BLUMEA 21 (1973) 1—80

A REVISION OF DIGITARIA HALLER (GRAMINEAE) IN MALESIA

NOTES ON MALESIAN GRASSES VI

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'...a material stronger than armor: Crabgrass'
(B. Parker & J. Hart, The King is a Fink, 1964)

CONTENTS

SUMMARY

In this paper a revision is given of the Malesian species of the Crabgrasses, or *Digitaria* Haller (*Gramineae*). The research was done at the Rijksherbarium, Leyden, while many other Herbaria were shortly visited; some field work was done in Indonesia, Australia, and Papua-New Guinea.

The foundation for the study in this large and cosmopolitan genus must be Henrard's monumental work 'Monograph of the genus Digitaria' (1950), which is therefore extensively cited and discussed.

Henrard based his division in sections, 32 in the subgenus *Digitaria*, with an emphasis on the amount of spikelets per grouplet and the various types of hairs, but such a subdivision appears difficult to maintain. As only part of the species of *Digitaria* occurs in Malesia, not representing all sections, a new infra-generic system can not be given. As far as the sections present in Malesia are concerned, it appeared that the *Biformes*, *Horizontales*, and *Parviglumae* had to be united with the section *Digitaria*, the *Remotae* and *Subeffusae* had to be merged into one, the *Remotae*, while the *Atrofuscae* had to be included, at least partly, in the *Clavipilae*, here renamed *Filiformes*. The subgenus *Solitaria* is better regarded as a section of the subgenus *Digitaria*.

The distinction between annual and perennial in the everwet tropics poses a problem; these conceptions have been maintained, but on a more clearly defined basis.

In the region studied 27 species occur, 3 of which are new to science; 25 species are indigenous, 2 are introduced and established; in the key 4 more species have been taken up, which were introduced only once, but have probably vanished. One subspecies and one variety are distinguished, both under a new name. All taxa were also studied for their extra-Malesian distribution; from the resulting synonymy it appeared

that about 52 species recognized by Henrard could be reduced to 24. The genus is estimated to contain about 170 species instead of about 325.

Finally, some species are discussed which were said either to occur in Malesia or to belong to *Digitaria*, but for which one or the other of these suggestions proved to be false. Of these taxa two species and one variety were given a new name, while one new variety could be described.

GENERAL INTRODUCTION

When I was appointed at the Rijksherbarium, Leyden, to study the *Gramineae* of Malesia, I was in one way fortunate to find an almost finished manuscript by the late Dr. P. Jansen, who treated about 650 species occurring in the area. Some of my colleagues had started to prepare it for publication, but were forced to give this up because its size and their other activities did not agree. Mention must be made of Dr. J. Kern, Mr. Ch. Monod de Froideville, and Dr. C. G. G. J. van Steenis, to all of whom I express my thanks for their tuition, discussions, help, and friendship.

When I started with my studies it was suggested to me to tackle a fairly large genus of which a recent revision was available in order to get acquainted with Jansen's work and with grasses in general. *Digitaria*, reportedly with 32 species in the region, seemed a good object, especially since it had been revised by my predecessor at the Rijksherbarium, Dr. J. Th. Henrard, whereby a good number of important specimens would be available immediately. It became soon apparent, however, that merely checking descriptions, filling in recent literature, and other editorial work would not be sufficient and a thorough treatment was undertaken, the results of which are presented in this paper.

Henrard's 'Monograph of the genus Digitaria' (1950)*) will stand for a long time as the foundation of any work on the genus. It is therefore in the following referred to by page only and a short discussion seems in place to show its importance and its weaknesses.

Such large monographs are becoming a rarity in taxonomy, as there seems to be a tendency to spend an amount of time on a genus in reverse relation to its size, whereby the larger ones, and therefore the ones giving the greatest problems, remain neglected and in confusion.

As in his previous studies of *Aristida* (1926—1933; 1929—1933) Henrard's chief purpose was to typify all names ever published in *Digitaria*, to examine, evaluate, and figure the type specimens in order to be able to name all specimens readily at hand. On this basis a subdivision of the genus could be composed and a key to the species and infra-specific taxa prepared.

In the published work all names, accepted or not, are arranged alphabetically, for each the basionym, when present, and some homo- or heterotypic synonyms (but not all!) are given, and the text of the original description(s) is/are copied. When possible a spikelet of the type-specimen is depicted (magn. × 20), and notes, critical remarks, additional descriptions, and comparisons with related taxa are given. Thus the main bulk of the work consists of bibliography and typology. As the type-setting of the manuscript was started during the last World War, an appendix became necessary for the names which were published during that period, but became available to him only after the Liberation. At the end keys are given to the 4 subgenera, the 32 sections, the *ca.* 325 species, and the infra-specific taxa; in these keys the actual descriptions of the taxa are built in.

The absence of a general index makes it hard to unearth the information laid down in this book, especially since the author occasionally changed his mind about nomenclature,

*) Henrard (1950); when only a page number is cited, reference is always made to this publication.

taxonomic status, or position, without noting this under the taxon concerned. Very often, important descriptions and comparisons are given under little related taxa, which information is then only stumbled on accidentally.

The foundation of the book was laid in the period that the type method in plant taxonomy was strongly advocated by some American agrostologists, mainly A. S. Hitchcock and Miss Agnes Chase; this apparently greatly influenced Henrard's method and thought. From this it can be explained why so much stress is being placed on type specimens, whereby the other, nomenclaturaly less important collections are relatively neglected. Hardly ever are extensive descriptions given, showing the variability, and when they are present, they cannot be compared with others. Even in the keys, odd mixtures of important characters and irrelevant remarks are given. It is regrettable that the keys are not too well compared with the descriptions, whereby species may be keyed out on characters which in the keys to their section are explicitly declared to be absent. E.g. *D. maniculata* Stapf and *D. patagiata* Henr. with binate spikelets are placed in sect. *Verrucipilae* ('spikelets always ternate', p. 852), *D. didactyla* Willd., *D. mezii* Kanehira, and others with cataphylls are considered to belong to sect. *Sanguinales*, although the key (p. 860) defines these as 'Culms not thickened at the base, without cataphylls', etc.

In the delimitation of sections too much importance is often attributed to a certain number of characters which unfortunately prove to be not so stable and unequivocal as thought by Henrard, as will be shown in the relevant chapter (p. 12).

As far as the delimitation of species and infra-specific taxa is concerned, Henrard and I are frequently at odds. He has a tendency, which he admits (p. 841), to recognize 'small' taxa, which, in view of the often scarce material, may be a wise thing. On the other hand such taxa may be expected to be the extremes of a range of sympatric variability or the result of geographical distributional patterns.

Henrard based his conclusions and interpretations on the application of Vavilov's Law of homologous series in variation (1922), by which it is suggested that variations of the same nature should be given equal rank. Henrard thus called all taxa with bristled sterile lemmas ('pectinate') parallel subspecies, disregarding the genetical background of which he was occasionally aware (see also under Infra-specific taxonomy and genetics, p. 17).

It is, of course, always difficult to decide where taxonomic lines should be drawn for specific and infra-specific distinction, but I have tried to apply this rule: when forms are connected by numerous intergrading specimens and so no character on which they can be divided is correlated by another, these forms are considered to belong to a single taxon, although specimens of the extremes of the range of variability can easily be recognized. In following this rule I have in several cases united a considerable number of taxa kept separate by Henrard and other botanists. Not all will therefore agree with the course I have taken. Such differences are to be expected in complicated situations as these, which made even Hooker *f.* (1896) write in exasperation, when he tried to sort out what he called *Paspalum sanguinale* Lamk.: '... as to the result, I am satisfied that no two botanists working independently over the same materials would arrive at the same (results), or agree in any other...' and indeed, his and Henrard's and my interpretation differ considerably.

Jansen recorded 32 species for Malesia, of which one was once cultivated; the 31 others I reduced to 22, adding 3 new ones and 2 recently introduced and established ones. As it was impossible to delimit the species without studying them also from extra-Malesian localities, several thousands of specimens had to be examined, with the pertaining literature. It appeared from this, that about 52 species recognized by Henrard had to be reduced to 24. Taking into account undescribed species, the genus can be estimated to have some 170 species, instead of the 325 suggested by Henrard.

Most of the work on this revision has of course been done at the Rijksherbarium, Leyden, but in the course of the research I was fortunately able to visit several other Institutions and/or could have important material sent to me for closer scrutiny. I wish to express my gratitude to all the Directors and their staff-members who showed me their hospitality and gave me free use of their facilities, while the discussions I had with many of them were important in formulating the final results given here. I personally visited the following Herbaria; the abbreviations given here and elsewhere are after the Index Herbariorum, ed. 5 (1964).

B	Botanisches Museum, Dahlem, Berlin
BM	British Museum (Natural History), London
BO	Herbarium Bogoriense, Bogor
BRI	Queensland Herbarium, Indooroopilly
CANB	C.S.I.R.O., Division of Plant Industry, Canberra
K	Royal Botanic Gardens, Kew, Richmond
LAE	Department of Forests, Division of Botany, Lae
NSW	National Herbarium of New South Wales, Sydney
P	Muséum National d'Histoire Naturelle, Laboratoire de Phanérogamie, Paris
PR	Botanické oddělení Národního musea, Průhonice
PRC	Botanický ústav Karlovy University, Prague
U	Botanisch Museum en Herbarium, Utrecht
W	Naturhistorisches Museum, Botanische Abteilung, Vienna

Material was received on loan only from the following institutions:

C	Botanical Museum and Herbarium, Copenhagen
G	Conservatoire et Jardin Botanique, Geneva
LD	Botanical Museum, Lund
SING	Botanic Gardens, Singapore
US	United States National Museum, Department of Botany, Washington, D.C.
WAG	Laboratorium voor Plantensystematiek en -geographie, Wageningen

Finally I was very fortunate to be able to study some species in the field during an expedition in the summer of 1972, which took me to Australia, the Territory of Papua & New Guinea, and Indonesia.

As the figures given by Henrard are present in Leyden by their originals prepared by our former draughtsman Mr. J. Biegelaar, some of these could be used. Additional ones were prepared in an excellent style by Mr. J. H. van Os, thus showing the continuous presence of botanical draughtsmanship with which our Institute is blessed.

In similar papers as these Miss E. E. van Nieuwkoop is always extensively praised for her typing and correcting of the manuscripts and indeed without her ability to finish a manuscript swiftly, faultlessly, and still cheerfully, publications of the Rijksherbarium would never be as well prepared.

Last but not least I want to thank Dr. C. G. G. J. van Steenis, not only for his stimulating interest in the Malesian *Gramineae*, but especially for the guidance, positive criticism, intellectual pressure, and general example, through which I and so many of his other students will always remember him as a, if not the, major factor in the appreciation and enthousiasm for our '*scientia amabilis*'.

NOMENCLATURE

Although the interpretation of the generic name *Digitaria* has recently not been in doubt, this has not always been so, while it appears that the name is invalid.

The name was first used by the pre-Linnean author Heister (1748), who preferred Latin

names over Greek ones, and proposed it for *'(gramen) dactyloides, vel dactylites'* (l.c., p. 45). He does not refer to an author for these names, Rothmaler's addition 'Raii' (1944), is therefore wrong. In his book Heister proposed a Systema '...trium Legionum sive familiarum, quamlibet rursus distribuo in Classes, Classes in ordines, Ordines in genera, Genera in species, & has in varietates.' (l.c., p. 3). He gives a rough key to the genera, which in our case leads to *'Digitaria, H. Dactylis Royeni, Mannaria (pro gramine mannae).'* (l.c., p. 12). These three names refer to three different genera, and are not synonyms, for these are, when given, always placed between brackets, as for *'gramen mannae'*. The genera are not further described.

'Gramen mannae' was a name usually applied to the cultivated forms of *Digitaria sanguinalis* Scop. and Heister created a special genus for it, separate from his *Digitaria*. What then was his concept of the latter? It seems to be different from the contemporary one.

Rothmaler's reference to Ray may be a correct interpretation of Heister's intentions, but it cannot be proven. Ray (1688, 1704; 1703) distinguished a heterogenous group of grasses as *'Dactyloides seu Ischaemum'*, which is a medley of a number of genera and about 45 species, of which are of importance to us *Digitaria sanguinalis* (as no. 1 and 2 of the Methodus of 1703), *Tripsacum dactyloides* Linné (no. 8), and *Paspalum virgatum* Linné (no. 27). Trinius, in this survey of pre-Linnean grass names (1822), cited *'Dactyloides indica perennis, spica articulata* Zannon.' (l.c., p. 120), which is *Tripsacum dactyloides*, *'Gramen dactyloides radice repente* Ger.', which is *Cynodon dactylon* Pers., and *'Gramen dactyloides, spicis deorsum aristatis* Burm.', which is *Eleusine indica* Gaertn.

The returning occurrence of *Tripsacum dactyloides* as one of the interpretations of *'Dactyloides'* makes it plausible that this is what Heister had in mind. A similar conclusion was reached by Adanson (1763), who equated *Digitaria* Heist. with *Tripsakum* Linné (!) and choose the first name, it being the oldest.

'Dactylis' as used by Van Royen (1740), is a mixture of *Paspalum virgatum, Brachiaria reptans, Paspalum conjugatum* Berg, and *Beckmannia erucaeformis* Host. This genus is therefore not identical with that of Linné (1753), although the latter suggested it is.

The first post-Linnean author to take up *Digitaria* again is Heister's successor Fabricius, who, following his Systema, enumerated the plants in the botanical garden of Helmstad (1759). A key, similar to Heister's is given, leading to 'DIGITARIA Heister. *Dactylis* Rai. *Gramen dactylon majus, panicula longa spicis pluribus nudis crassis* Sloane.' (l.c., p. 217).

Contrary to the situation with Heister, the names following *Digitaria* are not separate genera or even species, but synonyms, as is stated in the introduction: 'Utplurimum & ubi id fieri potuit, aut necessarium fuit, Synonyma significantiora adjeci, in quibus vero plantis vel minimum dubium superfuit, sola nomine Heisteriana vel illa, sub quibus quondam missae fuerent, adhibui...' (l.c., fifth page).

It has been suggested that *Digitaria* was validly published here as a genus (Dandy, 1967; Rauschert, 1968) with a *'descriptio in clavi'*. A closer inspection, however, shows that Fabricius actually enumerated species only, although they were listed according to genera, for which no descriptions are given. Whenever only one species was present, Fabricius usually confined himself to an uninomium, when there were more, non-binomial names were given.

As there is no description and because synonyms are given, art. 42 of the Code (*descriptio generico-specifica*) cannot be applied, as it is *not* a new species. Nor does art. 41 fit, for, although a reference is given to a previously published generic name, Heister's interpretation is insufficiently clear. And even, if one accepts that it is Ray's group, what is its type species? Not *Digitaria* in our sense, as that was excluded by Heister as *Mannaria*,

nor *Tripsacum*, for Fabricius gives as synonym a reference to a plant of Sloane, which was taken up by Ray, Van Royen (as *Dactylis*), and Linné (1759) and which is *Paspalum virgatum*. Linné's Systema is probably published somewhat earlier than Fabricius' Enumeratio.

The first synonym given by Fabricius is clearly a misprint, referring either to Ray's group or Van Royen's *Dactylis*. In both cases *Paspalum virgatum* remains the type.

Fabricius, however, deleted the reference to Sloane in the second edition of his work (1763) and replaced it by '*Gramen ischaemon Plinii* Clus. H. CCXVII. Tabern. Ic. 222. *Panicum spicis aggregatis, basi interiore nodosis, flosculis geminis muticis, vaginis foliorum punctatis* L. Sp. 8?' These three synonyms all refer to *Digitaria sanguinalis* and the interpretation of *Digitaria* has been stable since. But *Digitaria* was still not validly published for the genus as we know it now.

Adanson, presumably earlier in 1763 (Stafleu, 1967), used *Digitaria* Heist. for *Tripsacum* Linné, providing a description; his name is of course superfluous. All later uses of *Digitaria* are therefore actually illegal.

Haller (1768) gave a description of *Digitaria* Heister & Adanson, but in fact rejected Adanson's interpretation. He used the name in the sense of Fabricius (1763), including two species, but not giving them binomia, *Digitaria sanguinalis* and *Cynodon dactylon*. He is the first to give a generic description of *Digitaria* which is somewhat applicable to the genus in its current sense. Art. 48 therefore applies here and *Digitaria* Hall. should be conserved.

Scopoli (1772) did not give a generic description, but referred to '*Digitaria* Heist. Adans. Hall. Hist. II, p. 244'. He was the first to use binomia for the species, calling them *Digitaria sanguinalis* and *D. dactylon*.

Persoon (1805) distinguished for these two species two separate genera, retaining *D. sanguinalis* in *Digitaria* and placing *D. dactylon* in the new genus *Cynodon*. The generic description used by him was taken from notes by L. C. M. Richard, who is duely cited, but who cannot be considered as a co-author or contributor to Persoon's Synopsis. Because no reference is made to prior authors, *Digitaria* may be regarded as a new genus with an original description, as suggested by Rauschert (1973), but the use of the same name and the inclusion of *D. sanguinalis* make this suggestion hardly acceptable.

Some authors, realizing that *Digitaria* Fabricius was invalid and impossible to use because of Adanson's publication, have searched for an other synonym.

Sanguinella Gleichen (1764) must be rejected as a uninomium for *Digitaria sanguinalis*.

Valota Adanson (1763) cannot be used, as it is a *nomen rejiciendum*, while many authors have considered it to be a genus distinct from *Digitaria*.

The first name available is therefore *Syntherisma* Walt. (1788), which name was therefore temporarily used by a number of authors (e.g. Nash, 1895, Chase, 1906, and others) before it fell into disuse again.

It is therefore necessary to conserve the generic name *Digitaria*, as was already proposed twice (Hitchcock, 1927; Rauschert, 1969, 1973) and officially rejected once (Pichi Sermolli, 1954) without any reasons given. Rauschert's latest proposal should be rephrased, appointing Haller as the author. The type species is of course automatically *D. sanguinalis*, as it is the only one of the two species recognized by Haller retained in *Digitaria* by Persoon.

TAXONOMIC POSITION

Digitaria has always been considered to be related to *Panicum* Linné and *Paspalum* Linné, the individual species having been placed in the past now in one, then in the other genus.

Miss Chase (1906) pointed out the existence of a small group of genera within the

Paniceae, which differed from the others by their 'cartilagineous-indurated (not rigid) papillose' fertile florets with 'lemmas and paleas alike in texture; the lemmas with ... hyaline margins not inrolled'. Stapf (1917) created the subtribe *Digitariinae* ('*Digitariastrae*') for the African representatives of this group, using the same characters, while Jacques-Félix (1962) divided this again in two '*séries*', placing the genus in the *Digitariastrae*. Butzin (1970; 1972) enlarged Stapf's concept, including part of the latter's *Paniciinae* ('*Panicastrae*'), in which he also recognizes a group with 'mangelnde Verhärtung der Deckspelze mit scharf eingefälteten Rändern', but refrained from giving them a special status or name.

Miss Chase furthermore distinguished *Valota* Adans. (= *Trichachne* Nees) and *Leptoloma* Chase from *Syntherisma* Walt. (= *Digitaria*). Henrard demonstrated convincingly that these genera are only artificially separated. Hsu (1965) also, following Chase's concept, found neither differences in the characters of the epidermis of the fertile lemma, the structure and the position of the lodicules, nor in the shape of the style-bases. The only representative of *Trichachne* introduced in Malesia, *T. insularis* (Linné) Nees, is therefore included here in *Digitaria*.

MORPHOLOGY

Bor (1955) has given an extensive survey of the morphology of the Indian species and in general not much needs to be added. Some points will therefore be discussed in the following.

Habit. In agrostology much stress is laid upon the length of life of the individuals of a species. However, in the rather monotonous environment of the everwet tropics of Malesia, where most species of *Digitaria* grow, distinct seasons are absent and terms as 'annual' or 'perennial' can hardly be applied. Moreover, cultivating experiments and field observations showed plants generally considered as 'annuals' to live considerably longer than one year. Nevertheless, I have maintained these descriptive terms, using the following definitions.

'True' 'annuals' are found in the drier parts of the regions, e.g. *D. abludens* Veldk.; they are more or less erect, not rooting in the lower nodes ('runners'), without stolons, rootstocks, or cataphylls. 'Annuals' are most of the other species; these have a rather loose, sprawling or matforming habit, rooting in the lower nodes of decumbent culms and often vegetatively propagating from these points, or with stolons, but never with cataphylls. 'True' 'perennials' have cataphylls and may have runners (*D. didactyla* Willd.), but are usually erect with rootstocks or stolons. These species are found in the probably natural savannah regions of New Guinea (*D. ramularis* Henr., *D. tararensis* Henr.) or in the obviously man-made savannah of the Markham Valley (*D. insularis* Ekman).

An interesting situation is present in *D. longiflora* Pers., where there are apparently a number of races, some of them creeping mat-forming annuals and others erect perennials with rootstocks and cataphylls. All intermediates may be found. For a more extensive discussion see under the species (p. 66).

Indument of the vegetative parts. The hairs on the sheaths, leaves, and peduncles of sect. *Verrucipilae*, which according to Bor are of the same type as those found on the spikelets, are very often quite normal with smooth walls. Sometimes hairs are found with a much thickened base, e.g. on the sheaths, in the throat of the leaf-blades, etc. These are called 'bulbous-based bristles', contracted to 'bbb'.

Rachis. Stapf (1919) used the difference in the shape of the transverse section of the rachis of the raceme in the delimitation of his subsections; this feature is generally neglected by later authors. There are two basic types, one, as found in *D. ciliaris* Koel., where the

midrib is accompanied by broad wings along the sides, each usually as broad as the midrib itself, while the midrib between the spikelets is also winged, be it less widely; the other, as in *D. abludens*, where the rachis is mainly made up of the midrib and some surrounding tissue, more or less triquetrous in transverse section, and with narrow keels along the edges. The only case where both types are found in the same section is in sect. *Clavipilae* which probably is not a homogeneous group.

These wings or keels are usually bordered by small triangular silica bodies, also found along the edges of the leaf-blades or on the nerves; these are called 'spicules'.

Bbb may be present in the lower parts of the racemes, usually near the base of a grouplet of spikelets. As pointed out by Bor they are hardly ever reliable in the distinction of a species, let alone of a section, as they may be suppressed, while specimens of species purportedly without them may occasionally show development of some hairs.

Pedicels and spikelets. Only in subg. *Solitaria* are there exclusively subsessile spikelets present, in all other species at least one spikelet of each grouplet has a reasonably well-developed pedicel. In depauperate specimens this may be the only one developed, vestiges of the others are then usually found at the base of the pedicel as small scales or buds. Therefore, *D. abortiva* Reeder does not belong to the *Solitaria*, but in fact its type is a depauperate specimen of *D. ciliaris* Koel., and the specimen used by Henrard for his figure was a poor *D. setigera* R. & S.

In all other species the spikelets are usually placed in grouplets of two ('*Binata*') or three ('*Ternata*'), or with more together (for example in some cultivars of *D. sanguinalis* Scop.), representing reduced side-branches. Sometimes there is a gradual transition between side-branches and grouplets, as is shown by *D. monodii* Veldk. and less so in *D. abludens*. The terminal spikelet of a side-branch is apparently the longest pedicelled spikelet, which flowers first and drops off earliest.

In the '*Ternata*' species spikelets may appear solitary occasionally, when the pedicel of one spikelet is adnate to the midrib. It can then always be traced to a lower situated grouplet.

Pedicels are usually provided with minute spicules, in *D. longiflora* and *D. mollicoma* Henr. these are usually absent, which then distinguishes them from *D. violascens*. In *D. ternata* Stapf the spicules under the abscission of the spikelet are elongated and hair-like, forming a coronula.

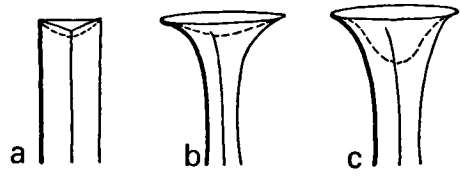


Fig. 1. Abscission of the pedicels. — a. truncate. — b. discoid. — c. cupuliform.

This abscission, best seen after the spikelet has fallen off, seems of taxonomic value. With Stapf two types may be distinguished: in one the pedicel ends abruptly and truncately (e.g. in *D. ciliaris*), in the other it is dilated and disk-like to concave ('cupuliform') (e.g. in *D. abludens*).

Indument of the spikelets. Two major types of hairs can be distinguished with a lens and several more with a microscope. Stapf and Henrard placed considerable importance on these, as will be discussed in the next chapter (p. 12).

The basic type of hairs is fine, thin, acute, with smooth walls, 'normal', from which the

others may be derived (fig. 2). At first the hairs are appressed, at maturity, in fruit, they become patent and form by their usually adhering tips fringes on the sterile lemma and upper glume. The fertile floret is apparently always glabrous, except for *D. atra* Luces which is reported to have fringes of hairs on the back of the fertile lemma. The pubescense is usually restricted to certain areas, viz. the margins of the scales and, alternatingly, in the second interspace between the usually three nerves present on each side of the midnerve of the sterile lemma, but sometimes the scales are pubescent all over and one gets the impression that the amount and location of the pubescence is of little taxonomic importance.

The presence of indument has a marked influence on the nervation of the scales. When no or only a few hairs are present, the nerves are more or less equidistant, but when the density of the indument increases, some nerves approach each other and others become more distant, whereby an inequidistant nervation is obtained. In sect. *Sanguinales* the first interspace is then widest and the second very narrow, in the '*Ternata*' the first interspace becomes narrow and the second wide.

The indument is usually best developed on the pedicelled spikelet of each grouplet and the difference may become quite marked, which situation was called 'heteromorphous' by Henrard. As the actual shape of the spikelet is not changed, however, but the density of the pubescence and thereby the distance of the nerves, 'heterotrichous' would have been a better term.

In these heteromorphous spikelets the hairs are often mixed with some bristles, which are then usually found in the second interspace only. They originate from a thickened bulbous base, but are shorter and stiffer than the bbb. In youth they are appressed and obscured by the other indument, being pale and translucent. When the fruit matures they become patent and yellowish and protrude from the indument, which then usually coheres, as curved eye-lashes. This has been referred to by various authors as 'blepharate', 'bristled', 'pectinate' and unfortunately also as 'ciliate'.

The presence of bristles has an even more marked effect on the relative distance of the nerves and thus the heteromorphism of the spikelets. The genetic factors determining density of pubescence and presence of bristles apparently have an incomplete expression, as a gradation of heteromorphy along a single rachis can be observed. This results in several phases which individually may also be present exclusively on a whole rachis. This latter situation has caused the description of a number of taxa, ranging from sections to varieties! (Compare Table I.)

Theoretically the following sequence may be found, for example in *D. bicornis* R. & S. The most basal pairs of spikelets are homomorphous, entirely glabrous and equidistantly nerved, this is equivalent to the type found in *D. adscendens* ssp. *nubica* Henr. Somewhat higher up the pedicelled spikelet becomes pubescent and inequidistantly nerved, the pair becoming thereby heteromorphous (*D. biformis* ssp. *desvauxii* Henr., *D. bicornis* ssp. *gamblei* Henr., *D. queenslandica* Henr., *D. diversiflora* Swallen). The pubescence of the pedicelled spikelets then becomes mixed with the bristles, the sessiles may begin to show a little pubescence, if so, then also with inequidistant nerves (*D. bicornis* ssp. *lamarckiana* Henr., *D. biformis* ssp. *willdenowii* Henr., *D. adscendens* ssp. *chrysoblephara* Henr. *p.p.*, *D. diversiflora p.p.*). Finally all spikelets are bristled, inequidistantly nerved, and homomorphous (*D. adscendens* ssp. *chrysoblephara p.p.*). It will be obvious that on such a basis no separate taxa may be distinguished. In some cases one spikelet may even have the different 'types' on the two sides of the midnerve of the sterile lemma.

Microscopically in the '*Ternata*' a few types of hairs can be distinguished besides the 'normal' one and the bristles (see table II). Henrard noted the following ones: clavate

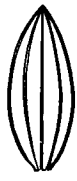
pedicelled spikelet / sessile spikelet			
	D.adscendens ssp.nubica	D.bicornis ssp.gamblei D.biformis ssp.desvauxii D.diversiflora D.queenslandica	D.adscendens ssp. chrysoblephara D.bicornis ssp.lamarckiana D.biformis ssp.willdenowii
		D.adscendens ssp.marginata	D.adscendens ssp. chrysoblephara D.bicornis ssp.lamarckiana D.biformis ssp.willdenowii
			D.adscendens ssp. chrysoblephara

TABLE I. The various combinations of non-pectinate and pectinate spikelets of *D. bicornis* and. *D. ciliaris* and their interpretation by Henrard (1950).

hairs (c-1, d-1) which have smooth walls and dilated apices shorter than the basal filiform part; corynous hairs (e) which have smooth walls and dilated apices longer than the filiform base; capitate hairs which have smooth walls and either pear-shaped elongated heads with truncate to flattened apices (c-2) or with minute flattened heads, resembling pins (d-3); calvous hairs (d-2) which have smooth walls and minutely dilated, but not clavate or capitate apices; cirrous hairs (a-2) which have smooth walls and acute apices, but which are crooked in the upper part; and, finally, verrucose hairs (b) which have very irregular walls and acute apices, often also crooked or curled at the top (b-2). Generally only one type of hairs is found in one species. Henrard recorded both verrucose and smooth hairs for *D. violascens* Link, but I have not observed this, nor has Bor, who also cited unpublished work by Metcalfe. Two types, verrucose and smooth, were observed in different plants of *D. mollicoma* Henr., with a slight correlation with spikelet size. Two types on the same spikelet were occasionally observed in *D. ischaemum* Muehl., clavate and non-clavate, but always verrucose (b1-3).

In *Paspalum*, capitate, clavate, and corynous hairs may also be found, apart from sessile

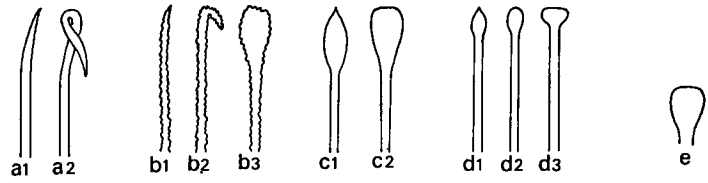
Sections (delimitation according to Henrard, 1950)					
	a1 a2	b1 b2 b3	c1 c2	d1 d2 d3	e
	long	long	long	long	short
	smooth	verrucose	smooth	smooth	smooth
	not dilated	not dilated (1,2)	much dilated	little dilated	much dilated
	straight(1) or recurved(2)	straight(1) or recurved(2) or dilated(3)	straight	straight	straight
	acute	acute(1,2) rounded(3)	apiculate(1) rounded(2)	apiculate(1) rounded(2) flattened(3)	rounded
Verrucosae	mollicoma(1)	mollicoma(1) ischaemum(1-3)			
Cirripilae	rivae(2)				
Clavipilae			abludens(1)	sparsifructus(1) ternata(2)	stricta
Capitipilae			maitlandii(2)	capitipila(3)	
Orthotrichae				panicea(1) argyllacea(1)	
Calvulae				fibrosa(2)	
Leianthae				curtigluma(2)	
Corynotrichae					bonplandii

TABLE II. Hairtypes in the '*Ternata*' and their distribution over the sections. — a1. 'normal'. — a2. cirrous. — b1—3. verrucose. — c1. clavate. — c2. capitate. — d1. clavate. — d2. calvous. — d3. capitate. — e. corynous. (For *Verrucosae* read *Verrucipilae*.)

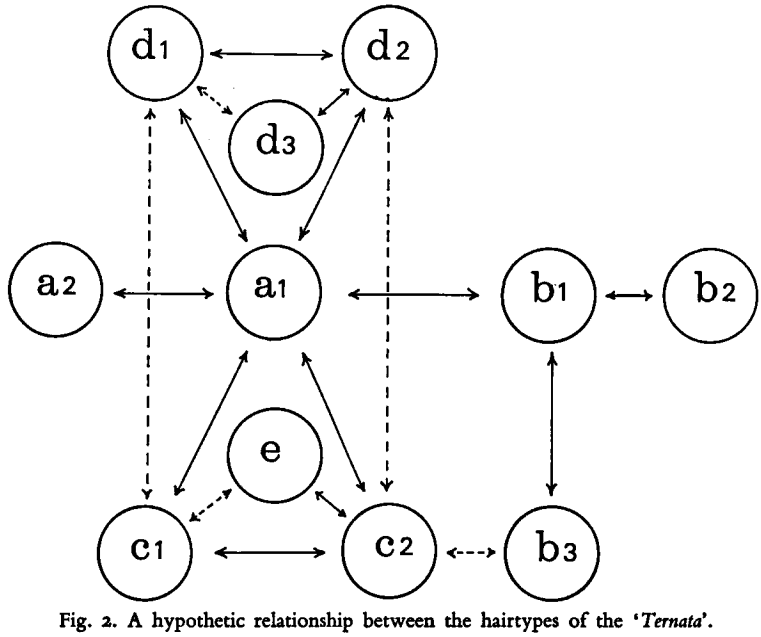


Fig. 2. A hypothetic relationship between the hairtypes of the '*Ternata*'.

globular hairs and raised papils which are both not known from *Digitaria*. The hairs on the spikelets of *Panicum* are always 'normal' (a-1).

Glumes. It is hardly safe to rely upon the relative sizes of the glumes alone for the delimitation of groups, although it may be of some value to distinguish species.

Two types of lower glumes may be distinguished, the first a small, usually triangular scale of the same texture as the upper glume and sterile lemma, the second a membranaceous, transparant, fragile collar, clasping the base of the sterile lemma, but not with overlapping margins on the adaxial side, as found in *Panicum* species.

Fertile floret. The texture of the scales and the margin of the fertile lemma have been briefly discussed in the previous chapter. The epidermal structure has been studied by Hsu (1965), who described deeply rippled or pitted longitudinal ridges and extremely narrow short depressions. In *Leptoloma* Chase, which he kept separate following Chase's generic delimitation (1906), the transverse ridges are thickened with a papilla arising from the back of the transverse ridges. In *Trichachne* Nees these papillae are swollen and convex and regularly arranged in longitudinal rows. These differences are of hardly any importance to justify the separation of three genera. The lodicules and styles, also studied by Hsu, are the same in all three.

INFRA-GENERIC TAXONOMY

It is nearly impossible to make a useful infra-generic subdivision in such a large, polymorphous genus as *Digitaria* because of the presence of obviously reticulately related species. A few attempts have been made, of which I will mention the following most important ones. As I have only studied a small part of the genus I am not in a position to give a better system, but I have endeavoured to make some critical observations.

Hackel (1901) suggested that the number of spikelets per grouplet was of significant importance, immediately adding that the resulting three groups were not entirely natural. Thus he obtained the 'series' *Solitaria*, *Binata*, and *Ternata*. He also pointed out the importance of the colour of the fruiting fertile spikelet, which is a character on the level of specific distinction.

Hooker *f.* (1896) casually remarked that there were various types of hairs, which suggestion was elaborated by Stapf (1919) as a criterion for the distinction of subsections in his revision of the species of tropical Africa. The latter also pointed out the importance of the shape of the rachis of the racemes and the abscission of the pedicels.

Henrard (1950) found both the number of spikelets and the type of hairs of great significance and based many of his sections primarily on these features. The system was taken over without comment by Bor (1955).

Inter alia it may be remarked that the presence of various hair types in *Paspalum*, though known to her, did not cause Miss Chase (1929) to distinguish 'groups' on that basis, nor is there any correlation between her 'groups' and the type of hair.

During my work on the Malesian species it appeared, however, that the infra-generic subdivision based on these characters by Henrard is unsatisfactory. It was found, on one hand, that species were accommodated in sections where they clearly did not belong, on the other hand that a number of sections could not be separated from each other satisfactorily. This is illustrated in the following critical discussion on the definition and delimitation of the sections to which the Malesian species belong. Their sequence is that of the species as treated in this paper. Sectional names in quotation marks indicate that these names are, or the status of the section is, questioned by me.

'Solitaria'. Spikelets solitary, subsessile. *D. mariannensis* Merr., *D. jansenii* Veldk.

TABLE III Classification of the Malesian species of Digitaria Haller

According to Henrard (1950) (Epithets according to Veldkamp, 1973)	According to Veldkamp (1973)
Subgen. Solitaria: (D. jansenii), D. mariannensis	Subgen. Digitaria sect. Solitaria: D. jansenii, D. mariannensis
Subgen. Eu-digitaria	
'group' Binata	
sect. Biformes: D. bicornis	sect. Digitaria: D. bicornis,
sect. Sanguinales: D. ciliaris, D. didactyla, D. eminens, D. radicosa	D. ciliaris, D. didactyla, D. eminens, D. nuda D. radicosa, D. setigera
sect. Parviglumae: D. setigera	(D. perpusilla in sect. Ischaemum)
sect. Horizontales: D. nuda, D. perpusilla	
sect. Heteranthae: D. heterantha	sect. Heteranthae: ? D. divaricatissima, D. heterantha
sect. Pennatae: D. divaricatissima	
sect. Trichachne: D. insularis	sect. Trichachne: D. insularis
sect. Remotae: D. wallichiana	sect. Remotae: D. junghuhniana, D. wallichiana
sect. Subeffusae: D. junghuhniana	
sect. Erianthae: D. milanjiana, D. pentzii, D. smutsii	sect. Erianthae: D. milanjiana, D. pentzii, D. smutsii
'group' not indicated	
sect. Parviflorae: D. ramularis, D. tararensis	sect. Parviflorae: D. ramularis, D. tararensis
'group' Ternata	
sect. Clavipilae: D. abludens, (D. henrardii, D. monodii), D. sparsifructus, D. ternata	sect. Filiformes: D. abludens, D. henrardii, D. monodii, D. sparsifructus, D. ternata
sect. Atrofuscae: D. fuscescens	sect. Ischaemum: D. fuscescens,
sect. Verrucipilae: D. longiflora, D. mollicoma, D. philippinensis, D. pusilla, D. violascens	D. longiflora, D. mollicoma, D. perpusilla, D. pusilla, D. violascens

The fact that Henrard raised this group to that of a subgenus shows the importance he placed on the amount of spikelets per grouplet. It seems, however, a group derived from the *Parviflorae* and would better be regarded as a section, sect. *Solitaria* (Hack.) Ohwi of the subgenus *Digitaria*.

'Eudigitaria'. In this subgenus the spikelets are binate or ternate; pedicels without a coronula or with a coronula much shorter than the spikelet.

Hackel's 'series' '*Binata*' and '*Ternata*', called groups by Henrard and placed without status above the sections, are included here. Henrard distinguishes within this subgenus 31 sections, 11 of which are represented in Malesia. The correct name of this subgenus is of course *Digitaria*, as it includes the type species *D. sanguinalis* Scop.

'Biformes'. Spikelets binate, distinctly heteromorphous, otherwise as the '*Sanguinales*', but 'of such a limited geographical distribution, that, notwithstanding the similarities, they must be accepted as members of a small separate section.' (p. 978). *D. bicornis* R. & S.

