On some Tuberiform Vegetable Productions from China.

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SOME months since I received, by the kindness of Professor Horaninow, two tuberiform productions from China, of which one was nearly allied to *Mytilis australis*, Berk., and the other, marked *Pachyma Coniferarum*, Horaninow, was evidently identical with the Tuckahoe or Indian Bread of the United States, *Pachyma Cocos*, Fries.

At a later period, specimens of a drug, known in China under the name of Pe-foo-ling, were shown by Mr. Daniel Hanbury to Mr. Kippist, who at once pointed out their identity with *Lycopodon solidum* of the 'Flora Virginica,' *Pachyma Cocos*, Fries.

The subject was brought to my especial notice by Dr. Hooker; and having ascertained the identity of the productions of Mr. Hanbury and Prof. Horaninow, I thought that a short note on it might possibly be acceptable to the Society; and the more so, as Mr. Hanbury has a second production very nearly allied, while I am in possession of a third very distinct though allied substance, through Prof. Horaninow.

The best introduction to my note will be an extract from a letter received by me from Mr. Hanbury:—

"There are *two* Chinese esculent *Fungi*, which I think are worthy of notice. My attention was first drawn to them while examining some specimens of Chinese Materia Medica, by stumbling on the following passage in Loureiro's 'Flora Cochinchinensis' (ed. Willd. 1793, p. 710):—

" 'Ad radices Pinorum sylvestrium magnæ longævitatatis in provincia boreali Chinensi *Su chuyen* gigni solent quædam tubera, subrotunda, magna, scabra, fusca, intus albissima, quæ ab Europæis vocantur *Radix Sinensis alba*, a Cochinchinensibus *Bach phuc linh*, ab ipsis vero Sinensibus *Pě fû lín*. Horum tuberum decocto feliciter utuntur in praxi medica, præcipue in morbis pulmonum et vesicæ.

" 'Radix Sinensis rubra provenit ex diversa planta, quæ a Linnaeo dicitur *Smilax China*.'

"Nor was my curiosity diminished by finding in Endlicher's 'Enchiridion Botanicum' (p. 144) the following allusion to the same subject:—

" 'In annosis *Pinus Massonianæ* Lamb. radicibus apud Sinas gigni solent tubera (vulgo *Pe-fu-lín*, Radix Sinensis alba) magna,

subrotunda, extus scabra, fusca, intus albida, insipida, tactu cerasca, quorum decocto in morbis pulmonum et vesicæ utuntur.'

"I therefore wrote to my brother Thomas Hanbury of Shanghai, who obtained for me not only the substance called *Pe-foo-ling*, but a second, known as *Choo-ling*, together with some cakes said to be made from one or both of them. These cakes, or an imitation of them, are commonly sold in the streets of Shanghai; and the cry of the itinerant vendors—*À Hoo Ka Foo-ling Ka!*—is one of the first of the many strange sounds to salute the ear of the newly-arrived foreigner.

"With respect to the *Foo-ling* itself, my first impression was to regard it as the rhizome of some species of *Smilax*, allied to *S. China*, L., the source of the drug known as *China Root*. Such was the opinion of the older writers, as Martini, who, in his '*Novus Atlas Sinensis*' (1655), describes it as being the *true China Root*. Cleyer also, in his '*Specimen Medicinæ Sinicæ*' (1682), says of it*, 'Est idem quod Lusitanice dicitur Pao de China, nisi quod album et multo melius sit rubeo illo, et etiam carius multo.'

"I had soon, however, to alter my opinion on testing a decoction of the *Foo-ling* with iodine and finding it to contain no starch, the abundant presence of that body being a marked character of the *Smilax* rhizome. I found also, upon turning to the '*Herbarium Amboinense*' (xi. 123), where Rumphius describes it as *Hoelen*, that its distinctness from *China Root* had been there noticed. Mr. Kippist, however, soon settled the question, by pointing out to me in the '*Linnean Transactions*†' a paper by Dr. James Macbride, of South Carolina, entitled "*Some account of the Lycoperdon solidum of the Flora Virginica,*" read before the Society 3rd June, 1817; and at the same time laying before me a fine series of specimens of *Lycoperdon solidum*, with which plant it was evident the Chinese *Pe-foo-ling* was, if not identical, at least very nearly related.

"Of the *Choo-ling*, I have nothing to tell you, except that, in common with the *Pe-foo-ling*, it is described and figured in the great Chinese Herbal, the *Pun-tsaou*."

Mr. Hanbury has, in addition to these remarks, furnished me with a translation of that portion of the '*Pun-tsaou*' which relates to these productions, which I have the pleasure of now laying before the Society‡.

* *Medicamenta simplicia*, No. 189.

† Vol. xii. p. 368.

