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Miscellaneous notes on the flora of Tropical East Africa, 29

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Enquiry into the occurrence of the Yeheb nut (Cordeauxia edulis Hemsl.) in the Horn of Africa

RÉSUMÉ.

L'importance économique du Yeheb, *Cordeauxia edulis* Hemsl., un arbuste habitant le sud-est de la République de Somalie et une partie de l'Ogaden (Abyssinie), est discutée. Sa noix est un élément constitutif de la nourriture de la population locale. Un exposé de l'histoire de sa découverte vers la fin du siècle dernier est suivi d'une description sommaire de ce genre monotypique, présentant un grand intérêt botanique. L'auteur nous présente des données analytiques sur la valeur nutritive des noix et sur la matière colorante contenue dans les feuilles. Finalement, l'attention du lecteur est attirée sur la menace d'extermination qui pèse sur cette espèce aussi intéressante qu'utile; menace causée par une exploitation déraisonnable et par le manque quasi-total de mesures protectrices de la végétation dans cette région. L'application de telles mesures dans les plus brefs délais est recommandée. On propose encore d'assurer la survie du Yeheb en le cultivant dans les endroits favorables de son pays d'origine.

ZUSAMMENFASSUNG.

Die wirtschaftliche Bedeutung des Yeheb-Strauches, *Cordeauxia edulis* Hemsl., der im Südosten der Republik Somalia und im Ogaden (Abessinien) heimisch ist, und dessen Nuss ein wichtiges Nahrungsmittel der einheimischen Bevölkerung bildet, wird erörtert. Die Geschichte seiner Entdeckung gegen Ende des vorigen Jahrhunderts wird kurz umrissen; es folgt eine Beschreibung dieser auch botanisch hochinteressanten, monotypischen Gattung, deren Blätter zudem einen in der Pflanzenwelt sonst nicht vorkommenden Alizarinfarbstoff enthalten. Analysen, welche Aufschluss über die chemische Zusammensetzung und den Nährwert der Nuss geben, sowie Angaben über die Untersuchungen des Farbstoffes sind beigefügt. Schliesslich wird auf die sehr ernstliche Bedrohung des Yeheb-Strauches durch unkontrollierte Ausbeutung und Mangel an Schutz in seinem natürlichen, allem Anschein nach rasch schwindenden Verbreitungsgebiet hingewiesen. Die Einführung von Schutzmassnahmen an seinen heutigen Standorten und der Versuch, sein Fortbestehen durch Anbau dort und in anderen geeigneten Landstrichen zu sichern, werden empfohlen.

SUMMARY.

The economic importance of Yeheb, *Cordeauxia edulis* Hemsl., a small tree, found in the South-East of the Somali Republic and in part of the Ogaden (Abyssinia), is discussed.

Its nut is an important item of food of the local population. An account of the history of its discovery near the end of the last century is followed by a brief description of this monotypic genus, which is botanically of great interest. The author gives us analytical data on the nutritive value of the nuts and on the Alizarin dye found in the leaves. Finally, the reader's attention is drawn to the fact that this both useful and interesting plant is threatened with extermination; a threat due to excessive exploitation coupled with an almost entire lack of protective measures for the vegetation in those regions. It is recommended that such measures be taken with the least possible delay. Moreover it is suggested that the survival of Yeheb be ensured by its cultivation in the favourable areas of its native country.

Among the few plants of economic importance indigenous to the Horn of Africa the Yeheb-nut bush is of particular interest, although it is little known outside the region in which it occurs. There are many variants of spelling the name of the nut, depending on the recording collector, but phonetically they express very much the same sound: Ghieheb, giaeb, giaheb, gieheb, ieebb, iee-ep, ieheb, iieb, jeebb, jieheb, ye'eb, yee-ep, yeheb, yehib. According to G. CUFODONTIS (1955) the terms: Gud, guda, gude, gut, which are cited by some authors, designate the bush itself.