As is shown in the paragraph on the indument of the spikelets, heteromorphy must be used with great caution. That it cannot be used to delimit a section upon, exclusively, is inadvertently shown by Henrard himself, who described a number of taxa in the '*Sanguinales*' with exactly the same features, e.g. *D. acuminatissima* Stapf, *D. adscendens* Henr., *D. ctenantha* Hughes, *D. queenslandica* Henr., and *D. sanguinalis*. Moreover, the two species of the '*Biformes*' are considered conspecific by me and are closely related to *D. sanguinalis*. Sect. *Biformes* must be reduced to sect. '*Sanguinales*' (= sect. *Digitaria*). The

name cannot be used, anyway, as there is an older one available, viz. *Heterosyntherisma* (Honda) Ohwi, based on *D. barbata* Willd., a synonym of *D. bicornis*. The material included by Honda and Ohwi under that name belongs to *D. heterantha* Merr. of the section *Heteranthae* (q.v.).

The recognition of this section also shows the significance placed by Henrard on geographical distribution, which can hardly be used here, as *D. bicornis* R. & S. is much wider spread than indicated by him: it occurs in Central and South America also.

The statement by Henrard that the '*Biformes*' are restricted to the Old World possibly induced Swallen (1963) to describe the American representatives of *D. bicornis* as a new species (*D. diversiflora*).

'Sanguinales'. Plants not stoloniferous, without cataphylls (fide Henrard, but *D. didactyla* Willd., *D. doellii* Mez. *D. mezii* Kanehira, and others have the latter, as is also mentioned in the key!). Racemes two or more, closely spikeled to base, digitate or corymbosely whorled, or a few solitary along the common axis, when developed, and much longer than it. Rachis winged. Spikelets binate, essentially homomorphous (?), more or less pubescent, the hairs fine, acute, the apices not curled, with smooth walls, sometimes mixed with bristles (!). Lower glume well-developed, nerveless, triangular, acute, herbaceous. Upper glume 1/3—3/4 times as long as the spikelet. Sterile lemma not with many close-set nerves and slit-like interspaces. *D. ciliaris* Koel., *D. radicosa* Miq., *D. eminens* Backer (for which Steudel, 1853, made a monotypic section *Elytroblepharum*), *D. didactyla* Willd.

The correct name of this section is of course *Digitaria*, as it includes the type-species *D. sanguinalis* Scop.

As stated above heteromorphous spikelets are present in a number of species, in fact the presence of bristled spikelets, and thus possibly heteromorphy by implication, is considered a prime feature of the '*Sanguinales*' by Henrard himself, who repeatedly refers to Vavilov's Law of homologous series in variation (1922; 1949—1950).

As far as the relative sizes of the upper glumes are concerned, it has been observed that this is a character to distinguish species upon, but it is very variable and of little value in the distinction of sections. Actually, there is an obvious gradation from *D. sanguinalis* and *D. ciliaris* Koel. via *D. radicosa* Miq. into *D. nuda* Schumach. and then into *D. horizontalis* Willd. of the '*Horizontales*' and via *D. radicosa* and *D. nuda* to *D. setigera* R. & S. of the '*Parviglumae*'. These sections should therefore be included here.

'Parviglumae'. Said to differ from the '*Sanguinales*' by the absence of a lower glume and the presence of a 0- or 1-nerved upper glume at most 1/4 times as long as the spikelet. Bulbous-based hairs may be found in the inflorescence. *D. setigera* R. & S.

A similar argumentation as given for the preceding section can be applied here. The very variable *D. setigera* R. & S. is linked to *D. ciliaris* Koel. through forms of *D. radicosa* Miq. and to *D. horizontalis* Willd. through *D. nuda* Schumach. Most of the species mentioned by Henrard for this section can be united into *D. setigera*. *D. gymnostachys* Pilger (type seen in B!) belongs to sect. *Flaccidulae*.

'Horizontales'. Said to differ from the '*Sanguinales*' by the absence or strong reduction of the lower glume, or, when well-developed, by the then also well-developed common axis with solitary, fastigiate, or subwhorled racemes which are often provided with bulbous-based hairs at least at the base. Spikelets homomorphous, without bristles (but *D. nuda* ssp. *senegalensis* Henr. is described with them!). Upper glume at least 1/3 times as long as the spikelet. *D. nuda* Schumach.

As said above the development of the lower glume is hardly a reliable character. Similar inflorescences are also found in the '*Sanguinales*' and the '*Parviglumae*', while hairs

in the inflorescence are a common feature in *D. setigera* of the latter section and may occasionally be encountered in the first also. They can, moreover, hardly ever be used to distinguish a species upon.

The section is not quite natural, either. *D. perpusilla* Pilg. must be removed to the '*Verrucipilae*' and there is good reason to consider the African *D. perrottettii* Stapf closely related to *D. wallichiana* Stapf of the *Remotae*. As said before sect. '*Horizontales*' is better included in sect. *Digitaria*.

Trichachne. Rather robust perennials with a rhizomatous knotty base and pubescent cataphylls. Racemes solitary or approximate along a usually well-developed common axis, loosely spikeled to base, rachis triquetrous. Spikelets binate, homomorphous, silkily long-pubescent, hairs fine smooth, straight, acute. Lower glume developed, the glumes distant from the lemmas by a small stipe. (Henrard discussed this stipe extensivily under the species, but inadvertently describes it as present between the glumes instead in the key, p. 851). *D. insularis* Ekman.

Since Miss Chase (1906) distinguished *Valota* Adans. from *Syntherisma* Walt. these genera have been kept separate by a number of authors, e.g. Hsu (1965). Henrard convincingly demonstrated that there are no good reasons to do so (p. 348). *Valota insularis* Chase is included here as a *Digitaria*.

Heteranthae. Distinct from all other sections by the binate heteromorphous spikelets with sterile lemmas that are many-nerved with slit-like interspaces. *D. heterantha* Merr.

The sectional name is not superfluous, although Henrard refers to an older section *Heterosyntherisma* (Honda) Ohwi (p. 692, 814). The type-species of the latter is *D. barbata* Willd., a synonym of *D. bicornis* Willd. of the '*Biformes*' (q.v.); *D. bicornis* and *D. heterantha* have often been confused with each other (cf. also Hsu, 1971!), but are little related.

The latter species is very close to *D. ctenantha* Hughes, included in the '*Sanguinales*' by Henrard, and less so to *D. divaricatissima* Hughes (incl. *D. macractinia* Hughes) which was placed in the '*Pennatae*' by Henrard. The latter section seems heterogeneous to me.

Henrard pointed out relationships of *D. heterantha* to the '*Solitaria*' (p. 318), which is not unlikely.

Remotae. As the '*Sanguinales*', but differing in the following characters: Inflorescence lax and open along an elongated common axis, racemes solitary (fide Henrard, but often paired or whorled at base and becoming solitary upwards), the lower often branched and bare at base, rachis triquetrous. Spikelets homomorphous. Lower glume absent (occasionally a herbaceous, triquetrous scale). Upper glume about as long as the spikelet. Fertile floret brown in fruit. *D. wallichiana* Stapf.

The two species included by Henrard are here regarded as subspecies of a single one, *D. wallichiana* Stapf. This section cannot be distinguished from the next, as the size of the spikelets and density of their indument, the presence of a lower glume, and the colour of the fruiting floret are merely useful at the specific level and not above. Closely related is also *D. perrottettii* Stapf, placed in the '*Horizontales*' by Henrard, with which species *D. wallichiana* was often understandably, confused by previous authors.

'Subeffusae'. Said to differ from the preceding section by some characters of little value, e.g. the size of the inflorescence, the digitate or whorled lower racemes, size and pubescence of the spikelets, presence and size of the glumes. Some of these characters are even incorrect, as can be seen from my descriptions. The section must therefore be included in sect. *Remotae*, which name I prefer above '*Subeffusae*' of the same date of publication. Sect. *Remotae* then includes also *D. junghuhniana* Henr. and the Indo-Chinese *D. quinhonensis* Camus, *D. subcorymbosa* Camus, and *D. thyrsoidea* Balansa, all three known from their types only and most likely but forms of the single species *D. thyrsoidea*.

Parviflorae. Caespitose perennials with small, villous cataphylls. Racemes solitary or paired along the usually well-developed common axis, loosely spikeled, sometimes bare at base, rachis triquetrous. Spikelets binate or ternate, homomorphous, hairs, when present, smooth, straight, acute. *D. ramularis* Henr., *D. tararensis* Henr.

Of this section these two species are the only ones so far known to occur outside Australia. *D. recta* Hughes most likely should be excluded; it has a winged rachis and is rather similar to *D. violascens* Link, but with entirely glabrous spikelets. Several of the species of this section are intermediate between Hackel's 'series' *Binata* and *Ternata*, as there is apparently no fixed and constant number of spikelets per grouplet; there may be either 2 or 3 spikelets present in a single raceme, without indication of reduction.

The species so far treated have spikelets with smooth, straight, acute hairs. As explained in the preceding chapter various types of other hairs are possible, to which Henrard attributed great value in the delimitation of his sections. In several cases I have failed to see sharp distinctions between the types and a reassessment of the section seems warranted.

'Clavipilae'. Rachis triquetrous or winged. Spikelets ternate. Hairs smooth, straight, either abruptly passing into a large globular head, shorter than its filiform stalk, or gradually passing into a smaller globular head, rounded or acuminate, never truncate. Fertile floret very dark in fruit (fide Henrard, but brownish ones are also admitted by him). *D. abludens* Veldk., *D. henrardii* Veldk., *D. monodii* Veldk., *D. sparsifructus* Ohwi, and *D. ternata* Stapf.

The first four species have a triquetrous rachis and are intermediate between Hackel's 'series' *Binata* and *Ternata*. In some there is a gradation between basal secondary branches of the racemes into the grouplets which then may become binate.

The last species has a winged rachis and is strictly ternate.

The shape of the hairs is very variable whereby the section grades into others. Sometimes as in *D. stricta* Roth, the hairs are indistinguishable from those found in the *Corynotrichae*, which are 'provided with a large globular head, about as long as ... their basal part' (p. 852); this is not true, as especially the hairs at the base of the spikelet have stalks distinctly longer than the heads.

Other species, e.g. *D. sparsifructus*, otherwise closely related to *D. abludens*, have hairs with a minute apical dilatation often apiculate at apex, identical with those found in some *Calvulae* and *Orthotrichae* and even in the *Leianthae* when an indument is present.

A curious case is presented by *D. ischaemum* Muehl., which is placed in this section by Henrard, but which cannot be determined with his keys, as the hairs are always verrucose, usually acute and curled or twisted at the end, and but occasionally clavate.

Henrard's name *'Clavipilae'* must yield to Honda's older (1930) *Syntherisma* sect. *Filiformes*. The correct name therefore is *Digitaria* sect. **Filiformes** (Honda) Veldk., *comb. nov.*, type species *D. filiformis* (L.) Koel. The identity of *Syntherisma filiformis* (*non* Nash) *sensu* Honda is not quite clear to me. It is identical with *D. leptalea* var. *recticulmis* Ohwi, but I have not seen any material under either name from Formosa. Judging from the description it might be conspecific with *D. abludens*, but that species is unknown to me from the island.

'Verrucipilae'. Spikelets always ternate, hairs with verrucose walls. 'Other characters for this section ... occur in so many other groups, that they cannot be used in a dichotomical key' (p. 852). *D. perpusilla* Pilg., *D. fuscescens* Henr., *D. pusilla* Ridl., *D. violascens* Link, *D. longiflora* Pers., *D. mollicoma* Henr., *D. philippinensis* Henr.

Notwithstanding his description, Henrard included the binate species *D. maniculata*

Stapf and *D. patagiata* Henr., while *D. perpusilla* should be included also, as it looks like a depauperate *D. violascens* with glabrous spikelets. It certainly does not belong in the '*Horizontales*', where it was placed by Henrard.

Other species with glabrous spikelets may be admitted also, as Henrard created an admittedly artificial section '*Atrofuscae*' to accommodate annual species with small glabrous spikelets, for so rigid was his conception of the value of the hair-types, that he could not bring himself to include species with glabrous spikelets in sections which contained species otherwise obviously related but with pubescent spikelets. *D. fuscescens* Henr. is close to *D. violascens* and *D. longiflora* Pers., with which it is usually even confused.

If Henrard's dictum that only species with verrucose hairs may be included is accepted, half of *D. mollicoma* Henr. must be excluded, since in that species plants with verrucose and plants with smooth hairs may be found, the type of hair having a slight correlation with spikelet size. *D. philippinensis* Henr., only known from the type, has smooth hairs also, although Henrard says verrucose.

Spikelets with mixed pubescence were recorded for *D. violascens* by Henrard, but Bor, also citing unpublished information from Metcalfe, stated that he never saw this and neither have I.

Mixed pubescence is, however, observed on the spikelets of *D. ischaemum*, which seems very close to *D. violascens*. Henrard placed it in the '*Clavipilae*', q.v. If this species is admitted here, the section must carry the name sect. *Ischaemum* Ohwi (1942).

INFRA-SPECIFIC TAXONOMY AND GENETICS

A curious recurrent feature in taxonomy is, that infra-specific taxa are often described on the strength of a single character which struck an author for some reason or the other as important. When varieties are then based on other features by other authors, or sometimes even by the same, leaves may place the specimen in one variety, inflorescences in another, length of the spikelet in a third, etc. Such delimitations make no sense.

A single character may prove eventually to be a good constant to distinguish taxa which are shown by later research and more material to be 'really different'. Often such taxa represent worthless manifestations of a continuous phenotypic variation with little relation to genotypic differences. If such variations are formally recognized they are a burden to nomenclature. I have therefore restricted myself to the description of only three infra-specific taxa.

Henrard, who was much impressed by the presence of parallel forms with pectinate and non-pectinate sterile lemmas, reserved the rank of subspecies for them, applying Vavilow's Law of homologous series in variation (1949—1950). The latter stated that in related taxa homologous series of heritable variations may be found, which is quite acceptable and is convincingly demonstrated by him, but the suggestion by Malte (1932) taken up with approval by Vavilov that all variations of the same nature should be given equal value and taxonomic rank cannot be accepted. '... within the family of Gramineae, all variations of the same nature ... ought to be conceded equal taxonomic rank and value... The presence or absence of... (an) awn on the lemma cannot be considered of any greater taxonomic value in Agropyron than in other genera of Gramineae' (p. 72). Every taxon has had his own evolution, with or with-out its effect on each feature, which therefore must be considered on its own merits in each case. The absence or presence of an awn on the lemma in *Agropyron* may be a variable of little importance in that genus, but the presence of one in a *Digitaria* species would be most surprising and would remove it from that genus.

In several cases it is most likely that a fairly simple, possibly monohybrid factor is responsible for the occurrence of the bristles. One example is reported by Henrard himself (1950, p. 659; see also 1917), where the seeds of the pectinate form of *D. sanguinalis* Scop. ('ssp. *pectiniformis*' Henr.) gave exclusively non-pectinate offspring. He concluded from this that there was a recessive factor responsible; unfortunately there was no report of an F2, nor did this observation affect his subspecific concept.

In Malesia mixed collections of *D. mariannensis* Merr. (and *D. jansenii* Veldk.) are often found; some plants may appear to grow from the same clump, but careful plucking apart shows that the various forms have their own root-systems and apparently originated from different, close laying seeds which I suggest were derived from the same inflorescence.

More complicated is the situation in *D. heterantha* Merr., where various local races can be distinguished, each with pectinate and non-pectinate parallels in a reticulate relationship which I have not been able to disentangle (see under the species, p. 46).

In some cases the difference is accompanied by a demonstrable genetical background of a more important character. In the pectinate *D. bicornis* R. & S. a chromosome number of $2n = 72$ is invariably reported, while the non-pectinate *D. ciliaris* Koel., of which it was considered a subspecies, always has $2n = 54$. It is therefore impossible to derive *D. bicornis* directly from *D. ciliaris*. A hybrid origin might be suggested, which would require a pectinate parent with $2n = 18$. A related species with that number is sympatric in Asia, *D. radicosa* Miq., but it is invariably non-pectinate; the pectinate form to be expected according to Vavilow's Law and described by Henrard as ssp. *blepharophora* is actually the pectinate form of *D. setigera* R. & S. Another possibility would be autopolyploidisation of the pectinate form of *D. sanguinalis*, which is sympatric in Northern Africa, but then *D. ciliaris* and *D. bicornis* would be the result of different genetical pathways.

In the related *D. setigera* R. & S. both forms are found also, the non-pectinate was reported as $2n = 72$. Personal observation showed them to grow in monotypic stands, which does not rule out homozygous populations. Moreover, hand mixed collections were never observed, and as it is the most wide-spread and best collected species in Malesia, it does not seem likely that they will be growing together very often, nor hybridize, which indicates different genotypes. I have treated them as varieties.

The species mentioned in the above paragraphs are closely related and have been regarded as conspecific by many authors. Of course that is one solution to the problem. The consequence is, however, that one has obtained a very variable species difficult to distinguish from other related ones, e.g. *D. cruciata* A. Camus, *D. nuda* Schumach., *D. horizontalis* Willd., etc. By necessarily engulfing these also the delimitation would become larger and larger, so that the need for a host of infra-specific names to bring some order in the chaos would be urgent, which would bring one back to the present situation, one taxonomic step lower and no taxonomic insight gained.

Experiments by Ebinger (1962) and Gould (1963) have shown that hybrids between *D. sanguinalis* and *D. ciliaris* occur, but that these are sterile with $2n = 48$, instead of the expected 45. Brown (1948) records the presence of $2n = 36$, 40, 44, 45, and 48 from a garden patch in North Carolina, the geographic region of overlap between the two species. It may be pointed out that seedlings may have chromosome numbers not to be found in mature populations (cf. Jones, 1958).

Another attempt was made by Yasue (1956) with *D. ciliaris* and *D. ischaemum*. The F1 had $2n = 45$ and was nearly completely pollensterile; no F2 could be obtained, as could be expected from the choice of such little related progenitors.

Bor reported possible hybrids between *D. cruciata* and *D. sanguinalis*; these plants belong

to what is here called *D. compacta* Veldk., which is cultivated and may be of hybrid origin.

Cleistogamic forms are of little importance and have not been observed in Malesia; records from elsewhere are for *D. lecardii* Stapf (Stapf, 1919), *D. aequiglumis* Parodi, *D. insularis* Ekman, and *D. sacchariflora* Henr. (Rosengurtt & Arrillaga, 1962).

CULTIVATED SPECIES

The species of Digitaria are generally of little economic value, although most are eaten readily by cattle. *D. sanguinalis* Scop., 'Crabgrass', is considered a pest in North America. Some have been cultivated for their grains, e.g. *D. cruciata* A. Camus and *D. compacta* Veldk. in India and Vietnam and possibly South China, *D. sanguinalis* in Central and eastern Europe in special cultivars ('Manna'). *D. exilis* Stapf is an important cereal of tropical West Africa ('Fonio'). More rarely cultivated are *D. iburua* Stapf, *D. ciliaris* Koel., *D. debilis* Willd., and *D. longiflora* Pers. In general, these species can be regarded as a famine crop, 'il s'agit simplement de faire bon au ventre' (Portères, 1955, an extensive and important discussion, in particular of 'fonio').

Other species are known for their soil-binding properties and are cultivated here and there. The most important species are *D. longiflora* Pers., *D. fuscescens* Henr., and *D. didactyla* Willd. The latter has been introduced in Malaya, Java, and New Guinea and is by some regarded as an excellent turf, even better than *Cynodon dactylon* Pers.

Some African species have been cultivated as fodder and are locally quite important, e.g. *D. decumbens* Stent ('Pongola'), probably a form of *D. pentzii* Stent, *D. smutsii* Stent, *D. milanjiana* Stapf, etc. In Malesia cultivating experiments have met with little success so far, for which reason these species, belonging to the African *Erianthae* have been treated in the key only.

The Australian *D. divaricatissima* Hughes (the pectinate form is *D. macractinia* Hughes) was once accidentally introduced in the Experimental Gardens of Pasuruan, where it disappeared after a few years. It is treated in the key only. (See also Monod de Froideville, 1968).

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Ind. 7 (1896) 10, 13. — *Panicum* subg. *Digitaria* Hack., Oesterr. Bot. Z. 51 (1901) 290. — *Paspalum* subg. *Digitaria* A. Camus, Not. Syst. 2 (1912) 216. — Type species: *Panicum sanguinale* Linné = *Paspalum sanguinale* Lamk. = *D. sanguinalis* (L.) Scop.

Valota Adans., Fam. Pl. 2 (1763) 495; Chase, Proc. Biol. Soc. Washington 19 (1906) 188; *nom. rejic., non Vallota* Herb., 1821. — *Trichachne* Nees, Agrost. Bras. (1829) 85; Hitchc., Man. Grasses U.S. ed. 2 (1951) 570, 969. — *Panicum* sect. *Trichachne* Steud., Syn. 1 (1853) 38; Benth. & Hook. *f.*, Gen. Pl. 3 (1883) 1001; Hackel in E. & P., Nat. Pfl. Fam. 2, 2 (1887) 35, excl. synon. — *Panicum* series *Trichachne* Benth., Fl. Austr. 7 (1878) 464, *pro nomen*, excl. spp. — *Digitaria* subsect. *Trichachne* Stapf, Fl. Trop. Afr. 9 (1919) 424, 427, *pro nomen*, excl. spp. — *Digitaria* sect. *Trichachne* Henr., Mon. Dig. (1950) 851, 866. — Type species: *Andropogon insularis* Linné = *V. insularis* Chase = *T. insularis* Nees = *D. insularis* (L.) Ekman.

Sanguinella Gleichen, Mikrosk. Unters. 1, 4 (1764) 4, pl. 8; *nom. inval.* — Type species: according to plate *D. sanguinalis* (L.) Scop.

Syntherisma Walt., Fl. Carol. (1788) 76; Chase, Proc. Biol. Soc. Washington 19 (1906) 188. — Type species: *S. praecox* Walt. = *D. sanguinalis* (L.) Scop.

Acicarpa Raddi, Agrost. Bras. (1823) 31; *non* R. Br., 1818. — Type species: *A. sacchariflora* Raddi = *D. sacchariflora* (Raddi) Henr.

Gramerium Desv., Opusc. 1 (1831) 61. — Type species: *G. convolutum* Desv. = ? *D. adusta* (Nees) Griseb.

Sanguinaria Bub., Fl. Pyren. 4 (1901) 257; *non* Linné, 1753. — Type species: *S. nevenarae* Bub. = *D. sanguinalis* (L.) Scop.

Leptoloma Chase, Proc. Biol. Soc. Washington 19 (1906) 192; Hitchc., Man. Grasses U.S. ed. 2 (1951) 585, 892. — *Digitaria* subg. *Leptoloma* Henr., Mon. Dig. (1950) 839, 849. — Type species: *Panicum cognatum* Schult. *f.* = *L. cognata* Chase = *D. cognata* (Schult. *f.*) Pilg.

Annuals or perennials, often with stolons or runners. *Ligules* membranaceous, usually glabrous; leafblades usually flat, flaccid. *Inflorescences* terminal, solitary; common axis usually short; racemes usually spike-like, digitate, corymbose, or paniculate; rachises triquetrous or flattened and winged, usually serrate, not articulating between the spikelets, at most at base only. *Spikelets* abaxial, basically in series along the two abaxial sides of the rachis in grouplets of two ('binate') or three ('ternate'), rarely solitary, representing secondary branches, unequally pedicelled, biflorous, hermaphroditic, homomorphous, sometimes heterotrichous ('heteromorphous') within a grouplet, ovoid to lanceolate, dorsoventrally planoconvex, callus and awn absent, falling entirely in fruit, variously pubescent, rarely glabrous, hairs soft, of various types, sometimes mixed with bristles. *Lower glume* absent or minute, much shorter than the spikelet, abaxial, very rarely nerved, glabrous, either a small deltoid scale of the same texture as the upper glume and sterile lemma, or a fragile, membranaceous collar, not adaxially clasping the base of the spikelet with overlapping margins. *Upper glume* variable, 0, 1, 3, or 5-nerved, usually ± pubescent. *Lower floret* neutral. *Sterile lemma* (3) 5 or 7 (9, 11, or 13)-nerved, usually as long as the spikelet, usually pubescent. *Palea* usually present as a minute scale with bicellular microhairs. *Lodicules* occasionally developed. Palea and lodicules attached to the base of the fertile floret. *Upper floret* hermaphroditic, ± as long as the spikelet, chartaceous and smooth to minutely granulate, becoming variously coloured, especially in fruit, glabrous. *Fertile lemma* rounded on the back, the flat, not inrolled margins curved over and enclosing at least the apex and margins of the palea, not or faintly 3-nerved. *Palea* not or faintly 2-nerved. *Lodicules* cuneate, flat, 3-nerved, between lemma and palea. *Anthers* 3, emerging apically. *Styles* 2, apical, at base shortly united; stigmas plumose, emerging apically. *Caryopsis* planoconvex; embryo 0.2—0.5 times as long; hilum subbasal, small, punctiform to ellipsoid.

Distribution. About 170 species, cosmopolitan, mainly in the tropics and subtropics, 25 indigenous and 2 naturalized species in Malesia.

Ecology. Disturbed and grassy places, often as pioneers, occasionally vegetation forming, sometimes along beaches, mainly in the lowlands.

Chromosome numbers. 2n = 18, 36, 54, 72 (x = 9) in Malesia.

PRESENTATION OF DATA

The *arrangement* of the species is more or less in the order of their putative relationship.

The *synonymy* is given as complete as possible, taking into account the entire distribution and pertaining literature of each species. For each name the type specimen is mentioned and abbreviations according to the Index Herbariorum, ed. 5 (1964) for the herbaria have been added in which the types have been seen or can be expected to be present. When a lectotype had to be chosen, the syntypes are not cited.

The synonyms are arranged by their types, all homotypic ones grouped together in chronological order, starting with the oldest, valid or not. These homotypic groups are again arranged in a chronological order.

Misidentifications occurring in the literature have been included under the correct taxon, as e.g. '*Panicum sanguinale auct., non* Linné: ...', and placed in the chronological sequence when the oldest misidentifications occurred, followed by references to misidentifications using the same basionym.

Literature references are given as far as they are the first record for an island or a large region, or give information of some importance.

When *infra-specific taxa* are recognized the literature references to the non-typical ones are given under the latter. References under the species name therefore refer either to the entire species or to the typical taxon.

Specimens, types excepted, are indicated only sporadically when it was necessary to do so in distributions and discussions. A separate list of the collector's numbers seen will eventually be published in the Flora Malesiana 'Identification Lists of Malesian Specimens'. Their omission here will not be felt as a great loss, as all relevant data on distribution, ecology, and local names have been summarized under each taxon.

Most taxa are wide-spread and only a global delineation of their distributional area is necessary, for some of particular interest a distribution map has been prepared.

Vernacular names have been copied from the labels, but could not be checked for correct spelling or meaning. I assume most of them will mean 'grass', 'weed', and the like and will be of little value; they have been given since some people seem to be interested in them.

The *remarks* have been kept as short as possible and are mainly discussions of infra-specific variability and the interpretation based upon it by previous authors. They are therefore of prime interest for the circumscription of the taxa and the reasons which have led me to my conclusions. The section to which Henrard attributes them is usually given, a more full discussion about this matter is given in the chapter on infra-generic taxonomy.

A special chapter is devoted to names purportedly pertaining to Digitaria species occurring in Malesia, but which proved either not belong to the genus, or not to occur in the region. The most interesting cases are discussed more extensively.

GUIDE TO SOME TECHNICAL TERMS USED IN THE KEY AND THE DESCRIPTIONS

1. Vegetative parts.

a. *Habit.* Plants considered to be '*annuals*' (see also introduction) are loosely spreading with runners or stolons, rooting at the lower nodes, branching intravaginally at base, or erect without runners or stolons, always without cataphylls or rootstocks. '*Perennials*' are erect, usually not rooting at their lower nodes, with stolons or rhizomes, usually with cataphylls, i.e. reduced, scale-like sheaths without blades or chlorophyll, often pubescent, branching at base is usually extravaginal, along the culm intravaginal. In *extravaginal branching* the young shoot breaks through the supporting sheath,

in *intravaginal branching* the young shoot emerges from the throat and gradually pushes the sheath away. A *stolon* is an epigeal culm, rooting at the nodes, primarily growing horizontally, with green leaves, not terminated by an inflorescence. A *runner* is similar, but grows primarily vertically, though gradually it will become decumbent and root at the nodes touching the soil; it ends in an inflorescence. From the rooting nodes of both secondary tufts may sprout, whereby vegetative propagation is achieved. A *rhizome* is hypogeal, rooting at the nodes, primarily growing horizontally, usually provided with cataphylls; when young it serves for vegetative propagation, later as an hibernating organ.

b. *Surface.* Along the margins of the leaves and on the nerves small, glassy, triangular, acroscopic bodies are usually present, called '*spicules*'; their presence is indicated by 'serrate', or 'serrulate', when very small. Spicules are also found on the rachises of the racemes, on the pedicels, and occasionally on the nerves of the sterile lemmas. The pubescence often consists of 'bbb', i.e. '*bulbous-based bristles*', stiff hairs with a thickened ring-like base, especially found in the throat of the leafblades, i.e. in the region at the base of the upper surface of the blade, near the ligule, but also on the sheaths and in the inflorescence.

2. Generative parts.

a. *The length of the racemes* should be decided by measuring the longest present, usually the basal one.

b. For a correct measurement of the spikelet and its parts a dissecting microscope with a calibrated micrometer is indispensable. For field work or quick survey 'Brinell'-lenses are very helpful; these are small hand-lenses with a build-in micrometer, magnifying × 8, and measuring accurately to 0.1 mm (e.g. Leitz 810 130; Hensoldt 291 300). For the microscopic types of pubescence a microscope is of course needed, although after some experience the type can be distinguished with a 25 × magnification.

Interspaces are the spaces between the nerves of a glume or lemma; they are counted from the midnerve outwards. The second interspace of a sterile lemma is usually provided with an indument; when this consists of, or is mixed with bristles the spikelet is called '*pectinate*' or '*bristled*'. In young spikelets they are appressed and obscured by the indument, but they can be pried loose with a needle. For studying the spikelet soaking it in a little water to which a drop of detergent has been added is recommended, boiling is then unnecessary. When all spikelets of a cluster have the same pubescence and nervation of the sterile lemma, these spikelets are '*homomorphous*', when the pedicelled one is more pubescent and has a different nervation they are '*heteromorphous*'. The pubescence influences the distance between the nerves, whereby some may become closer to one another and others more distant. When they have equal distances, they are '*equidistant*' when not '*inequidistant*'. For the presence of heteromorphous spikelets the entire raceme should be inspected, as there may be gradations of homo- and heteromorphy present on one raceme.

For the colour of the fruiting fertile floret ripe ones should be preferred; the colour is usually already present during anthesis, but occasionally develops later.

KEY TO THE SPECIES

1. Spikelets all solitary, subsessile. Upper glume absent to 0.25 mm long. Nerves of sterile lemma 9—13, serrate.
   2. Spikelets 2.5—3.5 mm long . . . . . **1. D. mariannensis**
   2. Spikelets 5.25—6 mm long . . . . . **2. D. jansenii**

1. Spikelets placed in grouplets of 2 ('binate'), 3 ('ternate'), sometimes more, at least one pedicelled (rarely spikelets solitary, but then pedicelled and usually with an arrested spikelet at the base of the pedicel, or inflorescence apparently mixed with binate and solitary spikelets). Upper glume longer, or, when minute, sterile lemma with other venation.
   3. Rachis distinctly winged, the lateral wings at least half as wide as the midrib. Abscission of pedicels truncate (except in *D. perpusilla*).
      4. Spikelets in grouplets of two ('binate') in the whole inflorescence, no traces of arrested spikelets at the base of the pedicels, the solitary ones excepted. Abscission of pedicels truncate (except in *D. perpusilla*).
         5. Lower glume absent or very small, less than 0.25 mm long.
            6. Spikelets 1.6—1.8 mm long, glabrous. Upper glume 0.8—0.95 times as long as the spikelet. Fertile floret chestnut-coloured in fruit. Abscission of pedicels discoid to cupuliform. . . . . **21. D. perpusilla**
            6. Spikelets 2—4 mm long, pubescent. Upper glume at most 0.8 times as long as the spikelet. Fertile floret yellowish to brownish in fruit.
               7. Margins of rachis smooth to serrulate, spicules up to 0.03 mm long. Upper glume 0.25—0.6 times as long as the spikelet, 0.75—2 mm long. **5. D. radicosa**
               7. Margins of rachis distinctly serrate, spicules at least 0.05 mm long.
                  8. Spikelets either homomorphous and all sterile lemmata in the second interspace with yellowish bristles (appressed in anthesis!), or heteromorphous, i.e. sterile lemma of the sessile spikelet glabrous and nerves equidistant to slightly pubescent and nerves inequidistant, that of the pedicelled spikelet always more pubescent to bristled, nerves inequidistant. (The basal spikelets may be homomorphous and glabrous!)
                     9. Upper glume 1—2.75 mm long, 0.35—0.8 times as long as the spikelet. Bristles, when present, often obscured by the pubescence **3. D. bicornis**
                     9. Upper glume 0.3—1 mm long, 0.15—0.3 times as long as the spikelet. At most a few hairs between the bristles **6b. D. setigera** var. **calliblepharata**
                  8. Spikelets homomorphous in the entire raceme, never bristled.
                     10. Upper glume at most 0.4 times as long as the spikelet, usually much less, 0.25—1.25 mm long. Anthers 0.65—1.25 mm long **6. D. setigera**
                     10. Upper glume 0.4—0.8 times as long as the spikelet, 1—1.5 mm long. Anthers 0.3—0.6 mm long. . . . . **7. D. nuda**
         5. Lower glume distinct, at least 0.25 mm long.
            11. Sterile lemma 5—6.25 mm long, dorsally widely 3-nerved, third interspace with a very dense, usually purplish frings of lanate hairs **8. D. eminens**
            11. Sterile lemma 2—3.5 mm long, with a different indument.
               12. Ligule with an erose margin.
                  13. Small matforming perennial with minute cataphylls. Leaf-blades up to 2 mm wide. Spicules of pedicels often ± hair-like **9. D. didactyla**

13. Annuals or short-living perennials, without cataphylls. Leaf-blades 2—9 mm wide. Spicules of pedicels triangular or ± absent.
    14. Spikelets either homomorphous and bristled, or heteromorphous (see entry 8) . . . . . **3. D. bicornis**
    14. Spikelets homomorphous in the entire raceme, never bristled.
        15. Rachis distinctly serrate, spicules at least 0.05 mm long **4. D. ciliaris**
        15. Rachis smooth to minutely serrulate, spicules up to 0.03 mm long . . . . . **5. D. radicosa**
12. Ligule fimbriate. Large, tufted perennials, with or without coarse runners and with distinct cataphylls. Leaves 3—12—more mm wide. Rarely cultivated.
    16. Plants with runners, rooting at the nodes. Sterile lemma with smooth nerves . . . **D. pentzii** Stent (incl. *D. decumbens* Stent)
    16. Plants without runners, with scaly rhizomes, not rooting at the nodes.
        17. Sterile lemma with serrate nerves **D. milanjiana** (Rendle) Stapf
        17. Sterile lemma with smooth nerves . . . **D. smutsii** Stent

4. Spikelets in grouplets of three ('ternate'), at least in the middle of the racemes. Sometimes apparently binate, the pedicel of the third spikelet adnate to the rachis and this spikelet apparently solitary (but pedicelled!), or pedicels with an arrested spikelet at base. Abscission of pedicels discoid to cupuliform.
    18. Spikelets glabrous, 1.3—1.6 mm long. Fertile floret usually protruding beyond the scales, yellowish to brownish in fruit, often with bluish apex. Racemes 2 or 3, digitate, common axis only very rarely developed (up to 5 mm long). . . . . **22. D. fuscescens**
    18. Spikelets puberulous to pubescent, at least along the margins of the upper glume and sterile lemma.
        19. Fertile lemma fuscous to chestnut-coloured in fruit. Racemes 2—10(—14), common axis usually well-developed, up to 6(—9.5) cm long.
            20. Distal spicules of pedicel elongated, forming a coronula under the spikelet. Upper glume 0.5—0.75 times as long as the spikelet **20. D. ternata**
            20. Spicules of pedicel minute, not forming a coronula. Upper glume 0.9—1 times as long as the spikelet . . . . . **24. D. violascens**
        19. Fertile lemma persistently yellowish to brownish in fruit. Racemes 2—4, common axis only very rarely developed (up to 1 cm long).
            21. Spikelets 1.3—1.7 mm long. Sterile lemma with 5—7 ± inequi distant nerves. Upper glume as long as the spikelet **25. D. longiflora**
            21. Spikelets 1.8—2.5 mm long. Sterile lemma with 7 ± equidistant nerves. Upper glume 0.7—1 times as long as the spikelet.
                22. Upper glume 1.6—2.5 mm long, 0.8—1 times as long as the spikelet. Fertile lemma not protruding. Culm-leaf-blades 1.25—6 cm long . . . . . **26. D. mollicoma**
                22. Upper glume 1.35—1.5 mm long, 0.7—0.75 times as long as the spikelet. Fertile lemma protruding beyond the scales. Culm-leaf-blades 8.5—14 cm long . . . . **27. D. philippinensis**

3. Rachis triquetrous to narrowly winged, lateral wings less than half as wide as the midrib. Abscission of pedicels discoid to cupuliform (except in *D. heterantha*).
   23. Spikelets longer than 3.5 mm.
      24. Racemes solitary, numerous, not articulating at base, in a contracted panicle. Spikelets grey- to isabel-lanate, homomorphous. Fertile floret fuscous in fruit . . . . . **11. D. insularis**
      24. All, or at least lower racemes whorled, 2—10, articulating at base, spreading in an open panicle or umbel. Spikelets with different indument, usually heteromorphous. Fertile floret yellowish to brownish in fruit.
         25. Plant tufted, without runners, with cataphylls. Racemes 7—10, panicled, naked at base to 0.8th of their length. Common axis well-developed. Interspaces of sterile lemma not slit-like, at least as wide as the nerves. Once cultivated in E. Java
            D. divaricatissima (R. Br.) Hughes
         25. Plant caespitose with long runners, no cataphylls. Racemes 2—4, umbelled, loosely spikeled to base. Common axis very rarely developed. Interspaces of sterile lemma slit-like. Abscission of pedicels truncate.
            10. D. heterantha
   23. Spikelets up to 3 mm long.
      26. Spikelets 1—1.3 mm long. Leaves densely pilose. Hairs of spikelets with verrucose walls (magn. × 400!) . . . . . **23. D. pusilla**
      26. Spikelets either longer, or if *ca.* 1.3 mm long, leaves subglabrous and hairs of spikelets with smooth walls and dilated apex.
         27. Cataphylls present, pubescent. Lower glume a triquetrous scale, 0.2—0.4 mm long.
            28. Spikelets 2—2.5 mm long. Fertile floret yellowish in fruit, enclosed within the scales . . . . . **15. D. tararensis**
            28. Spikelets 1.5—2 mm long. Fertile floret brown in fruit, protruding beyond the scales . . . . . **14. D. ramularis**
         27. Cataphylls absent. Lower glume absent, or a scarious collar, up to 0.3 mm high (no 17).
            29. Spikelets 2.4—3 mm long .Upper glume 0.4—0.6 times as long as the spikelet . . . . . **13. D. junghuhniana**
            29. Spikelets up to 2.25 mm long. Upper glume 0.7—1 times as long as the spikelet.
               30. Lower glume an inconspicuous, scarious collar, 0.1—0.3 mm high. Upper glume as long as the spikelet *and* leaf-blades up to 4 mm wide . . . . . **17. D. henrardii**
               30. Lower glume absent. Upper glume either distinctly shorter than spikelet, or if as long, leaf-blades wider.
                  31. Fertile floret protruding beyond the scales. Upper glume 1—1.65 mm long.
                     32. Spikelets 1.3—1.75 mm long. Anthers purple, 0.4—0.65 mm long . . . . . **16. D. abludens**
                     32. Spikelets 1.85—2.1 mm long. Anthers yellow, 0.6—0.9 mm long . . . . . **18. D. monodii**
                  31. Fertile floret enclosed within the scales. Upper glume 1.6—2 mm long.

