[443] Linnæus, *Species Pl.*; De Candolle, *Fl. Franç.*, iii. p. 219.

[444] Koch, *Synopsis Fl. Germ.*; Babington, *Man. of Brit. Bot.*; *English Bot.*, etc.

[445] Ledebour, *Flora Ross.*, iv. p. 163.

[446] Baker, *Journal of Bot.*, 1874, p. 295.

[447] Strabo, xii. p. 560; Pliny, bk. xviii. c. 16.

[448] Hehn, *Culturpflanzen*, etc., p. 355.

[449] Gasparin, *Cours d'Agric.*, iv. p. 424.

[450] Targioni-Tozzetti, *Cenni Storici*, p. 34.

[451] Fraas, *Synopsis Fl. Class.*, p. 63; Heldreich, *Die Nutzpflanzen Griechenlands*, p. 70.

[452] Bauhin, *Hist. Plant.*, ii. p. 381.

[453] Colmeiro, *Catal.*

[454] Tozzetti, *Dizion. Bot.*

Persian *isfist*.[455] It will be seen that, if we are to trust to the common names, the origin of the plant would be either in Spain, Piedmont, or Persia. Fortunately botanists can furnish direct and possible proofs of the original home of the species.

It has been found wild, with every appearance of an indigenous plant, in several provinces of Anatolia, to the south of the Caucasus, in several parts of Persia, in Afghanistan, in Beluchistan,[456] and in Kashmir.[457] In the south of Russia, a locality mentioned by some authors, it is perhaps the result of cultivation as well as in the south of Europe. The Greeks may, therefore, have introduced the plant from Asia Minor as well as from India, which extended from the north of Persia.

This origin of the lucern, which is well established, makes me note as a singular fact that no Sanskrit name is known.[458] Clover and sainfoin have none either, which leads us to suppose that the Aryans had no artificial meadows.

Sainfoin—*Hedysarum Onobrychis*, Linnæus; *Onobrychis sativa*, Lamarck.

This leguminous plant, of which the usefulness in the dry and chalky soils of temperate regions is incontestable, has not been long in cultivation. The Greeks did not grow it, and their descendants have not introduced it into their agriculture to this day.[459] The plant called *Onobrychis* by Dioscorides and Pliny, is *Onobrychis Caput-Galli* of modern botanists,[460] a species wild in Greece and elsewhere, which is not cultivated. The sainfoin, or *lupinella* of the Italians, was highly esteemed as fodder in the south of France in the time of Olivier de Serres,[461] that is to say, in the sixteenth century; but in Italy it was only in the eighteenth century that this cultivation spread, particularly in Tuscany.[462]

Sainfoin is a herbaceous plant, which grows wild in the temperate parts of Europe, to the south of the Caucasus, round the Caspian Sea,[463] and even beyond Lake Baikal.[464] In the south of Europe it grows only on the hills. Gussone does not reckon it among the wild species of Sicily, nor Moris among those of Sardinia, nor Munby among those of Algeria.

No Sanskrit, Persian, or Arabic names are known. Everything tends to show that the cultivation of this plant originated in the south of France as late perhaps as the fifteenth century.

French Honeysuckle, or **Spanish Sainfoin**—*Hedysarum coronarium*, Linnæus.

The cultivation of this leguminous plant, akin to the sainfoin, and of which a good illustration may be found in the *Flora des Serres et des Jardins*, vol. xiii. pl. 1382, has been diffused in modern times through Italy, Sicily, Malta, and the Balearic Isles.[465] Marquis Grimaldi, who first pointed it out to cultivators in 1766, had seen it at Seminara, in Lower Calabria; De Gasparin[466] recommends it for Algeria, and it is probable that cultivators under similar conditions in Australia, at the Cape, in South America or Mexico, would do well to try it. In the neighbourhood of Orange, in Algeria, the plant did not survive the cold of 6° centigrade.

Hedysarum coronarium grows in Italy from Genoa to Sicily and Sardinia,[467] in the south of Spain[468] and in Algeria,[469] where it is rare. It is, therefore, a species of limited geographical area.

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[455] Ebn Baithar, *Heil und Nahrungsmittel*, translated from Arabic by Sontheimer, vol. ii. p. 257.

[456] Boissier, *Fl. Orient.*, ii. p. 94.

[457] Royle, *Ill. Himal.*, p. 197.

[458] Piddington, *Index*.

[459] Heldreich, *Nutzpflanzen Griechenlands*, p. 72.

[460] Fraas, *Synopsis Fl. Class.*, p. 58; Lenz, *Bot. der Alten Gr. und Röm.*, p. 731.

[461] O. de Serres, *Théâtre de l'Agric.*, p. 242.

[462] Targioni-Tozzetti, *Cenni Storici*, p. 34.

[463] Ledebour, *Fl. Ross.*, i. p. 708; Boissier, *Fl. Or.*, p. 532.

[464] Turczaninow, *Flora Baical. Dahur.*, i. p. 340.

[465] Targioni-Tozzetti, *Cenni Storici*, p. 35; Marès and Virgineix, *Catal. des Baléares*, p. 100.

[466] De Gasparin, *Cours d'Agric.*, iv. p. 472.

[467] Bertoloni, *Flora Ital.*, viii. p. 6.

[468] Willkomm and Lange, *Prodr. Fl. Hisp.*, iii. p. 262.

Purple Clover—*Trifolium pratense*, Linnæus.

Clover was not cultivated in ancient times, although the plant was doubtless known to nearly all the peoples of Europe and of temperate Western Asia. Its use was first introduced into Flanders in the sixteenth century, perhaps even earlier, and, according to Schwerz, the Protestants expelled by the Spaniards carried it into Germany, where they established themselves under the protection of the Elector Palatine. It was also from Flanders that the English received it in 1633, through the influence of Weston, Earl of Portland, then Lord Chancellor.[470]

Trifolium pratense is wild throughout Europe, in Algeria,[471] on the mountains of Anatolia, in Armenia, and in Turkestan,[472] in Siberia towards the Altai Mountains,[473] and in Kashmir and Garwhall.[474]

The species existed, therefore, in Asia, in the land of the Aryan nations; but no Sanskrit name is known, whence it may be inferred that it was not cultivated.

Crimson or **Italian Clover**—*Trifolium incarnatum*, Linnæus.

An annual plant grown for fodder, whose cultivation, says Vilmorin, long confined to a few of the southern departments, becomes every day more common in France.[475] De Candolle, at the beginning of the present century, had only seen it in the department of Ariège.[476] It has existed for about sixty years in the neighbourhood of Geneva. Targioni does not think that it is of ancient date in Italy,[477] and the trivial name *trafoglio* strengthens his opinion.

The Catalan *fé*, *fench*,[478] and, in the patois of the south of France,[479] *farradje* (Roussillon), *farratage* (Languedoc), *feroutgé* (Gascony), whence the French name *farouch*, have, on the other hand, an original character, which indicates an ancient cultivation round the Pyrenees. The term which is sometimes used, "clover of Roussillon," also shows this.

The wild plant exists in Galicia, in Biscaya, and Catalonia,[480] but not in the Balearic Isles;[481] it is found in Sardinia[482] and in the province of Algiers.[483] It appears in several localities in France, Italy, and Dalmatia, in the valley of the Danube and Macedonia, but in many cases it is not known whether it may not have strayed from neighbouring cultivation. A singular locality in which it appears to be indigenous, according to English authors, is on the coast of Cornwall, near the Lizard. In this place, according to Bentham, it is the pale yellow variety, which is truly wild on the Continent, while the crimson variety is only naturalized in England from cultivation.[484] I do not know to what degree this remark of Bentham's as to the wild nature of the sole variety of a yellow colour (var. *Molinerii*, Seringe) is confirmed in all the countries where the species grows. It is the only one indicated by Moris in Sardinia, and in Dalmatia by Viviani,[485] in the localities which appear natural (*in pascuis collinis*,

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[469] Munby, *Catal.*, edit. 2, p. 12.

