

Iburu and Fundi, Two Cereals of Upper Guinea. (*Digitaria iburua*; *D. exilis*.)

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nevertheless represents only one of a series of forms, which hardly admit of independent recognition, though the extremes are readily separable. *Brandegee* No. 93, from Monterey has leaves like those of var. *pallens*, but shorter pedicels, and *Elmer* No. 3535, from the same locality, resembles typical *C. rigidus*, but has almost entire leaves. *Trelease** considers the plant figured in *Bot. Mag.* t. 4660 as a form of *C. rigidus*, and this form bridges over the gap between typical *rigidus* and var. *grandifolius*, which has a very distinct facies.

The illustration of *C. rigidus* given by Lindley and Paxton† resembles var. *pallens* rather than the type, which suggests that there may have been a considerable amount of variation in the plants of *C. rigidus* raised by the Horticultural Society from Hartweg's seed.

T. A. S.

XXXVIII.—IBURU AND FUNDI, TWO CEREALS OF UPPER GUINEA.

(*Digitalia Iburua*; *D. exilis*.)

O. STAPP.

Iburu. In Dudgeon's "The Agricultural and Forest Products of British West Africa" (1911), p. 149, a cereal, called "Iboru," is mentioned as being grown in Northern Nigeria in the fields along with millet. It is also quoted in the Report on the Agricultural Department for 1912, Northern Nigeria, as a "cereal" (a small millet) receiving "a great deal of attention" at Zaria. No description is given nor is it referred to a definite species or genus of grasses. Quite recently, however, specimens of Iburu were received from Mr. Lamb with a note that the grass was sown in rows as a field crop in the Hausa States. The specimens had been obtained at Zaria, and were numbered 54. The grass belongs to the genus *Digitalia*, and resembles *D. exilis*, Stapf (*Paspalum exile*, Kippist) another small grained cereal of West Africa. Its botanical affinity is, however, with *D. ternata*, Stapf (*Panicum ternatum*, Hochst.), from which it can easily be distinguished by its crowded, closely imbricate spikelets, which are at the same time quite glabrous and slightly larger. From *D. exilis* it differs likewise in the packed arrangement of the spikelets and also in the angular, scabrid (not terete, smooth and disk-tipped) pedicels, and the short, very delicate upper glume. The grains of Iburu separate fairly readily from the surrounding husks when pressure is applied, and those of the sample received are pure white. They weigh in their husks on the average 0.7 mgr., so that over 40,000 go to one ounce. As one raceme may contain as many as 200 spikelets, a single head may yield between 1,000 and 2,000 grains.

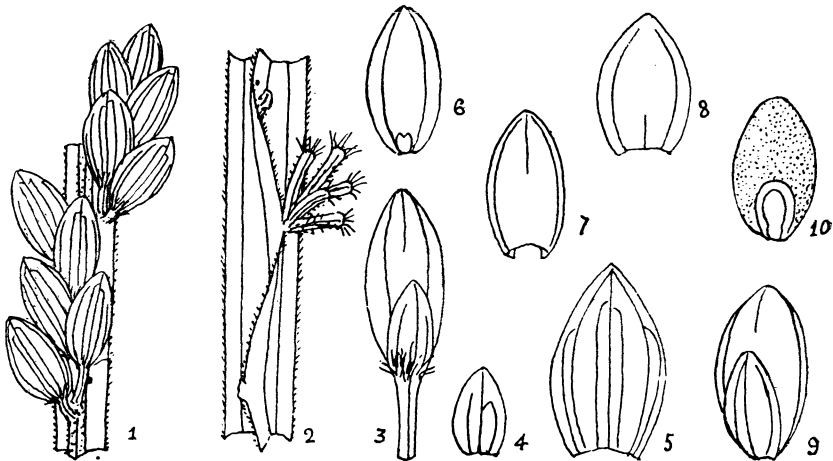
As the grass has not been described so far, a full technical description is given herewith.

* A. Gray, *Syn. Fl. N. Am.* vol. i. part I, p. 417.

† Paxton's *Flower Garden*, vol. i. p. 74, fig. 51.

Digitaria Iburua, Stapf [Gramineae-Paniceae]; affinis *D. ternatae*, Stapf, sed spiculis majoribus glaberrimis densissime imbricatis distincta. A *D. exili*, Stapf, simili differt spiculis multo arctius aggregatis, pedicellis angulatis scaberulis apice haud in discum dilatatis, gluma superiore tenuiore multo brevior.