33. Upper glume 0.8—0.95 times as long as the spikelet. Nerves of sterile lemma not anastomosing. Anthers 1 mm long. Stigma white. Leaf-blades 2—4 mm wide **12. D. wallichiana**

33. Upper glume as long as the spikelet. Nerves of sterile lemma anastomosing. Anthers 0.5—0.6 mm long. Stigma purple. Leaf-blades 4—6 mm wide **19. D. sparsifructus**

1. Digitaria mariannensis Merr. — Fig. 3a, b; 4.

D. mariannensis Merr., Philip. J. Sc. 9 (1914) Bot. 54; Henr., Mon. Dig. (1950) 434, fig., 845; B. C. Stone, Fl. Guam (1972) 211. — *Syntherisma mariannensis* Hosokawa, Trans. Nat. Hist. Soc. Formosa 24 (1934) 198; J. Trop. Agric. 7 (1935) 314. — Type: *MacGregor* 372 (US, holo, *n.v.*; K).

D. virens Ridley, Kew Bull. 1926 (1926) 478; Henr., Mon. Dig. (1950) 793, fig., 845; De Castro, Garcia de Orta 12 (1964) 56, fig. 4. — *Paspalum sanguinale* Lamk. var. *commutatum auct., non* Hook. *f.*: Ridley, J. Str. Br. Roy. As. Soc. 45 (1906) 241, *pro forma* 2. — Type: *Ridley* 154 (SING, holo; K).

D. pectinata Henr., Meded. Rijksherb. Leiden 61 (1930) 19, fig., *p.p.* — *D. virens* Ridley ssp. *pectinata* Henr., Mon. Dig. (1950) 533, fig., 846, *p.p.* — Type: *R. Brown s.n.* (L, holo, no. 908. 92—1882; BM).

D. kangeanensis Ohwi, Bull. Tokyo Sc. Mus. 18 (1947) 6; Henr., Mon. Dig. (1950) 364, fig., *in synon.* — Type: *Backer* 28738 (BO, holo; L).

Loosely caespitose and spreading annuals, up to 60 cm high, culms geniculately ascending, much branched, rooting at the lower nodes. Lower *sheaths* puberulous to glabrous, upper glabrous, rarely all villous. *Ligules* 0.5—1.5 mm long, truncate, erose. *Blades* ovate-lanceolate to -linear, 1.5—7.5 (—12) cm by 2—6 mm, scaberulous, glabrous to velvety, throat sometimes with bbb. *Peduncle* up to 30 cm long, glabrous, rarely shortly pilose. *Racemes* 2—5(—8), longest 2—10(—12) cm long, geminate to corymbosely paniculate along an up to 1 cm long common axis. *Rachis* winged to swollen and ± triquetrous, serrate to smooth. *Abscission of pedicels* truncate. *Spikelets* solitary, sessile, homomorph, lanceolate, 2.5—3.5 mm long, not imbricate; hairs smooth, acute. *Lower glume* absent or a minute rim. *Upper glume* a fringe of hairs or a villous triangular scale up to 0.25 mm long. *Sterile lemma* 0.85—1 times as long as the spikelet, acute to truncate, nerves (7—)9—13, equidistant, smooth to minutely serrate, usually wider than the interspaces, glabrous to puberulous, rarely villous, third interspace sometimes with yellow bristles, patent in fruit, and few hairs. *Fertile floret* as long as the spikelet, usually somewhat protruding, yellowish in fruit. *Anthers* purplish (*i.s.*), 1.2—2.5 mm long. *Stigmata* purplish (*i.s.*).

Distribution. Micronesia (Guam) and Malesia: Philippines (Luzon: Pangasinan Prov., *FB* 8399 *Curran & Merritt*), Lesser Sunda Is. (Timor, Sawu, Sumba), Kangean Arch., East Java (Djapara: Grissee), Christmas I. (Ind. Ocean).

Ecology. Grassy sandy places on and behind the beach, as a weed on compounds. Locally abundant, up to 50 m alt.

Vernacular name. *Tjeu kelake* (Sawu).

Notes. The distinction made by Henrard (1950, p. 845) between *D. mariannensis* and *D. virens*, based on the acuminate fertile lemma, protruding in the first species, disappears when more material is studied. The type of *D. mariannensis* and the specimen from Luzon have somewhat smaller spikelets, 2.5 mm *vs.* 2.75—3.5 mm long in the other specimens, which is not sufficient to keep the two separate, especially because there is so little material of them.

The collections of this (and the following species) are often mixtures of two forms, those without bristles on the sterile lemma and those with. In this case a simple genetical mechanism seems at work, as sometimes the two 'subspecies' of Henrard grow from the

same clump (but as separate plants!), from which I assume that they germinated from two seeds of the same rachis. The formation of the bristles does have some influence on the sterile lemma, as can be seen from the following key:

a. Sterile lemma 9—13-nerved, third interspace without bristles, usually pubescent (fig. 3a) . . . . . *mariannensis s.s.*

a. Sterile lemma 7—9-nerved, third interspace with yellow bristles and few hairs. Distal spikelets often not pectinate or only so on one side (fig. 3b) . . . . 'ssp. *pectinata*'

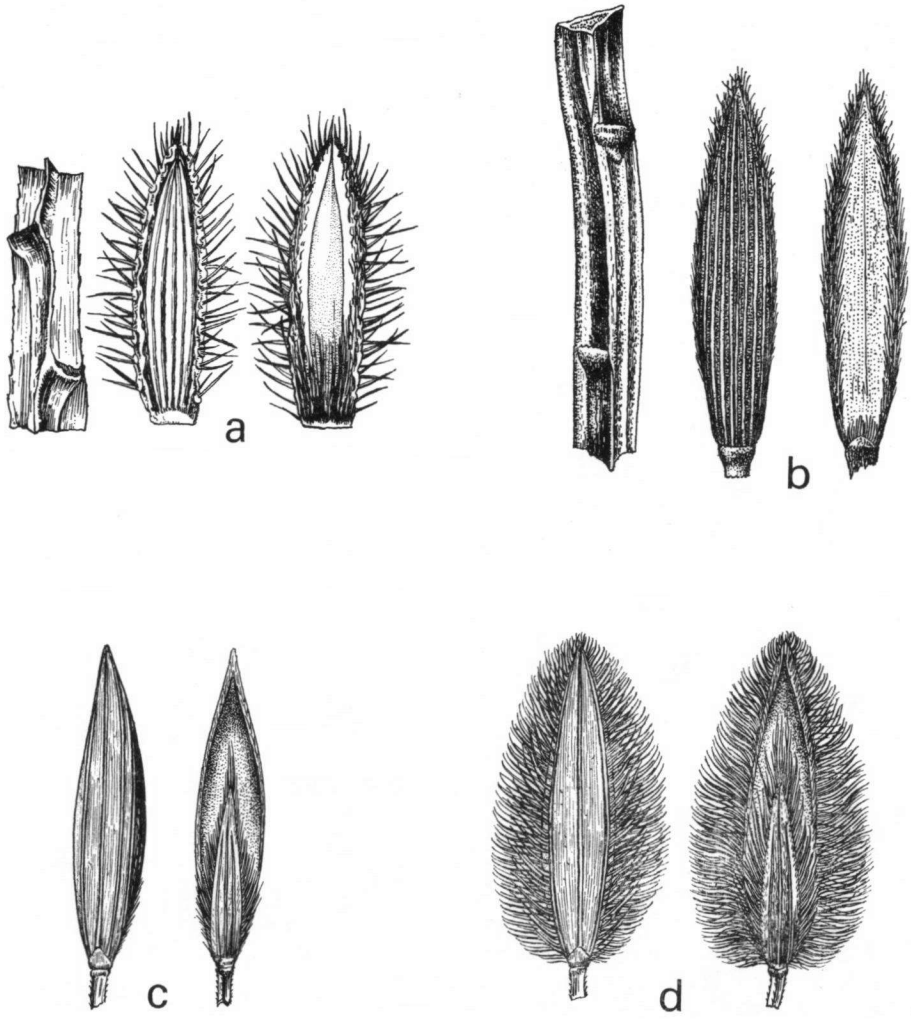

Fig. 3. Rachis and spikelets of *D. mariannensis*: a. pectinate form (*R. Brown s.n.*, type of *D. pectinata*); — b. non-pectinate form (*Ridley 154*, type of *D. virens*). — *D. bicornis* (*Bory de St Vincent s.n., type*): c. sessile spikelets; — d. pedicelled spikelets. Note the bristles among the hairs. — All × 13.

The pectinate form has been seen from E. Java (Grissee), Kangean, Timor, and Sumba.

It may be noted here that the correct combination for the related *D. gaudichaudii* was already made by Buse in Miq., Pl. Jungh. (1854) 381, in a note under *D. ropalotricha*, 76 years before Henrard did so again (1930, p. 18).

2. **Digitaria jansenii** Veldk., *spec. nov.* — **Fig. 4.**

D. pectinata auct., non Henr.: Henr., Meded. Rijksherb. Leiden 61 (1930) 19, *p.p.* — *D. virens* Ridley ssp. *pectinata auct., non* Henr.: Henr., Mon. Dig. (1950) 533, *p.p.* — Type: *Bloembergen 3752* (L, holo, no. 952.64—330; BO).

Affine D. mariannense. Spiculae solitariae, subsessiles, imbricatae, 5.25—6 mm longae. Nervi lemmatis sterilis 11—13, equidistantes, serrulati. Antherae 3—3.25 mm longae.

Loosely caespitose and spreading annual, up to 60 cm high, culms geniculately ascending, branched, rooting at the lower nodes. *Sheaths* velvety. *Ligules* 1.5—2 mm long, erose, truncate. *Blades* linear-lanceolate, 2—10 cm by 2—6 mm, velvety, throat with

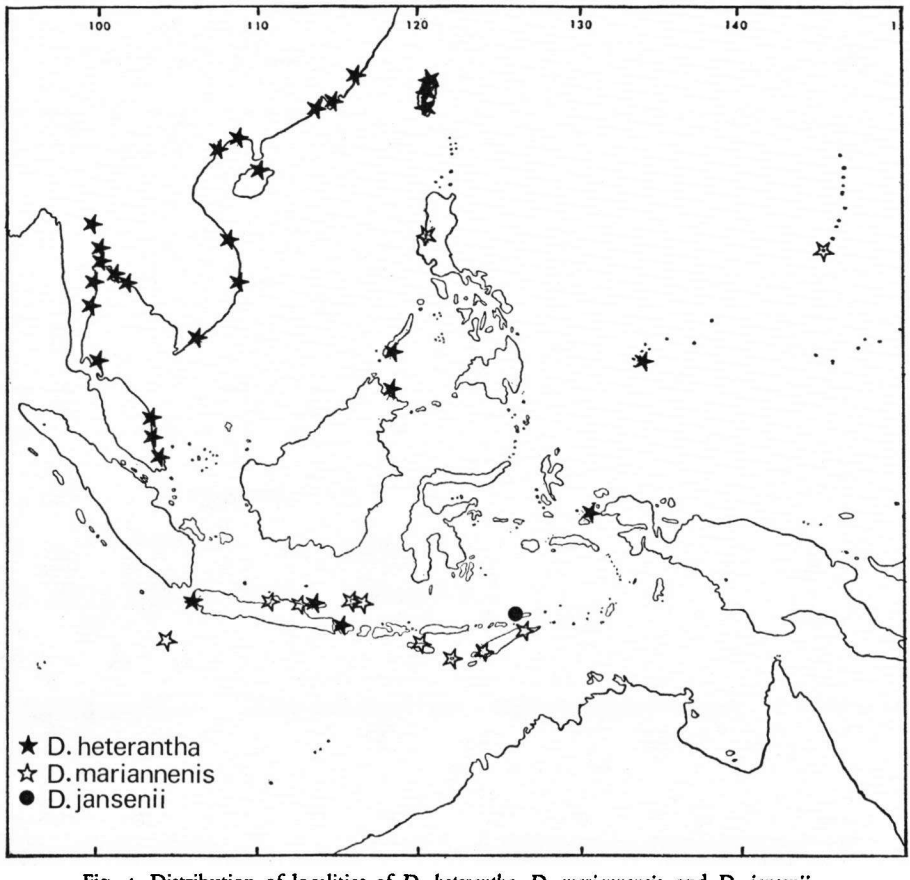

Fig. 4. Distribution of localities of *D. heterantha*, *D. mariannensis*, and *D. jansenii*.

some bbb. *Peduncle* up to 30 cm long, glabrous. *Racemes* 2—4, longest 6—9 cm long, umbellate, common axis absent. *Rachis* winged, serrate. *Abscission of pedicel* truncate. *Spikelets* solitary, subsessile, homomorphous, lanceolate, 5.25—6 mm long, imbricate; hairs smooth, acute. *Lower glume* inconspicuous, deltoid, 0.15—0.2 mm long. *Upper glume* a fringe of hairs or a triangular villous scale up to 0.25 mm long, occasionally with 1 serrulate nerve. *Sterile lemma* 0.9—1 times as long as the spikelet, acute to truncate, nerves 11—13, at least the costals serrulate, glabrous but for the margins, third interspace sometimes with yellow patent bristles. *Fertile floret* as long as the spikelet, protruding or not, yellowish in fruit. *Anthers* 3—3.25 mm long, purplish (*i.s.*). *Stigma* purplish (*i.s.*).

Distribution. Only known from the type from Wetar, Lesser Sunda Is.

Ecology. Eucalyptus-forest behind the beach wall, at ± 5 m alt.

Notes. The single collection is a mixture of the two forms, as discussed under the preceding species. Again they are slightly different. The type has a 13-nerved sterile lemma, glabrous but for the margin, while the bristled form has an 11-nerved sterile lemma with bristles, the spikelet of the lower part of the racemes without these.

This plant is named after Dr. P. Jansen, who recognized it as a new species, but whose untimely death unfortunately prevented him from publishing it in his nearly completed revision of the Malesian *Gramineae*.

3. **Digitaria bicornis** (Lamk.) R. & S. — **Fig. 3c, d; table 1.**

D. bicornis (Lamk.) R. & S., Syst. 2 (1817) 470; Henr., Mon. Dig. (1950) 71, fig., 979; Bor, Webbia 11 (1955) 323; Grasses (1960) 299; Monod de Froid. in Backer & Bakh., Fl. Java 3 (1968) 565. — *Paspalum bicorne* Lamk., Encycl. 1 (1791) 176; Poir. in Lamk., ibid. 5 (1804) 29; Suppl. 4 (1816) 83. — *Panicum bicorne* Kunth, Rév. Gram. 1 (1829) 33; Enum. Pl. 1 (1833) 83. — [*D. bicornis* R. & S. ssp. *lamarckiana* Henr., Mon. Dig. (1950) 979, *nom. inval.*; Bor, Webbia 11 (1955) 325; Grasses (1960) 297] — *D. bicornis* R. & S. ssp. *bicornis*: Bor, Webbia 11 (1955) 325; Grasses (1960) 297; Monod de Froid. in Backer & Bakh., Fl. Java 3 (1968) 565. — Type: *Sonnerat in Hb. Lamarck* (P, holo).

Panicum adpressum Willd., Ges. Naturfr., Neue Schr. 4 (1803) 193; *non P. appressum* Forssk., 1775. — *D. barbata* Willd., Enum. Hort. Berol. 1 (1809) 91; Henr., Mon. Dig. (1950) 64, fig., *in synon.*; M. Schmid, l'Agron. Trop. 13 (1958) 304, *p.p.* — *D. rottleri* R. & S., Syst. 2 (1817) 471; Henr., Mon. Dig. (1950) 634, *in synon.* — *Panicum barbatum* Kunth, Rév. Gram. 1 (1829) 33; Enum. Pl. 1 (1833) 84; *non* Lamk., 1791, *nec* Torrey, 1818, *nec* Roxb., 1820. — *Syntherisma barbata* Nash, Bull. Torrey Bot. Cl. 25 (1898) 303; *pro comb.* — Type: *Klein s.n.* (in Hb. Willd. 1653—1, B, holo; in Hb. Rottler, K).

D. biformis Willd., Enum. Hort. Berol. 1 (1809) 92; Henr., Mon. Dig. (1950) 75, fig., 978; Bor, Webbia 11 (1955) 325; Grasses (1960) 299; Gupta & Srivastava, Genetica Iberica 21 (1969) 11, fig. 10; Bor in Rechinger, Fl. Iran. 70 (1971) 486. — *Panicum biforme* Kunth, Rév. Gram. 1 (1829) 33; Enum. Pl. 1 (1833) 84. — *Panicum sanguinale* Linné var. *biforme* Hack. *ex* Dur. & Sch., Consp. Fl. Afr. 5 (1894) 762. — [*D. biformis* Willd. ssp. *willdenowii* Henr., Mon. Dig. (1950) 978, *nom inval.*; Bor, Webbia 11 (1955) 326; Grasses (1960) 296.] — *D. biformis* Willd. ssp. *biformis*: Bor, Webbia 11 (1955) 326; Grasses (1960) 296. — Type: *Bory de St Vincent s.n.* (in Hb. Willd. 1652, B, holo).

Panicum ciliare auct., non Retz: Roxb., Fl. Ind. 1 (1820) 293; ed. 2 (Carey) 1 (1832) 290. — *D. commutata* Schult. *f.*, Mant. 2 (1824) 262; Henr., Mon. Dig. (1950) 142, *in synon.* — *Panicum commutatum* Nees, Linnaea 7 (1832) 274; Fl. Afr. Austr. 1 (1841) 25; Agrost. Cap. (1853) 25; *pro comb.*; *non* R. & S., 1824. — *Paspalum sanguinale* Lamk. var. *commutatum* Hook. *f.*, Fl. Br. Ind. 7 (1896) 15, *p.p.* — *D. sanguinalis* Scop. f. *commutata* Haines, Bot. Bihar & Orissa 5 (1924) 1007, *pro comb.* — Type: *Roxburgh s.n.* (BM, holo); *Icon. ined. 788* (K).

Panicum filiforme auct., non Linné: Roxb., Fl. Ind. 1 (1820) 293; ed. 2 (Carey) 1 (1832) 290; Icon. ined. 2025 (K).

Panicum glaucescens Nees, Agrost. Bras. (1829) 100; *non* H.B.K., 1816. — *Panicum neesii* Kunth, Rév. Gram. 1 (1829) 33; Enum. Pl. 1 (1833) 84; — Type: *Sellow s.n.* (B†, holo, *n.v.*; L).

D. barbulata Desv., Opusc. (1831) 62. — *D. biformis* Willd. ssp. *desvauxii* Henr., Mon. Dig. (1950) 68, fig., 978. — Type: *Hb. Desvaux s.n.* (P, holo).

Panicum ciliare A. Rich., Tent. Fl. Abyss. 2 (1851) 360; *non* Retz, 1786. — *Panicum sanguinale* Linné var. *blepharanthum* Hack. *ex* Dur. & Sch., Consp. Fl. Afr. 5 (1894) 762. — *Panicum aegyptiacum* Retz var. *blepharanthum* Chiov., Annuario R. Inst. Bot. Roma 8 (1908) 296. — Type: *Schimper 1616* (P, holo; K, L, W).

D. chrysoblephara Fig. & Denot., Ac. Rle Sc. Torino Class. Fis. & Mat. II, 14 (1852) 364, fig. 27. — *D. marginata* Link var. *fimbriata auct., non* Stapf: Stapf, Fl. Trop. Afr. 9 (1919) 440, *p.p.*; E. G. & A. Camus, Fl. Gén. I.-C. 7 (1922) 401; Blatter & MacCann, J. Bomb. Nat. Hist. Soc. 32 (1928) 633. — *D. sanguinalis* Scop. var. *fimbriata auct., non* Merr.: Merr., En. Philip. Fl. Pl. 1 (1923) 55. — *D. adscendens* Henr. ssp. *chrysoblephara* Henr., Mon. Dig. (1950) 125, fig., 998; Bor, Webbia 11(1955) 352; Grasses (1960) 299; Gupta & Srivastava, Genetica Iberica 21 (1969) 11, fig. 8, 9. — *D. ciliaris* Koel. ssp. *chrysoblephara* S. T. Blake, Proc. Roy. Soc. Queensl. 81 (1969) 12; R. R. Stewart, Biologia 16 (1970) 23. — Type: *Figari s.n.* (FI, holo, *n.v.*).

Panicum sanguinale Linné var. *ciliare auct., non* St Amans: Dur. & Sch., Consp. Fl. Afr. 5 (1894) 762. — *Paspalum sanguinale* Lamk. var. *ciliare auct., non* Hook. *f.*: Hook. *f.*, Fl. Br. Ind. 7 (1896) 15, *p.p.*; Ridley, Mat. 3 (1907) 125; A. Camus, Not. Syst. 2 (1912) 220. — *D. sanguinalis* Scop. var. *ciliaris auct., non* Parl.: Rendle in Forb. & Hemsl., J. Linn. Soc. Lond., Bot. 36 (1904) 325. — *D. sanguinalis* Scop. f. *ciliaris auct., non* Haines: Haines, Bot. Bihar & Orissa 5 (1924) 1008.

Panicum sanguinale Linné var. *macrostachyum* Hack. *ex* Dur. & Sch., Consp. Fl. Afr. 5 (1894) 763. — Type: *Schimper 2162* (W. holo).

Panicum sanguinale auct., non Linné: Mez in Perk., Fragm. Fl. Filip. (1904) 143, *p.p.* — *D. sanguinalis auct., non* Scop.: Merr., Philip. J. Sc. 1 (1906) Suppl. 346, *p.p.*; En. Philip. Fl. Pl. 1 (1923) 55, *p.p.*; Reeder, J. Arn. Arb. 29 (1948) 290, *p.p.*

Panicum sanguinale Linné var. *barcaldinense* Domin, Bibl. Bot. 85 (1915) 295. — Type: *Domin 1016* (PR, holo).

D. corymbosa auct., non Merr.: Merr., En. Philip. Fl. Pl. 1 (1923) 53, *p.p.*

[*D. bicornis* R. & S. ssp. *gamblei* Henr., Mon. Dig. (1950) 979, *nom. inval.*; Monod de Froid. in Backer & Bakh., Fl. Java 3 (1968) 565. — Type: *Gamble 17177* (K. holo; L).]

D. corymbosa Merr. ssp. *marathensis* Henr., Mon. Dig. (1950) 152, fig., 943. — *D. setigera* R. & S. ssp. *marathensis* Henr. *ex* Bor, Webbia 11 (1955) 309, 346; Grasses (1960) 295; *pro comb.* — Type: *Young s.n.* (L, holo; BM, K).

D. queenslandica Henr., Mon. Dig. (1950) 612, fig., 996. — Type: *Simmons s.n.* (W, holo; NSW).

[*D. biformis* Willd. var. *rachiseta* Bor, Webbia 11 (1955) 318, *nom. inval*; Grasses (1960) 296. — Type: not indicated.]

D. diversiflora Swallen, Rhodora 65 (1963) 356; Reeder, Bull. Torrey Bot. Cl. 94 (1967) 6, fig. 44; Gould & Soderstrom, Am. J. Bot. 54 (1967) 678, fig. 31. — Type *Hitchcock 9636* (US, holo).

Annual, at first tufted, culms later decumbent, rooting at the nodes, forming loose mats; flowering culms ascendingly erect, up to 60 cm high. *Cataphylls* absent. *Sheaths* moderately bbb-pilose to glabrous. *Ligule* 1—3.5 mm high, truncate, erose. *Blades* linear, 2.5—13.5(—23) cm by 2—9 mm, patent to ascending, soft, usually scabrous on both sides, glabrous but for some bbb in the throat, rarely sparsely pilose. *Peduncle* up to 40 cm long, glabrous. *Racemes* 2—5(—10), longest 3.5—14.5 cm long, digitate or in up to 3 whorls along an up to 5 cm long common axis. *Rachis* winged, serrate, spicules at least 0.05 mm long, rarely with some setae at base ('rachiseta'). *Abscission of pedicels* truncate. *Spikelets* binate, usually heteromorph, the sessile one glabrous to slightly pubescent, the pedicelled one pubescent, to both pectinate and pubescent, lanceolate, 2.75—3.5 mm long; hairs smooth, acute. *Lower glume* very variable, 0.15—0.4 (—0.75) mm long, from nearly absent to a triangular scale, acute to bifid. *Upper glume* 1—2.75 mm long, 0.35—0.8 times as long as the spikelet, nerves 3, pubescent, hairs overtopping. *Sterile lemma* as long as the spikelet, that of the sessile spikelet usually glabrous and equidistantly 7-nerved, to slightly pubescent and inequidistantly nerved (the pedicelled spikelet then always pectinate!), to pubescent and pectinate (spikelets then homomorphous), those of the pedicelled spikelet usually pubescent and inequidistantly nerved, pubescence usually mixed with bristles, these indistinct and appressed in youth, patent and protruding from the pubescence in fruit, rarely and then only the basal spikelets homomorphous, glabrous and equidistantly nerved (the whole raceme should therefore be inspected!); nerves usually smooth, the second nerves sometimes minutely serrulate towards the apex. *Fertile lemma* slightly shorter than the spikelet, yellowish in fruit. *Anthers* 0.5—0.6 mm long, purple. *Stigma* purple.

Distribution. Tropics and subtropics, rare in Africa, throughout Malesia.

Ecology. Waste places, often on sand, also along the shore and in the dunes, up to 2000 m in New Guinea, but to 2450 m in Assam.

Chromosome number. 2n = 72 (Reeder, 1967, and Gould & Soderstrom, 1967, sub *D. diversiflora*; Gupta & Srivastava, 1969, sub *D. biformis* and *D. adscendens* ssp. *chrysoblephara*).

Vernacular names. Java: *putian, putikan, suket lamuran* (M). — Timor: *kolun, kuru keo.* — Alor: *menikom.*

Notes. The circumscription of the taxa included in this species has caused many difficulties in the past, partly because of its worldwide distribution, partly because of the great variability expressed by the nervature and pubescence of the spikelets. This has been discussed under morphology (table 1).

Very rarely the rachis is provided with setae (*D. setigera* ssp. *marathensis, D. biformis* var. *rachiseta*). Specimens with this feature have been seen from the entire range of the species, but are apparently rare everywhere.

4. Digitaria ciliaris (Retz.) Koel. — Fig. 5a; table 1.

D. ciliaris (Retz.) Koel., Descr. Gram. (1802) 27, *pro comb.*; Buse in Miq., Pl. Jungh. (1854) 380, var. *δ*; Miq., Fl. Ind. Bat. 3 (1857) 436, *p.p.*; Merr., Philip. J. Sc. 5 (1910) Bot. 168; Fl. Manila (1912) 87, *p.p.*; Henr., Mon. Dig. (1950) 129; S. T. Blake, Proc. Roy. Soc. Queensl. 81 (1969) 10; Bor in Rechinger, Fl. Iran. 70 (1970) 490; Gill., Rev. Fl. Malaya 3 (1971) 196, fig. 40, excl. pl. 25c. — *Panicum ciliare* Retz., Obs. 4 (1786) 16, *pro specim. Chin.*; Willd., Sp. Pl. 1 (1797) 344, *non* 1809; Boerl., Ann. Jard. Bot. Btzg 8 (1890) 52. — *Milium ciliare* Moench, Meth. Pl., Suppl. (1802) 66 ('*ciliatum*'). — *Syntherisma ciliare* Schrad., Fl. Germ. 1 (1806) 160, t. 3 f. 7; *pro comb.*; Hosokawa, J. Soc. Trop. Agric. 7 (1935) 314. — *Paspalum ciliare* DC. in Lamk., Fl. Franç., Suppl. 5 (1815) 250, *pro comb.* — *Panicum sanguinale* Linné var. *ciliare* St Amans, Fl. Agén. (1821) 25, *pro comb.* — *D. sanguinalis* Scop. var. *ciliaris* Parl., Fl. Ital. 1 (1848) 126, *pro comb.*; Sabnis, J. Ind. Bot. 2 (1921) 222. — *D. sanguinalis* Scop. ssp. *ciliaris* Arcang., Fl. Ital. (1882) 762, *pro comb* *Paspalum sanguinale* Lamk. var. *ciliare* Hook. *f.*, Fl. Br. Ind. 7 (1896) 15, *p.p.* — *Sanguinaria ciliaris* Bub., Fl. Pyren. 4 (1901) 257, *pro comb.* — *Syntherisma sanguinalis* Dulac var. *ciliaris* Honda, Bot. Mag. Tokyo 38 (1924) 120. — *D. sanguinalis* Scop. f. *ciliaris* Hook. *f. ex* Haines, Bot. Bihar & Orissa 5 (1924) 1008. — *D. marginata* Link var. *ciliaris* Hook. *f. ex* Ridley, Fl. Mal. Pen. 5 (1925) 214, *p.p.* — *Syntherisma sanguinalis* Dulac ssp. *ciliaris* Masamune & Yanagihara, Trans. Nat. Hist. Soc. Formosa 31 (1941) 327. — Type: *Wennerberg s.n. in Hb. Retz e Canton* (LD, hololecto).

Panicum sanguinale auct., non Linné: Linné, Sp. Pl. 1 (1753) 57, *p.p.*; Burm. *f.*, Fl. Ind. (1768) 25, t. 10 f. 11; Decne., Nouv. Ann. Mus. Hist. Nat. Paris III, 3 (1834) 351; Benth., Fl. Austr. 7 (1878) 469, *p.p.*; K. Sch. & Laut., Fl. Deut. Schutzgeb. Südsee (1901) 176; Mez in Perk., Fragm. Fl. Filip. (1904) 143, *p.p.* — *D. sanguinalis auct., non* Scop.: Miq., Fl. Ind. Bat. 3 (1857) 437; Rendle in Forb. & Hemsl., J. Linn. Soc. Lond., Bot. 36 (1904) 325; Merr., Philip. J. Sc. 1 (1906) Suppl. 346, *p.p.*; En. Born. Pl. (1921) 43, *p.p.*; Backer in Heyne, Nutt. Pl. 1 (1922) 159; ed. 2 (1927) 207; Merr., En. Philip. Fl. Pl. 1 (1923) 54, *p.p.*; Backer & Sloot., Theeonkr. (1924) 51, *p.p.*; Backer, Onkr. Suikerr. (1928) 68, fig. 60, *p.p.*; Handb. Fl. Java 2 (1928) 130, *p.p.*; Reeder, J. Arn. Arb. 29 (1948) 290, *p.p.* — *Paspalum sanguinale auct., non* Lamk.: K. Sch., Bot. Jahrb. 9 (1887) 195; Ridl., J. Str. Br. Roy. As. Soc. 46 (1906) 216; Burkill & Holttum, Gard. Bull. Str. Settl. 3 (1923) 89. — *Syntherisma sanguinalis auct., non* Dulac: Hosokawa, J. Soc. Trop. Agric. 7 (1935) 315.

Asperella digitaria Lamk., Encycl. 1 (1791) 167. — Type: *D. Richard in Hb. Lamarck* (P, holo).

Panicum adscendens H.B.K., Nov. Gen. 1 (1815) 80; Kunth, Enum. Pl. 1 (1833) 83. — *D. adscendens* Henr., Blumea 1 (1934) 92; Mon. Dig. (1950) 9, fig. ,998; Bor, Webbia 11 (1955) 350; Grasses (1960) 298; Vickery, Contr. N.S.W. Nat. Herb., Fl. Ser. 19, 1 (1960) 102; Gill., Gard. Bull. Sing. 19 (1962) 156; Ebinger, Brittonia 14 (1962) 248; Gould, ibid. 15 (1963) 241; Monod de Froid. in Backer & Bakh., Fl. Java 3 (1968) 566; Henty, Bot. Bull. Lae 1 (1969) 76; Ramakrishnan & Khosla, Trop. Ecol. 12 (1971) 112; Hsu, Ill. Pl. Taiwan 1 (1971) 303, fig. 142. — [*D. adscendens* Henr. ssp. *marginata* (Link) Henr. var. *typica* Henr., Mon. Dig. (1950) 999; *nom. inval.*] — *D. adscendens* Henr. ssp. *adscendens*: Bor, Webbia 11 (1955) 352; Grasses (1960) 299. — Type: Humboldt s.n. e Guyaquil, Mexico (P, hololecto; Hb. Willd. 1663—1, B; BM).

Paspalum inaequale Link, Enum. Hort. Berol. 1 (1821) 103; F.-Vill., Nov. App. (1882) 301. — *D. inaequalis* Spreng., Syst. 1 (1825) 271; Link, Hort. Berol. 1 (1827) 224. — Type: *Chamisso s.n.* (B†, holo, *n.v.*).

D. marginata Link, Enum. Hort. Berol. 1 (1821) 102; Stapf, Fl. Trop. Afr. 9 (1919) 439; E. G. & A. Casmu,

Fl. Gén. I.-C. 7 (1922) 400; Ridley, Fl. Mal. Pen. 5 (1925) 213; Blatter & MacCann, J. Bomb. Nat. Hist. Soc. 32 (1928) 632; Black, Fl. S. Austr. 4 (1929) 666; Ewart, Fl. Vict. (1930) 129; Burk., Dict. Econ. Pl. (1935) 808; Henr., Mon. Dig. (1950) 429, fig., in synon.; Henderson, Mal. Fl., Monoc. (1954) 340, fig. 194 A—D; M. Schmid, l'Agron. Trop. 13 (1958) 304, 308, fig. 49, 1. — *Panicum linkianum* Kunth, Rév. Gram. 1 (1829) 33. — *Panicum marginellum* Schrad., Linnaea 12 (1838) 428; *nom. superfl.* — *Panicum sanguinale* Linné var. *longiglume* 1. *marginatum* Doell in Mart., Fl. Bras. 2, 2 (1877) 133. — *Syntherisma marginata* Nash, N. Am. Fl. 17 (1912) 154. — [*D. marginata* Link var. *linkii* Stapf, Fl. Trop. Afr. 9 (1919) 440, *nom. inval.*; E. G. & A. Camus, Fl. Gén. I.-C. 7 (1922) 401.] — *Panicum sanguinale* Linné ssp. *marginatum* Thell., Vierteljahrschr. Nat. Ges. Zürich 64 (1919) 699. — *D. sanguinalis* Scop. var. *marginata* Fern., Rhodora 22 (1920) 103. — [*D. adscendens* Henr. ssp. *marginata* Henr., Mon. Dig. (1950) 998; *nom. inval.*] — Type: *Hb. Link 97* (B, holo, left side of sheet).

Panicum ornithopus Trin. in Spreng., Neue Entdeck. 2 (1821) 83. — Type: *Forster s.n.* e Insula Adscensionis (LE, holo, *n.v.*).

D. brevifolia Link, Hort. Berol. 1 (1827) 225. — *Panicum brevifolium* Kunth, Rév. Gram. 1 (1829) 32; Enum. Pl. 1 (1833) 81; *non* Linné, 1753. — *Panicum brachyphyllum* Steud., Syn. 1 (1853) 42. — Type: *Hb. A. Braun s.n.* (B†, holo, *n.v.*).

D. fimbriata Link, Hort. Berol. 1 (1827) 226; Henr., Mon. Dig. (1950) 254, fig., in synon. — *Panicum fimbriatum* Kunth, Rév. Gram. 1 (1829) 33; Presl, Rel. Haenk. 1 (1830) 298; Kunth, Enum. Pl. 1 (1833) 81; Curtis, J. Str. Br. Roy. As. Soc. 25 (1894) 155. — *Syntherisma fimbriata* Nash, Bull. Torrey Bot. Cl. 25 (1898) 302. — *Panicum sanguinale* Linné var. *fimbriatum* Usteri, Vierteljahrschr. Nat. Ges. Zürich 50 (1905) 455. — *D. marginata* Link var. *fimbriata* Stapf, Fl. Trop. Afr. 9 (1919) 440, *p.p.* — *D. sanguinalis* Scop. var. *fimbriata* Stapf *ex* Merr., En. Philip. Fl. Pl. 1 (1923) 55; *pro comb.* — *D. adscendens* Henr. var. *criniformis* Henr., Mon. Dig. (1950) 255, fig., 999; Bor, Webbia 11 (1955) 352; Grasses (1960) 299. — *D. adscendens* Henr. var. *fimbriata* Cufod., Bull. Jard. Bot. Nat. Belg. 39 (1969) Suppl. 1327. — *D. ciliaris* Koel. var. *criniformis* R. R. Stewart, Biologia 16 (1970) 23. — Type: *Hb. Link 97* (B, holo, right side of sheet).

[*Spartina pubera* Hassk., Cat. Hort. Bog. (1844) 18; *nom. nud.* — Type: *Hasskarl s.n.* (BO, holo).]

D. pes-avis Buse in Miq., Pl. Jungh. (1854) 380; Miq., Fl. Ind. Bat. 3 (1857) 437; Henr., Mon. Dig. (1950) 552, fig., in synon. — *Panicum pes-avis* Hook. *f. ex* Koord., Exk. Fl. Java 1 (1911) 128, *p.p.* — *D. adscendens* Henr. ssp. *marginata* Henr. var. *pes-avis* Henr., Mon. Dig. (1950) 552, fig., 998. — Type: *Junghuhn s.n.* (L, holo sub no. 908.92—134; U).

D. tarapacana Philippi, Verz. Philippi (1891) 80; Henr., Mon. Dig. (1950) 730, fig., in synon. — Type: *Philippi s.n.* (W, holo *sub* no. 40677).

Panicum sanguinale Linné var. *australe auct., non* Thw.: Ridl., J. Str. Br. Roy. As. Soc. 23 (1891) 20, *p.p.*; Curtis, ibid. 25 (1894) 155, *p.p.*

Paspalum sanguinale Lamk var. *commutatum auct., non* Hook. *f.*: Hook. *f.*, Fl. Br. Ind. 7 (1896) 15, *p.p.*; Ridl., Mat. 3 (1907) 125, *p.p.*; A. Camus, Not. Syst. 2 (1912) 221, *p.p.*; Blatter & MacCann, J. Bomb. Nat. Hist. Soc. 32 (1928) 633. — *D. sanguinalis* Scop. f. *commutata auct., non* Haines: Haines, Bot. Bihar & Orissa 5 (1924) 1007.