The low annual rainfall, usually well under 10 in., and the nomadic habits of the Somals make it impossible for them to grow the usual legumes which form important items in the dietary of East Africans, and although the protein and carbohydrate content of the Yeheb nut is inferior to that of the legumes currently consumed in East Africa, it has the advantage of being comparatively rich in fat and in sugar. Its presence in those semi-desert regions with extremely poor red sandy soil ¹, which are locally known as the "Haud", is therefore of a considerable economic importance to its inhabitants.

From the time when the Italian traveller ROBECCHI-BRICCHETTI (1893) came back in 1891 with the first reports of this remarkable plant it aroused the interest of the administrators of both Italian and British Somaliland as well as of the botanists in their respective home countries.

¹ It had been suggested that the limited geographical distribution of *Cordeauxia edulis* might have its explanation in special soil conditions, and in 1910 Capt. CORDEAUX sent samples of top- and subsoil to Kew for examination. The surface soil consists mainly of fine to coarse sand or grit, coloured bright red by the very dark red subsoil, with total absence of clay and very little lime. The poverty of nitrogen is one of its features, a defect probably made good by the fixation of atmospheric nitrogen by the plant. The subsoil is of a deeper and darker red colour and, except that it is finer and may possibly have a little clay in the sand, very similar.

The analysis brought out nothing but the very poor character of the soil.

The figures speak for themselves:

(Soils dried at 212° C.)	Surface soil	Subsoil
Organic matter and loss on heating . . . . .	.16	.62
Oxide of iron . . . . .	.83	1.34
Alumina . . . . .	.56	1.89
Lime . . . . .	.13	.17
Magnesia . . . . .	.36	.30
Potash . . . . .	.06	.21
Soda . . . . .	.09	.16
Phosphoric acid . . . . .	.006	.012
Siliceous matter	97.81	95.30
	100.00	100.00
Nitrogen . . . . .	.011	.026

The analyst, Dr. VOELCKER, concluded that if the Yeheb plant grows well in the soils indicated by the foregoing analyses it is not because of the richness of the soil; it may possibly be because of its poverty.

In 1894 Capt. M. S. WELLBY (1896) found the Yeheb bush in three different localities in the Marehan country and he drew attention to the plant in the report on his journey published a year later. G. G. GILLIGAN, a British resident officer in Somaliland, contributed more information on its occurrence in the Ogaden. Col. E. J. E. SWAYNE, C.B., onetime Governor of the then British Somaliland forwarded seeds to the Imperial Institute in Kensington for determination of their nutritive value.

It was however only in 1907 that Capt. H. E. S. CORDEAUX, C.B., H.M. Commissioner, Somaliland Protectorate, obtained adequate botanical specimens from the neighbouring Ogaden in Abyssinia, from which it was possible at last in Kew to establish the identity of the plant; it proved to represent a hitherto unknown genus in the *Caesalpinaceae* (Family: *Leguminosae*). To commemorate Capt. CORDEAUX' successful endeavour W. B. HEMSLEY (1907), who drew up the description, named the new genus *Cordeauxia* and gave the species the epithet *edulis* = "edible".