[470] De Gasparin, *Cours d'Agric.*, iv. p. 445, according to Schwerz and A. Young.

[471] Munby, *Catal.*, edit. 2, p. 11.

[472] Boissier, *Fl. Orient.*, i. p. 115.

[473] Ledebour, *Fl. Ross.*, i. p. 548.

[474] Baker, in Hooker's *Fl. of Brit. Ind.*, ii. p. 86.

[475] *Bon Jardinier*, 1880, pt. i. p. 618.

[476] De Candolle, *Fl. Franç.*, iv. p. 528.

[477] Targioni, *Cenni Storici*, p. 35.

[478] Costa, *Intro. Fl. di Catal.*, p. 60.

[479] Moritzi, *Dict. MS.*, compiled from floras published before the middle of the present century.

[480] Willkomm and Lange, *Prodr. Fl. Hisp.*, iii. p. 366.

[481] Marès and Virgineix, *Catal.*, 1880.

[482] Moris, *Fl. Sard.*, i. p. 467.

[483] Munby, *Catal.*, edit. 2.

[484] Bentham, *Handbook Brit. Fl.*, edit. 4, p. 117.

[485] Moris, *Fl. Sard.*, i. p. 467; Viviani, *Fl. Dalmat.*, iii. p. 290.

in montanis, *in herbidis*). The authors of the *Bon Jardinier*[486] affirm with Bentham that *Trifolium Molinerii* is wild in the north of France, that with crimson flowers being introduced from the south; and while they admit the absence of a good specific distinction, they note that in cultivation the variety *Molinerii* is of slower growth, often biennial instead of annual.

Alexandrine or **Egyptian Clover**—*Trifolium Alexandrinum*, Linnæus.

This species is extensively cultivated in Egypt as fodder. Its Arab name is *bersym* or *berzun*.[487] There is nothing to show that it has been long in use; the name does not occur in Hebrew and Armenian botanical works. The species is not wild in Egypt, but it is certainly wild in Syria and Asia Minor.[488]

Ervilia—*Ervum Ervilia*, Linnæus; *Vicia Ervilia*, Willdenow.

Bertoloni[489] gives no less than ten common Italian names —*ervo*, *lero*, *zirlo*, etc. This is an indication of an ancient and general culture. Heldreich[490] says that the modern Greeks cultivate the plant in abundance as fodder. They call it *robai*, from the ancient Greek *orobos*, as *ervos* comes from the Latin *ervum*. The cultivation of the species is mentioned by ancient Greek and Latin authors.[491] The Greeks made use of the seed; for some has been discovered in the excavations on the site of Troy.[492] There are a number of common names in Spain, some of them Arabic,[493] but the species has not been so widely cultivated there for several centuries.[494] In France it is so little grown that many modern works on agriculture do not mention it. It is unknown in British India.[495]

General botanical works indicate *Ervum Ervilia* as growing in Southern Europe, but if we take severally the best floras, it will be seen that it is in such localities as fields, vineyards, or cultivated ground. It is the same in Western Asia, where Boissier[496] speaks of specimens from Syria, Persia, and Afghanistan. Sometimes, in abridged catalogues,[497] the locality is not given, but nowhere do I find it asserted that the plant has been seen wild in places far from cultivation. The specimens in my own herbarium furnish no further proof on this head.

In all likelihood the species was formerly wild in Greece, Italy, and perhaps Spain and Algeria, but the frequency of its cultivation in the very regions where it existed prevent us from now finding the wild stocks.

Tare, or **Common Vetch**—*Vicia sativa*, Linnæus.

Vicia sativa is an annual leguminous plant wild throughout Europe, except in Lapland. It is also common in Algeria,[498] and to the south of the Caucasus as far as the province of Talysch.[499] Roxburgh pronounces it to be wild in the north-west provinces and in Bengal, but Sir Joseph Hooker admits this only as far as the variety called *angustifolia*[500] is concerned. No Sanskrit name is known, and in the modern languages of India only Hindu names.[501] Targioni believes it to be the *ketsach* of the

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[486] *Bon Jardinier*, 1880, p. 619.

[487] Forskal, *Fl. Egypt.*, p. 71; Delile, *Plant. Cult. en Egypt.*, p. 10; Wilkinson, *Manners and Customs of Ancient Egyptians*, ii. p. 398.

[488] Boissier, *Fl. Orient.*, ii. p. 127.

[489] Bertoloni, *Fl. It.*, vii. p. 500.

[490] *Nutzpflanzen Griechenlands*, p. 71.

[491] See Lenz, *Bot. d. Alten*, p. 727; Fraas, *Fl. Class.*, p. 54.

[492] Wittmack, *Sitzungsber Bot. Vereins Brandenburg*, *Dec. 19, 1879*.

[493] Willkomm and Lange, *Prodr. Fl. Hisp.*, iii. p. 308.

[494] Baker, in Hooker's *Fl. Brit. Ind.*

[495] Herrera, *Agricultura*, edit. 1819, iv. p. 72.

[496] Baker, in Hooker's *Fl. Brit. Ind.*

[497] For instance, Munby, *Catal. Plant Algeriæ*, edit. 2, p. 12.

[498] Munby, *Catal.*, edit. 2.

[499] Ledebour, *Fl. Ross.*, i. p. 666; Hohenacker, *Enum. Plant. Talysch*, p. 113; C. A. Meyer, *Verzeichniss*, p. 147.

[500] Roxburgh, *Fl. Ind.*, edit. 1832, iii. p. 323; Hooker, *Fl. Brit. Ind.*, ii. p. 178.

[501] Piddington's *Index* gives four.

Hebrews.[502] I have received specimens from the Cape and from California. The species is certainly not indigenous in the two last-named regions, but has escaped from cultivation.

The Romans sowed this plant both for the sake of the seed and as fodder as early as the time of Cato.[503] I have discovered no proof of a more ancient cultivation. The name *vik*, whence *vicia*, dates from a very remote epoch in Europe, for it exists in Albanian,[504] which is believed to be the language of the Pelasgians, and among the Slav, Swedish, and Germanic nations, with slight modifications. This does not prove that the species was cultivated. It is distinct enough and useful enough to herbivorous animals to have received common names from the earliest times.

Flat-podded Pea—*Lathyrus Cicera*, Linnæus.

An annual leguminous plant, esteemed as fodder, but whose seed, if used as food in any quantity, becomes dangerous.[505]

It is grown in Italy under the name of *mochi*.[506] Some authors suspect that it is the *cicera* of Columella and the *ervilia* of Varro,[507] but the common Italian name is very different to these. The species is not cultivated in Greece.[508] It is more or less grown in France and Spain, without anything to show that its use dates from ancient times. However, Wittmack[509] attributes to it, but doubtfully, some seeds brought by Virchow from the Trojan excavations.

According to the floras, it is evidently wild in dry places, beyond the limits of cultivation in Spain and Italy.[510] It is also wild in Lower Egypt, according to Schweinfurth and Ascherson;[511] but there is no trace of ancient cultivation in this country or among the Hebrews. Towards the East its wild character becomes less certain. Boissier indicates the plant "in cultivated ground from Turkey in Europe, and Egypt as far as the south of the Caucasus and Babylon."[512] It is not mentioned in India either as wild or cultivated, and has no Sanskrit name.[513]

The species is probably a native of the region comprised between Spain and Greece, perhaps also of Algeria,[514] and diffused by a cultivation, not of very ancient date, over Western Asia.

Chickling Vetch—*Lathyrus sativus*, Linnæus.

An annual leguminous plant, cultivated in the South of Europe, from a very early age, as fodder, and also for the seeds. The Greeks called it *lathyros*[515] and the Latins *cicercula*.[516] It is also cultivated in the temperate regions of Western Asia, and even in the north of India;[517] but it has no Hebrew[518] nor Sanskrit name,[519] which argues a not very ancient cultivation in these regions.