‡ *Fuh-ling* and *Choo-ling*.—Abstract of the account given in the great

A microscopical examination of the several specimens of Foo-ling from Messrs. Horaninow and Hanbury, and a comparison with a fine series from South Carolina, sent to me by Mr. Curtis,

Chinese Herbal, 'Pun-tsaou-kang-muh,' Chap. 37. sect. 4. (Translated by the Rev. W. C. Milne.)

茯苓 *Fuh-ling*: synonyms 伏菟 *Fuh-too*, — *too* being a name

given to it because it is found on the same tree as the *Too-sze*, another medicinal plant; or rather, as some say, because it resembles a small hare.

松腴 *Sung-yu*, a name derived from its connexion with the pine-tree.

不死麴 *Puh-sze-mien*, literally *Undying-flower*.

伏神 *Fuh-shin*, which name is restricted to a species to be found

clinging to the root of the pine. Such, it is presumed, contains the finest essence of the pine. One of the fairy tales says, that there are pieces of this species to be found as big as a man's fist, one of which, if you sling it as an amulet round your person, will discomfit a hundred devils, in full proof of its divine origin.

In describing the *Fuh-ling*, one author observes that both it and the species called *Fuh-shin* grow under the large pines on the heights and valleys of lofty mountains, and that they may be gathered in the second and eighth moons [*i. e.* during spring and autumn].

Another writer remarks, that samples come from *Yuh-chow* as large as a vessel with a capacity of three or four shings [pints]. The outer skin is black, with small wrinkles on it; underneath it is fine and white. Its appearance is that of a small tortoise; and that with a reddish tinge is not unlike a frog after being imbedded underground for thirty years.

A third writer notes that *Fuh-ling* is produced in the *Tai-shan* mountains of the province of *Shantung*, but that the best kind is decidedly that of the *Hwa-shan* hills of *Shen-se*.

According to the testimony of a fourth writer, wherever large pines flourish you have the *Fuh-ling*; but as at *Hwa-shan* there stands an immense number of old firs, you have there excellent specimens.

A fifth observer remarks, that pines of 1000 years old are sure to have the *Fuh-ling*; but a sixth observes, that after the resin of the pine has fallen on the ground and remained there 1000 years, it is changed into *Fuh-ling*. When you see the pine-tree turn red, you have the *Fuh-ling*. *Fuh-shin* is a product of the pine superior to the *Fuh-ling*.

At present all the hills of the *Hwa-shan* range produce it. It clings to the under-roots of the pine-trees, and grows leafless and flowerless, as large as a man's fist. Sometimes underground you meet with it so big as to be several catties* in weight. There are two varieties, red and white. Some say it is the gum of the fir-tree metamorphosed; and others, that it is the excrescence of the spurious pine-tree. But down to the present day there are people who constantly meet with the *Fuh-ling* under masses of very old pines which have long been cut down, and whose trunks, branches, and twigs lie about rotten and decaying.

* The catty equals 1½ lb.

as also with a portion of an authentic specimen of Schweinitz, show that they are all identical. The structure varies a little with age, and in Horaninow's specimens there are abundant very

To procure it, a plot of ground is cleared and probed with an iron barbed instrument. Should any Fuh-ling be there, it will be impossible to pull out the instrument again, except by digging about it.

[Under this heading some legends are given, which it is needless to translate, as they would be unintelligible, and (as the author hints regarding one) are treated with little faith.]

Five forms of Fuh-ling are mentioned as of medicinal use, viz. :—

1. Ordinary Fuh-ling.
2. Red Fuh-ling.
3. Fuh-ling bark.
4. Fuh-shin.

5. Shin-muh or Hwang-shin-tsoh, a rare species found in the heart of the Fuh-shin: one of its names signifies *Yellow-fir-knot*.

In the preparation of this medicinal plant, whoever uses the bark must put away the heart of the Fuh-ling, then pound the bark small in a basin of water, take off the scum and filter the water. An erroneous application of this may prove hurtful to the eye. To make it into powders or pills, let it be boiled thoroughly two or three times, and then dried.

Its taste and smell are agreeable, and not poisonous.

The class of diseases for which it is used are, to sum them up generally, pains in the chest, severe ague, great debility, depression of spirits, stoppage of urine, want of sleep, excess of phlegm, dropsy, affections of the kidneys, violent retching, rheumatism, infantile convulsions, fatigue in body and mind, dysentery, disease in the groin, and female complaints.

猪苓 *Choo-ling*, derives its name, first, from its resemblance in colour to the faeces of the pig (*Choo*); and secondly, from its being found lying here and there as droppings from the tree upon which it is parasitic. Its other names indicate the same, viz.

豕段猪屎 *Kia-choo-she*, literally *Hog's-dung*.

豕囊 *She-t'oh*, literally *Pig's-entrails*?

地烏桃 *Te-woo-taou*, literally *Earth-walnuts*.

The following is an abridged summary of the opinions of various Chinese observers relative to the Choo-ling.