Panicum nodosum auct., non Kunth: Koord., Nat. Tijd. Ned. Ind. 62 (1903) 242, *p.p.*

Panicum sanguinale Linné var. *digitatum auct., non* Hack.: Hack. in Urb., Symb. Antill. 4 (1903) 86, *pro specim.*

D. henryi Rendle in Forb. & Hemsl., J. Linn. Soc. Lond., Bot. 36 (1904) 323; Whitney, Paradise of the Pacific 1 (1937) 24, fig.; Degener & Whitney in Degener, Fl. Hawaii (1938) fig.; Burcham, Contr. U.S. Nat. Herb. 30 (1948) 438; Henr., Mon. Dig. (1950) 312, in synon.; Hsu, Taiwania 16 (1971) 279; Hatusima, Fl. Ryukyus (1971) 690. — *Syntherisma henryi* Newbold, Torreya 24 (Febr. 1924) 9; Honda, Bot. Mag. Tokyo 38 (July 1924) 127; Yamamoto, J. Soc. Trop. Agric. Taihoku 9 (1937) 382, fig. 28 (type!). — *Panicum henryi* Makino & Nemoto, Fl. Jap. (1925) 1472. — Type: *Henry 1031* (K, holo; BM, P); see note.

D. didactyla auct., non Willd.: Stapf, Kew Bull. (1911) 256, *p.p.*; E. G. & A. Camus, Fl. Gén. I.-C. 7 (1922) 403, Henr., Mon. Dig. (1950) 178, *p.p.*; M. Schmid, l'Agron. Trop. 13 (1958) 306, 308; Monod de Froid. in Backer & Bakh., Fl. Java 3 (1968) 566, *in nota.* — *Paspalum sanguinale* Lamk. var. *didactylum auct., non* A. Camus: A. Camus, Not. Syst. 2 (1912) 223, *pro specim.*

D. marginata Link var. *nubica* Stapf, Fl. Trop. Afr. 9 (1919) 441. — *D. adscendens* Henr. ssp. *nubica* Henr., Mon. Dig. (1950) 431, fig., 998. — *D. ciliaris* ssp. *nubica* S. T. Blake, Proc. Roy. Soc. Queensl. 81 (1969) 12. — Type: *Kotschy 429* (K, holo; P, W).

Syntherisma sasakii Honda, Bot. Mag. Tokyo 39 (1925) 41. — *D. sasakii* Tuyama, J. Jap. Bot. 18 (1942) 13; Henr., Mon. Dig. (1950) 665, in synon.; Hsu, Taiwania 9 (1963) 42, in synon. — Type: *Sasaki 18* (*n.v.*).

D. abortiva Reeder, J. Arn. Arb. 29 (1948) 291, pl. 2; Henr., Mon. Dig. (1950) 809, 844, excl. fig.; Henty, Bot. Bull. Lae 1 (1969) 76. — Type: *Carr 11108* (US, holo, *n.v.*; BM, CANB, L).

D. formosana auct., non Rendle, *pro specim. Jav.*: Henr., Mon. Dig. (1950) 993, *p.p.*; Monod de Froid. in Backer & Bakh., Fl. Java 3 (1968) 566, *p.p.*

Annual (?), at first tufted, culms later decumbent, rooting at the nodes, forming loose mats; flowering culms ascendingly erect, up to 60 cm high. *Cataphylls* absent. *Sheaths* variously bbb-pilose, upwards glabrous. *Ligule* 1—3 mm high, truncate to rounded, erose. *Blades* linear, 3—15 cm by 3—7 mm, patent to ascending, soft, scabrous, glabrous to sparsely bbb-pilose, throat with some bbb. *Peduncle* up to 40 cm long, glabrous. *Racemes* (2) 3—7(—10), longest (3—)5—15(—22) cm long, digitate or in up to 2(3) whorls along an up to 2(—4) cm long common axis. *Rachis* winged, serrate, spicules at least 0.05 mm long. *Abscission of pedicels* truncate. *Spikelets* binate, homomorphous, lanceolate, 2.5—3.5 mm long; hairs smooth, acute. *Lower glume* deltoid to triangular, 0.25—0.5 mm long, acute to obtuse, rarely bifid. *Upper glume* 1—2.4(—2.75) mm long, 0.5—0.8 times as long as the spikelet, nerves 3, pubescent, hairs overtopping. *Sterile lemma* as long as the spikelet, nerves inequidistant, (3—)7, smooth, variously pubescent, rarely glabrous, nerves then ± equidistant (*'nubica'*). *Fertile floret* slightly shorter than spikelet, yellowish in fruit, sometimes tinged with purple or leadish. *Anthers* 0.6—1 mm long, purple with yellowish connective area (*v.v.*). *Stigma* purple (*v.v.*).

Distribution. Tropics and subtropics, rare in Africa, throughout Malesia.

Ecology. Waste places, often on sand, also along the shore and in the dunes, up to 2000 m in New Guinea.

Chromosome number. 2n = 54 (Ebinger, 1962, Gould, 1963, sub *D. adscendens*, and many other records).

Anatomy. Sabnis, 1921, sub *D. sanguinalis* var. *ciliaris*.

Vernacular names. Sumatra: *gĕndjuran, kremilan, rumput gerintjingan, r. kolomenta, r. kuda* (Medan), *sĕmat* (Palembang). — Java: *djlamparan, rumput sunduk gangsir, tĕkĕn, tjĕkĕr ajam* (J); *putian* (M); *djukut djampang piit, dj. djĕmprak, dj. kakawatan, dj. leuleus* (S). — Philippines: *banban-sigan* (Igor). — New Guinea: *gjak* (Enga, Yogos).

Notes. Although the pubescence of the sterile lemma may be variable, truly heteromorphic spikelets are never encountered, nor are bulbous-based bristles present. The plants referred to *D. ciliaris* ssp. *chrysoblephara* belong to *D. bicornis*. See the discussion there.

D. pes-avis is included here and considered as a small form. The venation of the sterile lemma is often reduced to only 3 nerves, while it may be pubescent all over. It has nothing to do with *D. didactyla* to which it was referred by Monod de Froideville (1968).

Another small form with a ± persistently contracted panicle has been described as *D. henryi* (but the racemes may become spreading!). Except for this feature I can not find any other morphological difference. Hsu (1971) records n = 18 for it, it is therefore tentatively included here. I have seen specimens from Hawaii, where it is introduced, Indo-China, S. China, Formosa, and Okinawa.

The epithet *'ciliaris'* has caused some confusion, dating from Koeler's time. He based his description on two specimens, the Chinese one belonging to the current species, the Javanese one to *D. setigera*. Although he did not say so, later authors interpreted his *'calycibus ciliatis'* as referring to the bristled state known to them of *D. sanguinalis*, called ssp. *pectiniformis* by Henrard. Thus all specimens referred to in European literature belong to that temperate taxon, while all new combinations made pertain to the current one, which is only rarely introduced in Europe.

The species is described as annual; in fact, cultivation in the hothouses of the Botanical Garden, Leyden, showed it to be a short-living perennial, forming new shoots from the rooting nodes.

I once saw a specimen with a pilose rachis (W. Australia, *Burbidge* 5687, CANB).

An interesting discussion on the germination and seed-dormancy in relation to time and the presence or absence of the scales is given by Ramakrishnan & Khosla (1971, sub

D. adscendens). A water-soluble inhibitor is shown to be present, while the scales serve as a barrier to oxygen-entry up to the time of 4 months storage. The presence of a relative high level of nitrogen in the substrate seems to be required for optimal germination.

5. Digitaria radicosa (Presl) Miq. — Fig. 5b.

D. radicosa (Presl) Miq., Fl. Ind. Bat. 3 (1857) 437; Reeder, J. Arn. Arb. 29 (1948) 293; Walker & Rodin, Contr. U.S. Nat. Herb. 30 (1949) 454; Henr., Mon. Dig. (1950) 617, in synon. — *Panicum radicosum* Presl, Rel. Haenk. 1 (1830) 297, excl. synon., ?incl. var. *procerior*; F.-Vill., Nov. App. (1882) 311. — Type: *Haenke s.n.* (PR, holo). The type of var. *procerior* was not found in PR, PRC, or W.

D. propinqua Gaud. in Freyc., Voy. Uranie, Bot. 1 (1829) 410; Miq., Fl. Ind. Bat. 3 (1857) 437; E. G. & A. Camus, Fl. Gén. I.-C. 7 (1922) 403; Henr., Mon. Dig. (1950) 592, in synon.; M. Schmid, l'Agron. Trop. 13 (1958) 306, 308; *non* Beauv., 1812. — *Panicum timorense* Kunth, Enum. Pl. 1 (1833) 83; Rév. Gram. (1834) 587; ed. 2 (1835—37) Suppl. ix. — *D. timorensis* Balansa in Morot, J. Bot. 4 (1890) 138; Henr., Mon. Dig. (1950) 124, 745, fig., 994; Bor, Webbia 11 (1955) 357; Grasses (1960) 306; Hsu, Taiwania 9 (1963) 43; S. T. Blake, Proc. Roy. Soc. Queensl. 81 (1969) 19; Henty, Bot. Bull. Lae 1 (1969) 77; Gill., Rev. Fl. Malaya 3 (1971) 198, fig. 41, pl. 25c. — *Panicum sanguinale* Linné var. *timorense* Hack. in Schmidt, Bot. Tidsskr. 24 (1901) 41; Bull. Herb. Boiss. II, 4 (1904) 528. — *Paspalum sanguinale* Lamk. var. *timorense* A. Camus, Not. Syst. 2 (1912) 222. — *D. sanguinalis* Scop. var. *timorensis* Hayata, Gen. Ind. (1916) 95. — [*D. timorensis* Balansa ssp. *kunthiana* Henr., Mon. Dig. (1950) 994; *nom. inval.*] — *D. timorensis* Balansa ssp. *timorensis*: Monod de Froid. in Backer & Bakh., Fl. Java 3 (1968) 566. — *D. timorensis* Balansa var. *timorensis*: Hsu, Taiwania 16 (1971) 281. — Type: *Gaudichaud s.n.* (P, holo; L, US).

Panicum stipatum auct., non Presl: Presl, Rel. Haenk. 1 (1830) 297, *p.p.* — See *sp. exclud.*

[*Spartina glabriuscula* Hassk., Cat. Hort. Bog. (1844) 18; *nomen.* — Type: *Hasskarl 93* (BO, holo).]

D. ciliaris Koel. var. *β* Buse in Miq., Pl. Jungh. (1854) 380; Miq., Fl. Ind. Bat. 3 (1857) 436. — Type: *Junghuhn s.n.* (L, holo, no. 904.26—28).

D. ciliaris Koel. var. *γ* Buse in Miq., Pl. Jungh. (1854) 380; Miq., Fl. Ind. Bat. 3 (1857) 437; Buse in De Vriese, Pl. Ind. Bat. Or. 2 (1857) 112. — Type: *Van den Bosch s.n.* (L, holo, no. 904.26—29).

D. pertenuis auct., non Buse: Miq., Fl. Ind. Bat. (1861) Suppl. 606, *p.p.*; Kurz, Nat. Tijd. Ned. Ind. 27 (1864) 227, *p.p.*; Stapf in Craib, Kew Bull. (1912) 428; Contr. Fl. Siam, Monoc. (1913) 32; E. G. & A. Camus, Fl. Gén. I.-C. 7 (1922) 404; M. Schmid, l'Agron. Trop. 13 (1958) 306, 309.

Panicum sanguinale Linné var. *australe auct., non* Thw.: Thw., En. Pl. Zeyl. (1864) 358. — *D. sanguinalis* Scop. var. *australis auct. non* Ledeb., *nec* Merr.: Ridley, J. Str. Br. Roy. As. Soc. 23 (1891) 20; Merr., Fl. Manila (1912) 78; En. Philip. Fl. Pl. 1 (1923) 55.

Paspalum sanguinale Lamk. var. *debile auct., non* Hook. *f.*: Hook. *f.*, Fl. Br. Ind. 7 (1896) 16; Ridley, Mat. 3 (1907) 125; *pro specim.* — *D. marginata* Link var. *debilis auct., non* Ridley: Hook. *f. ex* Ridley, Fl. Mal. Pen. 5 (1925) 214, *pro specim.* — *Syntherisma debilis auct., non* Skeels: Hitchc., Mem. Bish. Mus. 8 (1922) 175.

D. formosana Rendle in Forb. & Hemsl., J. Linn. Soc. Lond., Bot. 36 (1904) 323; Henr., Mon. Dig. (1950) 264, fig., 993; Monod de Froid. in Backer & Bakh., Fl. Java 3 (1968) 566, *p.p.* — *Syntherisma formosana* Honda, Bot. Mag. Tokyo 38 (1924) 122; Yamamoto, J. Soc. Trop. Agric. Taihoku 9 (1937) 382, fig. 29 (of type). — *Panicum formosanum* Makino & Nemoto, Fl. Jap. (1925) 1471. — Type: *Henry 1941* (K, holo; BM, P, W) (1841, *sphalm* Henr.).

Panicum sanguinale auct., non Linné: Mez in Perk., Fragm. Fl. Filip. (1904) 143, *p.p.*; Ridley, Trans. Linn. Soc. Lond., Bot. 9 (1916) 247. — *D. sanguinalis auct., non* Scop.: Balansa in Morot, J. Bot. 4 (1890) 138, *p.p.*; Merr., Philip. J. Sc. 1 (1906) Suppl. 346, *p.p.*; En. Born. Pl. (1921) 43, *p.p.*; Backer in Heyne, Nutt. Pl. 1 (1922) 159, *p.p.*; ed. 2 (1927) 207, *p.p.*; Merr., En. Philip. Fl. Pl. 1 (1923) 54, *p.p.*; Backer & Sloot., Theeonkr. (1924) 51, *p.p.*; Backer, Onkr. Suikerr. (1928) 68, pl. 60?, *p.p.*; Handb. Fl. Java 2 (1928) 130, *p.p.*; Elmer, Leafl. Philip. Bot. 10 (1938) 3511; Reeder, J. Arn. Arb. 29 (1948) 290, *p.p.*

D. tenuispica Rendle in Forb. & Hemsl., J. Linn. Soc. Lond., Bot. 36 (1904) 326; Henr., Mon. Dig. (1950) 734, in synon. — *Syntherisma tenuispica* Keng, Sc. Rep. Nat. Centr. Univ. Nanking, ser. B, Biol. 1 (1930) 54. — Types: *Maingay 554* (BM, K, P); *Buchanan-Hamilton s.n.* (BM).

Panicum didactylum auct., non Kunth: Hack., Bull. Bur. Govt. Lab. Philip. 35 (1906) 80.

?Syntherisma formosana Honda var. *hirsuta* Honda, Bot. Mag. Tokyo 38 (1924) 123. — *Panicum formosanum* Makino & Nemoto var. *hirsutum* Makino & Nemoto, Fl. Jap. (1925) 1472. — *S. formosana* ssp. *hirsuta* Masamune & Yanagihara, Trans. Nat. Soc. Formosa 31 (1941) 327. — *D. formosana* Rendle var. *hirsuta* Henr., Mon. Dig. (1950) 265, 993. — Type: *Hayata s.n.* (*n.v.*).

?Syntherisma sanguinalis Dulac var. *multinervis* Honda, Bot. Mag. Tokyo 38 (1924) 120. — *Panicum sanguinale* Linné var. *multinervis* Makino & Nemoto, Fl. Jap. (1925) 1476. — *Syntherisma multinervis* Honda, Rep. First Sc. Exp. Manch., Sect. IV, 4 (1936) 65, 105. — *D. sanguinalis* Scop. var. *multinervis* Kitagawa, Lineam. Fl. Mansh. (1939) 72. — Type: *Hiraoka s.n.* (*n.v.*).

D. longiflora auct., non Pers.: Henderson, Gard. Bull. Sing. 4 (1928) 356.
D. chinensis auct., non Hornem.: Christophersen, Bull. Bish. Mus. 128 (1935) 8; Burcham, Contr. U.S. Nat. Herb. 30 (1948) 432; Henr., Mon. Dig. (1950) 124, 746, 838, in synon.; Ono & Tateoka, Bot. Mag. Tokyo 66 (1953) 24, fig. 27 a, b. — See note.
D. chinensis Hormen. var. *hirsuta* Ohwi, Acta Phytotax. & Geobot. 11 (1942) 29. — *D. timorensis* Balansa var. *hirsuta* Henr., Mon, Dig. (1950) 838, 994; Hsu, Taiwania 9 (1963) 43; ibid. 16 (1971) 281. — Type: *Taira s.n.* (*n.v.*).

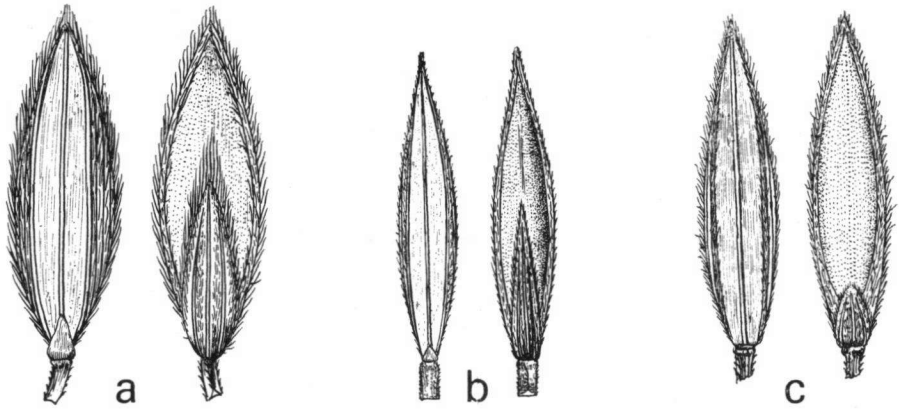

Fig. 5. Spikelets. All × 13. — a. *D. ciliaris* (*Herb. Link 97*, type of *D. fimbriata*). — b. *D. radicosa* (*Gaudichaud s.n.*, type of *D. propinqua* Gaud., *non* Beauv.). — c. *D. setigera* var. *setigera* (*Langsdorff s.n.*, type of *Panicum pruriens*).

Annual, culms becoming decumbent, rooting at the lower nodes, forming loose mats, flowering culms ascendingly erect, up to 60 cm high. *Cataphylls* absent. *Sheaths* glabrous to bbb-pilose. *Ligule* 0.75—2 mm long, truncate, erose. *Blades* linear, 2.5—11 cm by 2—8 mm, patent to ascending, soft, usually scabrous, glabrous to moderately appressed-pilose, throat with a few bbb. *Peduncle* up to 50 cm long, glabrous. *Racemes* 2—4(5), longest (2—)4—11(—14) cm long, digitate, rarely panicled, common axis usually absent, rarely up to 2 cm long. *Rachis* winged, smooth to minutely serrulate, spicules at most 0.03 mm long. *Abscission of pedicels* truncate. *Spikelets* binate, homomorphous, lanceolate, 2.25—3.25 mm long; hairs smooth, acute. *Lower glume* very variable, 0.1—0.25 mm long, a minute rim to a triangular scale. *Upper glume* very variable, 0.75—2 mm long, 0.25—0.6 times as long as the spikelet, acute to obtuse, that of the pedicelled spikelet sometimes relatively much longer than that of the sessile one, 1—3-nerved, glabrous or with over-topping pubescence. *Sterile lemma* as long as the spikelet, nerves 5—7, inequidistant, smooth, marginals hidden by the pubescence, never with bristles. *Fertile floret* slightly shorter than the spikelet, yellowish in fruit. *Anthers* 0.7—1 mm long, purple with yellowish connective area (*v.v.*). *Stigma* pale violet to purple (*v.v.*).

Distribution. Old World Tropics, from Madagascar to the Pacific, Japan, Australia (Queensland), throughout Malesia. Introduced in Africa (Cameroon, Tanzania).

Ecology. Waste places, up to 2000 m in New Guinea.

Chromosome number. 2n = 18 (Hsu, 1963, 1971, sub *D. timorensis*; the smooth rachis is being mentioned!; Ono & Tateoka, 1953, sub *D. chinensis*, compared with *D. adscendens* = *D. ciliaris*).

Vernacular names. Sumatra: *kremilan, rumput halus, r. pandjang* (Asahan), *r. rangut, r. udang* (Padang). — Java: *djampang piit* (S), *grinting, paleas.* — Timor: *kuru koga.* — Celebes: *kundu rintek* (Tombulu). — Ceram: *raë-raë.* — Philippines: *batad maya* (Mang.). — New Guinea: *gjak* (Enga, Yogos), *gunun* (Onjob, Naukwate), *kaubibia* (Kabubu, Minufia).

Notes. This is in its spikelet-characters an extremely variable plant, uniting so to say some forms encountered in *D. ciliaris* and *D. setigera*, with both of which it is easily confused. In habit it is a smaller plant with usually less racemes. It is remarkably well-recognized by previous students, as curiously enough the only character which appears to hold true is the absence of spicules on the rachis or the small size of these, first pointed out by Hsu (1963), who also gave the chromosome number as $2n = 18$. It is therefore the diploid form of the series presented by *D. sanguinalis* ($2n = 36$), *D. ciliaris* ($2n = 54$), and *D. bicornis* ($2n = 72$). That it cannot be united off-hand with *D. ciliaris* is proved by its absence from South America and until recently from Africa, where the other species are well-represented.

The distinction given by Henrard (1950, p. 993, 994), that it would differ by the 'sterile lemma apparently only 3-nerved' against 'distinctly 7-nerved' does not hold true and is immediately refuted by himself, when he stated under *D. formosana* 'sterile lemma 5-sub-7-nerved' and under *D. timorensis* 'the indistinct marginal nerves doubled'. That the lateral nerves cannot be seen from the abaxial side is quite common for many species of the genus.

The difference between *D. formosana* and *D. timorensis* is an attempt to distinguish between the *ciliaris*-like specimens and the *setigera*-like ones. In fact, both types can be found in the same spikelet-cluster! The sessile spikelet has then the shorter upper glume.

There is no bristled parallel as suggested by Henrard: the ssp. *blepharophora* belongs to *D. setigera* var. *calliblepharata*. The var. *norfolkiana* is a subglabrous form of *D. setigera*. The two varieties '*hirsuta*' under both species can safely be put in the synonymy, although the types have not been seen. Pubescent forms occur over the whole range of the species, but are nowhere common. The var. *multinervis* is provisionally included, as the type has not been seen and the original description is not very clear.

It is unfortunate that the name *D. timorensis* must be replaced by *D. radicosa*. Contrary to the opinion expressed by Henrard (1950, p. 618 and 745), the Supplement to Kunth's '*Révision des Graminées*' was not published in 1830, but in 1834 as the last consecutively paged instalment of that work. This is not clearly indicated by Stafleu (Tax. Lit. 1967, p. 249). It is the second printing, in which the separately paged Supplement is bound between the other fascicles.

D. chinensis, considered by some to be the correct name for this species, was described in 1819. It will be more extensively dealt with under the Excluded and Dubious species at the end of this revision (p. 71).

6. Digitaria setigera R. & S.

D. setigera Roth *ex* R. & S., Syst. Veg. 2 (1817) 474; Roth, Nov. Pl. Sp. (1821) 37; Henr., Mon. Dig. (1950) 684, *in obs.*; Bor, Webbia 11(1955) 344, fig. 2 (type of var. β!); Grasses (1960) 305. — *Cynodon setigerus* A. Rich. *ex* Hassk., Cat. Pl. Bog. Alt. (1844) 17. — *Panicum fimbriatum* Link var. *setigerum* Fourn., Mex. Pl. 2 (1886) 18; *pro comb.* — *Panicum setigerum* Boerl., Ann. Jard. Bot. Btzg. 8 (1890) 52; *non* Retz., 1786, *nec* Beauv., 1807. — Type: *Heyne s.n.* in Hb. Roth (B, holo; K), K neg. 2107, *nec* 2106.

Panicum ciliare auct., non Retz: Retz., Obs. 4 (1786) 16, *pro specim. Jav.*

Panicum corymbosum auct., non Roxb.: Trin., Diss. Alt. (1826) 77. — *D. corymbosa auct., non* Merr.: Merr., En. Philip. Fl. Pl. 1 (1923) 53, *p.p.*, excl. basion.; Elmer, Leafl. Philip. Bot. 10 (1938) 3511; Henr., Mon. Dig. (1950) 149, fig., 943. — *Syntherisma corymbosa auct., non* Hosokawa: Hosokawa, Trans. Nat. Hist.

Soc. Formosa 24 (1934) 199; J. Trop. Agric. 7 (1935) 314. — *D. corymbosa* Merr. ssp. *roxburghiana auct., non* Henr.: Henr., Mon. Dig. (1950) 943, *pro specim.*

Panicum pruriens Fischer *ex* Trin., Diss. Alt. (1826) 77; Gram. Ic. (1827 or early 1828) pl. 92; Mém. Ac. Sc. St Pétersb. VI, Sec. Nat. 3 (1834) 200; Nees in Hook., J. Bot. Kew 2 (1850) 97; Hack., Bot. Jahrb. 6 (1885) 234; K. Sch., ibid. 9 (1887) 196; Boerl., Ann. Jard. Bot. Btzg. 8 (1890) 53; K. Sch. & Laut., Fl. Deut. Schutzgeb. Südsee (1901) 177; Koord., Exk. Fl. Java 1 (1911) 127. — *D. pruriens* Buse in Miq., Pl. Jungh. (1854) 379; Miq., Fl. Ind. Bat. 3 (1857) 436; Merr., En. Born. Pl. (1921) 43; E. G. & A. Camus, Fl. Gén. I.-C. 7 (1922) 403; Hitchc., Brittonia 2 (1936) 120; Reeder, J. Arn. Arb. 29 (1948) 292; Henr., Mon. Dig. (1950) 594, fig., 943; S. T. Blake, Proc. Roy. Soc. Queensl. 81 (1969) 18; Henty, Bot. Bull. Lae 1 (1969) 77. — *Panicum sanguinale* Linné var. *pruriens* Drake, Fl. Polyn. Franç. (1893) 249. — *Paspalum sanguinale* Lamk. var. *pruriens* Hook. *f.*, Fl. Br. Ind. 7 (1896) 15; Ridley, Mat. 3 (1907) 125; A. Camus, Not. Syst. 2 (1912) 221. — *D. sanguinalis* Scop. var. *pruriens* Prain, Cat. Beng. Pl. (1903) 889; Rendle in Forb. & Hemsl., J. Linn. Soc. Lond., Bot. 36 (1904) 326. — *Syntherisma pruriens* Arthur, Torreya 19 (1919) 48 ('*Sanguinale pruriens*'), 83 (corr.). — *D. marginata* Link var. *pruriens* Hook. *f. ex* Ridley, Fl. Mal. Pen. 5 (1925) 214. — *Syntherisma sanguinalis* Dulac var. *pruriens* Honda, J. Fac. Sc. Tokyo III, Bot. 3 (1930) 299. — *D. pruriens* Buse var. *pruriens*: B. C. Stone, Fl. Guam (1972) 209. — Type: *Langsdorff s.n.* in Hb. Trin. (LE, hololecto, *n.v.*; BM); *Chamisso s.n.* in Hb. Trin. (LE, *n.v.*; K; MAU, *n.v.*).

D. consanguinea Gaud. in Freyc., Voy. Uranie, Bot. 1 (1829) 410; Merr., Philip. J. Sc. 1 (1906) Suppl. 347; ibid. 3 (1909) Bot. 396; Fl. Manila (1912) 88; Sp. Blanc. (1918) 64; En. Born. Pl. (1921) 43; E. G. & A. Camus, Fl. Gén. I.-C. 7 (1922) 400; Henr., Mon. Dig. (1950) 148, in synon. — *Paspalum consanguineum* Kunth, Enum. Pl. 1 (1833) 46; Rév. Gram., Suppl. (1834) 585. — *Panicum consanguineum auct., non* Kunth: Koord., Exk. Fl. Java 1 (1911) 127. — *Syntherisma consanguinea* Skeels, U.S. Dep. Agric. Bur. Pl. Ind., Bull. 282 (1913) 33. — Type: *Gaudichaud s.n.* (P, holo).

Panicum microbachne Presl, Rel. Haenk. 1 (1830) 298. — *Panicum sanguinale* Linné var. *microbachne* Hack., Bot. Jahrb. 13 (1890) 259; K. Sch. & Laut., Fl. Deut. Schutzgeb. Südsee (1901) 177; Hack. in Rechinger, Denkschr. Wien 89 (1913) 52, 494. — *Syntherisma microbachne* Hitchc., Mem. Bish. Mus. 8 (1922) 177; J. Arn. Arb. 13 (1932) 116. — *D. microbachne* Henr., Meded. Rijksherb. Leiden 61 (1930) 13; Hitchc., Lingn. Sc. J. 7 (1931) 210; Reeder, J. Arn. Arb. 29 (1948) 292, in synon.; Henr., Mon. Dig. (1950) 449, fig., 945; Bor, Webbia 11 (1955) 342; Grasses (1960) 302; De Castro, Garcia de Orta 12 (1964) 54, fig. 3; Monod de Froid. in Backer & Bakh., Fl. Java 3 (1968) 567; Henty, Bot. Bull. Lae 1 (1969) 77; Gill., Rev. Fl. Malaya 3 (1971) 194, pl. 25a; Hsu, Taiwania 16 (1971) 280. — [*D. microbachne* Henr. ssp. *presliana* Henr., Mon. Dig. (1950) 945; *nom. inval.*] — *D. pruriens* Buse var. *microbachne* Fosb., Phytologia 5 (1955) 289; B. C. Stone, Fl. Guam (1972) 210. — *D. microbachne* Henr. ssp. *microbachne*: Bor, Webbia 11 (1955) 344; Grasses (1960) 296. — Type: *Haenke s.n.* (PR, holo; W).

Panicum stipatum auct., non Presl: Presl, Rel. Haenk 1 (1830) 297, *p.p.*; see *spec. exclud.*

Paspalum reimarioides Brongn. in Duperrey, Voy. Coquille, Bot. (1833) 140, t. 20, excl. specim. Waigiou. — *Panicum sanguinale* Linné var. *reimarioides* Drake, Fl. Polyn. Franç. (1893) 250. — Type: *D' Urville s.n.* e Oualan (P, hololecto).

Panicum norfolkianum Nees *ex* Endl., Prodr. Fl. Norf. (1833) 18. — *D. timorensis* Balansa var. *norfolkiana* Henr., Mon. Dig. (1950) 748, fig., 994; Monod de Froid. in Backer & Bakh., Fl. Java 3 (1968) 566. — Type: *Bauer s.n.* (W, holo).

Panicum chrysanthum Steud., [Nomencl. ed. 2, 2 (1841) 254 (*nomen*)] Syn. 1 (1853) 50 (descr.). — *Panicum pruriens* Trin. var. *glabrum* Nees in Hook. J. Bot. Kew. 2 (1850) 97. — *Panicum sanguinale auct., non* Linné: Vidal, Phan. Cuming. (1885) 157; Rolfe, J. Bot. 23 (1885) 216; Vidal, Rev. Pl. Vasc. Philip. (1886) 287. — Type: *Cuming 561* (P, holo; K, L, PR).

D. lanosa Llanos, Fragm. Fl. Filip. (1851) 28; in Blanco, Fl. Filip. ed. 4, 4 (1880) 19; Henr., Mon. Dig. (1950) 374, in synon. — Type: the description.

[*Panicum extensum* Nees & Arn. *ex* Wight, Cat. (1837) 141 (*nomen*); *non* Steud., 1853. —] *Panicum dilatatum* Steud., Syn. 1 (1853) 39. — *Paspalum sanguinale* Lamk. var. *extensum* Hook. *f.*, Fl. Br. Ind. 7 (1896) 15; Ridley, Mat. 3 (1907) 125; A. Camus, Not. Syst. 2 (1912) 222, *p.p.* — *D. sanguinalis* Scop. var. *extensa* Hook. *f. ex* Rendle, Cat. Afr. Pl. Welwitsch 2, 1 (1899) 163; *pro comb.*; in Forb. & Hemsl., J. Linn. Soc. Lond., Bot. 36 (1904) 326. — *Panicum sanguinale* Linné var. *extensum* Hook. *f. ex* Matsumura, Ind. Pl. Jap. 2, 1 (1905) 72. — *D. marginata* Link var. *extensa* E. G. & A. Camus, Fl. Gén. I.-C. 7 (1922) 401. — *D. sanguinalis* Scop. f. *extensa* Hook. *f. ex* Haines, Bot. Bihar & Orissa 5 (1924) 1007. — *Syntherisma sanguinalis* Dulac var. *extensa* Honda, J. Fac. Sc. Tokyo III, Bot. 3 (1930) 298. — *D. extensa* Henr., Blumea 1 (1934) 100. — Type: *Wight Cat. 2340* (K, holo; MB); Steudel cited 1045 and 1047 (Kew distribution numbers), one of which is identical with the Catalogue number.

Lasiolytrum pilosum Steud. *ex* Jard., Mém. Soc. Sc. Nat. Cherbourg 5 (1857) 299; Hist. Nat. Marq. (1858) 27; Drake, Fl. Polyn. Franç. (1893) 249, in synon. — Type: *Jardin 59* (P, holo).

Panicum sanguinale Linné var. *humifusum* Hack., Bot. Jahrb. 6 (1885) 233; K. Sch., ibid. 9 (1887) 195. — Type: *Naumann s.n.* (B†, holo, *n.v.*).

D. sanguinalis auct., non Scop.: Balansa in Morot, J. Bot. 4 (1890) 138, *p.p.*; Rendle in Andrews, Mon. Christmas Isl. (1900) 192; Backer in Heyne, Nutt. Pl. 1 (1922) 159, *p.p.*; ed. 2 (1927) 207, *p.p.*; Backer & Sloot., Theeonkr. (1924) 51, *p.p.*; Backer, Onkr. Suikerr. (1928) 68, pl. 60?, *p.p.*; Handb. Fl. Java 2 (1928) 130, *p.p.* — *Panicum sanguinale auct., non* Linné: K. Sch. & Laut., Fl. Deut. Schutzgeb. Südsee (1901) 176, *p.p.* — *Paspalum sanguinale auct., non* Lamk.: Stapf in Koord., Fl. N.O. Celebes (1898) 276.

Panicum sanguinale Linné var. *australe auct., non* Thw.: Curtis, J. Str. Br. Roy. As. Soc. 25 (1894) 155, *p.p.*

Paspalum sanguinale Lamk. var. *commutatum auct., non* Hook. *f.*: Hook. *f.*, Fl. Br. Ind. 7 (1896) 15, *p.p.*; Ridley, J. Str. Br. Roy. As. Soc. 45 (1906) 241, *p.p.*; ibid. 46 (1906) 216, *p.p.*; Mat. 3 (1907) 125, *p.p.*; A. Camus, Not. Syst. 2 (1912) 221, *p.p.* — *D. marginata* Link var. *commutata auct., non* Ridley: Ridley, Fl. Mal. Pen. 5 (1925) 214, *pro specim.*

Syntherisma sanguinalis Dulac var. *evalvula* Honda, Bot. Mag. Tokyo 38 (1924) 122, excl. synon. — *D. sanguinalis* Scop. var. *evalvula* Honda, Nom. Pl. Jap. (1939) 506. — Lectotype: *Faurie 745* (BM, P).

D. marginata auct., non Link: Henderson, Gard. Bull. Str. Settl. 4 (1928) 356, *p.p.*

D. hainanensis Hitchc. *ex.* Keng, Sunyatsenia 3 (1935) 18; Henr., Mon. Dig. (1950) 309, fig., 944. — Type: *Hitchcock 19617* (US, holo, *n.v.*).

D. horizontalis auct., non Willd.: Ohwi, Bot. Mag. Tokyo 55 (1941) 541. — *D. subhorizontalis* Ohwi, Acta Phytotax. & Geobot. 11 (1942) 261; Henr., Mon. Dig. (1950) 719, in synon. — Type: *Hatusima 4861* (*n.v.*).

D. abortiva auct., non Reeder; Henr., Mon. Dig. (1950) 809, fig., 844, excl. typ.

D. microbachne Henr. var. *longivillosa* Henr., Mon. Dig. (1950) 454, fig., 945. — Type: *Fénix BS 24967* (L, holo; BM).

D. microstachya Henr., Mon. Dig. (1950) 454, fig., 942; Bor, Grasses (1960) 303; Dansk Bot. Ark. 23 (1965) 151; Gill., Rev. Fl. Malaya 3 (1971) 195. — Type: *Griffith s.n.* in Hb. Lehmann (CGE, holo, *n.v.*).

D. adscendens auct., non Henr.: Gupta & Srivastava, Genetica Iberica 21 (1969) 16, fig. 6, 7, *pro Gupta 183*.

See for further synonyms of the species under var. *calliblepharata*.

Two varieties can be distinguished:

a. Sterile lemmata variously pubescent, never with bristles in the second interspace. Spikelets homomorphous. . . . . var. **setigera**

a. Sterile lemmata with at most a few hairs between the bristles in the second interspace. Spikelets sometimes heteromorphous, the sessile subglabrous . var. **calliblepharata**

var. **setigera**. — **Fig. 5c.**

Annual, culms becoming decumbent, rooting at the lower nodes, forming loose mats; flowering culms ascendingly erect, up to 1.2 m high. *Cataphylls* absent. At least the lower *sheaths* with patent bbb. *Ligule* 1.5—3 mm long, truncate, erose. *Blades* linear, 4—28 cm by 4—12(—16) mm, patent to ascending, soft, usually scabrous, glabrous to moderately appressed pilose, throat with a few bbb. *Peduncle* up to 40 cm long, glabrous. *Racemes* 2—17(—21), longest (5—)6—17(—22) cm long, digitate or variously whorled along the 0—6(—9) cm long common axis. *Rachis* winged, serrate, the spicules at least 0.05 mm long, glabrous or with setae in the lower part. *Abscission of pedicels* truncate. *Spikelets* homomorphous, binate, oblong to lanceolate, 2—3.5 mm long; hairs smooth, acute. *Lower glume* absent or a minute rim or scale, up to 0.1(—0.25) mm long. *Upper glume* quadrangular to triangular, (0.1—)0.25—1.25 mm long, (0.05—)0.1—0.4 times as long as the spikelet, acute to emarginate, 0—3-nerved, glabrous or with overtopping pubescence. *Sterile lemma* as long as the spikelet, nerves (5—)7, inequidistant, smooth, variously pubescent, never bristled. *Fertile floret* slightly shorter than the spikelet, yellowish to brownish in fruit. *Anthers* 0.65—1.3 mm long, variously coloured from purple with pale connective zone to yellow or variegated without distinct connection zone (*v.v.*). *Stigma* pinkish violet to violet (*v.v.*).

Distribution. Tropical Asia from India and Ceylon to the Pacific, N. Australia, Kermadec Is., throughout Malesia. Introduced elsewhere, e.g. Honduras, Costa Rica, Jamaica, Surinam.

Ecology. Waste places, up to 2750 m in Java.

Chromosome number. 2n = 72 (Hsu, 1971, sub *D. microbachne*; Gupta & Srivastava, 1969, sub *D. adscendens*).

Vernacular names. Sumatra: *brandjangan* (Atjeh), *dahut napa, kolomento, krĕmilan alus, rumput hisik, r. gĕndjuran, r. kuda.* — Java: *djĕngkon, gĕndjoran, rĕmbejung, sukĕt tjakar ajam, sunduk gangsir* (J); *putian (radja), reba potean, rumput kembangan* (M). — Celebes: *tutunde-imerang* (Toulour), *sesewenan* (Tontemboan). — Philippines: *balisibis* (Bataan). — Moluccas: *botoboto ma fala* (Ternate), *karokaro ma fola* (Tidore), *kukumutu marubu* (Halmaheira), *kawasileh* (Alor). — New Guinea: *arrupepe* (Maring), *bagano* (Masul), *didadosubu* (Moro), *gunun* (Onjob), *hintri* (Dunantina), *hitilifa* (Okapa), *kaubibia, patane* (Kabubu, Minufia), *montey tey* (Tairora), *muterimaha* (Kefamo), *ruu* (Mapos), *sisipur* (Wangela), *tuwenseba* (Minj).