Nearly all the floras of the south of Europe and of Algeria give the plant as cultivated and half-wild, rarely and only in a few localities as truly wild. It is easy to understand the difficulty of

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[502] Targioni, *Cenni Storici*, p. 30.

[503] Cato, *Be re Rustica*, edit. 1535, p. 34; Pliny, bk. xviii. c. 15.

[504] Heldreich, *Nutzpflanzen Griechenlands*, p. 71. In the earlier language than the Indo-Europeans, *vik* bears another meaning, that of "hamlet" (Fick, *Vorterb. Indo-Germ.*, p. 189).

[505] Vilmorin, *Bon Jardinier*, 1880, p. 603.

[506] Targioni, *Cenni Storici*, p. 31; Bertoloni, *Fl. Ital.*, vii. pp. 444, 447.

[507] Lenz, *Botanik. d. Alten*, p. 730.

[508] Fraas, *Fl. Class.*; Heldreich, *Nutzflanzen Griechenlands*.

[509] Wittmack, *Sitz. Ber. Bot. Vereins Brandenburg*, Dec. 19, 1879.

[510] Willkomm and Lange, *Prodr. Fl. Hisp.*, iii. p. 313; Bertoloni, *Fl. Ital.*

[511] Schweinfurth and Ascherson, *Aufzählung*, etc., p. 257.

[512] Boissier, *Fl. Orient.*, ii. p. 605.

[513] J. Baker, in Hooker's *Fl. of Brit. Ind.*

[514] Munby, *Catal.*

[515] Theophrastus, *Hist. Plant.*, viii., c. 2, 10.

[516] Columella, *De rei rustica*, ii. c. 10; Pliny, xviii. c. 13, 32.

[517] Roxburgh, *Fl. Ind.*; Hooker, *Fl. Brit. Ind.*, ii. p. 178.

[518] Rosenmüller, *Handb. Bibl. Alterth.*, vol. i.

[519] Piddington, *Index*.

recognizing the wild character of a species often mixed with cereals, and which persists and spreads itself after cultivation. Heldreich does not allow that it is indigenous in Greece.[520] This is a strong presumption that in the rest of Europe and in Algeria the plant has escaped from cultivation.

It is probable that this was not the case in Western Asia; for authors cite sufficiently wild localities, where agriculture plays a less considerable part than in Europe. Ledebour,[521] for instance, mentions specimens gathered in the desert, near the Caspian Sea, and in the province of Lenkoran. Meyer[522] confirms the assertion with respect to Lenkoran. Baker, in his flora of British India, after indicating the species as scattered here and there in the northern provinces, adds, "often cultivated," whence it may be inferred that he considers it as indigenous, at least in the north. Boissier asserts nothing with regard to the localities in Persia which he mentions in his Oriental flora.[523]

To sum up, I think it probable that the species was indigenous before cultivation in the region extending from the south of the Caucasus, or of the Caspian Sea, to the north of India, and that it spread towards Europe in the track of ancient cultivation, mixed perhaps with cereals.

Ochrus—*Pisum ochrus*, Linnæus; *Lathyrus ochrus*, de Candolle.

Cultivated as an annual fodder in Catalonia, under the name of *tapisots*,[524] and in Greece, particularly in the island of Crete, under that of *ochros*,[525] mentioned by Theophrastus,[526] but without a word of description. Latin authors do not speak of it, which argues a rare and local cultivation in ancient times.

The species is certainly wild in Tuscany.[527] It appears to be wild also in Greece and Sardinia, where it is found in hedges,[528] and in Spain, where it grows in uncultivated ground;[529] but as for the south of France, Algeria, and Sicily, authors are either silent as to the locality, or mention only fields and cultivated ground. The plant is unknown further east than Syria,[530] where probably it is not wild.

The fine plate published by Sibthorp, *Flora Græca*, 589, suggests that the species is worthy of more general cultivation.

Trigonel, or **Fenugreek**– Trigonella fænum-græcum, Linnæus.

The cultivation of this annual leguminous plant was common in ancient Greece and Italy,[531] either for spring forage, or for the medicinal properties of its seeds. Abandoned almost everywhere in Europe, and notably in Greece,[532] it is maintained in the East and in India,[533] where it is probably of very ancient date, and throughout the Nile Valley.[534] The species is wild in the Punjab and in Kashmir,[535] in the deserts of Mesopotamia and of Persia,[536] and in Asia Minor,[537] where, however, the localities cited do not appear sufficiently distinct from the cultivated ground. It is also indicated[538]

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[520] Heldreich, *Pflanz. d. Attisch. Ebene*, p. 476; *Nutzpf. Gr.*, p. 72.

[521] Ledebour, *Fl. Ross.*, i. p. 681.

[522] C. A. Meyer, *Verzeichniss*, p. 148.

[523] Boissier, *Fl. Orient.*, ii. p. 606.

[524] Willkomm and Lange, *Prodr. Fl. Hisp.*, iii. p. 312.

[525] Lenz, *Bot. d. Alten*, p. 730; Heldreich, *Nutzpfl. Gr.*, p. 72.

[526] Lenz.

[527] Caruel, *Fl. Tosc.*, p. 193; Gussone, *Syn. Fl. Sic.*, edit. 2.

[528] Boissier, *Fl. Orient.*, ii. p. 602; Moris, *Fl. Sard.*, i. p. 582.

[529] Willkomm and Lange, *Prodr. Fl. Hisp.*

[530] Boissier, *Fl. Orient.*

[531] Theophrastus, *Hist. Plant.*, viii. c. 8; Columella, *De rei rustica*, ii. c. 10; Pliny, *Hist.*, xviii. c. 16.

[532] Fraas, *Syn. Fl. Class.*, p. 63; Lenz, *Bot. der Alten*, p. 719.

[533] Baker, in Hooker's *Fl. Brit. Ind.*, ii. p. 57.

[534] Schweinfurth, *Beitr. z. Fl. Æthiop.*, p. 258.

[535] Baker, in Hooker's *Fl. Brit. Ind.*

[536] Boissier, *Fl. Orient.*, ii. p. 70.

[537] Boissier, *ibid.*

[538] Sibthorp, *Fl. Græca*, t. 766; Lenz, *Bot. der Alten*, Bertoloni, *Fl. Ital.*, viii. p. 250; Willkomm and Lange, *Prodr. Fl. Hisp.*, iii.

in several places in Southern Europe, such as Mount Hymettus and other localities in Greece, the hills above Bologna and Genoa, and a few waste places in Spain; but the further west we go the more we find mentioned such localities as fields, cultivated ground, etc.; and careful authors do not fail to note that the species has probably escaped from cultivation.[539] I do not hesitate to say that if a plant of this nature were indigenous in Southern Europe, it would be far more common, and would not be wanting to the insular floras, such as those of Sicily, Ischia, and the Balearic Isles.[540]

The antiquity of the species and of its use in India is confirmed by the existence of several different names in different dialects, and above all of a Sanskrit and modern Hindu name, *methi*.[541] There is a Persian name, *schemlit*, and an Arab name, *helbeh*;[542] but none is known in Hebrew.[543] One of the names of the plant in ancient Greek, *tailis* τηλις, may, perhaps, be considered by philologists as akin to the Sanskrit name,[544] but of this I am no judge. The species may have been introduced by the Aryans, and the primitive name have left no trace in northern languages, since it can only live in the south of Europe.

Bird's Foot—*Ornithopus sativus*, Brotero; *O. isthmocarpus*, Cosson.

The true bird's foot, wild and cultivated in Portugal, was described for the first time in 1804 by Brotero,[545] and Cosson has distinguished it more clearly from allied species.[546] Some authors had confounded it with *Ornithopus roseus* of Dufour, and agriculturists have sometimes given it the name of a very different species, *O. perpusillus*, which by reason of its small size is unsuited for cultivation. It is only necessary to see the pod of *Ornithopus sativus* to make certain of the species, for it is when ripe contracted at intervals and considerably bent. If there are in the fields plants of a similar appearance, but whose pods are straight and not contracted, they are the result of a cross with *O. roseus*, or, if the pod is curved but not contracted, with *O. compressus*. From the appearance of these plants, it seems that they might be grown in the same manner, and would present, I suppose, the same advantages.