It is found principally on the heights and valleys of Hang-shan*, as also in Shuh-chow and Seih-chow.

It is picked up in spring and autumn. It is a parasite on the Fung-shoo tree [*Acacia* sp. ?], though also found upon other trees. It much resembles the Fuh-ling.

The skin of the Choo-ling is black, but the flesh is white and firm. It can be used only after scraping off this skin. In preparing it for medicinal pur-

* [Either in the province of Kiang-nan, or in that of Hoo-nan.]

delicate threads which traverse the mass in every direction ; but the nature of the bodies of which the greater part of the substance is composed, their form, and chemical characters are precisely the same, and there can be no doubt that they all belong to one and the same category.

This matter consists of irregular bodies, varying very greatly in size, often globular, but frequently forming broad bands with transverse markings and clefts, exhibiting no trace of starch under iodine, and without the slightest appearance of an investing membrane. This substance has been submitted to chemical investigation by Professor Ellett of South Carolina College, and has been ascertained to consist entirely of pure pectine of Braconnot. It is quite insoluble in water, though it dissolves in alkaline solutions, forming neutral pectates, whence the pectic acid is separated, by the addition of muriatic acid, in the form of a colourless jelly. By a particular management, with the details of which I am not acquainted, this jelly may be prepared so as to form an agreeable article for the dessert*.

It is not surprising, therefore, that it is manufactured in China into a popular and nutritious food. It is probable that the cakes which are made of it are regarded as medicinal as well as economical ; and it is curious that Prof. Ellett remarks that the nutritious jelly formed from the Tuckahoe is an excellent antidote against several of the most powerful mineral poisons.

The structure of the Choo-ling is somewhat different from that of the Foo-ling. The several parts are far smaller in their dimensions, and there are none of the streaked and incised bands. The greater part of the mass consists of short, sometimes forked, and

poses, scrape off the coarse skin with a copper knife, cut the Choo-ling into thin slices, and steep them in Tung-lew† water for a whole night ; drain off the water thoroughly ; pack the slices in a bundle of Shing-ma‡ leaves for a day, and, on removing the wrapper, they will be quite dry and fit for use. The smell and taste of the Choo-ling are mild, sweet, and not poisonous—something like the Fuh-ling.

The diseases for which it is generally used are, severe ague, severe dropsy, long-suppressed urine, debility and age, abdominal swellings attended with violent pains, depression of spirits, diseases in the groin, dysentery, and some affections peculiar to females in pregnancy.

* See "Observations on Tuckahoe," in Gardener's Chronicle, 1848, p. 829.

† [If Tung-lew is the name of a place, it is in the department of Che-chow, province of Ngan-hwuy.]

‡ *Shing-ma*, literally the *Ascending Hemp* : it is described in the 'Pun-tsaou,' chap. 13. fol. 29.

sometimes torulose linear bodies, varying, however, much in outline; and dispersed among them are a number of small granules, many of which contain a minute nucleus; while other larger bodies, exhibiting one or two faint traces of concentric circles, are scattered about, exactly like the asci of a truffle, but containing only a very small irregular nucleus. Treated with the same chemical tests as the Foo-ling, it exhibits precisely the same reaction. There is not the slightest trace of starch or cellulose, and it is evident that the structure is not accordant with that of any Fungus or phænogamous Tuber.

As there is some outward resemblance between this production and the tuberiform body which precedes the growth of *Peziza tuberosa*, I have made a comparative examination of the two, and though there is some resemblance as regards chemical reaction, the structure is totally different. In the *Peziza* tuber the whole mass consists of large threads with very thick gelatinous walls, and an abundant proteinous endochrome.

No fungus has ever been found on the American or Chinese tubers, and, unfortunately, *Pachyma tuber regium*, which gives rise to a species of *Lentinus*, as figured by Rumphius, is quite unknown. It is probably, however, of the same nature with the Pietra funghaja or Fungus-stone of Italy (a mere mass of earth and mycelium), which produces the edible *Polyporus tuberaster* even in our own hothouses.

Unfortunately but little light is thrown upon the real nature of these productions by all the specimens and information we possess. Dr. Macbride asserts that the Tuckahoe originates between the wood and bark of *living* roots; that it gradually detaches the bark, while it spreads round the wood and converts it into a substance similar to itself; and that if it comes in contact with the root of another tree, that root is also assimilated with it. Specimens, however, are wanting to show this transitional state.

I have still to notice briefly the third production sent to me by Prof. Horaninow, of which I forward a portion for your inspection. It is evidently closely allied to the native bread of Australia, but differs in the reddish, not black, cuticle, which does not crack and peel off, the total absence of an intermediate stratum between the cuticle and central mass, and the want of large clavate cells amongst the linear bodies of which the central mass is composed. The internal substance is marbled like a truffle; but there is not a trace of fruit, and in consequence, together with *Mylitta australis*, it must be considered of very doubtful affinity.