Bambarra Ground-Nut. (*Voandzeia subterranea*, Thou.)

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of 150 bags of various qualities was despatched to London in December, 1886. The bark weighed 17,009 pounds and was sold for £542 9s. There has been no export since that time.

“Mr. Thomson retired on pension in 1878, and in December, 1879, the Department was placed under the Directorship of Mr. (now Sir) D. Morris. After the appointment of Mr. D. Morris in 1886 as Assistant Director of the Royal Gardens, Kew, the Department was placed under the charge of the present Director, Mr. W. Fawcett, of the Natural History Department of the British Museum.

“In the report of the Royal Finance Commissioners this Department is mentioned as follows :—

“‘In a purely agricultural country like Jamaica a well organized Department of Gardens and Plantations is invaluable, not only for introducing and propagating such plants as are most suitable to the climate and soil, but also for the dissemination of the knowledge requisite to cultivate the products of the island to the best advantage. We found that this Department has done good work, and the public appreciation of the opportunities afforded by it is spreading fast.’

“The Department of Public Gardens and Plantations issues a Monthly Bulletin, affording information ‘on cultural industries, and on the diseases of plants, on soils, and on native plants.’ The Bulletin is supplied free of cost to residents in the Island, and is a most useful agent in the dissemination of information among all classes.”

X.—BAMBARRA GROUND-NUT.

(*Voandzeia subterranea*, Thou.)

Bambarra, a district on the Upper Niger near Timbuctoo, has in our language given its name to this African ground-nut. Cultivated throughout Tropical Africa from the Sahara to Natal, Bambarra has no pre-eminent claim to the plant, which bears a great variety of native names in different parts of the continent. On the Guinea Coast it is aquing or jubbejubbe, in Bornu mgangala, in Angola viélo, in Unyoro mpande, about Kilimanjaro puo, in Nyasaland litlo. On the Mozambique coast where *Arachis* is called mjugu nyasa, *Voandzeia* is mjugu mawa (mawa= a stone, from the hardness of the seeds, see Grant in *Trans. Linn. Soc.* xxix., p. 8); in the Transvaal it is tindlohu and in Natal inhlubu.

There is no trade in Bambarra ground-nuts, save to a small extent at Zanzibar (see *K.B.*, 1892, p. 88), only the hard starchy seeds are eaten wherever grown, the natives supplying their own needs. In German South-west Africa (see Warburg, *Tropenpflanzer*, iii., p. 169) and in the region of the great lakes this is particularly the case.

It is a mistake to count the nut among African oil-seeds, for as the following analysis by Dr. Thom (*Tropenpflanzer*, l. c.) indicates, the proportion of oil present is insignificant :—

Water	...	...	...	...	10.20
Oil	...	...	...	...	4.53
Nitrogenous matter	...	...	...	...	19.20
Starch	...	...	...	...	49.91
Phosphoric acid	...	...	...	...	0.80
Ash	...	...	...	...	5.13
					<hr/>
					89.77
					<hr/>

Dr. Thom does not account for the loss of over 10 per cent., but at the same time he does not give any figure for fibre, cellulose, &c., to which presumably the percentage omitted belongs.

In a note by Balland (*Comptes rendus*, cxxxviii., p. 1061) another analysis is given which corroborates the low percentage of fatty matter obtained by Thom. Balland's results are :—

Water	...	...	...	...	9.8
Fatty matter	...	...	...	...	6.0
Nitrogenous matter	...	...	...	...	18.6
Starch	...	...	...	...	58.3
Cellulose	...	...	...	...	4.0
Ash	...	...	...	...	3.3
					<hr/>
					100.0
					<hr/>

Balland's sample of this Ground-nut, which came from Bangasso in Upper Ubangi, was exhibited at the Paris Exposition among the products of the French Congo as *Haricot-Pistache*.

Voandzeia subterranea, the only species of the genus, is undoubtedly a native of Africa, despite the statements of Linnaeus and the botanists who preceded him to the effect that it comes from South America. Schweinfurth and Ascherson (*Aufzählung*, p. 259) record it as wild on the Upper Nile, and it is stated to be both wild and in cultivation in Senegambia (Guillemin, Perrottet and Richard, *Floræ Senegambiæ Tentamen*, p. 254).

There are several forms in cultivation, differing from one another in the colour and hardness of the seeds. These seeds are about the size of a pea, at times of a pale yellow with a black hilum or point of attachment, at times mottled and ranging through all shades to a very dark brown. Soaked for a night in water and then boiled they are said to form an excellent vegetable. It is further stated (Taubert in Engler *Pflanzenwelt Ost-Afrikas*, B., p. 123) that the red-brown or nearly black seeds become palatable with less cooking than those which are pale in colour or mottled. The younger they are the more pleasant and sweet they taste. They are boiled or fried in butter or oil, or sometimes pounded into a meal. Headaches are said to result from too free a use of them.

Balland states (*Comptes rendus*, l. c.) that when crushed the seeds of *Voandzeia* yield a white flour with a characteristic pulse

odour, but that, when boiled, they have exactly the flavour of chestnuts. He calls attention further to the fact that if we admit the contention of physiologists that the human frame, in order to repair natural loss of tissue, requires daily 120 to 130 grammes of nitrogenous matter, 56 grammes of fatty matter and 500 grammes of carbohydrates, we have, even if the co-efficients of digestibility are taken into account, these elements almost exactly present in a kilogramme of *Voandzeia* seeds. He further remarks that these seeds afford the first instance known to him of a natural substance possessing to an equal degree the chemical features of a complete food.

There is nothing to record concerning the mode of culture save that Pailleux and Bois (*Potager d'un curieux*, ed. 2, p. 568), quoting from a correspondent in the Transvaal, recommend that the growing plants be earthed up.

As the name "ground-nut" implies, the seeds mature under ground. To facilitate the necessary burial of the pod—for none mature that cannot bury (Correa de Mello in *Journ. Linn. Soc.*, xi., 254)—the short, somewhat flattened, hairy branches lie prone on the surface of the earth, often penetrating it where soft and always dipping downwards at the tip. On the primary and a few of the secondary branches are a few leaves, large, erect and trifoliate. The inflorescences, either terminal or from the axils of the leaves, are two-flowered and invariably penetrate the earth unless prevented by some solid body. The flowers thus produced underground, one on each side of a wart-like termination to the axis—may remain subterranean or may reach the surface by the elongation of the pedicel and open as small pale yellow pea like blossoms. In fruiting the ovary is drawn underground. The subterranean flowers, provided like the aerial with pedicels, lie folded on to these and do not develop any of the conspicuous parts; their petals are absent and so reduced are the stamens that observers have thought them female.

At times all the flowers are aerial, at times all are subterranean; and the earthing-up recommended in the Transvaal has for its object the burying of flowers and fruit.

The fruit is very like that of *Arachis hypogæa*, but is shorter and usually one-seeded at maturity. Though indehiscent, it is bordered by a prominent sutural ridge such as is not seen in *Arachis*. The sides are faintly reticulated, and the total length is about $\frac{3}{4}$ inch.

Although in many respects very like *Arachis hypogæa*, *Voandzeia* belongs to a different tribe of the Leguminosæ being much more closely allied to the Haricot beans.

The Bambarra earth-nut long ago found its way into Brazil where it has passed under the name of Angolan mandubi or earth-nut. India and Malaya have received it and it is cultivated in gardens to a small extent. It has been tried in North Australia and gave a large yield (Mueller, *Select Plants for Extra-trop. Culture*, p. 576), but nowhere has its cultivation assumed any large proportions.

I. H. BURKILL.