The bird's foot is only suited to a dry and sandy soil. It is an annual which furnishes in Portugal a very early spring fodder. Its cultivation has been successfully introduced into Campine.[547]

O. sativus appears to be wild in several districts of Portugal and the south of Spain. I have a specimen from Tangier; and Cosson found it in Algeria. It is often found in abandoned fields, and even elsewhere. It is difficult to say whether the specimens are not from plants escaped from cultivation, but localities are cited where this seems improbable; for instance, a pine wood near Chiclana, in the south of Spain (Willkomm).

Spergula, or **Corn Spurry**—*Spergula arvensis*, Linnæus.

This annual, belonging to the family of the Caryophylaceæ, grows in sandy fields and similar places in Europe, in North Africa and Abyssinia,[548] in Western Asia as far as Hindustan,[549] and even in Java.[550] It is difficult to know over what extent of the old world it was originally indigenous. In many localities we do not know if it is really wild or naturalized from cultivation. Sometimes a recent

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p. 390.

[539] Caruel, *Fl. Tosc.*, p. 256; Willkomm and Lange.

[540] The plants which spread from one country to another introduce themselves into islands with more difficulty, as will be seen from the remarks I formerly published. *Géogr. Bot. Raisonnée*, p. 706).

[541] Piddington, *Index*.

[542] Ainslie, *Mat. Med. Ind.*, i. p. 130.

[543] Rosenmüller, *Bibl. Alterth.*

[544] As usual, Fick's dictionary of Indo-European languages does not mention the name of this plant, which the English say is Sanskrit.

[545] Brotero, *Flora Lusitanica*, ii. p. 160.

[546] Cosson, *Notes sur Quelques Plantes Nouvelles ou Critiques du Midi de l'Espagne*, p. 36.

[547] *Bon Jardinier*, 1880, p. 512.

[548] Boissier, *Fl. Orient.*, i. p. 731.

[549] Hooker, *Fl. Brit. Ind.*, i. p. 243, and several specimens from the Nilgherries and Ceylon in my herbarium.

[550] Zollinger, No. 2556 in my herbarium.

introduction may be suspected. In India, for instance, numerous specimens have been gathered in the last few years; but Roxburgh, who was so diligent a collector at the end of the last and the beginning of the present century, does not mention the species. No Sanskrit or modern Hindu name is known,[551] and it has not been found in the countries between India and Turkey.

The common names may tell us something with regard to the origin of the species and to its cultivation.

No Greek or Latin name is known. *Spergula*, in Italian *spergola*, seems to be a common name long in use in Italy. Another Italian name, *erba renaiola*, indicates only its growth in the sand (*rena*). The French (*spargoule*), Spanish (*esparcillas*), Portuguese (*espargata*), and German (*Spark*), have all the same root. It seems that throughout the south of Europe the species was taken from country to country by the Romans, before the division of the Latin languages. In the north the case is very different. There is a Russian name, *toritsa*;[552] several Danish names, *humb* or *hum*, *girr* or *kirr*;[553] and Swedish, *knutt*, *fryle*, *nägde*, *skorff*.[554] This great diversity shows that attention had long been drawn to this plant in this part of Europe, and argues an ancient cultivation. It was cultivated in the neighbourhood of Montbelliard in the sixteenth century,[555] and it is not stated that it was then of recent introduction. Probably it arose in the south of Europe during the Roman occupation, and perhaps earlier in the north. In any case, its original home must have been Europe.

Agriculturists distinguish a taller variety of spergula,[556] but botanists are not agreed with them in finding in it sufficient characteristics of a distinct species, and some do not even make it a variety.

Guinea Grass—*Panicum maximum*, Jacquin.[557]

This perennial grass has a great reputation in countries lying between the tropics as a nutritious fodder, easy of cultivation. With a little care a meadow of guinea grass will last for twenty years.[558]

Its cultivation appears to have begun in the West Indies. P. Browne speaks of it in his work on Jamaica, published in the middle of the last century, and it is subsequently mentioned by Swartz.

The former mentions the name guinea grass, without any remarks on the original home of the species. The latter says, “formerly brought from the coast of Africa to the Antilles.” He probably trusted to the indication given by the common name; but we know how fallacious such indications of origin sometimes are. Witness the so-called Turkey wheat, which comes from America.

Swartz, who is an excellent botanist, says that the plant grows in the dry cultivated pastures of the West Indies, where it is also wild, which may imply that it has become naturalized in places where it was formerly cultivated. I cannot find it anywhere asserted that it is really wild in the West Indies. It is otherwise in Brazil. From data collected by de Martius and studied by Nees,[559] data afterwards increased and more carefully studied by Dœll,[560] *Panicum maximum* grows in the clearings of the forests of the Amazon valley, near Santarem, in the provinces of Balria, Ceara, Rio de Janeiro, and Saint Paul. Although the plant is often cultivated in these countries, the localities given, by their number and nature, prove that it is indigenous. Dœll has also seen specimens from French Guiana and New Granada.

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[551] Piddington, *Index*.

[552] Sobolewski, *Fl. Petrop.*, p. 109.

[553] Rafn, *Danmarks Flora*, ii. p. 799.

[554] Wahlenberg, quoted by Moritzi, *Dict. MS.; Svensk Botanik*, t. 308.

[555] Bauhin, *Hist. Plant.*, iii. p. 722.

[556] *Spergula Maxima*, Böninghausen, an illustration published in Reichenbach’s *Plantæ Crit.*, vi. p. 513.

[557] *Panicum maximum*, Jacq., Coll. 1, p. 71 (1786); Jacq., *Icones* 1, t. 13; Swartz, *Fl. Indiæ Occ.*, vii. p. 170; *P. polygamum*, Swartz, *Prodr.*, p. 24 (1788); *P. jumentorum*, Persoon Ench., i. p. 83 (1805); *P. altissimum* of some gardens and modern authors. According to the rule, the oldest name should be adopted.

[558] In Dominica according to Imray, in the *Kew Report* for 1879, p. 16.

[559] Nees, in Martius, *Fl. Brasil.*, in 8vo, vol. ii. p. 166.

[560] Dœll, in *Fl. Brasil.*, in fol., vol. ii. part 2.

With respect to Africa, Sir William Hooker[561] mentioned specimens brought from Sierra Leone, from Aguapim, from the banks of the Quorra, and from the Island of St. Thomas, in Western Africa. Nees[562] indicates the species in several districts of Cape Colony, even in the bush and in mountainous country. Richard[563] mentions places in Abyssinia, which also seem to be beyond the limits of cultivation, but he owns to being not very sure of the species. Anderson, on the contrary, positively asserts that *Panicum maximum* was brought from the banks of the Mozambique and of the Zambesi rivers by the traveller Peters.[564]

The species is known to have been introduced into Mauritius by the Governour Labourdonnais,[565] and to have become naturalized from cultivation as in Rodriguez and the Seychelles Isles. Its introduction into Asia must be recent, for Roxburgh and Miquel do not mention the species. In Ceylon it is only cultivated.[566]

On the whole, it seems to me that the probabilities are in favour of an African origin, as its name indicates, and this is confirmed by the general, but insufficiently grounded opinion of authors.[567] However, as the plant spreads so rapidly, it is strange that it has not reached Egypt from the Mozambique or Abyssinia, and that it was introduced so late into the islands to the east of Africa. If the co-existence of phanerogamous species in Africa and America previous to cultivation were not extremely rare, it might be inferred in this case; but this is unlikely in the case of a cultivated plant of which the diffusion is evidently very easy.

Article III.—Various Uses of the Stem and Leaves

Tea—*Thea sinensis*, Linnæus.