Annual, over 0.5 m. high. *Culms* glabrous, erect, simple, with 4-5 nodes; internodes enclosed in the sheaths, excepting the uppermost. *Leaf* sheaths tight, striate, glabrous, smooth, the lower keeled upwards; ligules membranous, rounded, broad, 2-3 mm. long; blades linear, rather broad at the base, long and finely attenuated upwards, up to 30 cm. long and 1 cm. wide, flat, with some long hairs near the base from behind the ligule, mid-rib slender, prominent above, primary side nerves about six on each side. *Racemes* subcomposite, 4-10, digitate, the lowest



D. Iburua. Fig. 1, part of raceme $\times 6$; 2, part of rhachis spikelets removed $\times 8$; 3, spikelet; 4, upper glume; 5, lower valve; 6, upper valve with valvule of lower floret in front; 7, upper valve, back view (the middle nerve is thinning out towards the base; it, as well as the side nerves are much less marked than shown in the drawing); 8, valvule; 9, fruiting spikelet; 10, seed. Figs. 3-10 $\times 10$.

usually somewhat distant (1-2 cm.) from the remaining, which are closely crowded, suberect, 12-13 cm. long, slender, dense, pale green; rhachis triquetrous, slightly over 1 mm. wide, white, rounded and smooth on the back, angles green, narrowly winged scaberulous; branchlets finely filiform, adpressed to the rhachis, up to 5 mm. long, about 4 mm. distant, bearing up to five spikelets from near the base, angular, scaberulous, with short hairs or almost glabrous; pedicels similar, the lower very short, the upper up to 2.5 mm. long, tips minutely bearded, slightly thickened. *Spikelets* tightly imbricate, elliptic-lanceolate, subacute at the base, acute at the tips, 2 mm. long, pale green, quite glabrous, flat on the abaxial face. *Glumes* very delicate, hyaline, the lower quite minute or suppressed, the upper

ovate, obtuse, 0.75–1 mm. long, delicately three-nerved. *Valve* of lower (barren) floret thin, membranous, as long as the spikelet, sub-seven-nerved, the three inner nerves parallel, approximate and prominent, the lateral in pairs at the flexures, the outermost usually finer and shorter, the accompanying valvule almost microscopic, broad, emarginate-truncate; valve of upper (fertile) floret thinly papery, as long as that of the lower, smooth, obscurely nerved, embracing the very similar valvule with wide margins. *Stamens* 3; anthers 1 mm. long. *Stigmas* shortly exerted from near the apex. *Grain* ellipsoid, slightly compressed from the back, 1.5–1.75 mm. long, white, very finely pitted, tightly enclosed by the somewhat indurated brown husks; scutellum broad-elliptic, not quite reaching to the middle of the grain.

NIGERIA. Hausa States, sown in rows as a field crop, Zaria, Lamb 54.

Fundi. This has for some time been known as a cultivated cereal in West Africa. It was first observed by Afzelius, who collected it in Sierra Leone in 1798, and on the label accompanying his specimen in the Smithian Herbarium at the Linnean Society observed that it was “much cultivated there by the negroes”; but he did not name it, and the plant remained unnoticed until in 1842 specimens were brought to this country by Mr. Robert Clarke, senior assistant surgeon to the Colony of Sierra Leone. From those Kippist described the grass as *Paspalum exile* in the Proceedings of the Linnean Society, vol. I. p. 157. Clarke’s account of the cultivation and uses of the grass is interesting enough to be reprinted here in full.

“This Lilliputian grain, which is described by Mr. Clarke as being about the size of mignonette-seed, is stated to be cultivated in the village of Kissy and in the neighbourhood of Waterloo by industrious individuals of the Soosoo, Foulah, Bassa and Jollof nations, by whom it is called “hungry rice.” The ground is cleared for its reception by burning down the copse-wood and hoeing between the roots and stumps. It is sown in the months of May and June, the ground being slightly opened, and again lightly drawn together over the seed with a hoe. In August, when it shoots up, it is carefully weeded. It ripens in September, growing to the height of about 18 in., and its stems, which are very slender, are then bent to the earth by the mere weight of the grain. They are reaped with hooked knives. The patch of land is then either suffered to lie fallow, or planted with yams or cassava in rotation. Manure is said to be unnecessary or even injurious, the plant delighting in light soils and being raised even in rocky situations, which are most frequent in and about Kissy. When cut down it is tied up in small sheaves and placed in a dry situation within the hut, for if allowed to remain on the ground or to become wet the grains become agglutinated to their coverings. The grain is trodden out with the feet, and is then parched or dried in the sun to allow of the more easy removal of the chaff in the process of pounding, which is performed in

wooden mortars. It is afterwards winnowed with a kind of cane fanner on mats.