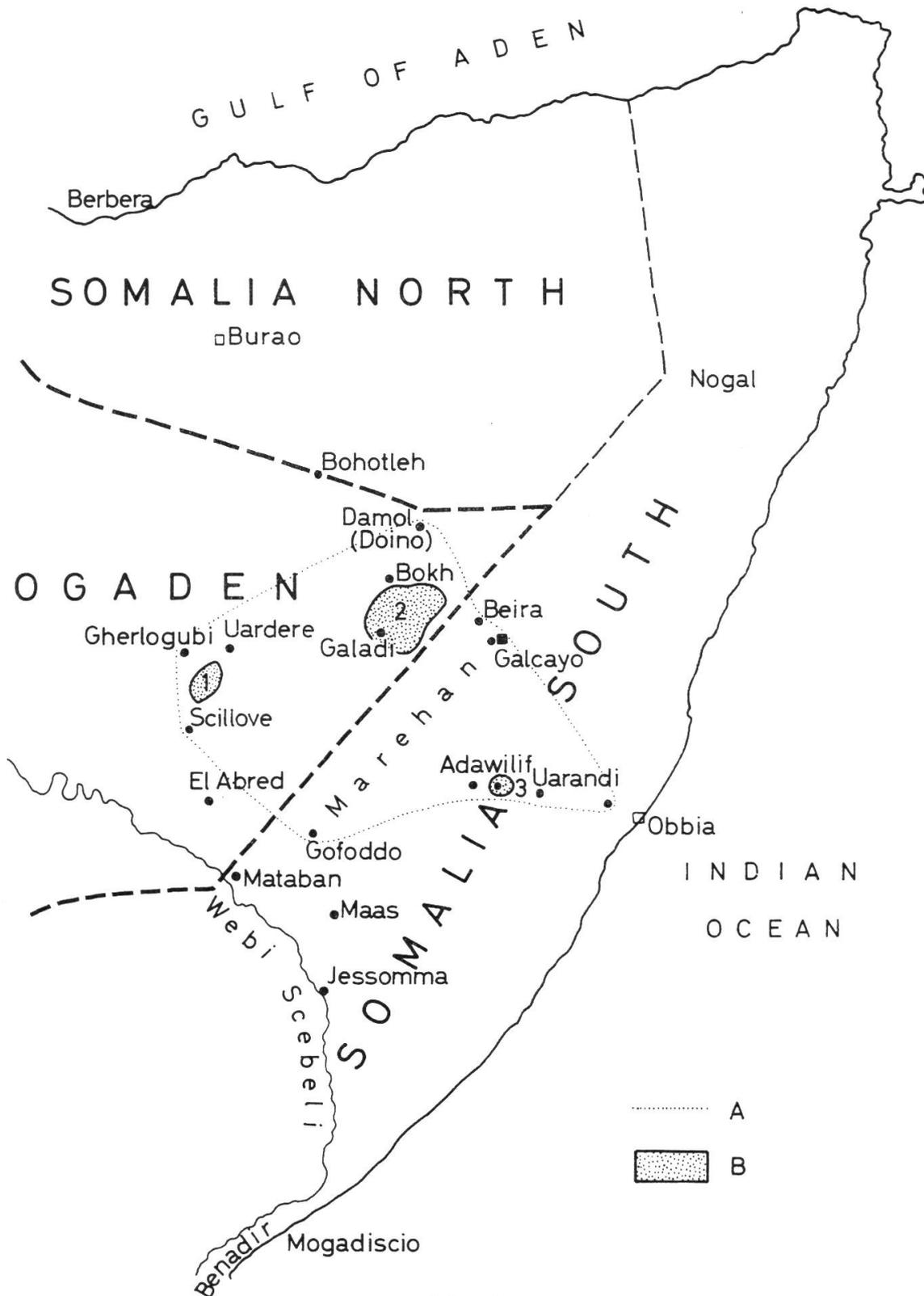
In 1929 Cav. R. MEREGAZZA in Italian Somaliland quoted a southeastern boundary, beyond which the Yeheb bush does not occur, which is formed by a line running from El Abred through Mataban, El Hommade and Maas to Jessomma, north of which he found it to be extremely common, forming a belt 20 to 40 km deep. MEREGAZZA's observation was confirmed by Capt. G. ZACCARINI, who stated that although it was entirely absent in the Benadir (the coastal belt which runs from Margherita to about 100 km north of Mogadiscio) the Yeheb bush was abundant in Central Somalia from north of the Webi Scebeli throughout the country practically up to the Nogal, in many localities constituting up to 50% of the woody vegetation.