In the middle of the eighteenth century, when the shrub which produces tea was still very little known, Linnæus gave it the name of *Thea sinensis*. Soon afterwards, in the second edition of the *Species Plantarum*, he judged it better to distinguish two species, *Thea bohea* and *Thea viridis*, which he believed to correspond to the commercial distinction between black and green teas. It has since been proved that there is but one species, comprehending several varieties, from all of which either black or green tea may be obtained according to the process of manufacture. This question was settled, when another was raised, as to whether *Thea* really forms a genus by itself distinct from the genus *Camellia*. Some authors make *Thea* a section of the old genus *Camellia*; but from the characters indicated with great precision by Seemann,[568] it seems to me that we are justified in retaining the genus *Thea*, together with the old nomenclature of the principal species.

A Japanese legend, related by Kæmpfer,[569] is often quoted. A priest who came from India into China in A.D. 519, having succumbed to sleep when he had wished to watch and pray, in a movement of anger cut off his two eyelids, which were changed into a shrub, the tea tree, whose leaves are eminently calculated to prevent sleep. Unfortunately for those people who readily admit legends in whole or in part, the Chinese have never heard of this story, although the event is said to have taken place in their country. Tea was known to them long before 519, and probably it was not brought from India. This is what Bretschneider tells us in his little work, rich in botanical and philological facts.[570]

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[561] Sir W. Hooker, *Niger Fl.*, p. 560.

[562] Nees, *Florœ Africœ Austr. Gramineœ*, p. 36.

[563] A. Richard, *Abyssinie*, ii. p. 373.

[564] Peters, *Reise Botanik*, p. 546.

[565] Bojer, *Hortus Maurit.*, p. 565.

[566] Baker, *Fl. of Mauritius and Seychelles*, p. 436.

[567] Thwaites, *Enum. Pl. Zeylaniæ.*

[568] Seemann, *Tr. of the Linnæan Society*, xxii. p. 337, pl. 61.

[569] Kæmpfer, *Amœn. Japon.*

[570] Bretschneider, *On the Study and Value of Chin. Bot. Works*, pp. 13 and 45.

The *Pentsao*, he says, mentions tea 2700 B.C., the *Rye* 300 or 600 B.C.; and the commentator of the latter work, in the fourth century of our era, gave details about the plant and about the infusion of the leaves. Its use is, therefore, of very ancient date in China. It is perhaps more recent in Japan, and if it has been long known in Cochin-China, it is possible, but not proved, that it formerly spread thither from India; authors cite no Sanskrit name, nor even any name in modern Indian languages. This fact will appear strange when contrasted with what we have to say on the natural habitat of the species.

The seeds of the tea-plant often sow themselves beyond the limits of cultivation, thereby inspiring doubt among botanists as to the wild nature of plants encountered here and there. Thunberg believed the species to be wild in Japan, but Franchet and Savatier[571] absolutely deny this. Fortune,[572] who has so carefully examined the cultivation of tea in China, does not speak of the wild plant. Fontanier[573] says that the tea-plant grows wild abundantly in Mantschuria. It is probable that it exists in the mountainous districts of South-eastern China, where naturalists have not yet penetrated. Loureiro says that it is found both "cultivated and uncultivated" in Cochin-China.[574] What is more certain is, that English travellers gathered specimens in Upper Assam[575] and in the province of Cachar.[576] So that the tea-plant must be wild in the mountainous region which separates the plains of India from those of China, but the use of the leaves was not formerly known in India.

The cultivation of tea, now introduced into several colonies, has produced admirable results in Assam. Not only is the product of a superior quality to that of average Chinese teas, but the quantity obtained increases rapidly. In 1870, three million pounds of tea were produced in British India; in 1878, thirty-seven million pounds; and in 1880, a harvest of seventy million pounds was looked for.[577] Tea will not bear frost, and suffers from drought. As I have elsewhere stated,[578] the conditions which favour it are the opposite to those which suit the vine. On the other hand, it has been observed that tea flourishes in Azores, where good wine is made;[579] but it is possible to cultivate in gardens, or on a small scale, many plants which will not be profitable on a large scale. The vine grows in China, yet the manufacture of wine is unimportant. Conversely, no wine-growing country grows tea for exportation. After China, Japan, and Assam, it is in Java, Ceylon, and Brazil that tea is most largely grown, where, certainly, the vine is little cultivated, or not at all; while the wines of dry regions, such as Australia and the Cape, are already known in the market.

Flax—*Linum usitatissimum*, Linnæus.

The question as to the origin of flax, or rather of the cultivated flax, is one of those which give rise to most interesting researches.

In order to understand the difficulties which it presents, we must first ascertain what nearly allied forms authors designate – sometimes as distinct species of the genus *Linum*, and sometimes as varieties of a single species.

The first important work on this subject was by Planchon, in 1848.[580] He clearly showed the differences between *Linum usitatissimum*, *L. humile*, and *L. angustifolium*, which were little known. Afterwards Heer,[581] when making profound researches into ancient cultivation, went again into the characters indicated, and by adding the study of two intermediate forms, as well as the comparison of

[571] Franchet and Savatier, *Enum. Pl. Jap.*, i. p. 61.

[572] Fortune, *Three Years' Wandering in China*, 1 vol. in 8vo

[573] Fontanier, *Bulletin Soc. d'Acclim.*, 1870, p. 88.

[574] Loureiro, *Fl. Cochin.*, p. 414.

[575] Griffith, *Reports*; Wallich, quoted by Hooker, *Fl. Brit. India*, i. p. 293.

[576] Anderson, quoted by Hooker.

[577] *The Colonies and India, Gardener's Chronicle*, 1880, i. p. 659.

[578] Speech at the Bot. Cong. of London in 1866.

[579] *Flora*, 1868, p. 64.

[580] Planchon, in Hooker, *Journal of Botany*, vol. vii. p. 165.

[581] Heer, *Die Pflanzen der Pfahlbauten*, in 4to, Zürich, 1865, p. 35; *Ueber den Flachs und die Flachskultur*, in 4to, Zürich, 1872.

a great number of specimens, he arrived at the conclusion that there was a single species, composed of several slightly different forms. I give a translation of his Latin summary of the characters, only adding a name for each distinct form, in accordance with the custom of botanical works.

Linum usitatissimum.

1. *Annuum* (annual). Root annual; stem single, upright; capsules 7 to 8 mm. long; seeds 4 to 6 mm., terminating in a point. α. *Vulgare* (common). Capsules 7 mm., not opening when ripe, and displaying glabrous partitions. German names, *Schliesslein*, *Dreschlein*. β. *Humile* (low). Capsules 8 mm., opening suddenly when ripe; the partitions hairy. *Linum humile*, Miller; *L. crepitans*, Böninghausen. German names, *Klanglein*, *Springlein*.

2. *Hyemale* (winter). Root annual or biennial; stems numerous, spreading at the base, and bent; capsules 7 mm., terminating in a point. *Linum hyemale romanum.* In German, *Winterlein*.

3. *Ambiguum* (doubtful). Root annual or perennial; stems numerous, leaves acuminate; capsules 7 mm., with partitions nearly free from hairs; seeds 4 mm., ending in a short point. *Linum ambiguum*, Jordan.

4. *Angustifolium* (narrow-leaved). Root annual or perennial; stems numerous, spreading at the base, and bent; capsules 6 mm., with hairy partitions; seeds 3 mm., slightly hooked at the top. *Linum angustifolium.*

It may be seen how easily one form passes into another. The quality of annual, biennial, or perennial, which Heer suspected to be uncertain, is vague, especially for the *angustifolium*; for Loret, who has observed this flax in the neighbourhood of Montpellier, says,[582] "In very hot countries it is nearly always an annual, and this is the case in Sicily according to Gussone; with us it is annual, biennial, or perennial, according to the nature of the soil in which it grows; and this may be ascertained by observing it on the shore, notably at Maguelone. There it may be seen that along the borders of trodden paths it lasts longer than on the sand, where the sun soon dries up the roots and the acidity of the soil prevents the plant from enduring more than a year."