In preparing this delicious grain for food, Mr. Clarke states that it is first thrown into boiling water, in which it is assiduously stirred for a few minutes. The water is then poured off and the natives add to it palm oil, butter or milk; but the Europeans and negroes connected with the colony stew it with fowl, fish or mutton, adding a small piece of salt pork for the sake of flavour, and the dish thus prepared is stated to resemble kous-kous. The grain is also made into a pudding with the usual condiments, and eaten either hot or cold with milk; the Scotch residents sometimes dressing it as milk-porridge. Mr. Clarke is of opinion that if the fundi grain were raised for exportation to Europe, it might prove a valuable addition to the list of light farinaceous articles of diet in use among the delicate or convalescent."

Subsequently it was noticed by Dr. A. Chevalier in "Une Mission au Senegal" (1900), 241. He identified it with *Paspalum longiflorum*, Retz, and gave "Fonio" as the native (Bambara) name. According to him it is cultivated almost all over the French Sudan, in Upper Gambia, Upper Casamance and Fouta-Djallon. The yield is small, but the taste so pleasant that even Europeans relish it. Pobéguin (Essai s.l. Flore de la Guinée Française, 1906, p. 215) also records it as cultivated all over French Guinea, and on the label of a specimen collected near Kouroussa (Upper Niger) he even calls it the principal food of the natives. Dr. Kersting observed it in cultivation in Togoland. In 1904 Kew received specimens of it from the late Mr. W. R. Elliot from Northern Nigeria, with a note to the effect that the plant was cultivated at Loko, Nassarawa, and the seeds "eaten made into porridge." The native name given was "Acha." In 1911 it was sent in by Mr. C. C. Yates from the Niger Province, and last year by Mr. P. H. Lamb from Zaria, with the statement that "Acha" was sown broadcast as a field crop in the Hausa States. He has since informed us that it is even more largely cultivated by the Pagan tribes who inhabit the Bauchi Plateau at an altitude of 4000 ft., where the soil is, for the most part, poor and sandy.

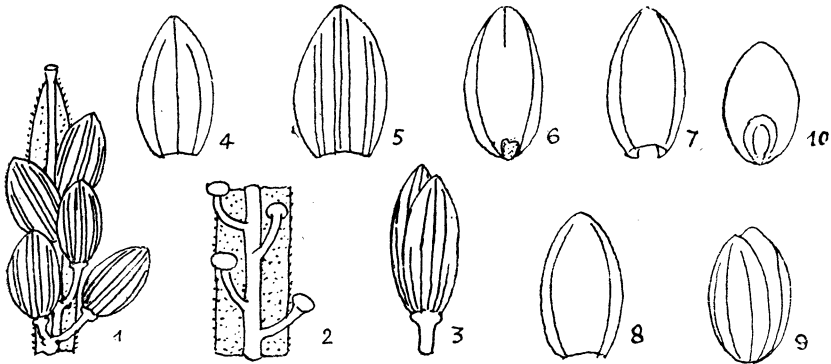
D. exilis approaches *D. longiflora*, Pers., very closely, and differs from it mainly in the perfectly glabrous and somewhat more turgid spikelets which, when mature, weigh on the average 0.53 mgr. (53,000 grains to the ounce). Well-developed racemes may contain up to and even over 200 spikelets, and there are usually 2-4 racemes to the head, so that one head may yield some 600 grains, which is well below the yield of Iburu. The very much more general use of Fundi, as compared with Iburu, suggests some advantages in favour of the former which are, however, not apparent from the meagre material at hand. The close resemblance between *D. exilis* and *D. longiflora* points to *D. longiflora* as the ancestral wild form of *D. exilis*, but more extended investigation is necessary before this hypothesis can be accepted as proved. *D. longiflora* is widely distributed throughout the tropics of the Old World, but is apparently rare in Upper

Guinea. *D. exilis*, on the other hand, is only known in the cultivated state from the area indicated above.

The following is a description of "Fundi."

***Digitaria exilis*, Stapf.**

Annual, over 0.5 m. high. *Culms* glabrous, erect or geniculate-ascending, simple or sparingly branched from below, with 5-8 nodes, nodes constricted, mostly shortly exerted from the sheaths, uppermost internode long exerted. *Leaf sheaths* tight, or the lower and intermediate somewhat loose and slipping off the internodes, striate, glabrous, smooth, the lower more or less keeled; ligules membranous, rounded, broad, up to 2 mm. long; blades linear, gradually attenuated to an acute point, 0.5-1.5 cm. by 3-7 mm.; flat, glabrous, midrib slender, primary side nerves 3-4 on each side. Racemes 2-4, digitate, sessile or subsessile, or