Notes. This is the most common representative of the genus in Malesia and exhibits a great variability. As can be seen from the list of synonyms above various attempts have been made to distinguish entities within it, of which the following may be mentioned as they are found in recent literature:

1. Panicle without or with a short common axis, 2—few racemes, the longest up to *ca.* 10 cm long. Rachis glabrous. Upper glume 0.5—1.25 mm long, 0.15—0.4 times as long as the 2.5—3.5 mm long spikelet. Sterile lemma inequidistantly nerved. The '*pruriens*' form, most common in the eastern part of the area and almost the only one in the Pacific. Approaching *D. radicosa, D. ciliaris.*
2. Panicle with a well-developed common axis and many (11—21) racemes, the longest 11—22 cm long. Rachis in lower half with setae. Upper glume up to 0.5 mm long, up to 0.25 times as long as the 2—2.5 mm long spikelet. Sterile lemma sometimes nearly equidistantly nerved. The '*setigera s.s.*' or '*corymbosa*' form, especially found in the western part of the area. Approaching *D. nuda.*
3. As 2, but with glabrous rachis. The '*microbachne*' and '*microstachya*' form, of western and central distribution.

Unfortunately, these extremes are linked by nearly all possible intermediates and no satisfactory subdivision of this rather unwieldy variety can be made at present.

Henrard created a special section '*Parviglumae*' to accommodate the species united here and *D. hainanensis.* It is obviously intermediate between his '*Sanguinales*' and his '*Horizontales*'. See introduction, p. 14.

var. **calliblepharata** (Henr.) Veldk., *comb. nov.* — **Fig. 6a.**

D. microbachne Henr. ssp. *calliblepharata* Henr., Mon. Dig. (1950) 452, fig., 945; Bor, Webbia 11 (1955) 346; Grasses (1960) 296; De Castro, Garcia de Orta 12 (1964) 54; Gill., Rev. Fl. Malaya 3 (1971) 194. — *D. microbachne* Henr. var. *calliblepharata* Henr. *ex* Henty, Bot. Bull. Lae 1 (1969) 77. — Type: *Backer 27997* (L, holo; BO).

D. marginata Link var. *ciliaris auct., non* Ridley: Ridley, Fl. Mal. Pen. 5 (1925) 214, *p.p.* — *Paspalum sanguinale* Lamk. var. *ciliare auct., non* Hook. *f.*: Ridley, Mat. 3 (1907) 125.

D. timorensis Balansa ssp. *blepharophora* Henr., Mon. Dig. (1950) 747, fig., 994. — Type: *Gaudichaud s.n.* (P, holo).

D. setigera R. & S. ssp. *marathensis auct., non* Bor: Bor, Webbia 11 (1955) 346, *pro specim.*; Grasses (1960) 295.

As the typical variety, differing in: Culms up to 90 cm high. Leaf-blades 2.5—18 cm by 3—8 mm. Racemes 3—14, longest 4—16 cm long, common axis up to 5 cm long. Rachis usually without setae. Spikelets usually homomorphous, lanceolate, 2.75—4 mm long. Lower glume absent, rarely up to 0.2 mm long. Upper glume 0.3—1 mm long, 0.15—0.3 times as long as the spikelet. Sterile lemma with at most a few hairs between the bristles in the second interspace, nerves 7, inequidistant, those of the sessile spikelets

sometimes subglabrous and ± equidistantly nerved, spikelets then heteromorphous. Fertile floret yellowish, occasionally purplish in fruit. Anthers 0.9—1.0 mm long, purple, connective zone yellow (*v.v.*). Stigma purple (*v.v.*).

Distribution. Among the typical variety, rare. India (Bengal), Malaya (Malacca, Singapore), Java (mainly in the eastern part), Kangean Arch., Lesser Sunda Is. (Bali, Timor, relatively common, Sumbawa, Alor), SW. Celebes (Bonthain), Philippines (Luzon), New Guinea (Kebar Valley), Micronesia (Guam).

Ecology. As the typical variety.

Vernacular names. Java: *kawattan, sukĕt paït, tuton.* — Lesser Sunda Is.: *rebu pajung* (Sumbawa), *arrag* (Alor).

Notes. Resembling *D. bicornis*, but differing in the size of the upper glume and the pubescence of the sterile lemma.

Jeswiet (no. 228) noted that the plant is a host of *Aphis adusta*.

7. **Digitaria nuda** Schumach. — **Fig. 6b.**

D. nuda Schumach., Beskr. Guin. Pl. (1827) 65; Henr., Mon. Dig. (1950) 500, fig., 952. — [*D. nuda* Schumach. ssp. *schumacheriana* Henr., Mon. Dig. (1950) 952; *nom. inval.*] — Type: *Thonner 367* (C, holo).

Milium digitatum Sw., Prodr. (1878) 24; Fl. Ind. Occ. 8 (1797) 181. — *Agrostis digitata* Poir. in Lamk., Encycl., Suppl. 1 (1810) 258; *non* Lamk., 1783. — *Axonopus digitatus* Beauv., Agrost. (1812) 12, 154, 167. — *D. jamaicensis* Spreng., Syst. Veg. 1 (1825) 272, *nom. superfl.* — *Paspalum digitatum* Kunth, Rév. Gram. 1 (1829) 24; Enum. Pl. 1 (1833) 46. — *Panicum sanguinale* Linné var. *digitatum* Hack. in Urb., Symb. Antill. 4 (1903) 86, *pro comb.* — *Syntherisma digitata* Hitchc., Contr. U.S. Nat. Herb. 12 (1908) 142; Hitchc. & Chase, ibid. 18 (1917) 293. — *Panicum digitatum* Asch. & Graebn., Syn. Mitt. Eur. Fl. ed. 2, 2, 1 (1920) 112; *nom. illeg.*; *non* Gilib., 1792, *nec* Koord., 1911. — *D. digitata* Urb., Symb. Antill. 8 (1920) 24; Henr., Mon. Dig. (1950) 185, in synon.; *non* Buse, 1854. — Type: *Swartz s.n.* (S, holo, *n.v.*; BM).

D. borbonica Desv., Opusc. (1831) 63; Henr., Mon. Dig. (1950) 82, fig., 952; Jansen, Fl. Neerl. 1, 2 (1951) 250; Metcalfe, Anat. Monoc. 1 (1960) 158; Monod de Froid. in Backer & Bakh., Fl. Java 3 (1968) 567. — Type: *Desvaux s.n.* (*n.v.*, not in P).

Panicum diamesum Steud., Syn. 1 (1853) 42. — [*D. diamesum* Henr., Mon. Dig. (1950) 177, fig., *nom. inval.*, in synon. on p. 500, 832, 952.] — Type: *Leprieur s.n.* (P, holo).

D. horizontalis auct., non Willd.: Stapf, Fl. Trop. Afr. 9 (1919) 436, *p.p.*; Hitchc., Man. Grasses U.S. (1935) 555, *p.p.*; ed. 2 (1950) 576, *p.p.*; Man. Grasses W. Ind. (1936) 169, *p.p.*; Adams, Fl. Pl. Jamaica (1972) 179 (photogr.?).

D. sanguinalis auct., non Scop.: Backer in Heyne, Nutt. Pl. 1 (1922) 158, *p.p.*; ed. 2 (1927) 207, *p.p.*; Backer & Sloot., Theeonkr. (1924) 51, *p.p.*; Backer, Onkr. Suikerr. (1928) 130, *p.p.*; Handb. Fl. Java 2 (1928) 130, *p.p.*

D. adscendens Henr. var. *rhachiseta* Henr., Mon. Dig. (1950) 11, fig., 999. — Type: *H. Smith 180* (L, holo; NY, *n.v.*).

Annual, culms becoming decumbent, rooting at the lower nodes, forming loose mats; flowering culms ascendingly erect, up to 60 cm high. *Cataphylls* absent. *Sheaths* glabrous to sparsely bbb-pilose. *Ligule* 1—1.5 mm long, truncate, erose. *Blades* linear, 2—12(—16) cm by 3—8 mm, ascending, soft, scabrous or with some bbb in the throat. *Peduncle* up to 40 cm long, glabrous. *Racemes* (2)3—8(—18), longest (4—)5—11(—12.5) cm long, digitate or in a corymbose panicle, common axis rarely developed, then up to 2.5(—7) cm long. *Rachis* winged, serrate, spicules at least 0.05 mm long, often with setae in lower part. *Abscission of pedicels* truncate. *Spikelets* binate, homomorphous, lanceolate, (1.75—) 2—2.5(—2.75) mm long; hairs smooth, acute. *Lower glume* absent, rarely a minute scale, up to 0.15 mm long. *Upper glume* 1—1.5 (—1.8) mm long, 0.4—0.8 times as long as the spikelet, acute, 3-nerved, with overtopping pubescence. *Sterile lemma* as long as the spikelet, nerves 7, ± equidistant, smooth, rarely minutely serrate, pubescent, never bristled, often brown when ripe. *Fertile lemma* slightly shorter than the spikelet, yellowish to

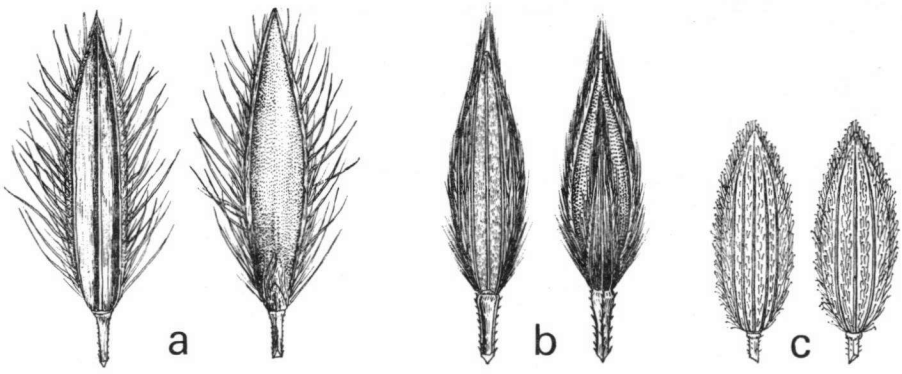

Fig. 6. Spikelets. All × 13. — a. *D. setigera* var. *calliblepharata* (*Backer 27997*, type). — b. *D. nuda* (*Thonnen 367*, type). — c. *D. sparsifructus* (*Backer 6605*, type).

brownish to leaden in fruit. *Anthers* 0.3—0.6 mm long, dark purple with pale connective zone (*v.v.*). Stigma violet to purple (*v.v.*).

Distribution. Tropics of the whole world, apparently most common in Africa, throughout Malesia.

Ecology. Weed in waste places, apparently preferring sandy soil. Up to 900 m alt. Locally common.

Anatomy. See Metcalfe, 1960.

Vernacular names. Java: *gĕndjoran* (J); *(djukut) djampang piit* (S). — New Guinea: *maroro* (Orokaiva, Mumuni).

Notes. Henrard kept *D. borbonica* and *D. nuda* separate and indeed the material in its extreme forms differs in several respects:

1. Inflorescence usually with setae. Racemes (2)3—8(—10). Upper glume 1—1.5 mm long, 0.4—0.6 times as long as the spikelet. Rare in continental Africa, elsewhere locally common . . . . . *D. borbonica*
2. Inflorescence without setae. Racemes 2—4 (but once 18). Upper glume 1.25—2 mm long, (0.5—)0.6—0.8 times as long as the spikelet. Continental Africa, Cape Verde *D. nuda*

Again, many intermediates were encountered and a separation cannot be maintained. The species is closely allied to *D. horizontalis* and differs mainly in the absence of pubescence on the leaf-blades and the lower glume. These differences must be checked by students of the African and American material, who will be able to make a better assessment.

The ssp. *senegalensis* mentioned by Henrard, which is the bristled variant, was not encountered. Although I did not look for the type when in Vienna I do not think it belongs to the present species, but probably it will turn out to be *D. bicornis*. As stated by Henrard himself (1950, p. 586—587) the section '*Horizontales*' to which *D. nuda* is reckoned by him has no bristled parallelforms.

Henrard depicted *D. adscendens* var. *rhachiseta* (p. 11) with a developed lower glume. It is absent in the material, however.

Den Hoed (no. 482) observed a deep purple colouring of the leaves, transversal purple

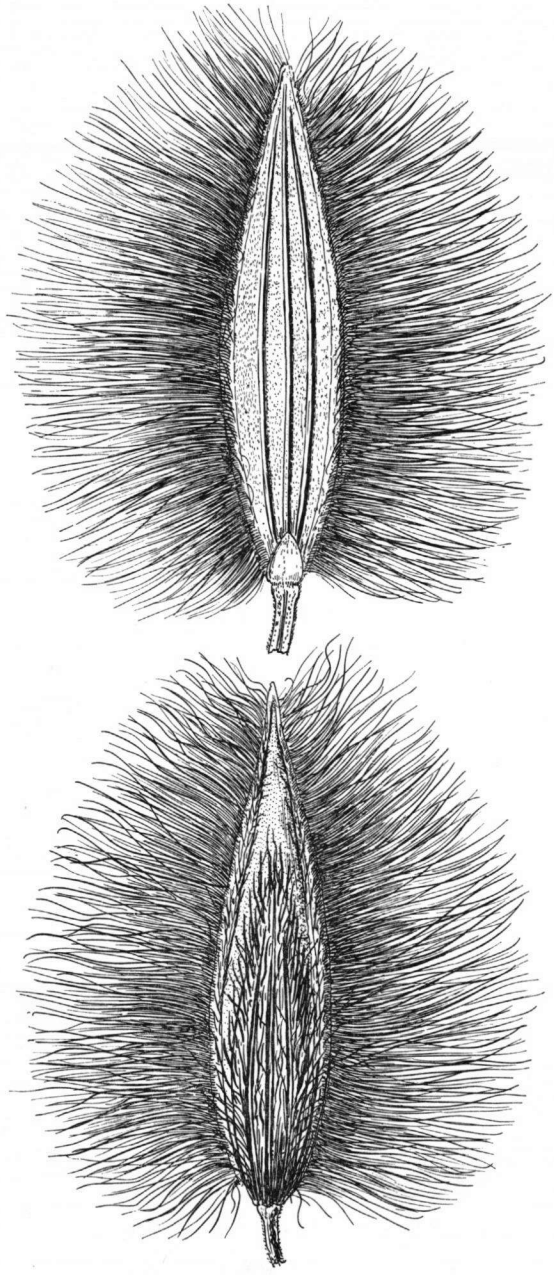

Fig. 7. Spikelets of *D. eminens* (*Zollinger 2783*, type), × 12.

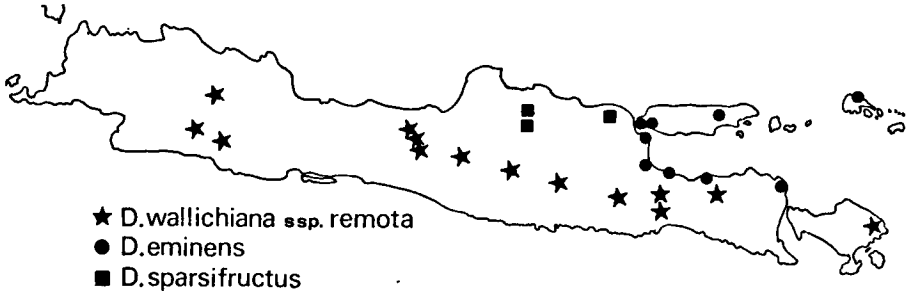

Fig. 8. Distribution of localities of *D. wallichiana* ssp. *remota*, *D. eminens*, and *D. sparsifructus*.

zones, which seemed to be formed by daily exposure of the younger part of the leaf to direct sunshine. This phenomenon could not any more be observed in the dried specimens.

8. Digitaria eminens (Steud.) Back. — Fig. 7; 8.

D. eminens (Steud.) Backer in Heyne, Nutt. Pl. 1 (1922) 156; ed. 2 (1927) 204; Handb. Fl. Java 2 (1928) 128; Henr., Mon. Dig. (1950) 220, fig., 981; Monod de Froid. in Backer & Bakh., Fl. Java 3 (1968) 564. — *Panicum eminens* Steud., Syn. 1 (1853) 43; Koord., Exk. Fl. Java 1 (1911) 128. — *Panicum elytroblepharum* Steud. [in Zoll., Syst. Verz. (1854) 54, *nomen*] ex Naves in Naves & F.-Vill., Nov. App. (1882) 311. — *D. elytroblephara* Steud. *ex* Miq., Fl. Ind. Bat. 3 (1857) 439. — *Paspalum heteranthum auct., non* Hook. *f.*: A. Camus, Not. Syst. 2 (1912) 220, *p.p.* — Type: *Zollinger 2783* (P, holo; B, BM).

Perennial (?), sometimes with a short rootstock, culms scrambling to erect, not rooting at the lower nodes, up to 2 m high, branched from nearly every node. No *cataphylls*. *Sheaths* glabrous. *Ligule* 1.5—3 mm high, obtuse to truncate, erose. *Blades* linear, (2.5—) 7.5—12.5(—25) cm by 5—7(—10) mm, soft, ± ascending, scabrous, glabrous or sparsely pilose, throat with a few bbb. *Peduncle* up to 50(—80) cm long, glabrous. *Racemes* 2 or 3(—5), longest (4—)10—24 cm long, digitate to corymbosely panicled, common axis 0—1.2 cm long. *Rachis* winged, serrate, sometimes with setae at base. *Abscission of pedicels* truncate. *Spikelets* binate, homomorph, 5—6.25 mm long, lanceolate; hairs smooth, acute. *Lower glume* 0.25—1 mm long, acute, rarely bifid. *Upper glume* 3—4.5 mm long, 0.65—0.8 times as long as the spikelet, 3-nerved, pubescent, those of the sessile spikelets less so. *Sterile lemma* as long as the spikelet, 9—11-nerved, third interspace with a very dense, usually purplish frings of lanate hairs, patent in fruit, the lemma thereby dorsally widely 3-nerved; the hairs sometimes absent in the basal sessile spikelets. *Fertile lemma* about 0.9 times as long as the spikelet, brownish in fruit. *Anthers* unknown. *Stigma* purple.

Distribution. Endemic in East Java, around Strait Madura, Madura, and the Kangean Arch.

Ecology. Open, dry, secondary forest, along ditches, roads, etc., on periodically desiccated soil, up to 600 m alt. Locally common.

Note. Placed in a special section *Elytroblepharum* by Steudel (1853) and included in the '*Sanguinales*' by Henrard (1950).

9. Digitaria didactyla Willd.

D. didactyla Willd., Enum. Hort. Berol. (1809) 91; Stapf, Kew Bull. 1911 (1911) 256; Hughes, ibid. 1923 (1923) 312; Burk., Dict. (1935) 807; S. T. Blake, Queensl. Nat. 11 (1939) 55; Henr., Mon. Dig. (1950) 178, fig., 991; Gill., Common Malay Pl. (1958) 80, fig.; Bor, Grasses (1960) 300; Vickery, Contr. N.S.W. Nat. Herb., Fl. Ser. 19, 1 (1961) 102; Henty, Bot. Bull. Lae 1 (1969) 76, fig. 25b; Tateoka, Bot. Mag.

Tokyo 78 (1965) 307; Burbidge, Austr. Grasses 3 (1970) 188, fig. 79; Gill., Rev. Fl. Malaya 3 (1971) 195, pl. 25d. — *Panicum didactylum* Kunth, Rév. Gram. 1 (1829) 33; Enum. Pl. 1 (1833) 84; Hack., Bull. Bur. Govt. Lab. Philip. 35 (1906) 80; Domin, Bibl. Bot. 85 (1915) 295. — *Panicum commutatum* Nees var. *didactylum* Nees, Fl. Afr. 1 (1841) 26; Agrost. Cap. (1853) 26. — *Paspalum sanguinale* Lamk. var. *didactylum* A. Camus, Not. Syst. 2 (1912) 223, *pro comb.* — Type: *Bory de St Vincent s.n.* (Hb. Willd. 1646—1, B, holo; BM).

[*Panicum gracile* Nees *ex* Spreng., Syst. Veg. 4, 2 (1827) 33, *nomen, non* R. Br., 1810, *nec.* Spreng., 1824. — *Panicum subtile* R. Br. *ex* Nees, Flora 11 (1828) 300, *nomen.* — Type: *Sieber Agrostotheca 72* (B, holo; BM, L, P, W).]

Panicum bicorne Sieb. *ex* Steud., Syn. 1 (1853) 41; *non* Kunth, 1829. — *Panicum sanguinale* Linné var. *bicorne* Drake, Fl. Polyn. Franc. (1893) 250, *pro comb.* — Type: *Sieber Hb. Maur. II, 42* (P, holo; B, BM, L, PRC, W).

Panicum sanguinale Linné var. *brevispicatum* Maiden, Agric. Gaz. N.S.W. 21 (1910) 789. — Type: *Cheel s.n.* (NSW, no. 26080, hololecto; K).

D. caespitosa Boivin *ex* A. Camus, Bull. Soc. Bot. France 73 (1926) 914; *non* Ridley, 1925. — *D. camusiana* Henr., Meded. Rijksherb. Leiden 61 (1930) 17; Mon. Dig. (1950) 112, fig., 987. — Type: *Boivin 1616—4* (P, holo; L).

D. truncata Henr. & A. Camus *ex* Henr., Blumea 1 (1934) 111; Mon. Dig. (1950) 761, fig., 964. — Type: *Decary 2455* (L, holo; P).

D. peninsulae Ohwi, Bull. Tokyo Sc. Mus. 18 (1947) 7; Henr., Mon. Dig. (1950) 538, fig. — *D. didactyla* Willd. var. *peninsulae* Henr., Mon. Dig. (1950) 991; Monod de Froid. in Backer & Bakh., Fl. Java 3 (1968) 565; Gill., Rev. Fl. Malaya 3 (1971) 196. — Type: *Ohwi 5* (BO, holo).

D. didactyla Willd. var. *decalvata* Henr., Mon. Dig. (1950) 182, fig., 991; Bor, Grasses (1960) 300. — Type: *Moses 5440* (L, holo; SRGH, *n.v.*).

Small, mat-forming, often glaucous perennial forming dense tufts with stolons and runners, rooting at the nodes, branching occasionally; flowering culms ascending, up to 40 cm high. *Cataphylls* small, inconspicuous, pubescent. Basal *sheaths* often pilose, upper glabrous or with a few hairs. *Ligule* 0.5—2 mm long, truncate to obtuse, erose. *Blades* linear, 2—7(—14.5) cm by 1—2 mm, patent on the stolons, ascending to erect on the flowering culms, rather stiff, ± smooth, glabrous or with a few bbb in the throat. *Peduncle* up to 15 cm long. *Racemes* (1)2 or 3 (4), longest 1—5.5 cm long, digitate or in a corymbose panicle, common axis usually absent, sometimes up to 1 cm long, erect to ascending, the longer sometimes with secondary branches at base. *Rachis* winged, at base often smooth, upwards becoming serrate, spicules, especially those of the pedicels, often hair-like. *Abscission of pedicels* truncate. *Spikelets* binate, homomorphous, oblong to lanceolate, 2—2.75 mm long; hairs smooth, acute. *Lower glume* 0.2—0.5 mm long, quadrangular to triangular, acute to emarginate. *Upper glume* 1—2 mm long, (0.4—) 0.5—0.75 times as long as the spikelet, acute to obtuse, 3(—5)-nerved, variously pubescent. *Sterile lemma* as long as the spikelet, nerves (5—)7, ± inequidistant, variously pubescent. *Fertile lemma* slightly shorter than the spikelet, yellowish to leaden in fruit. *Anthers* 1—1.25 mm long, purple with yellowish connective zone (*v.v.*). *Stigma* violet (*v.v.*).

Distribution. Tropical South Africa, Madagascar, Mauritius, Bourbon, Réunion, St Dénis. Cultivated and naturalized elsewhere, e.g. Florida, Ceylon, Australia (New South Wales, Queensland), Fiji, and Malesia: Malaya (Cameron Highlands; Kuala Lumpur; Penang; Singapore), N. Sumatra (Medan), Java (Bogor), and New Guinea (E. Highlands).

Ecology. Roadsides and lawns, up to 1800 m (Cameron Highlands). S. T. Blake, 1939, recorded it as a dominant pioneer after clearance of previous vegetation in N. Queensland, forming a cover up to an inch thick.

Uses. In Australia considered to be very useful as a lawn-grass in districts not subjected to heavy frosts or droughts, forming a close and fine, rather soft turf (Vickery, 1961), and said by some, e.g. Stapf, 1911, and Bor, 1960, to be superior to *Cynodon dactylon*. In use for lawns, tenniscourts, cricketfields, and golflinks.

Vernacular names. Blue or green serangoon grass (E). — Malaya: *rumput serangun*. — Java: *rumput palembang* (Mal.).

Chromosome number: 2n = 18 (Tateoka, 1965).

Notes. Because of the continuous variability of the characters of the spikelet, including its pubescence, it is not warranted to distinguish varieties as Henrard has done.

The specimens cited from Tonkin by Stapf (1911), Camus (1922), and others belong to *D. ciliaris* ('*D. henryi*') those from the Philippines cited by Hackel (1906) to *D. radicosa* (q.v.).

The record provided by *Sieber Agrost.* 72, presumably from Australia, is probably mislabelled and originated from Mauritius; the species was introduced into Australia since the beginning of this century.

Very similar is *D. mezii* Hosokawa from Saipan which differs by being a small tufted perennial without runners, not rooting at the nodes, with smooth rachises and pedicels, and with 3.1—3.5 mm long spikelets with an overtopping pubescence.

Henrard places this species in his section '*Sanguinales*', in which it is exceptional for having cataphylls. The present species and some related ones can therefore not be determined with his key!

10. Digitaria heterantha (Hook. *f.*) Merr. — Fig. 4; 9.

D. heterantha (Hook. *f.*) Merr., En. Philip. Fl. Pl. 1 (1923) 54; Henr., Mon. Dig. (1950) 314, fig., 861. — *Panicum heteranthum* Nees & Meyen *ex* Nees in Meyen, Nova Acta Ac. Caes.-Leop. Nat. Cur. 19 (1841) Suppl. 1, 42; ibid. (1843) Suppl. 2, 174; Ridley, J. Str. Br. Roy. As. Soc. 23 (1891) 20; Hack., Bull. Herb. Boiss. 7 (1899) 723; Hack. in Schmidt, Bot. Tidsskr. 24 (1901) 97; *non* Link, 1827. — *Paspalum heteranthum* Hook. *f.*, Fl. Br. Ind. 7 (1896) 16, *pro comb.*; Ridley, Mat. 3 (1907) 126; A. Camus, Not. Syst. 2 (1912) 220, *p.p.* — *D. dispar* Henr., Blumea 1 (1934) 97, *nom. superfl.*; Merr., J. Arn. Arb. 18 (1937) 58; Henr., Mon. Dig. (1950) 190; Gill., Rev. Fl. Malaya 3 (1971) 193, t. 25 f. — [*D. heterantha* Merr. ssp. *meyeniana* Henr., Mon. Dig. (1950) 861; *nom. inval.*] — Type: *Meyen s.n.* (Hb. Nees, B, holo; US).

Panicum commutatum auct., non Nees: Hook. & Walker, Bot. Beechey (1837) 232.

D. barbata auct., non Willd.: Balansa in Morot, J. Bot. 4 (1890) 139; Rendle in Forb. & Hemsl., J. Linn. Soc. Lond., Bot. 36 (1904) 32, *p.p.*; Matsumura & Hayata, En. Pl. Formosa (1906) 507; A. Camus, Fl. Gén. I.-C. 7 (1922) 398; Ridley, Fl. Mal. Pen. 5 (1925) 215; M. Schmid, l'Agron. Trop. 13 (1958) 304, *p.p.*; Gill., Gard. Bull. Sing. 19 (1962) 157. — *Panicum barbatum auct., non* Kunth: Benth., Fl. Hongkong (1861) 409. — *Syntherisma barbata auct., non* Nash: Honda, J. Fac. Sc. Imp. Univ. Tokyo, Sect. 3, 3 (1930) 301, *p.p.*

Panicum heteranthum Nees var. *pachyrhachis* Hack., Philip. J. Sc. 3 (1908) Bot. 167. — *D. heterantha* Merr. var. *pachyrhachis* Merr., En. Philip. Fl. Pl. 1 (1923) 54; Henr., Mon. Dig. (1950) 317, in synon. — Type: *Merrill 5276* (W, holo; B, P, US).

D. longissima Mez, Fedde Repert. 18 (1922) 26; Reeder, J. Arn. Arb. 29 (1948) 290; Burcham, Contr. U.S. Nat. Herb. 30 (1948) 432; Henr., Mon. Dig. (1950) 411, fig., 861; Henty, Bot. Bull. Lae 1 (1969) 77. — Type: *Peekel 301* (B, holo; US).

D. kanehirae Ohwi, Bot. Mag. Tokyo 55 (1941) 543; Henr., Mon. Dig. (1950) 362, in synon. — Type: *Kanehira & Hatusima 4818* (*n.v.*).

D. shimadana Ohwi, Acta Phytotax. & Geobot. 11 (1942) 28; Henr., Mon. Dig. (1950) 690, in synon.; Hatusima, Fl. Ryukyus (1971) 690. — Type: *Shimada 4871* (*n.v.*).

D. baliensis Ohwi, Bull. Tokyo Sc. Mus. 18 (1947) 5. — *D. heterantha* Merr. ssp. *aequabilis* Henr., Mon. Dig. (1950) 811, 827, 862. — Type: *Van Steenis 7605* (BO, holo; L).

D. bantamensis Ohwi, Bull. Tokyo Sc. Mus. 18 (1947) 5. — *D. heterantha* Merr. var. *holosericea* Henr., Mon. Dig. (1950) 813, 827, 862; Monod de Froid. in Backer & Bakh., Fl. Java 3 (1968) 562. — Type: *Backer 1609* (BO, holo; K, L).

D. bicornis auct., non R. & S.: Gill., Gard. Bull. Sing. 19 (1962) 157; Bor & Beliz, Garcia de Orta 15 (1965) 7; Hsu, Taiwania 16 (1971) 278.

Loosely caespitose perennial with long runners, rooting at the nodes, culms up to 80 cm high. No *cataphylls*. Lower *sheaths* bbb-pilose, upwards either glabrous but for some bbb at the nodes and along the margins, or villous all over. *Ligule* 1.5—3 mm high,

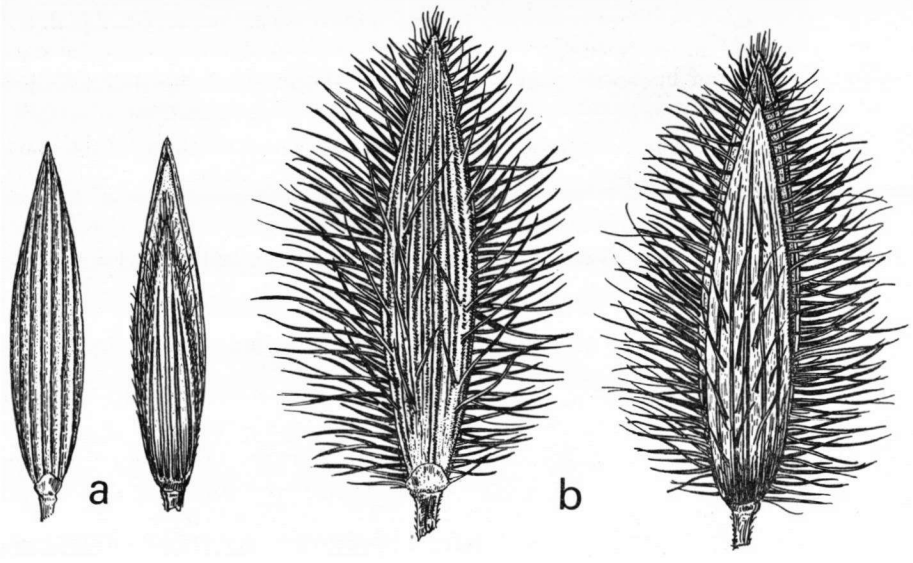

Fig. 9. Spikelets of *D. heterantha* (*Meyen s.n.*, type), × 13. — a. sessile spikelets. — b. pedicelled spikelets.

truncate, erose. *Blades* linear-lanceolate to linear, up to 7(—23) cm by 4(—10) m,m patent-ascending to ascending, smooth to scaberulous, glabrous, or with a few bbb in the throat, or velutinous. *Peduncle* up to 30(—40) cm long, glabrous. *Racemes* 2—4, digitate, common axis absent (very rarely developed, up to 5 cm long), longest 4.5—24(—32) cm long, the longer sparsely spikeled at base; articulating at base. *Rachis* swollen, ± triquetrous, slightly excavated under the spikelets, ± smooth to minutely serrate. *Abscission of pedicels* truncate. *Spikelets* very variable in length, lanceolate, 3.5—6(—7) mm long, the pedicelled ones largest, 4.5 mm or more long, binate, usually heteromorphous; hairs smooth, acute. *Lower glume* very variable, usually fairly large, up to 0.6(—1) mm long, triangular, obtuse. *Upper glume* 1.75—4.5 mm long, 0.5—1 times as long as the spikelet, shortest in the pedicelled spikelets, 3-nerved, glabrous to villous. *Sterile lemma* as long as the spikelet, equidistantly and closely 7—11-nerved, interspaces slit-like, nerves smooth, margins pubescent, interspaces glabrous in the sessile spikelets, pedicelled spikelets usually with rows of sericeous hairs, mixed with bristles in the lower 0.6—0.75th part, first interspace usually glabrous, margins pubescent only; rarely all spikelets homomorphous and ± glabrous. *Fertile floret* 3—5 mm long, yellowish in fruit. *Anthers* 1—1.25 mm long, yellow. *Stigma* yellow.

Distribution. Coasts of the South China Sea, from Hongkong to Malesia: east coast of Malaya (Johore, Pahang), Java (Bantam, Madura), Bali, Philippines (Ursula I., Palawan; Langaan I., Turtle I.; Lumbacan I.), New Guinea (Kofiau I.; New Ireland), Palau Is.

Ecology. Scattered and rare, locally common on sandy beaches, *Casuarina*-forests behind beach-walls, sometimes introduced inland with sand-ballast along railroads, etc.

Chromosome number. n = 18 (Hsu, 1971 as *D. bicornis*.).

Notes. Nees was unaware of Link's earlier name when he described his species. Hooker's combination, based on Nees' name and the specimen cited, can be regarded as

a *nomen novum* and as valid. His synonyms refer to *D. bicornis* and *D. eminens* (q.v.), but the description and the specimen to the present species (*Ridley* 6, Rumpin River, Pahang).

Various forms can be discerned, each of which have pectinate and non-pectinate parallels:

1a. '*heterantha*': leaves linear-lanceolate, glabrous. Racemes rather short, spikeled to base. Spikelets 3.5—4.5 mm long, sterile lemma 7—9-nerved, pectinate. Continental Asia, grading into no. 2.

1b. as 1a, but non-pectinate. N. Vietnam (*Balansa s.n.*).

2a. leaves linear-lanceolate to linear, glabrous. Racemes long, laxly spikeled towards base. Spikelets larger, sterile lemma 9—11-nerved, pectinate. Continental Asia, the only form in Malaya, Madura, and Bali. However, Henrard stated that his '*aequabilis*' (= '*baliensis*') was non-pectinate, which is correct for the holotype in BO, but the isotype in L has some pectinate spikelets.

2b. '*longissima*' or '*pachyrhachis*': as 2a, but non-pectinate. The only form of the Philippines and New Guinea (Bali?).

3a. '*holosericea*' or '*bantamensis*': leaves small, broad, velutinous, otherwise as 1a, but spikelets non-pectinate. Thailand (*Kerr* 12632), Java (*Backer* 1609).

3b. as 3a, but pectinate. N. Vietnam (*Couderc s.n.*), Thailand (*Noe* 134).

These reticulately related forms, partly named by Henrard, could not be maintained, as too little material is available; pointing out their existence and the present confusion should be sufficient.

The present species was distinguished by Henrard as a separate section *Heteranthae*.

The species has been confused with *D. bicornis* (incl. *D. barbata*) from which it can be recognized by the different venation of the sterile lemma.

11. Digitaria insularis (Linné) Ekman. — Fig. 11a, b.

D. insularis (Linné) Mez *ex* Ekman, Ark. Bot. 11, 4 (1912) 17; Henr., Mon. Dig. (1950) 341, fig., 869; Rosengurtt & Arrillaga, Rev. Fac. Agron. Montevideo 57 (1962) 4; Gould & Soderstrom, Am. J. Bot. 54 (1967) 678; Gould, Bol. Soc. Bot. Mex. 29 (1969) 49; Henty, Bot. Bull. Lae 1 (1969) 76, fig. 23. — [*Gramen avenaceum, panicula minus sparsa, glumis alba sericea lanigune obductis* Sloane, Cat. Pl. Jamaica (1696) 35; Hist. Jamaica 1 (1707) 43, t. 14 f. 2.] — *Andropogon insularis* Linné, Syst. Nat. ed. 2 (1759) 1304; Amoen. 5 (1760) 412 (Elmgren); Sp. Pl. ed. 2, 2 (1763) 1480. — *Milium villosum* Sw., Prodr. (1788) 24; *nom. superfl.* — *Panicum leucophaeum* H.B.K., Nov. Gen. & Sp. 1 (1815) 80; Presl, Rel. Haenk. 1 (1830) 298; Naves in Naves & F.-Vill., Nov. App. (1882) 311; Merr., En. Philip. Fl. Pl. 1 (1923) 70, sp. excl.; *nom. superfl.* — *Monachne unilateralis* R. & S., Syst. Veg. 2 (1817) 468, *pro var. typ., vix* Beauv., 1812; *nom. superfl.* — *Panicum insulare* Meyer, Primit. Fl. Essequebo (1818) 60. — *Trichachne insularis* Nees, Agrost. Bras. (1829) 86; Hitchc., Man. Grasses U.S. (1935) 551, fig. 1155; ed. 2 (1951) 570, fig. 823; Tateoka, Bull. Torrey Bot. Cl. 89 (1962) 78; Pohl & Davidse, Brittonia 23 (1971) 304; B. C. Stone, Fl. Guam (1972) 226, fig. 31, 32. — *Tricholaena insularis* Griseb., Abh. Ges. Wissensch. Göttingen 7 (1857) 265. — *D. leucophaea* Stapf, Fl. Cap. 7 (1898) 382, *in nota.* — *Panicum insulare* Meyer var. *leucophaeum* O. Ktze, Rev. Gen. Pl. 3, 3 (1898) 361. — *Syntherisma insularis* Millsp., Field Mus., Bot. 1 (1902) 473; Millsp. & Chase, ibid. 3 (1903) 23. — *Panicum insulare* Meyer ssp. *typicum* Hack. in Stuck., An. Mus. Nac. Buenos Aires 11(1904) 70; *nom. inval.* — *Valota insularis* Chase, Proc. Biol. Soc. Washington 19 (1906) 188; Hitchc., Grasses Hawaii (1922) 170, fig. 60. — Type: *Sloane Hb. 2, fol. 42* (BM, holo).