When forms and physiological conditions pass from one into another, and are distinguished by characters which vary according to circumstances, we are led to consider the individuals as constituting a single species, although these forms and conditions possess a certain degree of heredity, and date perhaps from very early times. We are, however, forced to consider them separately in our researches into their origin. I shall first indicate in what country each variety has been discovered in a wild or half-wild state. I shall then speak of cultivation, and we shall see how far geographical and historical facts confirm the opinion of the unity of species.

The *common annual flax* has not yet been discovered, with absolute certainty, in a wild state. I possess several specimens of it from India, and Planchon saw others in the herbarium at Kew; but Anglo-Indian botanists do not admit that the plant is indigenous in British India. The recent flora of Sir Joseph Hooker speaks of it as a species cultivated principally for the oil extracted from the seeds; and Mr. C. B. Clarke, formerly director of the botanical gardens in Calcutta, writes to me that the specimens must have been cultivated, its cultivation being very common in winter in the north of India. Boissier[583] mentions *L. humile*, with narrow leaves, which Kotschy gathered "near Schiraz in Persia, at the foot of the mountain called Sabst Buchom." This is, perhaps, a spot far removed from cultivation; but I cannot give satisfactory information on this head. Hohenacker found *L. usitatissimum* "half wild" in the province of *Talysch*, to the south of the Caucasus, towards the Caspian Sea.[584] Steven is more positive with regard to Southern Russia.[585] According to him, it "is found pretty often on the barren hills to the south of the Crimea, between Jalta and Nikita; and Nordmann found it on

[582] Loret, *Observations Critiques sur Plusieurs Plantes Montpelliéraines*, in the *Revue des Sc. Nat.*, 1875.

[583] Boissier, *Flora Orient.*, i. p. 851. It is *L. usitatissimum* of Kotschy, No. 164.

[584] Boissier, *ibid.*; Hohenh., *Enum. Talysch.*, p. 168.

[585] Steven, *Verzeichniss der auf der taurischen Halbinseln wildwachsenden Pflanzen*, Moscow, 1857, p. 91.

the eastern coast of the Black Sea." Advancing westward in Southern Russia, or in the region of the Mediterranean, the species is but rarely mentioned, and only as escaped from cultivation, or half wild. In spite of doubts and of the scanty data which we possess, I think it very possible that the annual flax, in one or other of these two forms, may be wild in the district between the south of Persia and the Crimea, at least in a few localities.

The *winter flax* is only known under cultivation in a few provinces of Italy.[586]

The *Linum ambiguum* of Jordan grows on the coast of Provence and of Languedoc in dry places.[587]

Lastly, *Linum angustifolium*, which hardly differs from the preceding, has a well-defined and rather large area. It grows wild, especially on hills throughout the region of which the Mediterranean forms the centre; that is, in the Canaries and Madeira, in Marocco,[588] Algeria,[589] and as far as the Cyrenaic;[590] from the south of Europe, as far as England,[591] the Alps, and the Balkan Mountains; and lastly, in Asia from the south of the Caucasus[592] to Lebanon and Palestine.[593] I do not find it mentioned in the Crimea, nor beyond the Caspian Sea.

Let us now turn to the cultivation of flax, destined in most instances to furnish a textile substance, often also to yield oil, and cultivated among certain peoples for the nutritious properties of the seed. I first studied the question of its origin in 1855,[594] and with the following result: —

It was abundantly shown that the ancient Egyptians and the Hebrews made use of linen stuffs. Herodotus affirms this. Moreover, the plant may be seen figured in the ancient Egyptian drawings, and the microscope indubitably shows that the bandages which bind the mummies are of linen.[595] The culture of flax is of ancient date in Europe; it was known to the Kelts, and in India according to history. Lastly, the widely different common names indicate likewise an ancient cultivation or long use in different countries. The Keltic name *lin*, and Greco-Latin *linon* or *linum*, has no analogy with the Hebrew *pischta*,[596] nor with the Sanskrit names *ooma*, *atasi*, *utasi*.[597] A few botanists mention the flax as "nearly wild" in the south-east of Russia, to the south of the Caucasus and to the east of Siberia, but it was not known to be truly wild. I then summed up the probabilities, saying, "The varying etymology of the names, the antiquity of cultivation in Egypt, in Europe, and in the north of India, the circumstance that in the latter district flax is cultivated for the yield of oil alone, lead me to believe that two or three species of different origin, confounded by most authors under the name of *Linum usitatissimum*, were formerly cultivated in different countries, without imitation or communication the one with the other… I am very doubtful whether the species cultivated by the ancient Egyptians was the species indigenous in Russia and in Siberia."

My conjectures were confirmed ten years later by a very curious discovery made by Oswald Heer. The lake-dwellers of Eastern Switzerland, at a time when they only used stone implements, and did not know the use of hemp, cultivated and wove a flax which is not our common annual

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[586] Heer, *Ueb. d. Flachs*, pp. 17 and 22.

[587] Jordan, quoted by Walpers, *Annal.*, vol. ii., and by Heer, p. 22.

[588] Ball, *Spicilegium Fl. Marocc.*, p. 380.

[589] Munby, *Catal.*, edit. 2, p. 7.

[590] Rohlf, according to Cosson, *Bulle. Soc. Bot. de Fr.*, 1875, p. 46.

[591] Planchon, in Hooker's *Journal of Botany*, vol. 7; Bentham, *Handbk. of Brit. Flora*, edit. 4, p. 89.

[592] Planchon, *ibid.*

[593] Boissier, *Fl. Or.*, i. p. 861.

[594] A. de Candolle, *Géogr. Bot. Rais.*, p. 833.

[595] Thomson, *Annals of Philosophy, June, 1834*; Dutrochet, Larrey, and Costaz, *Comptes rendus de l'Acad. des. Sc.*, Paris, 1837, sem. i. p. 739; Unger, *Bot. Streifzüge*, iv. p. 62.

[596] Other Hebrew words are interpreted "flax," but this is the most certain. See Hamilton, *La Botanique de la Bible*, Nice, 1871, p. 58.

[597] Piddington, *Index Ind. Plants*; Roxburgh, *Fl. Ind.*, edit. 1832, ii. p. 110. The name *matusi* indicated by Piddington belongs to other plants, according to Ad. Pictet, *Origines Indo-Euro.*, edit. 2, vol. i. p. 396.

flax, but the perennial flax called *Linum angustifolium*, which is wild south of the Alps. This is shown by the examination of the capsules, seeds, and especially of the lower part of a plant carefully extracted from the sediment at Robenhausen.[598] The illustration published by Heer shows distinctly a root surmounted by from two to four stems after the manner of perennial plants. The stems had been cut, whereas our common flax is plucked up by the roots, another proof of the persistent nature of the plant. With the remains of the Robenhausen flax some grains of *Silene cretica* were found, a species which is also foreign to Switzerland, and abundant in Italy in the fields of flax.[599] Hence Heer concluded that the Swiss lake-dwellers imported the seeds of the Italian flax. This was apparently the case, unless we suppose that the climate of Switzerland at that time differed from that of our own epoch, for the perennial flax would not at the present day survive the winters of Eastern Switzerland.[600] Heer's opinion is supported by the surprising fact that flax has not been found among the remains of the lake-dwellings of Laybach and Mondsee of the Austrian States, where bronze has been discovered.[601] The late epoch of the introduction of flax into this region excludes the hypothesis that the inhabitants of Switzerland received it from Eastern Europe, from which, moreover, they were separated by immense forests.