D. exilis. Fig. 1, part of raceme $\times 6$; 2, part of rhachis, spikelets removed $\times 8$; 3, spikelet; 4, upper glume; 5, lower valve; 6, upper valve with valvule of lower floret in front (the middle nerve should have been shown thinning out towards the base); 7, upper valve, back view (the side nerves are too much emphasized, and the middle nerve is omitted); 8, valvule; 9, fruiting spikelet; 10, seed. Figs. 3-10 $\times 10$.

the terminal shortly peduncled, 5-12 (rarely 14) cm. long, slender, pale green in flower; rhachis flat, 0.5 to almost 1 mm. wide, green, margins scabrid, midrib rather stout, whitish, very slightly convex and smooth on the back, more or less raised, rounded and almost smooth, or very sparingly and minutely pubescent on the face; pedicels paired or (upwards always) solitary or, towards the base, approximate in groups of 3 or 4, flexuous, terete, with the tips discoid, from less than 0.5 to 1 mm. long, whitish, smooth, or sometimes very sparingly and minutely asperulous or pubescent. *Spikelets* subimbricate when in flower, elliptic-oblong in outline, acute, 1.75-2 mm. long, pale green, quite glabrous, flat on the abaxial face. *Glumes* very different; the lower delicately hyaline, nerveless, very minute or almost suppressed, the upper broad-oblong, obtuse or subobtuse, hyaline between the 3-5 percurrent green nerves, slightly shorter than the spikelet. *Valve* of lower (barren) floret elliptic, subobtuse, as long as the spikelet, thin, hyaline between the seven raised percurrent green nerves, which are parallel and equally distant, or more often the three

inner and the two outer on each side slightly more approximate, usually all connected by transverse bars close below the hyaline tips; accompanying valvule almost microscopic, square, papillose; valve of upper (fertile) floret thinly papery, equalling the spikelet, acute, embracing the very similar valvule almost entirely, shining, faintly 5-nerved. *Stamens* 3. *Stigmas* dark purple, shortly exerted from near the tip of the spikelet. *Grain* oblong-ellipsoid, slightly flattened on the back, 1 mm. long, white, smooth and shining, tightly enclosed by the slightly indurated brown husks; scutellum ovate-elliptic, not quite reaching to the middle of the grain. *Digitaria longiflora*, Mission au Senegal, 241, non Retz. *Paspalum exile*, Kippist in Proceed. Linn. Soc. i. 157, 16.

SIERRA LEONE. Without precise locality, *Afzelius*, *R. Clarke*, *Schön*.

FRENCH GUINEA. San, *Chevalier* 2217; Koroussou, *Pobéguin* 490.

TOGOLAND. Difalu, *Kersting*.

NIGERIA. Nassarawa, *Elliot* 195; Zaria, *Lamb* 53; Niger Province, *Yates* 29.

XXXIX.—DIAGNOSES AFRICANAE: LXIV.

1551. *Passerina Galpini*, *C. H. Wright* in *Dyer*, Fl. Cap. vol. v. sect. 2, p. 10, anglice [Thymelaeaceae-Euthymelaeaceae]; affinis *P. filiformi*, Linn., foliis subcylindricis, bracteis transverse oblongis calyceque glabro differt.

Rami breves, glabri. *Folia* conferta, subcylindrica, leviter incurvata, 6 mm. longa, 1 mm. diametro, glabra, nitida. *Flores* ad ramorum apices aggregati; bracteae transverse oblongae, 5 mm. latae, scariosae, basi intus lanatae, apice in lobum crassum subulatum obtusum 2 mm. longum producto; bracteolae 0. *Calyx* glaber; tubus anguste ovoideus, 3 mm. longus, 1 mm. diametro parte inferiore; lobi 3 mm. longi, 2 mm. lati, ovati, concavi, obtusi. *Stamina* longiora 3 mm. longa; antherae obtuse cordatae, 1 mm. longae. *Ovarium* oblongum, glabrum; stylus calycis tubo paullo longior; stigma penicillatum.

SOUTH AFRICA. Riversdale Div.; Milkfontein, 183 m., *Galpin* 4491.

1552. *Passerina laniflora*, *C. H. Wright* in *Dyer*, Fl. Cap. vol. 5, sect. 2, p. 11, anglice [Thymelaeaceae-Euthymelaeaceae]; *P. paleaceae*, Wikstr., calyce lanato differt.

Planta lignosa; rami plures, breves, apice pilosi. *Folia* stricte quadrifaria, oblonga, paullo incurvata, obtusa, glabra, 4 mm. longa, 0.5 mm. lata. *Flores* ad ramorum apices aggregati; bracteae ovatae, 3 mm. longae; bracteolae 2, crasse triquetrae, 3 mm. longae. *Calyx* dense lanatus; tubus subcylindricus,