[*Bobartia spicis capitatis, involucro majori folioso tectis* P. Browne, Nat. Hist. Jam. 1 (1756) 129. — *Scirpoides fabri* Rottb., Descr. Pl. Rar. Progr. (1772) 28; *nom. inval.*] — *Schoenus fabri* Rottb., Descr. Ic. Rar. (1773) 62, t. 18 (*sphalm.* for 19) f. 2; Vahl, Enum. Pl. 2 (1806) 229, in synon. — *Andropogon fabri* Ekman *ex* Henr. in Herzog, Meded. Rijksherb. Leiden 40 (1921) 44 ('*fabricii*'). — Type: *Swartz in Hb. Thunberg 23884* (UPS, holo, cf. IDC 1036). See note.

Panicum lanatum Rottb., Acta Litt. Univ. Hafn. 1 (1778) 269, t. 1, f. 2; Descr. Pl. Surinam (1798) 1, t. 1 f. 2; *non* Sw., 1776. — Type: *Rolander s.n.* (C, holo, *n.v.*).

Milium hirsutum Beauv., Agrost. (1812) 13, pl. 5, f. 5; Niles, Contr. U.S. Nat. Herb. 24 (1925) 154, in synon. — Type: not indicated, not in P.

Panicum saccharoides A. Rich. in Sagra, Hist. Cuba 11 (1850) 306; *non* Trin., 1826, *nec* Kunth, 1830. — Type: *Sagra 9* (P, holo).
Panicum falsum Steud., Syn. 1 (1853) 67. — Type: not indicated, not in P.
Panicum duchaissingii Steud., Syn. 1 (1854) 93. — Type: *Duchaissing s.n.* (P, holo).
Milium lanatum auct., non R. & S.: Griseb., Fl. Br. W. Ind. Isl. (1864) 534.
Leptocoryphium penicilligerum Spegazzini, An. Soc. Cient. Arg. 16 (1883) 102. — *Panicum penicilligerum* Hack. *ex* Kneucker, Allg. Bot. Zeitschr. 8 (1902) 93. — *Panicum insulare* Meyer var. *penicilligerum* Hack. in Stuck., An. Mus. Nac. Buenos Aires 11 (1904) 70. — *Valota penicilligera* Chase *ex* Parodi, Rev. Fac. Agron. Vet. 4 (1922) 46; Raconese, Darwiniana 5 (1941) 403. — *Trichachne penicilligera* Parodi, Gram. Bon., ed. 3 (1939) 86, 89. — Type: *Spegazzini in Hb. Balansa s.n.* (L).

Rather coarse, tufted and erect, rhizomatous and stoloniferous perennial, branched at base only. Stolons short, with small, pubescent *cataphylls*. *Sheaths* sparsely to moderately pilose in upper part and along the margins, sometimes subglabrous. *Ligule* 3.5—6 mm long, obtuse, erose. *Blades* linear, 8—42 cm by 4—17 mm, rather stiff, ascending, smooth to slightly scabrous, throat glabrous. Peduncle up to 65 cm long, glabrous. *Panicle* 10—30 by 1.5—6 cm, contracted, dirty white- to isabel-coloured. *Racemes* (5—) many, longest 6—16 cm long, usually solitary and ± as long as to shorter than the 6—26 cm long common axis, ascendingly appressed, loosely spikeled to base. *Rachis* triquetrous, serrulate. *Abscission of pedicels* discoid to cupuliform. *Spikelets* binate, homomorphous, lanceolate, 4—7 mm long (incl. pubescence!); hairs smooth, acute, much overtopping. *Lower glume* 0.5—1.4 mm long, obtuse to acute with clasping base, scarious. *Upper glume* 3.25—4.25 mm long, 0.75—0.9 times as long as the spikelet, ± caudate, 3(—5)-nerved, densely long-lanate. *Sterile lemma* as long as the spikelet, acuminate, nerves 5—7, ± equidistant, densely long-lanate. *Fertile floret* ± as long as upper glume, fuscous when ripe, shortly stipitate, acuminate to caudate. *Anthers* 0.8—1 mm long, yellow. *Stigma* yellow.

Distribution. Tropical and subtropical America (southern U.S. to N. Argentine). Introduced elsewhere, e.g. Hawaii, Marshall Is. (Eniwetok, Kwajalein), and Malesia: Java (Bogor, once cultivated), Philippines (Bukidnon), New Guinea (Markham Valley).

Ecology. Open waste places, on coral-sand, *Imperata—fields*, up to 850 m. Locally abundant and becoming a pest in New Guinea.

Uses. None recorded; avoided by cattle.

Vernacular names. Sourgrass, bittergrass (E).

Chromosome number. 2n = 36 (Gould & Soderstrom, 1967, Gould, 1969, sub *D. insularis*; Tateoka, 1962, Pohl & Davidse, 1971, sub *Trichachne insularis*).

Notes. Henrard places this species in the section *Trichachne*, erroneously recognized as a separate genus by many authors.

Occasionally, forms are encountered in which a small grub has transformed the inflorescence into a large gall. Such plants have been described as *Bobartia spicis capitatis*..., and later as *Scirpoides* (*Schoenus*, and *Andropogon*) *fabri*. Vahl was the first to associate them with *D. insularis*. In the British Museum I saw specimens with both a galled and a normal inflorescence, bearing out this suggestion (e.g. *Harris* 11475, 11630). Although the above names are based on a gall-infested plant, the resulting structure cannot be regarded as 'abnormal', with which the term 'monstruosity' of Art. 71 of the ICBN is defined by McVaugh, Ross, and Stafleu (Regnum Veg. 56, 1968, 17). Instead, these galls are highly typical for this plant and the names must be accepted as valid.

Cleistogamous flowers are reported from Uruguay (Rosengurtt & Arrillaga, 1962).

12. Digitaria wallichiana (Steud.) Stapf.

D. wallichiana (Wight & Arn. *ex* Steud.) Stapf, Fl. Trop. Afr. 9 (1919) 436; Gamble, Fl. Madras 3 (1928) 1765; Henr., Mon. Dig. (1950) 797, fig., 922; Bor. Webbia 11 (1955) 349; Grasses (1960) 307; Metcalfe,

Anat. Monoc. 1 (1960) 162. — *Panicum wallichianum* Wight & Arn. *ex* Steud., Syn. 1 (1853) 41; Thw., Enum. Pl. Zeyl. (1864) 358. — *Paspalum perrottetii auct., non* Hook. *f.*: Hook. *f.*, Fl. Br. Ind. 7 (1896) 20; in Trimen, Handb. Fl. Ceylon 5 (1900) 125; *pro specim.* — Type: *Wight Cat. 1607* (*KD 3085*) (P. holo; B, K, U).

Panicum multibrachiatum Hochst. *ex* Steud., Syn. 1 (1853) 75. — Type: *Hohenacker 916* (P, holo; BM, K, L, PR, PRC, U, W).

For further synonyms see under ssp. *remota*.

Two subspecies can be distinguished:

a. Racemes at base with setae. Ceylon, Madras.. . . . . ssp. **wallichiana**
a. Racemes without setae. Java, Bali . . . . . ssp. **remota**

ssp. **remota** (Henr.) Veldk., *stat. nov.* — **Fig. 8.**

D. remota Henr., Blumea 3 (1940) 474; Mon. Dig. (1950) 623, fig., 921; Monod de Froid. in Backer & Bakh., Fl. Java 3 (1968) 564. — Type: *Beguin s.n.* (L, holo, no. 920.248—59; BO).

Panicum nodosum auct., non Kunth: Koord., Exk. Fl. Java 1 (1911) 129, *p.p.*

D. perrottetii auct., non Stapf: Backer in Heyne, Nutt. Pl. 1 (1922) 158, *p.p.*; ed. 2 (1927) 205, *p.p.*; Backer & Sloot., Theeonkr. (1924) 49, *p.p.*, fig.; Backer, Handb. Fl. Java 2 (1928) 125, *p.p.*; Chase, Candollea 6 (1936) 407.

Somewhat caespitose perennial, culms becoming decumbent, sometimes rooting at the lower nodes; flowering culms ascending to erect, up to 45 cm high. *Cataphylls* absent, but sometimes the lower sheaths with much reduced blade. *Sheaths* glabrous to weakly bbb-pilose. *Ligule* 2—3 mm long, truncate, erose. *Blades* linear, 4.5—12.5(—18) cm by 2—4(—10) mm, soft, ascending, smooth to scaberulous, glabrous to softly pilose and glabrescent, throat glabrous. *Peduncle* up to 35 cm long, glabrous. *Racemes* (4—)6—21 (—24), longest (1.5—)2.5—8(—11.5) cm long, the lower whorled, the upper alternate along a (2—)3.5—19.5(—14.5) cm long common axis, spreading in anthesis, later becoming contracted, the lower sometimes with secondary branches, at base often without spikelets. *Rachis* triquetrous, serrate. *Abscission of pedicels* discoid to cupuliform. *Spikelets* binate, homomorphous, oblong, 1.75—2.5 mm long; hairs smooth, acute. *Lower glume* absent, rarely some spikelets with a small triangular scale up to 0.25 mm long. *Upper glume* 1.6—2 mm long, 0.8—0.95 times as long as the spikelet, obtuse, nerves 3(—5), apically not anastomosing, glabrous to appressed pubescent. *Sterile lemma* as long as the spikelet, acute, nerves 7, ± equidistant, the costals apically sometimes slightly serrulate, apically not anastomosing, glabrous to appressed pubescent. *Fertile floret* slightly shorter than the spikelet, olive-brown to somewhat fuscous in fruit. *Anthers ca.* 1 mm long, purple, connective zone white (*v.v.*). *Stigma* white (*v.v.*).

Distribution. Malesia: Java, Bali.

Ecology. Light soil, especially sand, in sunny to somewhat shaded places, not too dry: edges of fields, thickets, plantations. Locally very common and dominant. Between 1200 and 2300 m alt. The elevation effect is about 450 m. (Records from lowest mountain is from the Penanggungan, 1653 m; lowest record is from Nongkodjadjar, Tengger, from 1200 m) (Compare Backhuys, Blumea 16, 1969, 273, for method).

Vernacular names. *Rubu* (M); *suket kawatan* (J).

Notes. When dried, the spikelets are often rather exceptional in *Digitaria*, where normally the stamens and stigmata protrude through an apical pore between lemma and palea. Here these scales spread widely and the generative organs are laterally suspended.

The typical subspecies, distinguished as a species by Henrard, differs, apart from the character mentioned in the key, by the smaller, broader, and more pubescent leaves,

smaller inflorescences, a lower glume that is more often present, and a less variable and slightly larger upper one. It is found in mountainous areas of Ceylon and Madras.

Henrard places these two in a separate section *Remotae*, but I think that it should be united with his next section *Subeffusae*.

13. **Digitaria junghuhniana** (Steud.) Henr.

D. junghuhniana (Nees *ex* Steud.) Henr., Meded. Rijksherb. Leiden 61 (1930) 11; Mon. Dig. (1950) 361, fig., 923; Monod de Froid. in Backer & Bakh., Fl. Java 3 (1968) 565. — *Panicum junghuhnianum* Nees *ex* Steud., Syn. 1 (1853) 63; Miq., Fl. Ind. Bat. 3 (1857) 454. — *D. pruriens* Buse var. *arnottiana* Nees & Arn. *ex* Buse in Miq., Pl. Jungh. (1854) 380; Miq., Fl. Ind. Bat. 3 (1857) 436. — Type: *Junghuhn s.n.* (L, holo, no. 904.26—34; B).

[*D. pruriens* Buse var. *β* Buse in Miq., Pl. Jungh. (1854) 380; Miq., Fl. Ind. Bat. 3 (1857) 436. — Type: *Junghuhn s.n.* (L, holo, no. 908.92—1281).]

D. perrottetii auct., non Stapf: Backer in Heyne, Nutt. Pl. 1 (1922) 158, *p.p.*; ed. 2 (1927) 205, *p.p.*; Backer & Sloot., Theeonkr. (1924) 49, *p.p.*; Backer, Handb. Fl. Java 2 (1928) 125, *p.p.*

Tufted annual, culms becoming decumbent, rooting at the nodes, flowering culms up to 50 cm high. No *cataphylls*. *Sheaths* sparsely to rather densely pilose. *Ligule* 1.5—4 mm high, truncate, erose. Blades (1.5—)4—14(—19) cm by 3—10 mm, ovate-lanceolate (especially the upper) to linear, soft, ascending, sparsely to moderately softly pilose, sometimes glabrescent. *Peduncle* up to 35 cm long, glabrous. *Racemes* (4—)6—15(—19), longest (1.5—)2.5—11(—13) cm long, alternate along the (1—)3—7(—9) cm long common axis, loosely spikeled, the longer ones often with secondary branches which grade into the spikelet-clusters. *Rachis* triquetrous, smooth to sparsely serrulate, glabrous, rarely with setae. *Abscission of pedicels* discoid to cupuliform. *Spikelets* binate, homomorphous, (2.25—)2.4—3(—3.25) mm long, lanceolate; hairs smooth, acute. *Lower glume* absent, rarely a minute scale up to 0.2 mm long. *Upper glume* (0.5—)1—1.65(—1.75) mm long, (0.2—)0.4—0.6(—0.7) times as long as the spikelet, acute, 3(—5)-nerved, usually pubescent along the margin only, hairs overtopping. *Sterile lemma* as long as the spikelet, acute, nerves 7, inequidistant, with overtopping pubescence. *Fertile floret* slightly shorter than the spikelet, fuscous to chestnut-coloured in fruit (see note). *Anthers* 0.6—0.65 mm long, purple (*v.v.*). *Stigma* purple (*v.v.*).

Distribution. Malesia: Sumatra (Sibolangit, Atjeh, West Coast), Java, Lesser Sunda Is. (Bali, Sumba, Flores, Timor), Borneo (Mt. Kinabalu), Celebes (Kulawi, Menado, *Posthumus* 2356; Bantimurung, SW. Celebes, *Buwalda* 3742), Philippines (Mt. Pulog), and according to a note by Dr. Jansen collected by Beccari in New Guinea (*n.v.*).

Ecology. Locally abundant on sandy or volcanic soil, abandoned fields, open forests, hedges, ditches, etc., between 200 and 2300 m (the specimen from Celebes, *Buwalda* 3742, aberrant in other characters as well, at 50 m; see note).

Vernacular names. Sumatra: *rumput udang*. — Java: *djampang piit* (S); *putean* (M), *djukut tatĕmbaga bulu*.

Notes. Henrard places this species in his section *Subeffusae*, in which it is the only species without whorled lower racemes.

Buwalda's specimen from Celebes referred to above, and those from Luzon differ from the above description in having setae at the base of the longer rachises, rather short upper glumes, 0.5—1.45 mm long, 0.2—0.5 times as long as the spikelet and a straw-coloured fertile floret. A variety might be discerned on these differences, but better fruiting material is needed, as fertile florets sometimes turn brown very tardily. The altitude from which the Celebes specimen was recorded is exceptionally low. However, Posthumus collected a

more typical one (no. 2356) at 700 m, without setae, but with straw-coloured fertile florets and an upper glume 0.4—0.5 times as long as the spikelet.

Remarkable are the occasional dwarf-forms with ovate-lanceolate, patent, closely placed leaves, short peduncles and common axes, with few and short racemes.

14. Digitaria ramularis (Trin.) Henr. — Fig. 11c.

D. ramularis (Trin.) Henr., Blumea 1 (1934) 101; Mon. Dig. (1950) 619, fig., 897; Vickery, Contr. N.S.W. Nat. Herb. 1 (1951) 322; ibid., Fl. Ser. 19, 1 (1961) 97; S. T. Blake, Proc. Roy. Soc. Queensl. 81 (1969) 18. — *Panicum ramulare* Trin., Diss. Alt. (1826) 244; Mém. Ac. Sc. St Pétersb. VI, Sec. Nat. 3 (1834) 204; Benth., Fl. Austr. 7 (1878) 471. — Type: *Hb. Lindley in Hb. Trinius* (LE, holo, *n.v.*).

Panicum tenuissimum Benth., Fl. Austr. 7 (1878) 470; *non* Schrank, 1822. — *D. tenuissima* Hughes, Kew Bull. 1923 (1923) 312; Henr., Mon. Dig. (1950) 735, fig., 898. — Lectotype: *F. v. Mueller s.n.* (K, holo).

Loosely caespitose perennial, culms sometimes decumbent, not rooting at the nodes, branched mainly at base, usually erect, up to 1 m high. *Cataphylls* up to 6 mm long, pubescent. Lower *sheaths* pubescent. *Ligule* (0.5—)1.25—4 mm high, truncate, erose. *Blades* linear, (1—)1.5—10(—25) cm by 1.5—3(—5) mm, glabrous to appressed-pilose, upper surface scabrous, patent to ascending, soft. *Peduncle* up to 40 cm long, glabrous. *Racemes* (1)2—11, longest (1—)2—13 cm long, distant and solitary to geminate along the (0—)1—10.5(—13) cm long common axis, loosely spikeled, finally patent. *Rachis* triquetrous, serrulate. *Abscission of pedicels* discoid to cupuliform. *Spikelets* binate, homomorphous, oblong, 1.5—2(—2.1) mm long, glabrous to sparsely pubescent, rarely shaggy hairy; hairs smooth, acute. *Lower glume* triangular, 0.2—0.6 mm long, acute to truncate, 0- or 1-nerved. *Upper glume* 0.8—1.5 mm long, 0.5—0.9 times as long as the spikelet, usually distinctly shorter than the sterile lemma, acute to rounded, nerves 3—5, apically not anastomosing. *Sterile lemma* 0.8—1 times as long as the spikelet, nerves (5—)7, equidistant to inequidistant, apically anastomosing. *Fertile floret* usually protruding, apiculate, olive-brownish to chestnut-coloured in fruit, sometimes with pale apex. *Anthers* 0.6—0.9 mm long, purple. *Stigma* purple.

Distribution. Australia (Queensland, New South Wales); Malesia: New Guinea (Tovobada Hills and Tawai Creek near Port Moresby, *Pullen* 6914, 6943 *A*).

Ecology. Open, scrubby savannah-forests with *Eucalyptus*, open rain forests, coastal sands on dry to moist, rocky, gravelly, or sandy to loamy soil, up to 560 m alt.

Note. Henrard placed *D. ramularis* and *D. tenuissima* as two distinct species in his section *Parviflorae*. The two are linked by numerous intermediates and are united here.

15. Digitaria tararensis Henr. — Fig. 10.

D. tararensis Henr., Mon. Dig. (1950) 728, fig., 894; Henty, Bot. Bull. Lae 1 (1969) 77. — *D. baileyi auct., non* Hughes: Reeder, J. Arn. Arb. 29 (1948) 293. — *D. quinhonensis auct., non* A. Camus: Chase, J. Arn. Arb. 20 (1939) 307. — Type: *Brass 8695* (A, holo, *n.v.*; BM, BO, BRI, L).

Erect, tufted perennial, branched mainly at base, culms ascending, not rooting at the lower nodes, up to 1 m high. *Cataphylls* up to 3 mm long, pubescent. Lower *sheaths* at base often pilose. *Ligules* 0.5—2.5 mm long, truncate, erose. *Blades* linear, 4—12(—15) cm by 2—5(—7) mm, glabrous, scabrous, patent, soft; throat subglabrous. *Peduncle* up to 50 cm long, glabrous. *Racemes* 2—6(—8?), longest 4—16 cm long, distant, solitary or paired along a (0—)1—5.5(—10?) cm long common axis. *Rachis* triquetrous, serrate. *Abscission of pedicels* cupuliform. *Spikelets* binate or ternate, at base in rather distant clusters (small secondary branches), homomorphous, oblong to lanceolate, 2—2.5 mm long, usually

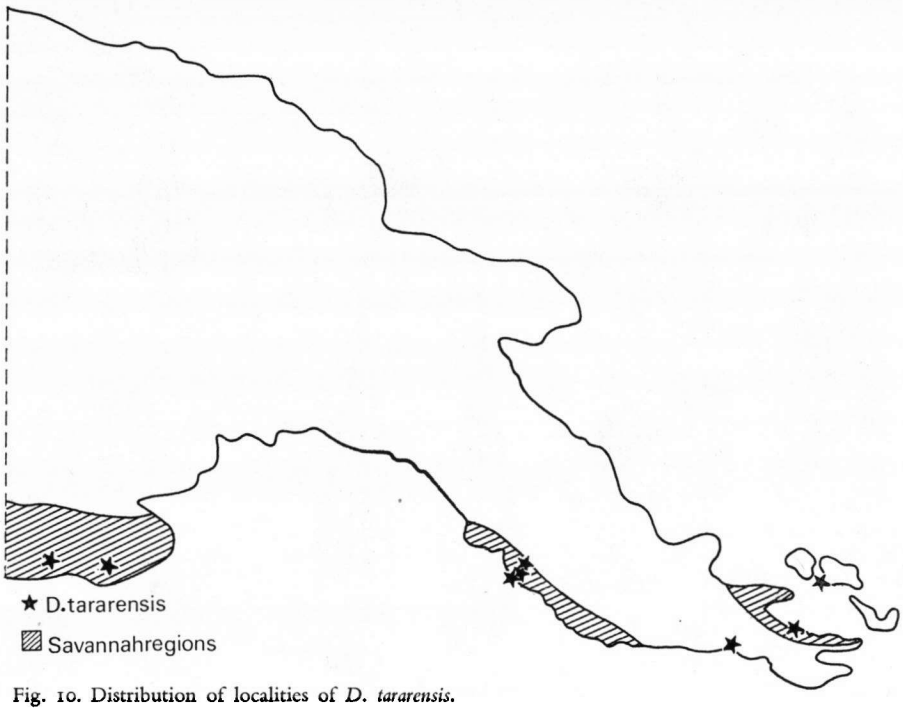

Fig. 10. Distribution of localities of *D. tararensis*.

with overtopping pubescence; hairs smooth, acute. *Lower glume* inconspicuous, triangular, 0.2—0.4 mm long, acute to truncate. *Upper glume* 1—2 mm long, 0.4—0.8 times as long as the spikelet, acute, nerves 3, apically not anastomosing. *Sterile lemma* as long as the spikelet, nerves 7, ± inequidistant, apically not anastomosing. *Fertile floret* as long as to slightly shorter than the spikelet, acuminate, straw-coloured in fruit. *Anthers ca.* 1 mm long, purple with yellow connective zone (*v.s.*). *Stigma* purple (*v.s.*).

Distribution. Malesia: New Guinea (Fly River District, Port Moresby, Amazon Bay, Dogwia, Ferguson I.).

Ecology. Locally common in scrubby open savannah forests with *Melaleuca*, *Eucalyptus*, *Acacia*, occasionally weedy in native gardens.

Notes. Henrard stated that there may be up to 9 racemes along a 10 cm long common axis; perhaps this is the case in the holotype which I have not seen. He places the species in the section *Parviflorae*.

The collection of this rare and local savanna species on Ferguson I. confirms Brass's suggestion that this vegetation-type is a primary community there. The occurrence of this species cannot otherwise be explained (Bull. Am. Mus. Nat. Hist. 111, 1956, 147).

16. Digitaria abludens (R. & S.) Veldk., *comb. nov.* — **Fig. 11d; 12.**

Panicum abludens R. & S., Syst. Veg. 2 (1817) 457; Roth, Nov. Pl. Sp. (1821) 53; Schult. *f.*, Mant. 2 (1824) 251. — Type: *Heyne s.n.* in Hb. Roth (B, holo; BM) (K neg. no. 2109).

Milium sanguinale auct., non Roxb.: Roxb. [Hort. Beng. (1814) 8, *nomen*] Fl. Ind. (1820) 317; ed. 2 (Carey) 1 (1832) 315, excl. syn. Burm. *f.* — *Paspalum? sanguinale auct., non* Lamk.: Schult. *f.*, Mant. 2 (1824) 171. — *Helopus sanguinalis auct. non* Nees: Nees, Agrost. Bras. (1829) 17. — *Paspalum pedicellatum* Nees *ex*

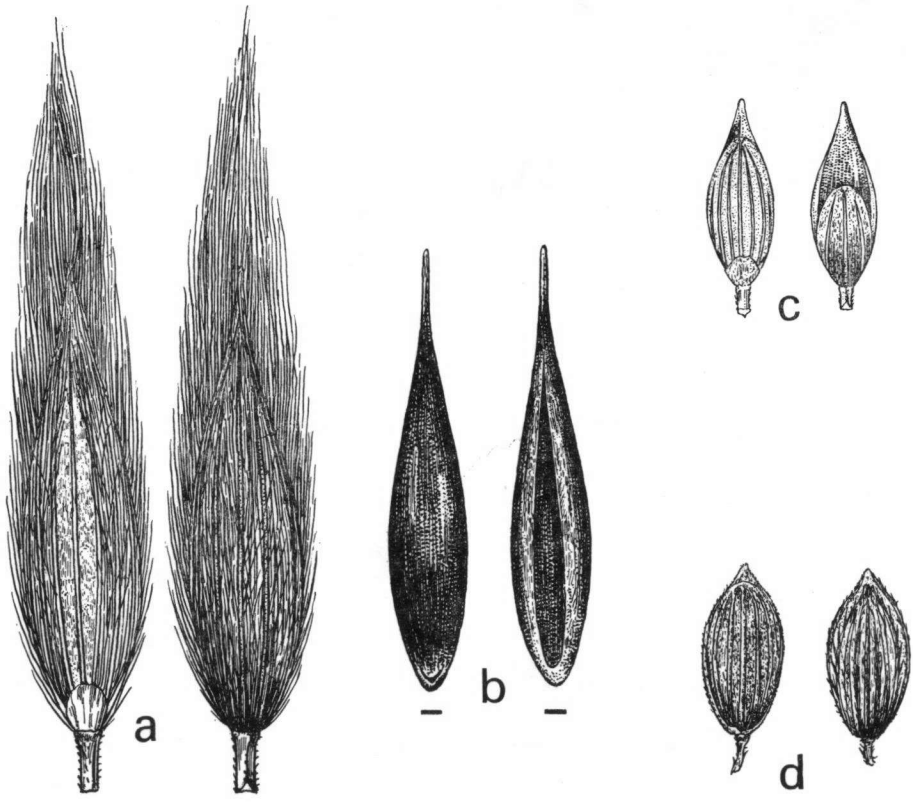

Fig. 11. All × 13. — *D. insularis* (*Cuming 83*): a. spikelets; — b. fertile florets in fruit. The lines indicate the relative position of the abscission of the pedicel. — c. *D. ramularis* (*Wools s.n.*). — d. *D. abludens* (*Wight KD 3027*).

Duthie, Grasses N.W. India (1883) 1. — *Paspalum pedicellare* Trin. [*ex* Steud., Nomencl. ed. 2, 2 (1841) 272, *nomen*] *ex* Hook.*f.*, Fl. Br. Ind. 7 (1896) 19; A. Camus, Not. Syst. 2 (1912) 225. — *Panicum pedicellare* Hack., Oest. Bot. Z. 51 (1901) 330, *pro comb.* — *D. pedicellaris* Prain, Beng. Pl. (1903) 890; Merr., Philip. J. Sc. 1 (1906) Suppl. 348, *p.p.*; Fl. Manila (1912) 89, *p.p.*; E. G. & A. Camus, Fl. Gén. I.-C. 7 (1922) 404; Backer in Heyne, Nutt. Pl. 1. (1922) 157; ed. 2 (1927) 205; Merr., En. Philip. Fl. Pl. 1 (1923) 54, *p.p.*; Backer, Handb. Fl. Java 2 (1928) 126; Henr., Mon. Dig. (1950) 534, fig., in synon.; M. Schmid, l'Agron. Trop. 13 (1958) 306, fig. 50, 2. — Type: *Roxburgh s.n.* (BM, holo; K), Icon ined. 816 (K).

Paspalum granulare Trin. in Spreng., Neue Entd. 2 (1821) 47; Diss. Alt. (1826) 92; Mém. Ac. Sc. St Pétersb. VI, Sect. Nat. 3 (1834) 134. — *D. granularis* Henr., Mon. Dig. (1950) 302, fig., 891; Bor, Kew Bull. 1954 (1954) 547; Webbia 11 (1955) 328; Grasses (1960) 301; Monod de Froid. in Backer & Bakh., Fl. Java 3 (1968) 564; Gupta & Srivastava, Genetica Iberica 21 (1969) 11, fig. 3; Gupta, Taxon 18 (1969) 214; Bor in Rechinger, Fl. Iran. 70 (1970) 487; Jain, J. Ind. Bot. Soc. 50 (1971) 128. — Type: *König sub Milium setaceum* in Hb. Trin. *ex* Hb. Banks *ex* Hb. Jacquin (LE, holo, *n.v.*; BM, *et sub M. punctatum Kön., ined.*).

Panicum puberulum auct., non Kunth: Mez in Perk., Fragm. Fl. Filip. (1904) 143.

Annual, growing in small tufts, culms erect or geniculately ascending, not rooting at the nodes, branched mainly at base, up to 90 cm high. No *cataphylls*. *Sheaths* glabrous, the basal sometimes sparsely bbb-pilose. *Ligule* 0.75—3 mm high, truncate, erose, sometimes

fimbriate. *Blades* linear, (2—)5—15(—20) cm by 2—4 mm, glabrous or upper surface with a few bbb, scabrid on upper surface and along margins, soft, ascendingly erect. *Peduncle* up to 50 cm long, usually much less, glabrous. *Racemes* 2—8(—11), longest 2.5—11.5 (—13.5) cm long, ± erect, later spreading to patent, solitary along the up to 5(—6.5) cm long common axis, loosely and laxly spikeled, longest often with secondary branches, grading into the spikelet-clusters. *Rachis* triquetrous, often somewhat wavy, serrate. *Pedicels* usually with a distinct bend, without a coronula, *abscission* discoid to cupuliform. *Spikelets* binate and ternate, homomorphous, tumidly elliptic to obovate-oblong, 1.3—1.75 mm long; hairs smooth, apex microscopically dilated (magn. × 400!), sometimes apiculate. *Lower glume* absent. *Upper glume* 1—1.5 mm long, (0.6—)0.7—0.9 times as long as the spikelet, acute to obtuse, nerves 3, apically anastomosing, pubescence slightly overtopping. *Sterile lemma* 0.85—0.95 times as long as the spikelet, apex rounded, apparently acuminate by the distinct midnerve, nerves 7, equidistant, apically anastomosing, pubescence sometimes slightly overtopping. *Fertile floret* protruding, acuminate, yellowish brown, often with pale apex, in fruit turning concolorously chestnut. *Anthers* 0.4—0.65 mm long, purple. *Stigma* purple.

Distribution. Continental Asia from N. Pakistan to Central Thailand and Malesia: E. Java, Madura, Lesser Sunda Is. (Sumbawa, Flores), SE. Celebes (Kendari; P. Muna), Philippines (Culion I., N. Luzon; Mindanao), New Guinea (Kebar Valley; Morobe Dist.).

Ecology. Regions with a distinct but not too dry monsoon. Locally common in teak forests, fields, grassy places on stony soil or marl. Up to 1500 m in E. Java, but reaching 1800 m in the Pulneys above Madras.

Chromosome number. 2n = 36 (Gupta & Srivastava, 1969; Gupta, 1969).

Notes. Henrard cited the plant from South America. Specimens determined as such belonged to *D. balansae*. He reckons this species to his section '*Clavipilae*'.

D. leptalea Ohwi from Formosa seems much related, if not conspecific. I have seen no material of it.

17. Digitaria henrardii Veldk., *spec. nov.* — Fig. 12.

D. pedicellaris auct., non Prain: Merr., Philip. J. Sc. 1 (1906) Suppl. 348, *p.p.*; Fl. Manila (1912) 89, *p.p.*; En. Philip. Fl. Pl. 1 (1923) 54, *p.p.* — *Panicum pedicellare auct., non* Hack.: Hack., Oest. Bot. Z. 51 (1901) 330; Philip. J. Sc. 1 (1906) Suppl. 268. — *Panicum parvulum auct., non* Trin.: Merr., Philip. J. Sc. 1 (1906) Suppl. 27, *p.p.*

Annua. Folia linearia, 1.5—7.5 cm longa, 1.5—4 mm lata. Racemi alternati, rache triangulare. Spiculae binatae, 1.5—2 mm longae. Pili leves, apicibus paullo inflatibus, saepe apiculatis (magn. 400-plo), glumas superantes. Gluma inferior limbo inconspicuo, scariosa, fragilis, 0.1—0.3 mm alta. Gluma superior spicula aequans, 5-nervata. Flos fertilis brunnescens, rarissime castaneus in fructu, prae glumis obtegentibus non protrudens. Stigma purpureum. — Typus: *Merrill 577* (L, holo; PRC, U).

Small, tufted annual, culms erect, up to 40 cm high, much branched. No *cataphylls*. Lower *sheaths* pilose, upper mainly hairy along the margin. *Ligule* 0.75—1.75 mm high, truncate, erose to ± fimbriate. *Blades* linear, 1.5—7.5 cm by 1.5—4 mm, ± erect, glabrous or upper surface sparsely pilose. *Peduncles* up to 27 cm long, glabrous. *Racemes* 2—4(—6), ± erect, later spreading, solitary along the up to 2.75 cm long common axis, longest 1.5—7 cm long. *Rachis* triquetrous, often somewhat wavy, serrate. Longer *pedicels* usually bent, without a coronula, *abscission* discoid to cupuliform. *Spikelets* binate, the lower sometimes ternate, representing an underdeveloped branch, homomorphous, oblong, 1.5—2 mm long; hairs smooth, apex not or only very slightly microscopically

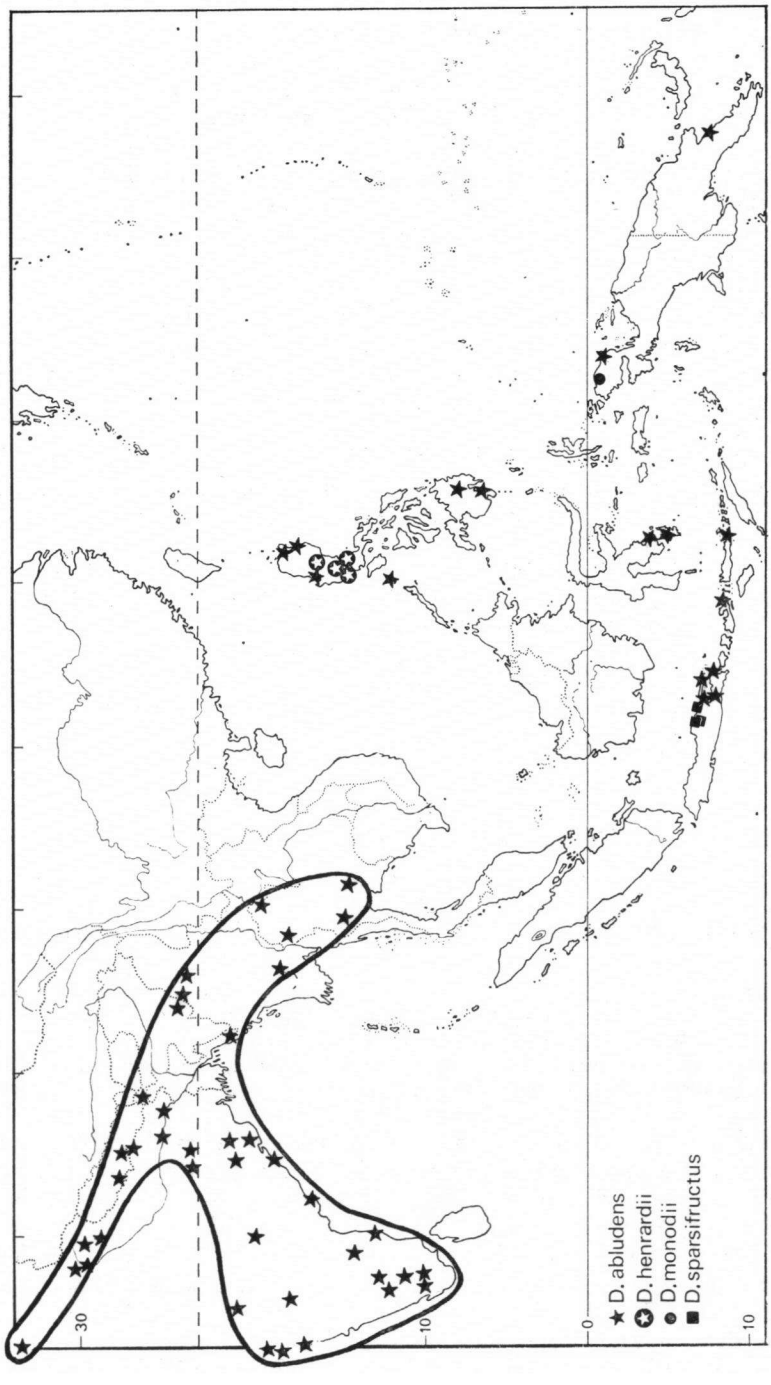

Fig. 12. Distribution of localities of *D. abludens*, *D. henrardii*, *D. monodii*, and *D. sparsifructus*.

dilated (magn. × 400!), sometimes apiculate, overtopping the scales. *Lower glume* a scarious, fragile, inconspicuous collar, 0.1—0.3 mm high. *Upper glume* as long as the spikelet, nerves (3—)5, apically anastomosing, the laterals often faint and covered by the pubescence. *Sterile lemma* as long as the spikelet, nerves equidistant, (5—)7, apically anastomosing. *Fertile floret* as long as the spikelet, not protruding, yellowish, brownish in fruit, rarely castaneous. *Anthers* 0.5—0.6 mm long, purple. *Stigma* purple.

Distribution. Malesia: Philippines (Luzon: Mt. Mariveles, Bataan; Masambong, Quezon City, Rizal; Mt. S. Thomas, Benguet; Mt. Arayat, Pampanga; Malinta).

Ecology. In grasslands, altitude not given.

Note. Closely related to *D. abludens*. Named after Dr. J. Th. Henrard, whose magnum opus on the genus is an essential trove of information for every student of *Digitaria*.

18. **Digitaria monodii** Veldk., *spec. nov.* — **Fig. 12; 13.**

Perennis? Racemi alternati, laterales sursum sensim in glomerulis binatis spicularum transientes, rache triangulare. Spiculae 1.85—2.1 mm longae, glaberrimae vel pubescentes. Gluma inferior nulla. Gluma superior spicula 0.7—0.8-plo brevior, nervis tribus anastomosantibus. Lemma sterilis (3—)5(—7)-nervata. Flos fertilis fuscus in fructu, apice protrudente. Antherae flavae. Stigma purpureum. — Typus: *Van Leeuwen KEB. 19* (L, holo).