Since the ingenious observations of the Zurich *savant*, a flax has been discovered which was employed by the prehistoric inhabitants of the peat-mosses of Lagozza, in Lombardy; and Sordelli has shown that it was the same as that of Robenhausen, *L. angustifolium*.[602] This ancient people was ignorant of the use of hemp and of metals, but they possessed the same cereals as the Swiss lake-dwellers of the stone age, and ate like them the acorns of *Quercus robur*, var. *sessiliflora*. There was, therefore, a civilization which had reached a certain development on both sides of the Alps, before metals, even bronze, were in common use, and before hemp and the domestic fowl were known.[603] It was probably before the arrival of the Aryans in Europe, or soon after that event.[604]

The common names of the flax in ancient European languages may throw some light on this question.

The name *lin*, *llin*, *linu*, *linon*, *linum*, *lein*, *lan*, exists in all the European languages of Aryan origin of the centre and south of Europe, Keltic, Slavonic, Greek, or Latin. This name is, however, not common to the Aryan languages of India; consequently, as Pictet[605] justly says, the cultivation must have been begun by the western Aryans, and before their arrival in Europe. Another idea occurred to me which led me into further researches, but they were unproductive. I thought that, since this flax was cultivated by the lake-dwellers of Switzerland and Italy before the arrival of the Aryan peoples, it was probably also grown by the Iberians, who then occupied Spain and Gaul; and perhaps some special name for it has remained among the Basques, the supposed descendants of the Iberians. Now, according to several dictionaries of their language,[606] *liho*, *lino*, or *li*, according to the dialects, signifies flax, which agrees with the name diffused throughout Southern Europe. The Basques seem, therefore,

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[598] Heer, *Die Pflanzen der Pfahlbauten*, 8vo pamphlet, Zürich, 1865, p. 35; *Ueber den Flachs und die Flachskultur in Alterthum*, pamphlet in 8vo, Zürich, 1872.

[599] Bertoloni, *Fl. Ital.*, iv. p. 612.

[600] We have seen that flax is found towards the north-west of Europe, but not immediately north of the Alps. Perhaps the climate of Switzerland was formerly more equable than it is now, with more snow to shelter perennial plants.

[601] *Mittheil. Anthropol. Gesellschaft*, Wien, vol. vi. pp. 122, 161; *Abhandl., Wien Akad.*, 84, p. 488.

[602] Sordelli, *Sulle piante della torbiera e della stazione preistorica della Lagozza*, pp. 37, 51, printed at the conclusion of Castelfranco's *Notizie alla stazione lacustre della Lagozza*, in 8vo, *Atti della Soc. Ital. Sc. Nat.*, 1880.

[603] The fowl was introduced into Greece from Asia in the sixth century before Christ, according to Heer, *Ueb. d. Flachs*, p. 25.

[604] These discoveries in the peat-mosses of Lagozza and elsewhere in Italy show how far Hehn was mistaken in supposing that (*Kulturpfl.*, edit. 3, 1877, p. 524) the Swiss lake-dwellers were near the time of Cæsar. The men of the same civilization as they to the south of the Alps were evidently more ancient than the Roman republic, perhaps than the Ligurians.

[605] Ad. Pictet, *Origines Indo-Europ.*, edit. 2, vol. i. p. 396.

[606] Van Eys, *Dict. Basque-Français*, 1876; Gèze, *Eléments de Grammaire Basque suivis d'un vocabulaire*, Bayonne, 1873; Salaberry, *Mots Basques Navarrais*, Bayonne, 1856; l'Ecluse, *Vocab. Franç. – Basque*, 1826.

to have received flax from peoples of Aryan origin, or perhaps they have lost the ancient name and substituted that of the Kelts and Romans. The name *flachs* or *flax* of the Teutonic languages comes from the Old German *flahs*. There are also special names in the north-west of Europe —*pellawa*, *aiwina*, in Finnish;[607] *hor*, *härr*, *hor*, in Danish;[608] *hor* and *tone* in ancient Gothic.[609] *Haar* exists in the German of Salzburg.[610] This word may be in the ordinary sense of the German for thread or hair, as the name *li* may be connected with the same root as *ligare*, to bind, and as *hör*, in the plural *hörvar*, is connected by philologists[611] with *harva*, the German root for *Flachs*; but it is, nevertheless, a fact that in Scandinavian countries and in Finland terms have been used which differ from those employed throughout the south of Europe. This variety shows the antiquity of the cultivation, and agrees with the fact that the lake-dwellers of Switzerland and Italy cultivated a species of flax before the first invasion of the Aryans. It is possible, I might even say probable, that the latter imported the name *li* rather than the plant or its cultivation; but as there is no wild flax in the north of Europe, an ancient people, the Finns, of Turanian origin, introduced the flax into the north before the Aryans. In this case they must have cultivated the annual flax, for the perennial variety will not bear the severity of the northern winters; while we know how favourable the climate of Riga is in summer to the cultivation of the annual flax. Its first introduction into Gaul, Switzerland, and Italy may have been from the south, by the Iberians, and in Finland by the Finns; and the Aryans may have afterwards diffused those names which were commonest among themselves – that of *linum* in the south, and of *flahs* in the north. Perhaps the Aryans and Finns had brought the annual flax from Asia, which would soon have been substituted for the perennial variety, which is less productive and less adapted to cold countries. It is not known precisely at what epoch the cultivation of the annual flax in Italy took the place of that of the perennial *linum angustifolium*, but it must have been before the Christian era; for Latin authors speak of a well-established cultivation, and Pliny says that the flax was sown in spring and rooted up in the summer.[612] Metal implements were not then wanting, and therefore the flax would have been cut if it had been perennial. Moreover, the latter, if sown in spring, would not have ripened till autumn.

For the same reasons the flax cultivated by the ancient Egyptians must have been an annual. Hitherto neither entire plants nor a great number of capsules have been found in the catacombs of a nature to furnish direct and incontestable proof. Unger[613] alone was able to examine a capsule taken from the bricks of a monument, which Leipsius attributes to the thirteenth or fourteenth century before Christ, and he found it more like those of *L. usitatissimum* than of *L. angustifolium*. Out of three seeds which Braun[614] saw in the Berlin Museum, mixed with those of other cultivated plants, one appeared to him to belong to *L. angustifolium*, and the other to *L. humile*; but it must be owned that a single seed without plant or capsule is not sufficient proof. Ancient Egyptian paintings show that flax was not reaped with a sickle like cereals, but uprooted.[615] In Egypt flax is cultivated in the winter, for the summer drought would no more allow of a perennial variety, than the cold of northern countries, where it is sown in spring, to be gathered in in summer. It may be added that the annual

[607] Nemnich, *Poly. Lex. d. Naturgesch.*, ii. p. 420; Rafn, *Danmark Flora*, ii. p. 390.

[608] Nemnich, *ibid.*

[609] *Ibid.*

[610] *Ibid.*

[611] Fick, *Vergl. Worterbuch. Ind. Germ.*, 2nd edit., i. p. 722. He also derives the name *Lina* from the Latin *linum*; but this name is of earlier date, being common to several European Aryan languages.

[612] Pliny, bk. xix. c. 1: *Vere satum æstate vellitur*.

[613] Unger, *Botanische Streifzüge*, 1866, No. 7, p. 15.

[614] A. Braun, *Die Pflanzenreste des Ægyptischen Museums in Berlin*, in 8vo, 1877, p. 4.

[615] Rosellini, pls. 35 and 36, quoted by Unger, *Bot. Streifzüge*, No. 4, p. 62.

flax of the variety called *humile* is the only one now grown in Abyssinia, and also the only one that modern collectors have seen in Egypt.[616]

Heer suggests that the ancient Egyptians may have cultivated *L. angustifolium* of the Mediterranean region, sowing it as an annual plant.[617] I am more inclined to believe that they had previously imported or received their flax from Egypt, already in the form of the species *L. humile*. Their modes of cultivation, and the figures on the monuments, show that their knowledge of the plant dated from a remote antiquity. Now it is known that the Egyptians of the first dynasties before Cheops belonged to a proto-semitic race, which came into Egypt by the isthmus of Suez.[618] Flax has been found in a tomb of ancient Chaldea prior to the existence of Babylon,[619] and its use in this region is lost in the remotest antiquity. Thus the first Egyptians of white race may have imported the cultivated flax, or their immediate successors may have received it from Asia before the epoch of the Phœnician colonies in Greece, and before direct communication was established between Greece and Egypt under the fourteenth dynasty.[620]

A very early introduction of the plant into Egypt from Asia does not prevent us from admitting that it was at different times taken from the East to the West at a later epoch than that of the first Egyptian dynasties. Thus the western Aryans and the Phœnicians may have introduced into Europe a flax more advantageous than *L. angustifolium* during the period from 2500 to 1200 years before our era.