In the course of my own travels in the Horn of Africa, which took me through the Marehan country in Somalia in 1943, 1953 and 1954, I got the impression that the Yeheb areas are now considerably reduced and that the shrub has disappeared from many regions cited by earlier travellers; this impression appears to be borne out by other recent collectors like P. E. GLOVER and C. HEMMING who seem to have encountered it only between Scillave and Uardere in the Ogaden.

My enquiries in Galkayu, Somalia, where WELLBY and GILLIGAN as well as DRAKE-BROCKMAN had found it in earlier years, elicited that the nearest locality was now some 50 miles away to the north-west, south of Bohotleh, in the neighbourhood of Bokh, the very region whence Capt. CORDEAUX obtained his botanical specimens and from which it had been reported by ROBECCHI-BRICCHETTI and Capt. WELLBY. This seems to be the most important Yeheb concentration at present. There is no evidence of its occurrence in the former British Somaliland; this was already stated by Capt. CORDEAUX in a letter to Kew in 1907.

The total geographical area as substantiated by collected specimens and reliable reports is shown on the map (p. 6); the shrub may of course occur elsewhere in localities from which records were not available to me, but it is certain that within these known limits it is now greatly diminished.

This decrease is due partly to the continued overall deterioration of the vegetation-cover all over Somalia and the adjacent country, inevitable with the greatly increased demands on it by the ever more numerous livestock and growing population; but partly it must be attributed to the thoughtless exploitation of the



MAP 1.

A: Contour of Yeheb area established from authentically recorded localities from 1891 to 1908. *Robecchi-Bricchetti* (1891); *Swayne* (1893); *Wellby* (1894); *Cordeaux* (1907); *Gilligan* (1908). — B: Yeheb areas seen by recent collectors. *Glover* (area 1, 1945); *Bally* (area 2, 1954); *Hemming* (area 1, 1954, 1958); *Ward* (area 3, 1962); *Moggi* (between Maas and Jessomma, 1959; communication rcd. subsequent to the printing of this map).

Yeheb-shrubs for their nuts; when they are harvested, none are left to allow for regeneration. Even if this were the case, or should any forgotten seeds germinate later, they would not survive, for the Yeheb areas are as open to the grazing and browsing stock as is all the land around; when the grass and herbaceous cover has gone, the mature plants too suffer considerable damage through the browsing goats which are fond of the Yeheb leaves.

When I visited the Yeheb area near Bokh in February 1954 and again in October of the same year, I found ample evidence of these happenings. The area itself is about 20 miles in diameter and consists of open bush savanna, in which *Cordeauxia edulis* is dominant. Apart from a few scattered trees of *Acacia tortilis* (Forsk.) Hayne, the Yeheb bush is the tallest of the woody plants such as *Boswellia microphylla* Chiov., *Commiphora* sp., *Euphorbia longispina* Chiov., *Cassia truncata* Brenan, *Corchorus bricchettii* H. Weinm. and *Polygala obtusissima* Hochst. ex Chodat, with which it grows in association. The Yeheb bushes grow in scattered but dense clumps with much open tufted grassland between them. None of the bushes are more than 7 ft high, the average height being nearer 5 ft. G. G. GILLIGAN's assertion that the Yeheb bush occasionally grows into a large tree could not be substantiated in the Bokh area.

The total absence of seedlings and of young plants suggested that regeneration had been inhibited for years. Most of the mature plants bore distinct traces of being browsed upon by stock. The impression I gained was that, if no steps are taken to protect the area from overgrazing, to limit the harvesting and to set aside some of the crop for seeding purposes, the Yeheb bush will disappear from the Bokh region within a matter of years.

It would be a severe loss for the Somali population of the interior if this convenient source of valuable foodstuff provided by nature, not requiring the cultivating and tending of fields, to which a nomadic people take either very reluctantly or not at all, were to vanish forever from their already so unproductive country.