Small, tufted perennial (?) from a short rootstock, covered by the fibrous remains of the basal sheaths, erect, up to 55 cm tall, branched at base only. No *cataphylls* seen. *Sheaths* ± glabrous. *Ligule* 1—1.5 mm high, truncate, serrate to fimbriate. *Blades* linear, 6.5—14 cm by 1.5—3 mm, upper surface scaberulous, pilose in lower half and in the throat, glabrescent, soft, ± erect. *Peduncle* up to 28 cm long, glabrous. *Racemes* 2—6, alternate along the up to 4.5 cm long common axis, longest 2.5—6 cm long, the branches gradually passing into the spikelet-clusters. *Rachis* triquetrous, serrate. *Pedicels* somewhat patent, slightly bent, without a coronula, *abscission* discoid to cupuliform. *Spikelets* apically binate, homomorphous, 1.85—2.1 mm long, glabrous or pubescent; hairs smooth, apically dilated (magn. × 400!), occasionally apiculate. *Lower glume* absent. *Upper glume* 1.4—1.65 mm long, 0.7—0.85 times as long as the spikelet, rounded to acute, nerves 3, apically anastomosing. *Sterile lemma* 0.9—0.95 times as long as the spikelet, nerves (3—)5, inequidistant, or 7 and equidistant, apically anastomosing. *Fertile floret* protruding, slightly acuminate, dark brown in fruit. *Anthers* 0.6—0.9 mm long, yellow. *Stigma* purple.

Distribution. Malesia: New Guinea (Kebar Valley, Vogelkop Peninsula).

Ecology. On rather fertile sandy soil, in low grassland, at 500 m alt.

Notes. This plant is most related to *D. abludens*. In that species and the related *D. henrardii* a similar inflorescence may be found where the lateral branches merge into the spikelet-clusters and whereby it is impossible to say which is which in certain circumstances. I have the impression that the spikelets are in principle binate. In the other species of *Digitaria* the distinction between spikelet-clusters and branches is usually quite obvious.

This plant is named after Mr. Ch. Monod de Froideville, who elaborated the grasses for the Flora of Java and to whom I am much indebted for his kind advice, fruitful discussion, and hospitality.

19. **Digitaria sparsifructus** Ohwi. — **Fig. 6c; 8; 12.**

D. sparsifructus Ohwi, Bull. Tokyo Sc. Mus. 18 (1947) 7; Henr., Mon. Dig. (1950) 702, fig., 889; Monod de Froid. in Backer & Bakh., Fl. Java 3 (1968) 564. — Type: *Backer 6605* (BO, holo; K).

Fig. 13. *D. monodii* (*Van Leeuwen KEB 19*, type). — a. Habit, × 1. — b. part of inflorescence, × 4½. — c. spikelet, adaxial side. — d. spikelet, abaxial side. — e. fertile lemma and lodicules, palea removed. — c—e × 17½.

Erect annual, growing in small, solitary tufts, branched at base only, not rooting at the nodes, up to 1.1 m high. No *cataphylls*. *Sheaths* glabrous, sometimes sparsely pilose towards the apex. *Ligule* 1—1.25 mm long, truncate, erose to fimbriate. *Blades* linear, (5—)9—27 cm by 4—6 mm, ascendingly erect, soft, glabrous, smooth to scaberulous, throat glabrous. *Peduncle* up to 50 cm long, glabrous. *Racemes* 3—10, longest 5—16 cm long, solitary or geminate along a 1—8.5 cm long common axis in a laxly contracted panicle, loosely spikeled at base or lower part bare with distant spikelet-clusters. *Rachis* triquetrous, serrulate. *Pedicels* ± straight, without a coronula, *abscission* discoid to cupuliform. *Spikelets* binate and ternate, homomorphous, oblong, 1.75—2 mm long; hairs smooth, apically dilated (magn. × 400!), sometimes apiculate, not overtopping the scales. *Lower glume* absent or a minute rim up to 0.1 mm long. *Upper glume* as long as the spikelet, acute, nerves 3, apically anastomosing. *Sterile lemma* as long as the spikelet, nerves ± equidistant, 5—7, apically anastomosing. *Fertile floret* slightly shorter than the spikelet, apex acuminate, becoming brownish in fruit. *Anthers* 0.5—0.6 mm long, purple. *Stigma* purple.

Distribution. East Java.

Ecology. Teak forests on rather heavy calcareous marl, at *ca.* 100 m alt.

Note. This species belongs to the section '*Clavipilae*' and is quite distinct from the other species. It is only known from four collections: *Backer* 6605, 6631 (Randublatang), *Beumée* 5566 (Sekaran), and *Hildebrand* 2 (Ngawen).

20. **Digitaria ternata** (A. Rich.) Stapf. — **Fig. 14a.**

D. ternata (A. Rich.) Stapf, Fl. Cap. 7 (1898) 376; Fl. Trop. Afr. 9 (1919) 452; Henr., Mon. Dig. (1950) 737, fig., 888; Chippindall, Grasses & Pastures S. Afr. (1955) 418, fig. 348; Bor, Webbia 11 (1955) 337; Grasses (1960) 306; Vickery, Contr. N.S.W. Nat. Herb., Fl. Ser. 19, 1 (1961) 94; Bor, Dansk Bot. Ark. 20 (1962) 159; Larsen, Dansk Bot. Ark. 20 (1963) 223; Rugolo de Agrasar, Bol. Soc. Arg. Bot. 12 (1968) 389, fig. 3. — *Cynodon ternatus* A. Rich., Tent. Fl. Abyss. 2 (1851) 405. — *Panicum ternatum* Hochst. [Flora 24, Intell. Bl. 2 (1841) 19, *nomen*]; *ex* Steud., Syn. 1 (1853) 40. — *Paspalum ternatum* Hook.*f.*, Fl. Br. Ind. 7 (1896) 17; A. Camus, Not. Syst. 2 (1912) 223. — *Syntherisma ternata* Newbold, Torreya 24 (1924) 9. — Type:. *Schimper 76* (P, holo; B, L).

Panicum phaeocarpum Nees var. *gracile* Nees, Fl. Afr. Austr. 1 (1841) 23; Agrost. Cap. (1853) 23. — Type: *Drège s.n.* (K, holo).

Panicum argyrostachyum Steud., Syn. 1 (1853) 40. — *D. ropalotricha* Buse var. *glabrescens* Buse in Miq., Pl. Jungh. (1854) 381; Miq., Fl. Ind. Bat. 3 (1857) 436. — *Syntherisma argyrostachya* Hitchc. & Chase, Contr. U.S. Nat. Herb. 18 (1917) 294. — *D. argyrostachya* Fern., Rhodora 22 (1920) 103; Henr., Meded. Rijksherb. Leiden 61 (1930) 16; Hitchc., Man. Grasses W. Ind. (1936) 170; Henr., Mon. Dig. (1950) 48, fig., 889; Reeder, Bull. Torrey Bot. Cl. 94 (1967) 6; Monod de Froid. in Backer & Bakh., Fl. Java 3 (1968) 563; Adams, Fl. Pl. Jamaica (1972) 179. — *D. argyrostachya* Fern. var. *glabrescens* Henr., Meded. Rijksherb. Leiden 61 (1930) 16; *nom. ill.* — Type: *Zollinger 260, p.p.* (P, holo; K, L).

D. ropalotricha Buse in Miq., Pl. Jungh. (1854) 381; Miq., Fl. Ind. Bat. 3 (1857) 436; Backer in Heyne, Nutt. Pl. 1 (1922) 159; ed. 2 (1927) 206; Backer & Sloot., Theeonkr. (1924) 50, fig.; Backer, Onkr. Suikerr. (1928) 67, fig. 59; Handb. Fl. Java 2 (1928) 127; Henr., Mon. Dig. (1950) 633, in synon. — *Panicum ropalotrichum* Buse *ex* Koord., Exk. Fl. Java 1 (1911) 126. — *D. argyrostachya* Fern. var. *hirticulmis* Henr., Mon. Dig. (1950) 49, 633, 889; Monod de Froid. in Backer & Bakh., Fl. Java 3 (1968) 563. — Type: *Junghuhn s.n.* (L, holo, no. 904.26—88; U).

Paspalum royleanum auct., non Thw.: Backer, Teysmannia 23 (1913) 495, fig. 11.

Tufted annual, culms geniculate at base, rarely rooting at the lower nodes, branched mainly at base, up to 1.25 m high. No *cataphylls*. *Sheaths* glabrous. *Ligule* 1—3 mm long, truncate, erose. *Blades* linear, up to 60 cm by 10(—16) mm, ± ascending, soft, glabrous, sometimes sparsely pilose, smooth; throat glabrous or bbb-pilose. *Peduncle* up to 90 cm long, glabrous or pilose. *Racemes* 2—10 (—14), longest (2—)4—21(—25) cm long, corymbosely panicled, one usually placed below the lowest whorl, along a 0—6(—9.5) cm

long common axis, ± erect to arcuate. *Rachis* winged, serrate. *Pedicels* with the distal spicules elongated, hair-like, forming a corona under the spikelet, ± straight, *abscission* discoid to cupuliform. *Spikelets* ternate, homomorphous, oblong, (1.25—)1.5—2.35(—2.5) mm long, obtuse to acutish; hairs smooth, apically distinctly dilated (magn. × 100!), usually apiculate, silvery, often yellowish when dry. *Lower glume* absent. *Upper glume* (0.2—)0.85—1.85(—2.0) mm long, (0.15—)0.5—0.8(—0.9) times as long as the spikelet, acute, nerves 3, apically anastomosing, with overtopping pubescence. *Sterile lemma* as long as the spikelet, acute, nerves 5—7, inequidistant, the third anastomosing with the midnerve, the second terminating below the anastomosis, with free apex. *Fertile floret* as long as the spikelet or slightly shorter, acute, fuscous to chestnut-coloured. *Anthers* 0.4—0.75 mm long, dark purple with pale connective zone (*v.v.*). *Stigma* violet (*v.v.*).

Distribution. Tropics and Subtropics of the Old World, from S. Africa north to Guinea, Ethiopia, India (Bombay, Mysore, Madras, Assam) to S. China (Yunnan), Malesia: N. Sumatra, Java, Lesser Sunda Is., SW. Celebes, Philippines (Luzon, Mindanao), New Guinea (Central District, Papua; introduced). Introduced elsewhere, e.g. Australia (New South Wales), America (Mexico, Jamaica, Argentine). Specimens cited from Japan and the Ryukyus belong to *D. violascens* (q.v.).

Ecology. Grassy or waste places on not too bad soil, up to 2000 m in Lombok.

Vernacular names. Java: *gangsiran, gĕndjoran, sunduk gangsir* (J); *kapotean* (M); *djampang piit* (S).

Chromosome number. 2n = 36 (Reeder, 1967, sub *D. argyrostachya*); 54 (Larsen, 1963).

Notes. Henrard kept *D. ternata* and *D. argyrostachya* separate, basing his decision on the width of the leaf-blades, shape, size, and pubescence of the spikelets, and the size and pubescence of the upper glume. As far as the leaf-blades and the pubescence is concerned this seems incorrect, but in the other characters small statistical differences are present between the Malesian and extra-Malesian material:

character	'*argyrostachya*'	$\bar{x}$	'*ternata*'	$\bar{x}$
racemes	(2)3—10(—14)	5.3	2—7	3.2
length spikelet	(1.3—)1.45—2.2(—2.5)	1.79	1.85—2.5	2.2
length upper glume	(0.2—)0.8—1.55(—2.0)	1.14	(1.25—)1.4—2	1.66
index upper gl./sp.	(0.15—)0.5—0.75(—0.85)	0.65	0.65—0.9	0.77

In most cases the provenance is essential for corroborating identification.

Specimens with pilose peduncles and with glabrous ones are present in both 'species'. In Malesia the pilose form is mainly found in Java and Madura, but one specimen was seen from N. Sumatra, Timor, and Luzon each. Outside Malesia the pilose form has been seen from the entire area and appears to be the most common one; the glabrous form was seen from Abyssinia (the type!), S. Africa, and S. India. Stapf (1919) stated in regard to this that 'all Rhodesian forms have long fine hairs on the peduncles'. Statistically, the glabrous form is a smaller plant with less and shorter racemes and shorter scales.

Remarkable are two collections from E. Java (*Jeswiet* 668, 694) which have glabrous peduncles, 1.25—1.35 mm long spikelets, and upper glumes only 0.2—0.5 mm long, 0.15—0.4 times as long as the spikelet. This phenomenon is reminiscent of the related Indian *D. stricta* Roth, where forms with either long ('*stricta*') or very short to nearly absent ('*denudata*') upper glumes are found.

Henrard places this species in the '*Clavipilae*', but it is quite different from for instance *D. abludens* and its allied species.

21. Digitaria perpusilla Pilg.

D. perpusilla Pilg., Bot. Jahrb. 69 (1938) 253; Reeder, J. Arn. Arb. 29 (1948) 295; Henr., Mon. Dig. (1950) 544, fig., 948; Henty, Bot. Bull. Lae 1 (1969) 77. — Type: *Clemens 6120* (B, holo; A, *n.v.*; BRI; US, *n.v.*).

Minute tufted annual, culms erect, branched at base only, not rooting at the nodes, up to 7 cm high. No *cataphylls*. *Sheaths* patently pilose. *Ligule ca.* 0.5 mm long, truncate, erose. *Blades* ovate-linear-lanceolate to -lanceolate, 0.5—1.5 cm by 1—1.5 mm, ± erect, patently pilose. *Peduncles* up to 1.5 cm long, glabrous. *Racemes* 1 or 2, longest 1.2—2 cm long, ± erect. *Rachis* winged, serrate. *Abscission of pedicels* discoid to cupuliform. *Spikelets* in principle ternate, but because of reduction usually binate or even solitary, oblong, 1.6—1.8 mm long, acute, glabrous. *Lower glume* absent or an inconspicuous scarious collar up to 0.1 mm long. *Upper glume* 1.4—1.7 mm long, 0.8—0.95 times as long as the spikelet, nerves 3(—5), apically anastomosing. *Sterile lemma* ± as long as the spikelet to slightly shorter, obtuse, inequidistantly 7-nerved, nerves apically anastomosing. *Fertile floret* as long as to slightly longer than the scales, chestnut-coloured in fruit. *Anthers* 0.5 mm long, yellowish. *Stigma* purplish.

Distribution. Only known from the type collection, Saruwaged Mountains, East New Guinea.

Ecology. Hilly grassland between 2450 and 2750 m (but altitude given with a question mark by Mrs. Clemens).

Notes. Pilger and Henrard incorrectly described the spikelets as only 1.5 mm long with the upper glume as long as the spikelet. Henrard erroneously stated that the sterile lemma is equinerved. According to Reeder the spikelets are only 1.2 mm long and the upper glume 0.67 times as long.

Henrard placed the species in the section '*Horizontales*'. It looks, however, most like a depauperate form of the section '*Verrucipilae*', e.g. the *pertenuis*-form of *D. violascens*, but differs from these by the glabrous spikelets. The combination of pubescent leaves, a winged rachis, the size of the glabrous spikelets, the lower glume, the venation and relative length of the upper glume, the venation of the sterile lemma, and the length and colour of the fertile floret makes it impossible to match this specimen to any species treated here. Other binate species were also accepted in the '*Verrucipilae*' by Henrard, e.g. *D. maniculata* Stapf and *D. patagiata* Henr.

22. Digitaria fuscescens (Presl) Henr. — Fig. 14b.

D. fuscescens (Presl) Henr., Meded. Rijksherb. Leiden 61 (1930) 8; C. E. Hubb. & Vaugh., Grasses Maur. & Rodr. (1940) 90; Henr., Mon. Dig. (1950) 270, fig., 899; Bor, Webbia 11 (1955) 320; Grasses (1960) 301; Gould & Soderstrom, Am. J. Bot. 54 (1967) 678, fig. 32; Monod de Froid. in Backer & Bakh., Fl. Java 3 (1968) 563; Gill., Rev. Fl. Malaya 3 (1971) 193. — *Paspalum fuscescens* Presl, Rel. Haenk. 1 (1830) 213, 351. — *Syntherisma fuscescens* Scribn., 10th Ann. Rep. Missouri Bot. Gard. (1899) 49, fig. 10, 1. — Type: *Haenke s.n.*, Luzon (PR, holo; MO, *n.v.*; W).

Paspalum micranthum Desv., Opusc. (1831) 56; C. E. Hubb. & Vaugh., Grasses Maur. & Rodr. (1940) 90; Henr., Mon. Dig. (1950) 605, in synon. — Type: not indicated, not in P.

D. pseudo-ischaemum Buse in Miq., Pl. Jungh. (1854) 382; Miq., Fl. Ind. Bat. 3 (1857) 438; Kurz, Nat. Tijd. Ned. Ind. 27 (1864) 227; Henr., Mon. Dig. (1950) 604, fig., in synon. — *Panicum pseudo-ischaemum* Boerl., Ann. Jard. Bot. Btzg 8 (1890) 52. — Type: *Junghuhn s.n.* (L, holo, no. 908.92—145).

Since this species is generally confused with *D. longiflora* see there also for further references.

Mat-forming perennial with widely creeping stolons, rooting at the nodes; flowering culms ascending-erect, up to 40 cm high. No *cataphylls*. *Leaves* usually distinctly distichous on the stolons. *Sheaths* glabrous, very rarely with some pilosity. *Ligule* 0.5—2 mm long,

truncate, erose. *Blades* ovate-linear-lanceolate to -linear, rarely -lanceolate, 1—5(—11) cm by 2—5 mm, usually patent, glabrous, but for some bbb in the throat and these often absent also, smooth. *Peduncle* up to 20 cm long, glabrous. *Racemes* 2 or 3(—5), longest (2—)3.5—7(—9) cm long, digitate, ascending-erect, common axis absent, rarely up to 5 mm long. *Rachis* winged, smooth to very finely serrate, axils black. *Pedicels* ± terete, ± smooth, *abscission* discoid to cupuliform. *Spikelets* ternate, oblong, 1.3—1.6(—1.7) mm long, glabrous. *Lower glume* absent, rarely a minute scarious collar, up to 0.1 mm long. *Upper glume* 1.1—1.5(—1.6) mm long, 0.85—0.95 times as long as the spikelet, acute to obtuse, nerves 3—5, apically anastomosing. *Sterile lemma* ± as long as upper glume, ± equi- to inequidistantly 5—7-nerved, the inner 3 proximate, nerves apically anastomosing. *Fertile floret* as long as the spikelet, protruding, yellowish to brownish in fruit, apex often bluish at anthesis, acuminate. *Anthers* 0.5—0.75 mm long, purple. *Stigma* purple.

Distribution. Mauritius, Bourbon, Madagascar, Ceylon, E. India to S. China and the Pacific, throughout Malesia. Recently introduced elsewhere, e.g. continental Africa (Cameroon), South America (Brasil, Guianas, Br. Honduras). Not yet seen from Australia.

In view of the distribution the type localities given by Presl seemed rather improbable (Peru, corrected to California). Indeed, the type in PR is labelled 'Sarsogon' (i.e. Philippines), which seems more likely, although Haenke's labels are not trustworthy.

Ecology. Locally common as a pioneer on humid sandy to rocky soil in disturbed places, beaches, dunes, fields, roads, etc. Sometimes becoming a pernicious weed. Up to 1350 m in N. Sumatra.

Chromosome number. 2n = 18 (Gould & Soderstrom, 1967).

Uses. Covers slopes quickly, providing a protection against erosion.

Vernacular names. Sumatra: *rumput tembagan* (Atjeh). — Java: *kakawatan* (J).

Notes. Henrard placed this species in his admittedly artificial section '*Atrofuscae*'. In its habit and spikelet-characters it is, however, very close to *D. longiflora* of the '*Verrucipilae*', from which it is best distinguished by the glabrous spikelets and the protruding fertile floret.

The leaves are said to be often reddish, purplish, or glaucous, the latter colour sometimes persisting in herbarium specimens.

23. Digitaria pusilla Ridl. — Fig. 14c.

D. pusilla Ridley, Fl. Mal. Pen. 5 (1925) 215; Henr., Mon. Dig. (1950) 609, fig., 874; Gill., Rev. Fl. Malaya 3 (1971) 191. — *Paspalum parviflorum* Ridley var.: Ridley, J. Str. Br. Roy. As. Soc. 59 (1911) 226. — Type: *Ridley 14866* (SING, holo; BM, K).

Small, mat-forming perennial, culms decumbent, rooting at the nodes, flowering culms ascendingly erect, up to 25 cm long. *Sheaths* densely pilose. *Ligule* 0.5 mm long, truncate, erose. *Blades* ovate-linear, 1.1—2.7 cm by 1—2.5 mm, ± erect, densely pilose, rather stiff. *Peduncles* up to 17 cm long, glabrous to sparsely pilose. *Racemes* 2 or 3, longest 1.25—4 cm long, digitate or rarely alternate along an up to 4 mm long common axis. *Rachis* triquetrous, serrate, wavy. *Abscission of pedicels* discoid to cupuliform. *Spikelets* binate or ternate, elliptic, 1—1.3 mm long; hairs with verrucose walls, acute. *Lower glume* absent or a scarious collar, up to 0.1 mm long. *Upper glume* 0.9—1.25 mm long, 0.9—1 times as long as the spikelet, acute to obtuse, nerves 3—5, apically anastomosing. *Sterile lemma* ± as long as the upper glume, nerves 7, ± equidistant, apically anastomosing. *Fertile floret* enclosed by the scales or slightly protruding, apex acuminate, often pale, chestnut-coloured in fruit. *Anthers* 0.3—0.35 mm long, purple. *Stigma* purple.

Distribution. S. Thailand (Ko Tao; Setul), Malesia: Langkawi (Ridley's record for Borneo relates to *D. violascens*).

Ecology. Sandy heaths on quartzite sand, up to 300 m alt.

Note. A very distinct plant with the smallest spikelets in Malesia. Habitually, it is very similar to a small specimen of *D. abludens*, but the verrucose hairs show that it was correctly placed in the section '*Verrucipilae*'.

24. Digitaria violascens Link. — Fig. 14d.

D. violascens Link, Hort. Berol. 1 (1827) 229; Merr., Philip. J. Sc. 1 (1906) Suppl. 347; Fl. Manila (1912) 88; E. G. & A. Camus, Fl. Gén. I.-C. 7 (1922) 406; Hitchc., Manual Grasses W. Ind. (1936) 171, fig. 109; Reeder, J. Arn. Arb. 29 (1948) 294; Henr., Mon. Dig. (1950) 790, fig., 878; Hitchc., Manual Grasses U.S. ed. 2 (1951) 576, fig. 831; Bor, Webbia 11 (1955) 363; M. Schmid, l'Agron. Trop. 13 (1958) 306, fig. 50, t. 1; Bor, Grasses (1960) 307, Vickery, Contr. N.S.W. Nat. Herb., Fl. Ser. 19, 1 (1961) 92; Hsu, J. Fac. Sc. Univ. Tokyo, Sect. 3, 9 (1965) 86, pl. II, 5, fig. 10, 18; Monod de Froid. in Backer & Bakh., Fl. Java 3 (1968) 563; Henty, Bot. Bull. Lae 1 (1969) 80, fig. 24; Bor in Rechinger, Fl. Iran. 70 (1970) 492; Gill., Rev. Fl. Malaya 3 (1971) 191, pl. 25b, col. pl. 16; Hsu, Taiwania 16 (1971) 281; Ill. Pl. Taiwan 1 (1971) 305, fig. 143; Adams, Fl. Pl. Jamaica (1972) 179. — *Panicum violascens* Kunth, Rév. Gram. 1 (1829) 33; Enum. Pl. 1 (1833) 84; Hack., Oest. Bot. Z. 51 (1901) 329; Koord., Exk. Fl. Java 1 (1911) 126, *p.p.* — Type: *Hb. Link 93* (B, holo).

Paspalum fuscum Presl, Rel. Haenk. 1 (1830) 214; Naves in Naves & F.-Vill., Nov. App. (1882) 310; Merr., Philip. J. Sc. 10 (1915) Bot. 188. — *Syntherisma fusca* Scribn., 10th Ann. Rep. Missouri Bot. Gard. (1899) 49, pl. 11. — *D. fusca* Merr., Philip. J. Sc. 35 (1928) 4; Henr., Mon. Dig. (1950) 269, *in synon.*; *non* Chiov., 1919. — Type: *Haenke s.n.* (PR, holo; MO, *n.v.*; W).

Panicum lineare auct., non Linné: Burm. *f.*, Fl. Ind. (1768) 25, t. 10 f. 3 (nec 2), excl. basion.; Roxb., Fl. Ind. 1 (1820) 294; ed. 2 (Carey), 1 (1832) 98; Icon. ined. 2029 (K). — *D. linearis auct., non* Pers.: Schult. *f.*, Mant. 2 (1824) 264. — *Panicum pseudo-durva* Nees var. *majus* Nees, Fl. Afr. Austr. 1 (1841) 21; Agrost. Cap. (1853) 21. — *D. pseudo-durva* Nees *ex* Schlechtend., Linnaea 26 (1853) 458; Miq., Fl. Ind. Bat. 3 (1857) 439; Henr., Mon. Dig. (1950) 601, in synon. — Type: Burman *f.*'s descr., plate.

Paspalum filiforme auct., non Sw.: Presl, Rel. Haenk. 1 (1830) 214; Naves in Naves & F.-Vill., Nov. App (1882) 310; Balansa in Morot, J. Bot. 4 (1890) 137.

Paspalum chinense Nees in Hook. & Arn., Bot. Beechey Voy. (1841) 231; Steud., Syn. 1 (1853) 41. — *Syntherisma chinensis* Hitchc., Contr. U.S. Nat. Herb. 22 (May 24th, 1922) 468; Mem. Bish. Mus. 8 (May 1922) 173, fig. 61. — *D. chinensis* A. Camus, Not. Syst. 4 (1923) 48; Merr., En. Philip. Fl. Pl. 1 (1923) 53; Ridley, Fl. Mal. Pen. 5 (1925) 215; Henr., Mon. Dig. (1950) 121, in synon.; *non* Hornem., 1819. — Type: *Vachell 'X', p.p.* (CAM, holo, *n.v.*).

Paspalum minutiflorum Steud., Syn. 1 (1853) 17; Benth., Fl. Austr. 7 (1878) 461; Backer, Teysmannia 23 (1913) 497, fig. 12; *non* Desv., 1931. — *Panicum steudelianum* Domin, Bibl. Bot. 85 (1915) 296. — Type: *Fortune 128* (P, holo; K, L, W).

D. digitata Buse in Miq., Pl. Jungh. (1854) 381; Miq., Fl. Ind. Bat. 3 (1857) 438; Henr., Mon. Dig. (1950) 183, fig., 878; Monod de Froid. in Backer & Bakh., Fl. Java 3 (1968) 563. — *Panicum digitatum* Hook. *f. ex* Koord., Exk. Fl. Java 1 (1911) 128; *non* Gilib., 1792. — Type: *Junghuhn s.n.* (L, holo, no. 908.91—1417; U).

D. pertenuis Buse in Miq., Pl. Jungh. (1854) 381; Miq., Fl. Ind. Bat. 3 (1857) 438; Backer in Heyne, Nutt. Pl. 1 (1922) 158; ed. 2 (1927) 206; Ridley, Fl. Mal. Pen. 5 (1925) 214; Backer, Handb. Fl. Java 2 (1928) 125; Henr., Mon. Dig. (1950) 550, fig., 878; Monod de Froid. in Backer & Bakh., Fl. Java 3 (1968) 563; Gill., Rev. Fl. Malaya 3 (1971) 192, excl. col. pl. 17. — *Panicum pertenue* Boerl., Ann. Jard. Bot. Btzg 8 (1890) 51. — *Paspalum pertenue* Backer, Bull. Jard. Bot. Btzg. II, 12 (1913) 25. — Type: *Junghuhn s.n.* (L, holo, no. 908.92—148; U).

Panicum pertenue Boerl. var. *glabrum* Boerl., Ann. Jard. Bot. Btzg. 8 (1890) 51. — Type: the description. — *D. pertenuis* Buse var. *glabra* Ohwi, Bull. Tokyo Mus. Sc. 18 (1947) 7, *p.p.*; Henr., Mon. Dig. (1950) 552, 878; De Castro, Garcia de Orta 12 (1964) 54; Monod de Froid. in Backer & Bakh., Fl. Java 3 (1968) 563, *p.p.* — Neotype: *Backer 9121* (BO, holo; L).

Panicum pseudo-ischaemum Boerl. var. *elongata* Boerl., Ann. Jard. Bot. Btzg. 8 (1890) 52. — Type: the description.

Paspalum brevifolium auct., non Fluegge: Balansa in Morot, J. Bot. 4 (1890) 137, *p.p.*

Panicum parvulum auct., non Trin.: Curtis, J. Str. Br. Roy. As. Soc. 25 (1894) 155.

Paspalum longiflorum auct., non Retz.: Hook. *f.*, Fl. Br. Ind. 7 (1896) 17, *p.p.*; Ridley, Mat. 3 (1907) 126, *p.p.*; A. Camus, Not. Syst. 2 (1912) 226, *p.p.*; E. G. & A. Camus, Fl. Gén. I.-C. 7 (1922) 406, *p.p.*; Burkill &

Holttum, Gard. Bull. Str. Settl. 3 (1923) 89. — *D. longiflora auct., non* Pers.: Rendle in Forb. & Hemsl., J. Linn. Soc. Lond., Bot. 36 (1904) 324; Merr., En. Philip. Fl. Pl. 1 (1923) 54, *p.p.*; Ridley, Fl. Mal. Pen. 5 (1925) 215, *p.p.*; Backer in Heyne, Nutt. Pl. 1 (1922) 156, *p.p.*; ed. 2 (1927) 204, *p.p.*; Backer, Handb. Fl. Java 2 (1928) 128, *p.p.*; Rozh. & Shisk. in Komarov, Fl. U.S.S.R. 2 (1934) 29.

Syntherisma helleri Nash *ex* Heller, Minnesota Bot. Stud. Bull. 9 (1897) 798, fig. 44. — Type: *Heller 2321* (K, L, P).

Paspalum sanguinale Lamk. var. *extensum auct., non* Hook. *f.*: A. Camus, Not. Syst. 2 (1912) 222, *p.p.*

Syntherisma ischaemum Nash var. *lasiophylla* Honda, Bot. Mag. Tokyo 38 (1924) 126. — *D. violascens* Link var. *lasiophylla* Tuyama, J. Jap. Bot. 18 (1942) 15; Ohwi, Fl. Jap. (1953) 67; ibid. (1965) 183. — *D. ischaemum* Muhl. var. *lasiophylla* Ohwi, Acta Phytotax. & Geobot. 11 (1942) 32. — Type: *Taquet 1712, 5026 (n.v.)*.

D. caespitosa Ridley, Fl. Mal. Pen. 5 (1925) 215; Henr., Mon. Dig. (1950) 103, fig., in synon. — Type: *Ridley s.n.* (K, hololecto).

D. pusilla auct., non Ridley: Ridley, Fl. Mal. Pen. 5 (1925) 215, *pro specim. Born.*

Syntherisma ischaemum auct., non Nash: Hosokawa, J. Soc. Trop. Agric. 7 (1935) 314.

D. violascens Link var. *villosa* Keng, Sunyatsenia 3 (1935) 19; Henr., Mon. Dig. (1950) 792. — *D. ropalotricha* Buse var. *villosa* Tuyama, J. Jap. Bot. 18 (1942) 18. — Type: *Hitchcock 18732* (US, holo, *n.v.*).

[*Paspalum filiculme* Nees *ex* Miq., Prol. Fl. Jap. (1867) 162, *nomen, non* Thw., 1864, *nomen, quid est D. longiflora.*] — *D. filiculmis* Ohwi, Acta Phytotax. & Geobot. 11 (1942) 32. — Type: *Von Siebold s.n.* (L, holo, no. 908.92—2453).

D. ischaemum Muhl. var. *asiatica* Ohwi, Acta Phytotax. & Geobot. 11 (1942) 32; Henr., Mon. Dig. (1950) 356. — Type: *J. Ohwi & M. Tagawa 100 (n.v.)*.

D. ropalotricha auct., non Buse: Tuyama, J. Jap. Bot. 18 (1942) 18; Masamune, Sc. Rep. Kanazawa Univ. 4 (1956) 229.

D. ischaemum Muhl. var. *intersita* Ohwi, Acta Phytotax. & Geobot. 11 (1942) 32. — *D. violascens* Link var. *intersita* Ohwi, Fl. Jap. (1953) 67; ibid. (1965) 183. — Type: *Ogata s.n. (n.v.)*.

D. bogoriensis Ohwi, Bull. Tokyo Sc. Mus. 18 (1947) 5; Henr., Mon. Dig. (1950) 815, fig., 874; Monod de Froid. in Backer & Bakh., Fl. Java 3 (1968) 562. — Type: *Ohwi 15* (BO, holo; K, L).

D. thwaitesii Henr. var. *tonkinensis* Henr., Mon. Dig. (1950) 742, fig., 876. — Type: *Balansa 1659* (P, holo; not in L).

Tufted annual, usually erect, sometimes mat-forming and rooting at the nodes, flowering culms up to 70 cm high. No *cataphylls*. *Sheaths* glabrous, rarely pilose. *Ligule* 1—3(—5) mm long, truncate, erose. *Blades* linear, (0.5—)4—17(—25) cm by (1—)3—5(—7) mm, ± ascending, soft, smooth or upper surface scaberulous, glabrous, throat sometimes with bbb, rarely pilose all over. *Peduncle* up to 30 cm long, glabrous, rarely sparsely pilose. *Racemes* (1)2—7(—13), longest (1.5—)4.5—12(—19) cm long, digitate, but usually corymbosely panicled along an up to 2.5(—4) cm long common axis, ascending to arcuate. *Rachis* winged, serrate. *Pedicels* subterete to angular, usually with minute spicules, without a corona under the spikelet, *abscission* discoid to cupuliform. *Spikelets* ternate, homomorphous, oblong (1.2—)1.3—1.9(—2.5) mm long, acute, variously pubescent; hairs with verrucose walls (magn. × 400!), acute. *Lower glume* absent, rarely a scarious collar up to 0.3(—0.5) mm long. *Upper glume* (1.2—)1.3—1.9(—2.4) mm long, (0.75—)0.9—1 times as long as the spikelet, acute, nerves 3—5, apically anastomosing. *Sterile lemma* usually as long as the spikelet, acute, nerves (3—)7, usually inequidistant, first interspace usually glabrous, narrow, the second broader, usually pubescent, nerves apically anastomosing. *Fertile floret* as long as to slightly shorter, rarely slightly longer than the spikelet, acute, chestnut-coloured in fruit, sometimes tardily so. *Anthers* 0.3—0.6 mm long, dark purple with white connective zone (*v.v.*). Stigma dark purple. (Gill., 1971: white).

Distribution. Tropics and subtropics of Asia, Australia, and America.

Ecology. Waste places, up to 2400 m in New Guinea.

Chromosome number. 2n = 36 (Hsu, 1971).

Vernacular names. Sumatra: *akar gujun gula* (Palembang); *rumput manis (gadjah)* (Gajo, Atjeh). — Java: *gĕndjoran, glĕmbang, sukĕt tajuman, dilawaratan, aäsinan* (Mad.); *djampang piit* (S); *rumput tuton* (Mal.). — Borneo: *rumput blanda* (SE. Borneo). — Celebes:

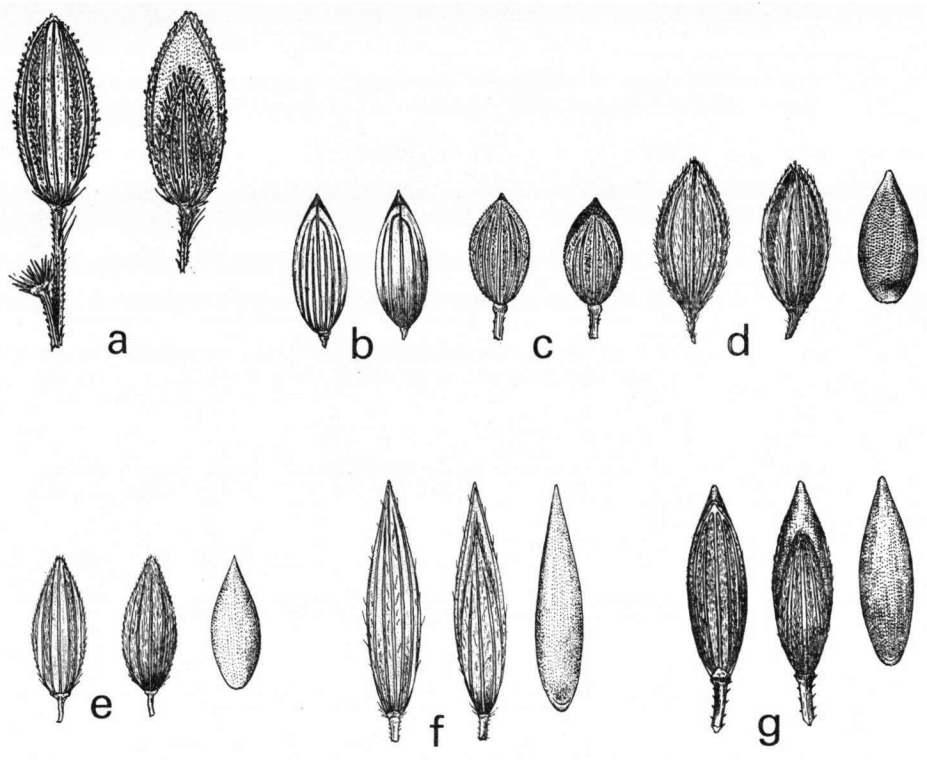

Fig. 14. Spikelets. All × 13. — a. *D. ternata* (*Zollinger 260*, type of *Panicum argyrostachyum*). — b. *D. fuscescens*(*Junghuhn s.n.*, type of *D. pseudo-ischaemum*). — c. *D. pusilla* (*Ridley 14866*, type). — d. *D. violascens* (*Junghuhn s.n.*, type of *D. digitata*). — e. *D. longiflora* (*Koenig s.n.*, type). — f. *D. mollicoma* (*Haenke s.n.*, type). — g. *D. philippinensis* (*Ramos BS 42890*, type). — d—g: including fertile florets in fruit, abaxial side.

rumput ranggut (Minahassa). — Philippines: *timi*, *tumi* (Bon.); *ualisibis* (Iv.). — Moluccas: *sialesa* (Simalur). — New Guinea: *gandikl* (Wankl, Hagen), *kongibuna* (Tomba), *krauteg* (Togoba, Hagen), *mutrinaha* (Kefamo, Asaro), *nemannemekul* (Masul, Chimbu), *sitrijai* (Dunantina), *tundreba* (Wahgi, Minj), *umetrihi* (Miruma).

Notes. The species has generally been confused or united with *D. longiflora* from which it usually differs by the combination of the following characters: habit, amount and position of the racemes, the subterete to angular, usually minutely spiculate pedicels, size of the anthers, colour of the stigmata (when fresh), and the dark coloured fruiting floret. This colouring sometimes takes place rather late, which may cause difficulties in determining the identity of the plant. It also has twice as many chromosomes.

The species is rather variable and several forms can be distinguished, usually based on a single character without any correlation with others or with distribution.

On the length of the spikelet the taxon falls apart in two forms, a small-spikeled, most common one, with the spikelets (1.2—)1.3—1.6 mm long, which includes the 'taxa' '*bogoriensis*', '*digitata*', '*helleri*', '*minutiflorum*', '*pertenuis*', and a larger spikeled one, the spikelets measuring (1.6—)1.7—2(—2.5) mm, which includes the type of *D. violascens*. Both forms occur over the whole area of the species.

Henrard recognized three species within the first form: *D. pertenuis*, *D. digitata*, and *D. bogoriensis*.