The cultivation of the plant by the Aryans must have extended further north than that by the Phœnicians. In Greece, at the time of the Trojan war, fine linen stuffs were still imported from Colchis; that is to say, from that region at the foot of the Caucasus where the common annual flax has been found wild in modern times. It does not appear that the Greeks cultivated the plant at that epoch.[621] The Aryans had perhaps already introduced its cultivation into the valley of the Danube. However, I noticed just now that the lacustrine remains of Mondsee and Laybach show no trace of any flax. In the last centuries before the Christian era the Romans procured very fine linen from Spain, although the names of the plant in that country do not tend to show that the Phœnicians introduced it. There is not any Oriental name existing in Europe belonging either to antiquity or to the Middle Ages. The Arabic name *kattan*, *kettane*, or *kittane*, of Persian origin,[622] has spread westward only among the Kabyles of Algeria.[623]

The sum of facts and probabilities appear to me to lead to the following statements, which may be accepted until they are modified by further discoveries.

1. *Linum angustifolium*, usually perennial, rarely biennial or annual, which is found wild from the Canary Isles to Palestine and the Caucasus, was cultivated in Switzerland and the north of Italy by peoples more ancient than the conquerors of Aryan race. Its cultivation was replaced by that of the annual flax.

2. The annual flax (*L. usitatissimum*), cultivated for at least four thousand or five thousand years in Mesopotamia, Assyria, and Egypt, was and still is wild in the districts included between the Persian Gulf, the Caspian Sea, and the Black Sea.

3. This annual flax appears to have been introduced into the north of Europe by the Finns (of Turanian race), afterwards into the rest of Europe by the western Aryans, and perhaps here and

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[616] W. Schimper, Ascherson, Boissier, Schweinfurth, quoted by Braun.

[617] Heer, *Ueb. d. Flachs*, p. 26.

[618] Maspero, *Histoire Ancienne des Peuples de l'Orient.*, edit. 3, Paris, 1878, p. 13.

[619] *Journal of the Royal Asiat. Soc.*, vol. xv. p. 271, quoted by Heer, *Ueb. den Fl.*

[620] Maspero, p. 213.

[621] The Greek texts are quoted in Lenz, *Bot. der Alt. Gr. und Röm.*, p. 672; and in Hehn, *Culturpfl. und Hausthiere*, edit. 3, p. 144.

[622] Ad. Pictet, *Origines Indo-Europ.*

[623] *Dictionnaire Franç. – Berbère*, 1 vol. in 8vo, 1844.

there by the Phœnicians; lastly into Hindustan by the eastern Aryans, after their separation from the European Aryans.

4. These two principal forms or conditions of flax exist in cultivation, and have probably been wild in their modern areas for the last five thousand years at least. It is not possible to guess at their previous condition. Their transitions and varieties are so numerous that they may be considered as one species comprising two or three hereditary varieties, which are each again divided into subvarieties.

Jute—*Corchorus capsularis* and *Corchorus olitorius*, Linnæus.

The fibres of the jute, imported in great quantities in the last few years, especially into England, are taken from the stem of these two species of Corchorus, annuals of the family of the Tiliaceæ. The leaves are also used as a vegetable.

C. capsularis has a nearly spherical fruit, flattened at the top, and surrounded by longitudinal ridges. There is a good coloured illustration of it in the work of the younger Jacquin, *Eclogæ*, pl. 119. *C. olitorius*, on the contrary, has a long fruit, like the pod of a Crucifer. It is figured in the *Botanical Magazine*, fig. 2810, and in Lamarck, fig. 478.

The species of the genus are distributed nearly equally in the warm regions of Asia, Africa, and America; consequently the origin of each cannot be guessed. It must be sought in floras and herbaria, with the help of historical and other data.

Corchorus capsularis is commonly cultivated in the Sunda Islands, in Ceylon, in the peninsula of Hindustan, in Bengal, in Southern China, in the Philippine Islands,[624] generally in Southern Asia. Forster does not mention it in his work on the plants in use among the inhabitants of the Pacific, whence it may be inferred that at the time of Cook's voyages, a century ago, its cultivation had not spread in that direction. It may even be suspected from this fact that it does not date from a very remote epoch in the isles of the Indian Archipelago.

Blume says that *Corchorus capsularis* grows in the marshes of Java near Parang,[625] and I have two specimens from Java which are not given as cultivated.[626] Thwaites mentions it as "very common" in Ceylon.[627]

On the continent of Asia, authors speak more of it as a plant cultivated in Bengal and China. Wight, who gives a good illustration of the plant, does not mention its native place. Edgeworth,[628] who has studied on the spot the flora of the district of Banda, says that it is found in "the fields." In the *Flora of British India*, Masters, who drew up the article on the Tiliaceæ from the herbarium at Kew, says "in the hottest regions of India, cultivated in most tropical countries."[629] I have a specimen from Bengal which is not given as cultivated. Loureiro says "wild, and cultivated in the province of Canton in China,"[630] which probably means wild in Cochin-China, and cultivated in Canton. In Japan the plant grows in cultivated soil.[631] In conclusion, I am not convinced that the species exists in a truly wild state north of Calcutta, although it may perhaps have spread from cultivation and have sown itself here and there.

C. capsularis has been introduced into various parts of tropical Africa and even of America, but it is only cultivated on a large scale for the production of jute thread in Southern Asia, and especially in Bengal.

C. olitorius is more used as a vegetable than for its fibres. Out of Asia it is employed exclusively for the leaves. It is one of the commonest of culinary plants among the modern Egyptians and Syrians,

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[624] Rumphius, *Amboin*, vol. v. p. 212; Roxburgh, *Fl. Ind.*, ii. p. 581; Loureiro, *Fl. Cochinchine*, vi. p. 408.

[625] Blume, *Bijdragen*, i. p. 110.

[626] Zollinger, Nos. 1698 and 2761.

[627] Thwaites, *Enum. Pl. Zeylan.*, p. 31.

[628] Edgeworth, *Linnæan Soc. Journ.*, ix.

[629] Masters, in Hooker's *Fl. Brit. Ind.*, i. p. 397.

[630] Loureiro, *Fl. Cochin.*, i. p. 408.

[631] Franchet and Savatier, *Enum.*, i. p. 66.

who call it in Arabic *melokych*, but it is not likely that they had any knowledge of it in ancient times, as we know of no Hebrew name.[632] The present inhabitants of Crete cultivate it under the name of *mouchlia*,[633] evidently derived from the Arabic, and the ancient Greeks were not acquainted with it.

According to several authors[634] this species of Corchorus is wild in several provinces of British India. Thwaites says it is common in the hot districts of Ceylon; but in Java, Blume only mentions it as growing among rubbish (*in ruderatis*). I cannot find it mentioned in Cochin-China or Japan. Boissier saw specimens from Mesopotamia, Afghanistan, Syria, and Anatolia, but gives as a general indication, "culta, et in ruderatis subspontanea." No Sanskrit name for the two cultivated species of Corchorus is known.[635]

[632] Rosenmüller, *Bibl. Naturgesch.*

[633] Von Heldreich, *Die Nützpfl. Griechenl.*, p. 53.

[634] Masters, in Hooker's *Fl. Brit. Ind.*, i. p. 397; Aitchison, *Catal. Punjab*, p. 23; Roxburgh, *Fl. Ind.*, ii. p. 581.

[635] Piddington, *Index*.

Конец ознакомительного фрагмента.