Description of the plant from my observations in the Bokh area

The mature Yeheb nut bush is a many-stemmed shrub not exceeding and rarely reaching a height of 7 ft. It is locally dominant and forms scattered, isolated clumps. The numerous stems are ascending, much-branched, forming a tightly bunched crown; the branchlets close to the ground are foliated where they are not denuded by browsing cattle. The leaves are pinnate, usually with 4 pairs of leaflets which are ovate, 2-2.5 cm long and 1-1.5 cm wide, leathery, olive-green above, lighter on the underside with numerous scale-like red glands.

When the leaves are handled or only touched they stain the hands red. They are used by the Somals (and were used by the Italians in wartime, when there was a shortage of aniline dyes) as a dye. In 1943 an Italian dyer in Mogadiscio showed me a batch of wool which he had dyed a rich magenta hue with the leaves of *Cordeauxia edulis*. P. E. GLOVER states that the Somals use approximately 1/2 lb. of pulverized leaves to dye 10 yards of 36 in. wide calico. When the leaves are eaten by goats the dye is deposited selectively in certain tissues, especially in their bones which become stained a bright orange.

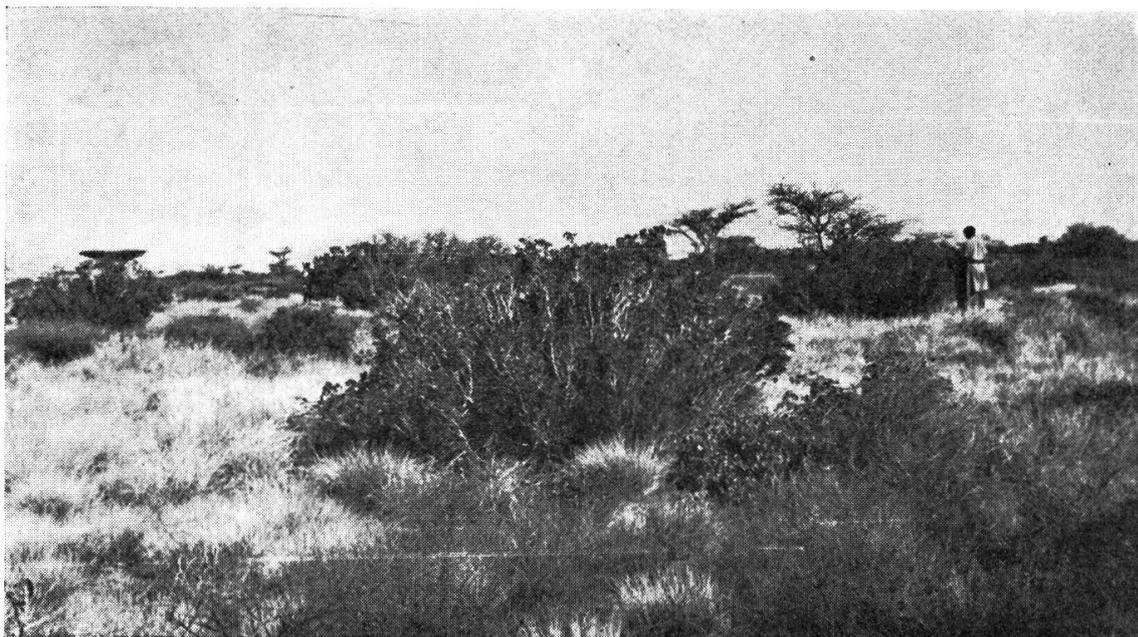


FIG. 1. — Yeheb area near Bokh (Ogaden).



FIG. 2. — Mature Yeheb bush.



FIG. 3. — Flowering branch.

The present writer sent a consignment of the leaves to the University of Zürich, where the red pigment was investigated by J. H. LISTER, C. H. EUGSTER and P. KARRER (1955) who succeeded in obtaining it in its pure crystallized form; they were further able to elucidate its chemical constitution. It was found to be a derivative of naphthazarine which they named Cordeauxiaquinone. The leaves contain 0.7-0.8% of this mordant dye which forms vividly coloured, fast and insoluble combinations with many metals.