Occasionally, small forms with short leaves have been collected which are peculiar for being rather pilose all over, while the fertile lemmas apparently obtain their distinctive purple colour rather late after the anthesis. These have been described as *D. pertenuis* and *D. caespitosa* and var. *villosa*. Their habit is reminiscent of *D. longiflora*, with which Henrard identified the second 'species', but the presence of a minute common axis and the small spicules on the pedicels, mentioned by Ridley, refer this 'species' without question to *D. violascens*. I saw specimens pertaining to '*pertenuis*' from Vietnam, Malaya, Sumatra, Java, Borneo, Luzon, and New Guinea, one or a few for each region.

The varieties *intersita* and *lasiophylla* distinguished by Ohwi (1942, 1953), based on the pubescence of the plant, cannot be delimited satisfactorily. More or less pubescent plants form the link between *D. pertenuis* and the more common glabrous representatives of the present species.

D. digitata is distinguished by the small spikelets, the shortly hairy interspaces of the sterile lemma, and the somewhat hairy peduncles. The pubescence of the spikelets may be variable within the inflorescence or even in the spikelet-cluster, one spikelet having a sterile lemma puberulous all over, the next having the normal glabrous first and third interspaces. Not much weight can be given to such a feature. The pubescence of the peduncle mentioned by Henrard is a character taken from specimens, which all proved to belong to *D. longiflora*. His concept was evidently based on a mixture, consisting partly of *D. violascens*, partly of tall, not very much creeping representatives of *D. longiflora*, such as have been recognized by others as *D. malesiae*, *D. preslii*, etc.

D. bogoriensis is a form with rather small spikelets, although none so small as indicated by Ohwi or Henrard. That the fertile floret is minutely protruding is a rarely occurring character, to which little value may be attributed in this case.

Henrard mentioned that on the same spikelet both smooth and verrucose hairs may occur. Although it is true that the quality of this curious feature differs from plant to plant, I have never observed this mixture of types in this species and neither did Bor (1955, p. 306). In some other species two types may be encountered, e.g. *D. mollicoma* (q.v.), *D. ischaemum*, and presumably in other species.

25. Digitaria longiflora (Retz.) Pers. — Fig. 14e.

D. longiflora (Retz.) Pers., Syn. 1 (1805) 85; Merr., Philip. J. Sc. 1 (1906) Suppl. 347; Fl. Manila (1912) 88; Sp. Blanc. (1918) 64; Stapf, Fl. Trop. Afr. 9 (1919) 469; E. G. & A. Camus, Fl. Gén. I.-C. 7 (1922) 405, *p.p.*; Backer in Heyne, Nutt. Pl. 1 (1922) 156, *p.p.*; ed. 2 (1927) 204, *p.p.*; Merr., En Philip. Fl. Pl. 1 (1923) 54, *p.p.*; Hughes, Kew Bull. 1923 (1923) 310; Backer & Sloot., Theeonkr. (1924) 48, fig., *p.p.*; Ridley, Fl. Mal. Pen. 5 (1925) 214, excl. specim.; A. Camus, Not. Syst. 4 (1927) 48; Backer, Onkr. Suikerr. (1928) 66, fig. 58, *p.p.*; Handb. Fl. Java 2 (1928) 129, *p.p.*; Burkill, Dict. (1935) 808, *p.p.*; Reeder, J. Arn. Arb. 29 (1948) 294; Henr., Mon. Dig. (1950) 408, fig., 881; Hitchc., Man. Grasses U.S. ed. 2 (1951) 581, fig. 833; Gardner, Fl. W. Austr. 1 (1952) 226; Henderson, Mal. Fl., Monoc. (1954) 342, fig. 194 E—G; Bor, Webbia 11 (1955) 359; M. Schmid, l'Agron. Trop. 13 (1958) 306, fig. 50, 3; Bor, Grasses (1960) 302; Vickery, Contr. N.S.W. Nat. Herb., Fl. Ser. 19, 1 (1961) 93; Larsen, Dansk Bot. Ark. 20 (1963) 223; Monod de Froid. in Backer & Bakh., Fl. Java 3 (1968) 563; Henty, Bot. Bull. Lae 1 (1969) 77, fig. 25a; Gupta & Srivastava, Generica Iberica 21 (1969) 11; Huang, Taiwania 15 (1970) 155; Hsu, ibid. 16 (1971) 280; Gill., Rev. Fl. Malaya 3 (1971) 280, col. pl. 17. — *Paspalum longiflorum* Retz., Obs. Bot. 4 (1786) 15; Presl, Rel. Haenk. 1 (1830) 208; Hook. *f.*, Fl. Br. Ind. 7 (1896) 17, *p.p.*, Ridley, Mat. 3 (1907) 126, *p.p.* — *Panicum longiflorum* Gmel., Syst. Nat. 2 (1791) 158. — *Paspalum brevifolium* Fluegge, Gram. Mon. (1810) 150, *p.p. nom. superfl.*; Kunth, Enum. Pl. 1 (1833) 48; Benth., Fl. Austr. 7 (1878) 461; Naves in Naves & F.-Vill., Nov. App. (1882) 310; Balansa in Morot, J. Bot. 4 (1890) 137, *p.p.*; Backer, Teysmannia 23 (1913) 500, fig. 13. — *Panicum parvulum* Trin., Mém. Ac. Sc. St Pétersb. VI, Sect. Nat. 3 (1834) 205, *nom. superfl.*; Merr., Philip. J. Sc. 1 (1906) Suppl. 27, *p.p.*; Mez in Perk., Fragm. Fl. Filip. (1904) 142. — *Panicum*

pseudo-durva Nees var. *minus* Nees, Fl. Afr. Austr. 1 (1841) 21; Agrost. Cap. (1853) 21. — *D. pseudo-durva* Schlechtend. var. *minus* Miq., Fl. Ind. Bat. 3 (1857) 439. — *Syntherisma longiflora* Skeels, U.S. Dept. Agric. Bur. Pl. Ind. Bull. 261 (1912) 30; Hitchc., Mem. Bish. Mus. 8 (1922) 171, excl. fig. — [*D. longiflora* Pers. var. *prorepens* Hack. *ex* Henr., Mon. Dig. (1950) 824, 881; *nom. inval.*] — Type: *Koenig, sub Milium setaceum* (LD, holo, *n.v.*; BM, K).

Agrostis lenta Soland. in Ait., Hort. Kew 1 (1789) 96; ed. 2, 1 (1810) 150; W. Wood in Rees, Encycl. 1 (1802) Agrostis 27. — Type: *Anon. ex Hort. Kew* (BM, holo).

Panicum propinquum R. Br., Prodr. (1810) 193; Kunth, Enum. Pl. 1 (1833) 85. — *D. propinqua* Beauv., Agrost. (1812) 51, 160, 170; Henr., Mon. Dig. (1950) 591, in synon.; S. T. Blake, Proc. Roy. Soc. Queensl. 81 (1969) 14. — *Paspalum brevifolium* Fluegge var. *propinquum* Benth., Fl. Austr. 7 (1878) 461. — Type: *R. Brown 6122* (BM, holo; K).

Panicum tenuiflorum R. Br., Prodr. (1810) 193. — *D. tenuiflora* Beauv., Agrost. (1812) 51, 160, 171; Henr., Mon. Dig. (1950) 731, in synon. — Type: *R. Brown 6121* (BM, holo).

Milium filiforme Roxb., [Hort. Beng. (1814) 8, *nomen*] Fl. Ind. 1 (1820) 317; ed. 2 (Carey), 1 (1832) 314; *non* Lag., 1816. — *Paspalum nematodes* Schult. *f.*, Mant. 2 (1824) 171. — *D. roxburghii* Spreng., Syst. Veg. 1 (1824—25) 270; *nom. superfl.* — *Paspalum bifarium* Edgew., J. As. Soc. Beng. 21 (1852) 157. — Type: *Roxburgh s.n.* (BM, holo); Icon. ined. 815, 2025 (K).

Paspalum pubescens Presl, Rel. Haenk. 1 (1830) 214; *non* Willd., 1809, *nec* R. Br., 1810, *nec* Lag., 1816. — *Paspalum preslii* Kunth, Enum. Pl. 1 (1833) 47; Rév. Gram., Suppl. (1834) 585. — *Syntherisma pubescens* Scribn., 10th Ann. Rep. Missouri Bot. Gard. (1899) 50, t. 10, 2. — *D. preslii* Henr., Mon. Dig. (1950) 589, fig., 880; Bor, Webbia 11 (1955) 360; Grasses (1960) 304. — Type: *Haenke s.n.* (PR, holo; MO, *n.v.*; W).

Panicum pseudo-durva Nees var. *gracillimum* Nees, Fl. Afr. Austr. 1 (1841) 21; Agrost. Cap. (1853) 21. — Type: *Drège 4300* (K, holo).

[*Paspalum filiculme* Nees *ex* Thw., Enum. Pl. Zeyl. (1864) 358; *nomen.* — Type: *Thwaites CP 860* (BM, holo; K, P).]

D. friesii Pilg. in Fries, Wiss. Ergebn. Schwed. Rhod.-Congo Exped. 1 (1915) 200; Henr., Mon. Dig. (1950) 266, 880. — Type: *Fries 952* (B, holo; S, n.v.).

D. curvipes Mez, Bot. Jahrb. 56 (1921) Beibl. 125: 8; Henr., Mon. Dig. (1950) 162, fig., 879; 732, in synon.!; S. T. Blake, Proc. Roy. Soc. Queensl. 81 (1969) 12. — Type: *Dallachy s.n.* (B, holo; BRI, K, L; MELB, *n.v.*; NSW).

D. hatusimae Ohwi, Bot. Mag. Tokyo 55 (1941) 543; Henr., Mon. Dig. (1950) 310. — Type: *Hatusima 10195* (*n.v.*).

D. malesiae Ohwi, Bull. Tokyo Mus. Sc. 18 (1947) 6; Henr., Mon. Dig. (1950) 424, in synon. — Type: *Bünnemeijer 4137* (BO, holo; L, U).

D. oblongo-ovata Ohwi, Bull. Tokyo Mus. Sc. 18 (1947) 7. — *D. preslii* Henr. var. *glabrata* Henr., Mon. Dig. (1950) 591. — Type: *Ohwi 12* (BO, holo).

D. pertenuis Buse var. *glabra auct., non* Ohwi: Ohwi, Bull. Tokyo Mus. Sc. 18 (1947) 7, *p.p.*; Monod de Froid. in Backer & Bakh., Fl. Java 3 (1968) 563, *p.p.*

D. eriolepis Henr., Mon. Dig. (1950) 819, fig., 875; S. T. Blake, Proc. Roy. Soc. Queensl. 81 (1969) 17, 18; Lazarides, Grasses C. Austr. (1970) 107, pl. 30 b. — Type: *Gulliver s.n.* (W, holo; BRI, K).

D. flexilis Henr., Mon. Dig. (1950) 258, fig., 879. — Type: *Hitchcock 24905* (L, holo; US, *n.v.*).

D. longiflora Pers. var. *elatior* Hack. *ex* Henr., Mon. Dig. (1950) 824, 881. — Type: *Wallich 8752 D* (W, holo; K, L).

D. speciosa Henr., Mon. Dig. (1950) 837, 879. — Type: *S. T. Blake 8383* (L, holo; BRI, K).

Caespitose annual or perennial, sometimes with a short rhizome, tufted and mat-forming with creeping, distinctly distichously leaved stolons, rooting at the nodes; flowering culms erect to ascending, up to 50 cm high. Usually without *cataphylls*, in some forms these well developed, pubescent. *Sheaths* usually glabrous, the basal sometimes pilose, rarely villous, very rarely pubescent all over. *Ligule* 0.75—1.5 mm long, truncate, erose. *Blades* ovate-lanceolate (especially on the runners) to linear (especially on the flowering culms), (0.75—)1—5.5(—11.5) cm by 2—5(—6) mm, usually glabrous all over, smooth, stiff to soft, patent (on the runners) to ascending. *Peduncles* up to 25(—45) cm long, glabrous to moderately pilose. *Racemes* 2 or 3, longest (1.5—)2.5—7.5(—10) cm long, digitate, common axis absent, very rarely shortly developed, up to 1 cm long, ascending to arcuate. *Rachis* winged, serrate. *Pedicels* usually terete and smooth, without a coronula under the spikelet, *abscission* discoid to cupuliform. *Spikelets* ternate, homo-

morphous, oblong, 1.3—1.7(—1.9) mm long, variously pubescent; hairs with verrucose walls (magn. × 400!), acute. *Lower glume* absent, sometimes a scarious collar up to 0.1 mm long. *Upper glume* as long as the spikelet, sometimes longer than the sterile lemma and the fertile floret, acute, nerves 3—5, apically anastomosing. *Sterile lemma* as long as to slightly shorter than the spikelet, acute, nerves (5—)7, inequidistant, apically anastomosing. *Fertile lemma* slightly shorter than the spikelet, yellowish to brownish in fruit, acute to acuminate. *Anthers* (0.5—)0.6—0.8 mm long, purple. *Stigma* purple.

Distribution. Tropical and subtropical regions of the Old World, throughout Malesia, introduced into the New World.

Ecology. Pioneering on humid sandy to rocky soil and rapidly covering it; open grasslands, open forests. Up to 1450 m in N. Sumatra.

Uses. Grown for rapidly covering disturbed places, but not well resistant against extremely dry or wet weather.

Chromosome number. 2n = 18 (Larsen, 1963, Gupta & Srivastava; 1969; Hsu 1971).

Vernacular names. Java: *gĕndjoran* (J). — Borneo: *bĕribi djawi* (Dajak). — Celebes: *rumput ranggut* (Minah.). — Moluccas: *sialesa* (Simalur). See also *D. violascens.*

Notes. For delimitation against *D. violascens*, see there.

Recent authors have tried to distinguish between *D. longiflora* and *D. propinqua*, e.g. Henrard (1950), Bor (1955), and S. T. Blake (1969). The characters used can be combined into the following key:

a. Annual. Sheaths glabrous or very sparsely pubescent, nodes glabrous, blades glabrous or sparsely pubescent. Peduncle glabrous. Spikelets usually less than 1.5 mm long. Upper glume 3-nerved above the middle, sometimes 5-nerved at base. Sterile lemma with glabrous interspaces . . . . . *D. longiflora*

a. Perennial. Sheaths densely, softly hirsute (') (but var. *glabrata* glabrous!), nodes bearded ('), blades pilose ('), uppermost sheaths glabrous. Peduncle with fine spreading hairs below the racemes. Spikelets at least 1.5 mm long. Upper glume 5-nerved to well above the middle. Sterile lemma pubescent all over . . . . *D. propinqua (D. preslii)*

A thorough study of the material showed the absence of any correlation between these characters. Those marked (') are absent or hardly present in the type.

Most plants attributed to these taxa are tufted with wide-creeping runners, rooting at the nodes and giving rise to small tufts there, flowering at the same time as the main tuft or not. Often only these secondary tufts are collected, whereby the base of the main tuft cannot be inspected to decide for annual or perennial. It is doubtful, anyway, if these plants can be regarded as annual, as the secondary tufts can be regarded as vegetative propagation. Some plants are obviously perennial, having distinct rhizomes, cataphylls, erect culms, and much longer blades; *D. eriolepis*, *D. friesii*, *D. malesiae*, and *D. speciosa* belong here. According to S. T. Blake no sharp boundaries can be drawn between these and the more typical ones, which agrees with my own observations.

The pubescence is very variable, although the plants are usually glabrous. The villous representatives have been described as *D. speciosa*. The pubescence of the peduncle did not show any correlation with other characters.

In both taxa plants identified by Henrard and S. T. Blake had spikelets varying from 1.3 to 1.9 mm in length. Similarly, one can encounter upper glumes with 3 and with 5 nerves in the same raceme. The outer nerves are often obscured by the marginal pubescence, but after soaking they can usually be detected easily with a magnification of about

× 25 from the inside. The same variability is encountered in the pubescence of the sterile lemma, which may have glabrous first and second interspaces and pubescent ones on the same plant. *D. eriolepis* has a very dense long-haired indument, much overtopping the scales and obscuring the venation entirely.

Another way to divide up the species is offered by the relative size of the second glume. It may be as long as to longer than the fertile lemma, which is then as long as to longer than the sterile one, or it may be as long as the sterile lemma, both being longer than the fertile one. In the first case the often dark apex of the fertile floret seems protruding from an abaxial view, in the latter it is entirely enclosed. But this distinction is not correlated with other differences.

A specimen from Hainan (*Lei* 18; B) showed vivipary. A lateral raceme was transformed into a hirsute leafy sprout. The plant was glabrous elsewhere.

Merrill (1918) referred *Paspalum fasciculatum* Llanos to this species. The original description is so vague that it may fit several species of *Digitaria* and some of other genera as well. It is certainly not Fluegge's plant (1810), which is a true *Paspalum*. Merrill's specimens (*Sp. Blanc.* 1022) are *D. violascens*.

A plant from Java was infested with the smut *Poecilosporium bogoriense* Rac. (*Bakhuizen f.* 1517; U).

26. Digitaria mollicoma (Kunth) Henr. — Fig. 14f.

D. mollicoma (Kunth) Henr., Blumea 1 (1934) 97; Mon. Dig. (1950) 462, fig., 877; Monod de Froid. in Backer & Bakh., Fl. Java 3 (1968) 562. — *Paspalum molle* Presl, Rel. Haenk. 1 (1830) 213; Merr., Philip. J. Sc. 10 (1915) Bot. 188; En. Philip. Fl. Pl. 1 (1923) 55; Philip. J. Sc. 35 (1928) 3; *non* Poir., 1804. — *Paspalum mollicomum* Kunth, Enum. Pl. 1 (1833) 47; Rév. Gram., Suppl. (1834) 585; Miq., Fl. Ind. Bat. 3 (1857) 433. — *Syntherisma molle* Scribn., 10th Ann. Rep. Missouri Bot. Gard. (1899) 50. — Type: *Haenke s.n.* (PR, holo, no. 197877-B; B, BM; MO, *n.v.*; W).

Syntherisma hayatae Honda, Bot. Mag. Tokyo 38 (1924) 128. — *Panicum hayatae* Makino & Nemoto, Fl. Jap. (1925) 1472; *non* Camus (1923). — *D. hayatae* Honda [J. Fac. Sc. Univ. Tokyo, Sec. 3, Bot. 3 (1930) 291, in synon.] *ex* Ohwi, Acta Phytotax. & Geobot. 11 (1942) 30; Henr., Mon. Dig. (1950) 311, 986; Hsu, Taiwania 16 (1971) 279; Hatusima, Fl. Ryukyus (1971) 691. — Type: *Hayata s.n.*, Ao 1919 (TI, holo, *n.v.*).

Syntherisma hayatae Honda var. *magna* Honda, Bot. Mag. Tokyo 38 (1924) 128. — *Panicum hayatae* Makino & Nemoto var. *magnum* Makino & Nemoto, Fl. Jap. (1925) 1472. — *Syntherisma magna* Honda, J. Fac. Sc. Univ. Tokyo, Sec. 3, Bot. 3 (1930) 294. — *D. magna* Tuyama, J. Jap. Bot. 18 (1942) 13; Henr., Mon. Dig. (1950) 419, in synon.; Hsu, Taiwania 16 (1971) 280. — Type: *Hayata s.n.*, Ao 1911 (TI, holo, *n.v.*).

D. elevatovenulosa Ohwi, Bull. Tokyo Sc. Mus. 18 (1947) 6. — Type: *Ohwi 6* (BO, holo; SING).

D. elevatovenulosa Ohwi var. *glabra* Ohwi, Bull. Tokyo Sc. Mus. 18 (1947) 6. — *D. mollicoma* Henr. var. *glabra* Henr., Mon. Dig. (1950) 819, 877; Monod de Froid. in Backer & Bakh., Fl. Java 3 (1968) 562. — Type: *Backer 7318* (BO, holo).

Perennial, usually mat-forming with stolons, rooting at the nodes; flowering culms geniculately ascending to erect, up to 50 cm high. *Cataphylls* absent. *Sheaths* glabrous to moderately appressed pilose. *Ligule* 1—2 mm long, truncate, erose. *Blades* linear-lanceolate to linear, 1.25—6(—12.5) cm by 2—5(—7) mm, smooth, glabrous to moderately appressed pilose, patent and rather short on the runners, longer, softer, and ascending on the flowering culms. *Peduncles* up to 30 cm long, glabrous or sparsely pilose under the racemes. *Racemes* 2 or 3(—5), longest (2.5—)3—9(—12.5) cm long, digitate, very rarely in a corymbose panicle along a developed common axis, up to 2 cm long, ascending to arcuately divergent. *Rachis* winged, serrate. *Pedicels* usually terete and smooth, without a coronula under the spikelet, *abscission* discoid to cupuliform. *Spikelets* ternate, homomorphous, lanceolate, (1.7—)1.8—2.3(—2.5) mm long, variously pubescent; hairs with verrucose to smooth walls (magn. × 400!; see note), acute. *Lower glume* absent, sometimes

a scarious collar up to 0.25 mm long. *Upper glume* 1.6—2.25(—2.5) mm long, 0.8—1 times as long as the spikelet, nerves 3—5, apically anastomosing. *Sterile lemma* ± as long as the spikelet, nerves 7, equidistant, rather elevated, apically anastomosing. *Fertile floret* usually as long as the sterile lemma, sometimes slightly longer, the upper glume then longest, yellowish to pale brownish in fruit. *Anthers* 0.5—0.9 mm long, pale pink to white (*v.v.*). *Stigma* violet to purple (*v.v.*).

Distribution. Taiwan, Malesia: Malaya (P. Penang, Selangor; Singapore), Sumatra, Java, Timor, Borneo, Celebes, Luzon, Ternate, New Guinea (Waigeo), a few specimens from each island.

Ecology. Locally common on open, humid, sandy to rocky soil, roadsides, in Taiwan also along the seashore, lawns. Up to 1200 m alt.

Chromosome number. 2n = 36 (Hsu, 1971).

Vernacular names. Java: *grintingan, lĕmon* (J); *djukut piit* (S). — Borneo: *rumput bĕbatungan.*

Notes. Very similar to *D. longiflora* and easily confused with it. It is usually collected by accident, as about 40% of all collections seen were mixed with other Digitarias!

Two types may be discerned, which do not correspond with Ohwi's and Henrard's varieties which are of little value:

a. Spikelets 1.7—2.1 mm long. Upper glume 0.9—1 times as long as the spikelet. Hairs with verrucose walls.

a. Spikelets 1.9—2.5 mm long. Upper glume 0.8—0.9 times as long as the spikelet. Hairs with smooth or only very slightly verrucose walls.

These forms occur scattered over the whole area. Curious is the fact that smooth hairs may be encountered, although the plant clearly belongs to Henrard's section '*Verrucipilae*'. A similar case of various types of hairs within the same species is offered by *D. ischaemum*, but not by *D. violascens*, as suggested by Henrard (1950, p. 791).

For *D. hayatae* and *D. magna* no description of the amount of spikelets per grouplet, nor of the type of hairs was given, which caused Henrard to place the species in '*Sanguinales*' Material received from Dr. Hsu under *D. magna* fitted the descriptions given and proved to belong to the current species. The leaves on the runners fit the description of *D. hayatae*, those of the erect culms those of *D. magna.*

Closely related is *D. petelotii* Henr. from Cambodia, known only from the type (*Pételot* 263, P, holo; L), which differs from the long-spikeled form of *D. mollicoma* in particular by the ciliolate shorter ligule (0.5—0.75 mm) and the even larger spikelets (2.5—2.75 mm) with very verrucose hairs. Henrard mistook the persistent pilose lower sheaths for internodes, which are glabrous.

27. Digitaria philippinensis Henr. — Fig. 14g.

D. philippinensis Henr., Mon. Dig. (1950) 563, fig., 874. — Type: *Ramos BS 42890* (W, holo; L, P, SING).

Perennial (?), culms geniculately ascending, up to *ca.* 70 cm high, glabrous, smooth. Base not seen. *Ligule* up to 2 mm long, truncate, erose. *Blades* linear, (3—)8.5—14 cm by 4—5 mm, glabrous but for some hairs in the throat, smooth, ascending, soft. *Peduncles* up to 45 cm long, sparsely pilose under the racemes. *Racemes* 3 or 4, longest 7.5—10 cm long, digitate or with an up to 0.5 cm long common axis. *Rachis* winged, serrate. *Pedicels* terete to ± triangular, minutely spiculate, without a coronula under the spikelet, *abscission* discoid to cupuliform. *Spikelets* ternate, homomorphous, lanceolate, 1.85—2 mm long, acuminate, sparsely pubescent; hairs with smooth walls, acute. *Lower glume* absent or a

minute scarious collar up to 0.15 mm long. *Upper glume* 1.35—1.5 mm long, 0.7—0.75 times as long as the spikelet, acute, nerves 3, apically anastomosing. *Sterile lemma* 1.6—1.8 mm long, 0.85—0.9 times as long as the spikelet, acute, nerves 7, ± equidistant, apically anastomosing. *Fertile lemma* as long as the spikelet, protruding, acute, yellowish brown in fruit. *Anthers* 0.6 mm long, purple. *Stigma* purple.

Distribution. Philippines (Bohol). Only known from the type.

Ecology. Not recorded.

Notes. Henrard places this species in his section '*Verrucipilae*' but the hairs have smooth walls. This does not rule out the possibility that it is correctly placed, as is demonstrated in the notes under *D. mollicoma*.

Since this species is known from the type only I have tried to match it with other, especially American, species, assuming it was introduced, but the combination of characters offered makes this not possible.

SPECIES DUBIAE VEL EXCLUDENDAE

1. **Digitaria chinensis** Hornem., Suppl. Hort. Bot. Hafn. (1819) 8; Christophersen, Bull. Bish. Mus. 128 (1935) 8; Henr., Mon. Dig. (1950) 123, fig. — Type: *Hb. Schumacher s.n.* (C, holo, *n.v.*).

This name has variously been identified with *D. radicosa* (Christophersen, sub *D. timorensis*) and *D. ciliaris* (Henrard, sub *D. adscendens*). I cannot agree with either opinion, as will be clear from the following table:

character	*D. ciliaris*	*D. chinensis*	*D. radicosa*
terminal inflorescences	1	2	1
length spicules on rachis	0.05—0.1 mm	absent	absent to 0.03 mm
length spikelets	2.5 —3.5 mm	2.5—2.9 mm	2.25—3.25 mm
lower glume, length	0.25—0.5 mm	0.45—0.6 mm	0.1—0.25 mm
lower glume, venation	0	1	0
upper glume, venation	3	3—5	1—3
upper glume / spikelet	0.5—0.8 ×	0.55—0.7 ×	0.25—0.6 ×

Most curious is the presence of the two terminal inflorescences, a character which can otherwise be used to distinguish the Malesian species of *Axonopus* from *Digitaria* at a glance. Two peduncles arising immediately from the uppermost leaf-sheath are not found elsewhere in the latter genus, where the inflorescence terminates the culm. I am unable to match this with any species of *Digitaria*. It is quite different from *D. horizontalis*, with which Mez (in sched.) identified it.

2. [*Digitaria cimicina* Thunb., Fl. Java (1825) 3, *nomen*, presumably based on *Milium cimicinum* Linné. — Type: *Hb. Thunberg* 1995, 1996, (UPS, holo, *n.v.*; IDC 1036).] = **Alloteropsis cimicina** (Linné) Stapf.

3. **Digitaria compacta** (Roth *ex* R. & S.) Veldk., *comb. nov.*

Paspalum compactum Roth *ex* R. & S., Syst. Veg. 2 (1817) 316; Roth, Nov. Pl. Sp. (1821) 36; Schult. *f.*, Mant. 2 (1824) 176; *non auct. post.* — Type: *Heyne s.n.* (B, holo, in Hb. Roth; BM, in Hb. Roxb.).
Panicum bifasciculatum Trin., Diss. Alt. (1826) 76. — *D. fascicularis* Link, Hort. Bot. Berol. 1 (1827) 223. — *Panicum schraderi* Kunth, Rév. Gram. 1 (1829) 32; Enum. Pl. 1 (1833) 80. — *Reimaria fascicularis* Link, Hort. Berol. 2 (1833) 203. — *Panicum fasciculare* Trin., Mém. Ac. Sc. St Pétersb. VI, Sect. Nat. 3 (1834) 199, *nom. superfl.* — *D. bifasciculata* Henr., Meded. Rijksherb. Leiden 61 (1930) 10; Mon. Dig. (1950) 74, 982. — Type: *Schrader s.n.* (B, holo, in Hb. Link; LE, in Hb. Trin., *n.v.*).

Paspalum sanguinale Lamk. var. *commutatum auct., non* Hook. *f.*: Hook. *f.*, Fl. Br. Ind. 7 (1896) 15, *p.p.* — *D. cruciata* A. Camus var. *esculenta* Bor, Webbia 11 (1955) 353; Grasses (1960) 300. — Type: *Hook. f.* & *T. Thomson s.n.* (K, holo).

Panicum corymbosum Roxb. [Hort. Beng. (1814) 7, *nomen*] Fl. Ind. 1 (1820) 295; ed. 2 (Carey), 1 (1832) 292; Trin., Diss. Alt. (1826) 77. — *Axonopus ? corymbosus* Schult. *f.*, Mant. 2 (1824) 177. — *Paspalum corymbosum* Kunth, Rév. Gram. 1 (1829) 25; Enum. Pl. 1 (1833) 48. — *Panicum sanguinale* Linné var. *corymbosum* O. Ktze., Rev. Gen. Pl. 2 (1891) 785. — *D. corymbosa* Merr., En. Philip. Fl. Pl. 1 (1923) 53, *pro comb.*; Henr., Mon. Dig. (1950) 149, excl. fig. — *Syntherisma corymbosa* Hosokawa, Trans. Nat. Hist. Soc. Formosa 24 (1934) 199, *pro comb.* — *D. corymbosa* Merr. ssp. *roxburghiana* Henr., Mon. Dig. (1950) 943, *nom. ill.* — Type: *Roxburgh s.n.* (BM, holo; K; *nec in* Hb. Trin.) (Icon. ined. 800, sub *Panicum imperfectum* Roxb.).

Paspalum sanguinale auct. non Lamk.: Krishmaswamy, Ind. J. Genet. & Pl. Breed. 11 (1951) 73.

Because Henrard could not locate Roxburgh's specimens of *Panicum corymbosum*, he assumed that the specimen from Roxburgh's herbarium in Trinius' possession and referred to by the latter in 1826 was a duplicate. He therefore used the name for specimens which I have here called *D. setigera*.

However, Roxburgh's specimens of *Panicum corymbosum* are in the British Museum and in Kew. The specimen in the British Museum is labelled '*Panicum imperfectum* Roxb. ic. 800' to which drawing Henrard also referred and which is obviously the same plant. In the Roxburgh manuscript this name is changed to *Panicum corymbosum*. The specimen in Kew is mislabelled *Panicum filiforme* Roxb. and does indeed not agree with the description of that species, as was also remarked by Henrard. Roxburgh's plants of *P. filiforme* belong to *D. bicornis*.

Specimens belonging to the same species as *P. corymbosum* were collected also by Heyne and labelled *Panicum imperfectum* Roxb. by him. One specimen is in the British Museum, the other was sent to Roth and is now at Berlin. Roth's specimen is the type of his *Paspalum compactum* and in the original publication reference is made to Roxburgh's *P. imperfectum*. It is therefore rather surprising that Roth's name is currently applied to an Indian *Paspalum* which does not fit Roth's extensive description (1821) at all, nor resembles Roxburgh's drawing. That species must therefore now be called **Paspalum canarae** (Steud.) Veldk., *comb. nov.*, based on *Panicum canarae* Steud. (Syn. 1, 1853, 58), and the var. *fimbriatum* Bor (Grasses, 1960, 336) **P. canarae** (Steud.) Veldk. var. **fimbriatum** (Bor) Veldk., *comb. nov.*

Henrard assumed that his species was extinct, but according to Bor it is still cultivated in the Khasi Hills. Furthermore, Krishmaswamy mentions the cultivation of *Paspalum sanguinale* in Vizagapatam (N. Madras) which is the same area as the Circar Mts. mentioned by Roxburgh for *Panicum corymbosum*.

In the key this species keys out with *D. setigera*, from which it can immediately be distinguished by the serrate nerves of the sterile lemma. From *D. cruciata* it differs by the absence of the lower glume, the smaller upper glume, and the hardly acuminate and not or slightly protruding fertile floret.

I here take the opportunity to point out the presence of a pectinate form of the latter species, seen from the Khasi Hills, India, and Cha-Pa, North Vietnam, locally occurring among the glabrous to subglabrous type-form:

D. cruciata (Nees *ex* Steud.) A. Camus var. **pectinata** Veldk., *var. nov.*: lemmata sterilia setas rigidas patentesque basibus bulbiformibus in interspatiis secundis et interdum per marginem glumarum inferiorium superiorumque gerentes. — Typus: *Griffith KD* 6574 (W, holo).

4. *Digitaria filiformis auct., non* Koel.: Thunb., Fl. Jav. (1825) 3; Henr., Mon. Dig. (1950) 230. — *Panicum filiforme auct., non* Linné: K. Sch., Notizbl. Bot. Gart. Berlin-Dahlem 1 (1896) 208. — *Paspalum filiforme auct., non* Sw.

The specimen in the Thunberg Herbarium (UPS, no 1999, *n.v.*; IDC 1036) cannot be identified with certainty from the microfiche. It may be either *D. bicornis*, *D. ciliaris*, *D. nuda*, *D. radicosa*, or *D. setigera*.

The specimens referred to by K. Schumann have been destroyed with the Berlin herbarium. As stated under the preceding species, Roxburgh's use of the name refers to *D. bicornis*.

Paspalum filiforme has been misapplied for *D. violascens* (q.v.).

5. *Digitaria glumaepatula* (Steud.) Miq., Fl. Ind. Bat. 3 (1857) 439; Henr., Mon. Dig. (1950) 826, in synon. — *Panicum glumaepatulum* Steud., Syn. 1 (1853) 41. — Type: *Cuming* 550 (P, holo; L).
= **Cynodon dactylon** (Linné) Pers.

6. **Digitaria orbata** Hughes, Kew Bull. 1923 (1923) 312; Henr., Mon. Dig. (1950) 508, fig. 895; Vickery, Contr. N. S. W. Nat. Herb., Fl. Ser. 19, 1 (1961) 99. — Type: *Bowman s.n.* (BM, holo).

A few culms without bases are mounted on a sheet in the BM, purportedly collected in Timor by Wallace. The species is so far only known from Queensland and New South Wales. Although Timor can still be expected to harbour many a grass from Australia still undetected, I assume this specimen to have been mislabelled.

7. **Digitaria parviflora** (R. Br.) Hughes, Kew Bull. 1923 (1923) 311; Henr., Mon. Dig. (1950) 522, fig., 897; Vickery, Contr. N.S.W. Nat. Herb. 1 (1951) 323; ibid., Fl. Ser. 19, 1 (1961) 96. — *Panicum parviflorum* R. Br., Prod. (1810) 192; Benth., Fl. Austr. 7 (1876) 471; K. Sch. & Laut., Fl. Deut. Schutzgeb. Südsee (1900) 177; Bailey, Queensl. Fl. 6 (1902) 1821. — *Paspalum parviflorum* R. Br. *ex* K. Sch. & Hollr., Fl. Kaiser Wilhelmsland (1889) 21, *pro comb.*; Reeder, J. Arn. Arb. 29 (1948) 383; *non* Fluegge, 1810. — *Syntherisma parviflora* Newbold, Torreya 24 (1924) 9. — Type: *R. Brown* 6117 (BM, holo; K).

Panicum striatum R. Br., Prod. (1810) 192; *non* Lamk., 1791. — *Panicum striatulum* Schult. *f.*, Mant. 2 (Jan.—Apr. 1824) 252. — *Panicum australe* Spreng., Syst. Veg. 1 (end 1824) 309. — *D. sanguinalis* Scop. var. *australis* Merr., Fl. Manila (1912) 78; En. Philip. Fl. Pl. 1 (1925) 55; *pro comb.*, *non* Ledeb., 1853. — *Panicum steudelianum* Domin var. *striatum* Domin, Bibl. Bot. 85 (1915) 296. — *D. striata* Hughes, Kew Bull. 1923 (1923) 311, *nom. illeg.*; Henr., Mon. Dig. (1950) 713, fig., in synon. — Type: *R. Brown* 6116 (BM, holo; K).

Paspalus patulus Hornem., Hort. Bot. Hafn. 1 (1813) 78. — *D. patula* Henr., Blumea 1 (1934) 101; Mon. Dig. (1950) 528, fig., 895. — Type: *Hornemann s.n.* (S, holo, *n.v.*; B).

This species has sofar only been recorded from Australia. I have not seen the specimen cited by K. Schumann et al. (1889, 1900), but a misidentification for a plant belonging to *D. violascens* seems plausible (Reeder, 1948). Merrill's plants belong to *D. radicosa* (q.v.).

8. *Digitaria urochloides* Buse in Miq., Pl. Jungh. (1854) 382; Miq., Fl. Ind. Bat. 3 (1857) 439; Henr., Mon. Dig. (1950) 769, in synon. — *Panicum urochloides* Boerl., Ann. Jard. Bot. Btzg. 8 (1890) 62; Koord., Exk. Fl. Java 1 (1911) 128. — Type: *Junghuhn s.n.* (L, holo, no. 908. 92—262).

D. divulsa Mez, Beibl. Bot. Jahrb. 125 (1921) 6; Henr., Mon. Dig. (1950) 202. — Type: *Meebold* 9427 (B, holo).
= **Ottochloa nodosa** (Kunth) Dandy.

9. *Panicum stipatum* Presl, Rel. Haenk. 1 (1830) 297; Naves in Naves & F.-Vill., Nov. App. (1882) 311; Scribn., 10th Ann. Rep. Missouri Bot. Gard. (1899) 48, pl. 22, in synon.; Merr., Philip. J. Sc. 1 (1906) Suppl. 348; En. Philip. Fl. Pl. 1 (1923) 55; Henr., Mon. Dig. (1950) 329, in synon. — Type: *Haenke s.n.* (PR, holo; MO, *n.v.*; W).

Presl recorded this species for Mexico and Luzon. Nearly all subsequent authors have considered it as a synonym of *Digitaria horizontalis*. Having studied the two sheets present in PR it may be observed, that indeed one is labelled 'Sorsogon' in Haenke's handwriting. The sheets, however, consist of a mixture of three species, viz. the American *D. horizontalis* and the Malesian *D. radicosa* and *D. setigera*. The sheet in W is *D. radicosa*, while the sheet in MO (*n.v.*) may well be *D. horizontalis*, as stated by Scribner (as *D. setosa*, a synonym).

In order to keep the name in its most accepted synonymy I hereby appoint the left-hand specimen on the sheet labelled 'Sorsogon' as the lectotype.

Mislabelling has been and will be easily achieved in the Haenke material in Prague, as most of the specimens, some types excepted, are unmounted in loose folders, several specimens to a folder with loose labels fluttering about.

=**D. horizontalis** Willd.

10. *Paspalum fasciculatum* Llanos, Fragm. Pl. Filip. (1851) 23; in Blanco, Fl. Filip. ed. 3, 4 (1880) 16; *non* Fluegge, 1810; *nec* H.B.K., 1829.

See sub 25. *Digitaria longiflora*, p. 69.

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New names are in bold type, *synonyms* in italics. A bold page number refers to a **description**, a page number with an asterisk to a figure.