The inflorescence is a few-flowered corymb at the tip of the branchlets, and as these are very numerous and close together, the bushes when in full bloom are densely covered with them. The flowers are 2.5 cm in diameter, bright yellow, with 5 spoon-shaped petals and with 10 straight stamens, their filaments hairy at the base. The calyx has 5 green sepals covered with red glands like the leaves. The fruit is an ovoid, slightly compressed, leathery-skinned pod with a beaked tip, containing usually one, occasionally two, ovoid seeds about the size of an almond.

The seeds or kernels have a sweetish, agreeable taste; they are eaten fresh, or boiled, occasionally roasted, when they taste somewhat like roasted chestnuts. Although mostly consumed locally where they form—according to CORDEAUX—the staple food of the poorer people, they find their way into the markets in the North and into the coastal towns and are much in demand among the Somals who value them greatly for their nutrient and alleged medicinal properties.

An analysis made at the Imperial Institute in 1907, gave the following results (Dried nuts, supplied by Col. E. J. F. SWAYNE):

Moisture	9.3%
Ash	3.1%
Reducing sugars	2.3%
Sucrose	21.6%
Carbohydrates other than sugars, by difference	37.1%
Proteids, albuminoids	11.8%
— amides	1.3%
Fibre	2.7%
Oil	10.8%
Nutrient ratio	1: 6.5
Nutrient value	92 cal/g
Tests for alkaloids and glucosides	negative

A sample of pre-heated seed obtained through Major P. E. GLOVER was analysed in the Chemical Laboratory in Daresalaam in 1947 with the following results:

Average weight of nut (including shell)	1.6 g
Average % of edible portion	69.0%
Average % of waste	31.0%
Alcohol insoluble matter 57 g %, made up of:	
Starch	41.5%
Protein	13.7%
Roughage (Fibre as determined: 1.6%)	1.3%
Sugar (calculated as invert sugar, but present in the form of sucrose)	12.4%
Moisture	14.3%
Ash	2.9%
Fat (ether extract)	12.0%
The ash is composed of (% g of edible portion):	
Calcium	29.6 mg
Magnesium	75.3 "
Iron	2.3 "
Sodium	74.5 "
Potassium	1,211 "
Phosphorus	250 "
Chlorine	19.6 "

The seeds do not contain any large amount of carotene; the vitamins of the B group and vitamin C have not been estimated.

P. J. GREENWAY and W. D. RAYMOND (1947) compare the food value of the Yeheb nut with other foods eaten by the Somals and other East African tribes such as dates, rice, caffir-corn and the three most current legumes (cow pea, kidney bean and Bonavista bean). They conclude that where these food crops are available there is no advantage in introducing the Yeheb shrub. For regions with a very low rainfall, which can carry only a nomadic population, and where agriculture is to all practical purposes non-existent, its introduction might well be worth considering.

A few haphazard attempts to grow the Yeheb bush outside its habitat have not been successful: J. A. HUNT (1951), for many years Chief Geologist in Somaliland

Protectorate, mentions that it failed to grow in Burao; he comments that the altitude there is probably too high. In 1953 and in 1954 I supplied fresh seeds from the Bokh area for trials to the Department of Agriculture in Nairobi, but they were planted only in the following year; germination was consequently poor, but eventually several plants survived on Mwakiki Seed Farm in Mbololo. In 1958 they were only 9 in. high but appeared to be strong. However, on enquiring in 1963 I was told that they could not be traced.

Yet, Capt. CORDEAUX reported to Kew in 1907 that he reared some plants successfully in Berbera, on the Somaliland Coast. In Kew, several plants were obtained from seed supplied by Major E. J. E. SWAYNE, and though slow-growing, they were kept alive for many years and even flowered in a moist tropical hothouse in rich black soil.

There is no reason why the Yeheb bush should not grow in some of the drier parts of Kenya such as the Tsavo District and possibly in Turkana, provided that fresh seeds can be obtained and that the exceedingly low requirements of moisture are strictly observed.

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